AP-1

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

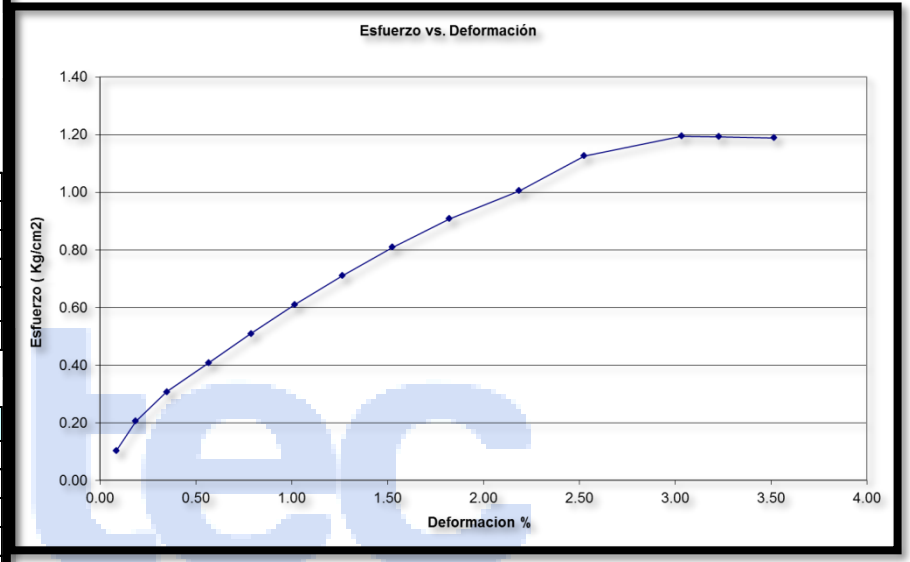
LOCALIZACION: CALLE 103 CARRERA 8 BIS — APIQUE /PERF: 1

PERFORACIÓN: 1 — APIQUE 1 — Nº LAB: 1

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 445.2 | gr. |
| P. Unitario | 1.90 | gr/cm3 |
| Alt. Final | 11.39 | cm, |

| | | |
|---|---|---|
| γd max | 1.637 | gr/cm3 |
| Gs: | 1600 | |
| W% | 16 | % |
| Ang. friccion | 31 | º |
| qumax | 1.13 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.22 | 0.00186 | 0.99814 | 19.91 | 40 | 4.082 | 0.21 | 0.19 |
| 0.41 | 0.00347 | 0.99653 | 19.94 | 60 | 6.122 | 0.31 | 0.35 |
| 0.67 | 0.00568 | 0.99432 | 19.98 | 80 | 8.163 | 0.41 | 0.57 |
| 0.93 | 0.00788 | 0.99212 | 20.03 | 100 | 10.204 | 0.51 | 0.79 |
| 1.2 | 0.01017 | 0.98983 | 20.08 | 120 | 12.245 | 0.61 | 1.02 |
| 1.49 | 0.01263 | 0.98737 | 20.13 | 140 | 14.286 | 0.71 | 1.26 |
| 1.8 | 0.01525 | 0.98475 | 20.18 | 160 | 16.327 | 0.81 | 1.53 |
| 2.15 | 0.01822 | 0.98178 | 20.24 | 180 | 18.367 | 0.91 | 1.82 |
| 2.58 | 0.02186 | 0.97814 | 20.32 | 200 | 20.408 | 1.00 | 2.19 |
| 2.98 | 0.02525 | 0.97475 | 20.39 | 225 | 22.959 | 1.13 | 2.53 |
| 3.58 | 0.03034 | 0.96966 | 20.49 | 240 | 24.490 | 1.20 | 3.03 |
| 3.81 | 0.03229 | 0.96771 | 20.53 | 240 | 24.490 | 1.19 | 3.23 |
| 4.15 | 0.03517 | 0.96483 | 20.60 | 240 | 24.490 | 1.19 | 3.52 |



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AP-2

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

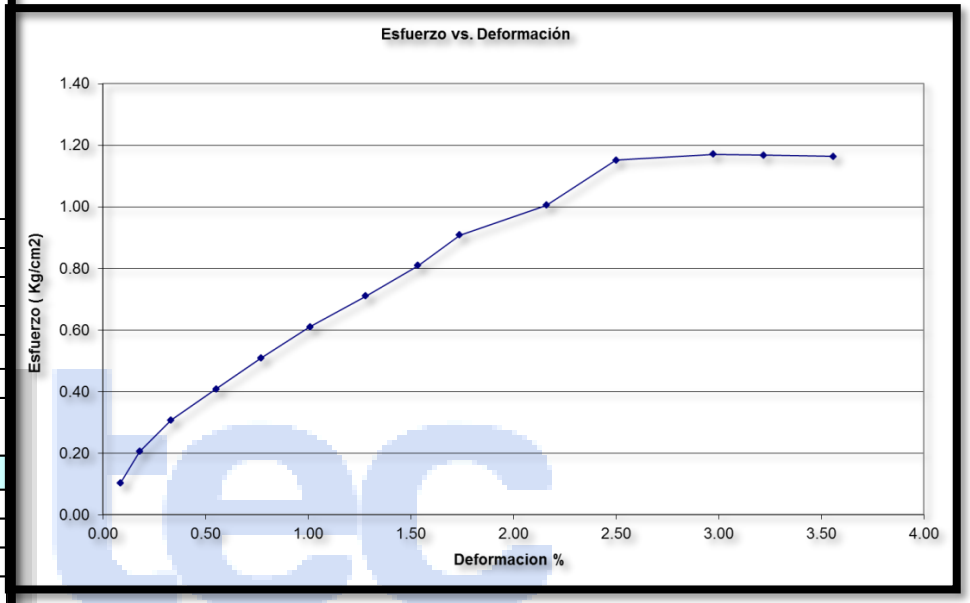
LOCALIZACION: CALLE 103 ENTRE CARRERAS 8B Y CRA 9 — APIQUE /PERF: 2

PERFORACIÓN: 2 — APIQUE Nº 2 — Nº LAB: 2

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 449.3 | gr. |
| P. Unitario | 1.92 | gr/cm3 |
| Alt. Final | 11.38 | cm, |

| | | |
|---|---|---|
| γd max | 1.638 | gr/cm3 |
| Gs: | 1621 | |
| W% | 17 | % |
| Ang. friccion | 31 | º |
| qumax | 1.15 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.21 | 0.00178 | 0.99822 | 19.91 | 40 | 4.082 | 0.21 | 0.18 |
| 0.39 | 0.00331 | 0.99669 | 19.94 | 60 | 6.122 | 0.31 | 0.33 |
| 0.65 | 0.00551 | 0.99449 | 19.98 | 80 | 8.163 | 0.41 | 0.55 |
| 0.91 | 0.00771 | 0.99229 | 20.03 | 100 | 10.204 | 0.51 | 0.77 |
| 1.19 | 0.01008 | 0.98992 | 20.07 | 120 | 12.245 | 0.61 | 1.01 |
| 1.51 | 0.01280 | 0.98720 | 20.13 | 140 | 14.286 | 0.71 | 1.28 |
| 1.81 | 0.01534 | 0.98466 | 20.18 | 160 | 16.327 | 0.81 | 1.53 |
| 2.05 | 0.01737 | 0.98263 | 20.22 | 180 | 18.367 | 0.91 | 1.74 |
| 2.55 | 0.02161 | 0.97839 | 20.31 | 200 | 20.408 | 1.00 | 2.16 |
| 2.95 | 0.02500 | 0.97500 | 20.38 | 230 | 23.469 | 1.15 | 2.50 |
| 3.51 | 0.02975 | 0.97025 | 20.48 | 235 | 23.980 | 1.17 | 2.97 |
| 3.8 | 0.03220 | 0.96780 | 20.53 | 235 | 23.980 | 1.17 | 3.22 |
| 4.2 | 0.03559 | 0.96441 | 20.60 | 235 | 23.980 | 1.16 | 3.56 |



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| AP-3 | Consoiltec s.a.s Ingenieros consultores y constructores |
|---|---|

**ENSAYO DE COMPRESIÓN SIMPLE**

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

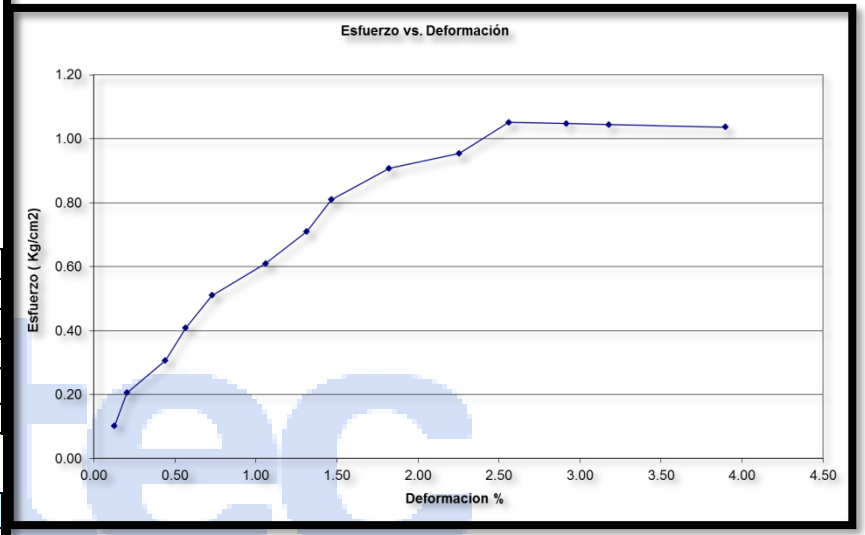
LOCALIZACION: CALLE 103 ENTRE CARRERAS 10 Y CRA 11 — APIQUE /PERF: 3

PERFORACIÓN: 3 — APIQUE Nº 3 — Nº LAB: 3

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 451.26 | gr. |
| P. Unitario | 1.92 | gr/cm3 |
| Alt. Final | 11.34 | cm, |

| | | |
|---|---|---|
| γd max | 1.673 | gr/cm3 |
| Gs: | 1614 | |
| W% | 15 | % |
| Ang. friccion | 29.5 | º |
| qumax | 1.05 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.15 | 0.00127 | 0.99873 | 19.90 | 20 | 2.041 | 0.10 | 0.13 |
| 0.24 | 0.00203 | 0.99797 | 19.91 | 40 | 4.082 | 0.20 | 0.20 |
| 0.52 | 0.00441 | 0.99559 | 19.96 | 60 | 6.122 | 0.31 | 0.44 |
| 0.67 | 0.00568 | 0.99432 | 19.98 | 80 | 8.163 | 0.41 | 0.57 |
| 0.86 | 0.00729 | 0.99271 | 20.02 | 100 | 10.204 | 0.51 | 0.73 |
| 1.25 | 0.01059 | 0.98941 | 20.08 | 120 | 12.245 | 0.61 | 1.06 |
| 1.55 | 0.01314 | 0.98686 | 20.14 | 140 | 14.286 | 0.71 | 1.31 |
| 1.73 | 0.01466 | 0.98534 | 20.17 | 160 | 16.327 | 0.81 | 1.47 |
| 2.15 | 0.01822 | 0.98178 | 20.24 | 180 | 18.367 | 0.91 | 1.82 |
| 2.66 | 0.02254 | 0.97746 | 20.33 | 190 | 19.388 | 0.95 | 2.25 |
| 3.02 | 0.02559 | 0.97441 | 20.39 | 210 | 21.429 | 1.05 | 2.56 |
| 3.44 | 0.02915 | 0.97085 | 20.47 | 210 | 21.429 | 1.05 | 2.92 |
| 3.75 | 0.03178 | 0.96822 | 20.52 | 210 | 21.429 | 1.04 | 3.18 |
| 4.6 | 0.03898 | 0.96102 | 20.68 | 210 | 21.429 | 1.04 | 3.90 |



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| AP-4 | Consoiltec s.a.s Ingenieros consultores y constructores |
|---|---|

**ENSAYO DE COMPRESIÓN SIMPLE**

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

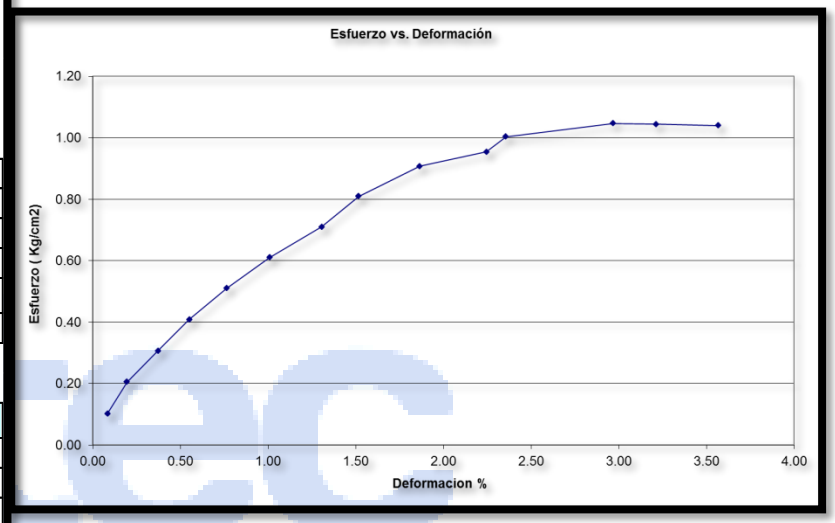
LOCALIZACION: CALLE 103 CARRERA 12 JUNTO AL CAÑO — APIQUE /PERF: 4

PERFORACIÓN: 4 — APIQUE 4 — Nº LAB: 4

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 451.26 | gr. |
| P. Unitario | 1.92 | gr/cm3 |
| Alt. Final | 11.38 | cm, |

| | | |
|---|---|---|
| γd max | 1.688 | gr/cm3 |
| Gs: | 1599 | |
| W% | 14 | % |
| Ang. friccion | 31 | º |
| qumax | 1.00 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.23 | 0.00195 | 0.99805 | 19.91 | 40 | 4.082 | 0.21 | 0.19 |
| 0.44 | 0.00373 | 0.99627 | 19.95 | 60 | 6.122 | 0.31 | 0.37 |
| 0.65 | 0.00551 | 0.99449 | 19.98 | 80 | 8.163 | 0.41 | 0.55 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 100 | 10.204 | 0.51 | 0.76 |
| 1.19 | 0.01008 | 0.98992 | 20.07 | 120 | 12.245 | 0.61 | 1.01 |
| 1.54 | 0.01305 | 0.98695 | 20.13 | 140 | 14.286 | 0.71 | 1.31 |
| 1.79 | 0.01517 | 0.98483 | 20.18 | 160 | 16.327 | 0.81 | 1.52 |
| 2.2 | 0.01864 | 0.98136 | 20.25 | 180 | 18.367 | 0.91 | 1.86 |
| 2.65 | 0.02246 | 0.97754 | 20.33 | 190 | 19.388 | 0.95 | 2.25 |
| 2.78 | 0.02356 | 0.97644 | 20.35 | 200 | 20.408 | 1.00 | 2.36 |
| 3.5 | 0.02966 | 0.97034 | 20.48 | 210 | 21.429 | 1.05 | 2.97 |
| 3.79 | 0.03212 | 0.96788 | 20.53 | 210 | 21.429 | 1.04 | 3.21 |
| 4.21 | 0.03568 | 0.96432 | 20.61 | 210 | 21.429 | 1.04 | 3.57 |



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| AP-5 | Consoiltec s.a.s Ingenieros consultores y constructores |
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**ENSAYO DE COMPRESIÓN SIMPLE**

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

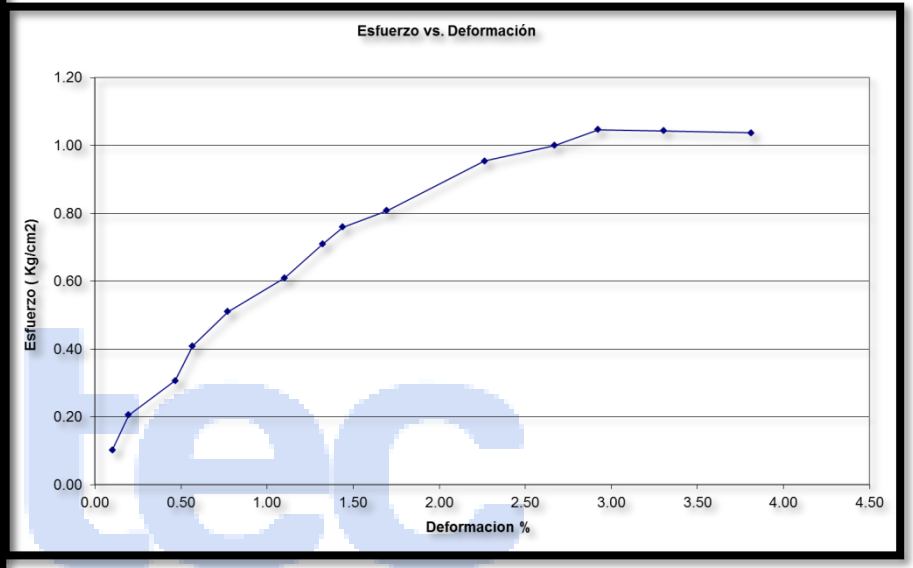
LOCALIZACION: CALLE 103 ENTRE CARRERAS 12 Y CRA 13 — APIQUE /PERF: 5

PERFORACIÓN: 3 — APIQUE Nº 5 — Nº LAB: 5

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 462.15 | gr. |
| P. Unitario | 1.97 | gr/cm3 |
| Alt. Final | 11.35 | cm, |

| | | |
|---|---|---|
| γd max | 1.685 | gr/cm3 |
| Gs: | 1589 | |
| W% | 17 | % |
| Ang. friccion | 29.5 | º |
| qumax | 1.00 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.12 | 0.00102 | 0.99898 | 19.89 | 20 | 2.041 | 0.10 | 0.10 |
| 0.23 | 0.00195 | 0.99805 | 19.91 | 40 | 4.082 | 0.21 | 0.19 |
| 0.55 | 0.00466 | 0.99534 | 19.96 | 60 | 6.122 | 0.31 | 0.47 |
| 0.67 | 0.00568 | 0.99432 | 19.98 | 80 | 8.163 | 0.41 | 0.57 |
| 0.91 | 0.00771 | 0.99229 | 20.03 | 100 | 10.204 | 0.51 | 0.77 |
| 1.3 | 0.01102 | 0.98898 | 20.09 | 120 | 12.245 | 0.61 | 1.10 |
| 1.56 | 0.01322 | 0.98678 | 20.14 | 140 | 14.286 | 0.71 | 1.32 |
| 1.7 | 0.01441 | 0.98559 | 20.16 | 150 | 15.306 | 0.76 | 1.44 |
| 2 | 0.01695 | 0.98305 | 20.21 | 160 | 16.327 | 0.81 | 1.69 |
| 2.67 | 0.02263 | 0.97737 | 20.33 | 190 | 19.388 | 0.95 | 2.26 |
| 3.15 | 0.02669 | 0.97331 | 20.42 | 200 | 20.408 | 1.00 | 2.67 |
| 3.45 | 0.02924 | 0.97076 | 20.47 | 210 | 21.429 | 1.05 | 2.92 |
| 3.9 | 0.03305 | 0.96695 | 20.55 | 210 | 21.429 | 1.04 | 3.31 |
| 4.5 | 0.03814 | 0.96186 | 20.66 | 210 | 21.429 | 1.04 | 3.81 |



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# AP-6

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

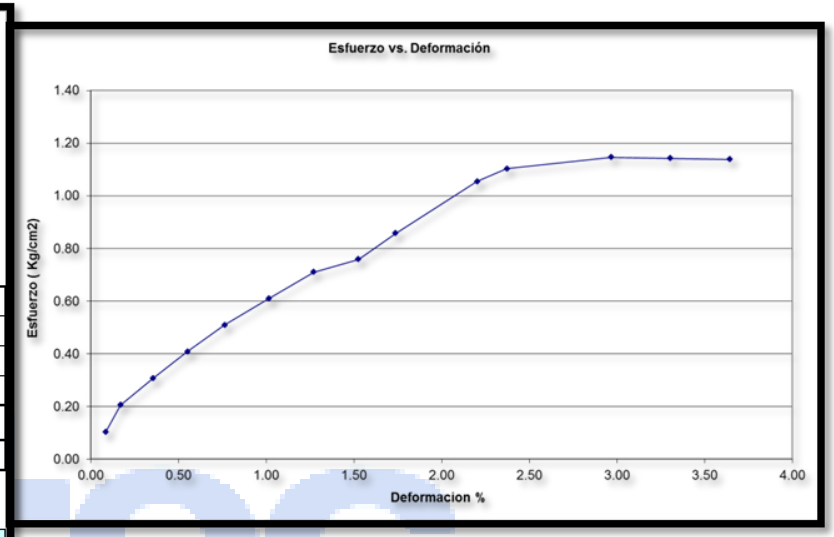
LOCALIZACION CALLE 103 ENTRE CARRERAS 13 Y 14 HACIA LA CRA 14 — APIQUE /PERF: 6

PERFORACIÓN: 6 — APIQUE Nº 6 — Nº LAB: 6

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 419.56 | gr. |
| P. Unitario | 1.79 | gr/cm3 |
| Alt. Final | 11.37 | cm, |

| | | |
|---|---|---|
| γd max | 1.479 | gr/cm3 |
| Gs: | 1578 | |
| W% | 21 | % |
| Ang. friccion | 28.56 | º |
| qumax | 1.10 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.42 | 0.00356 | 0.99644 | 19.94 | 60 | 6.122 | 0.31 | 0.36 |
| 0.65 | 0.00551 | 0.99449 | 19.98 | 80 | 8.163 | 0.41 | 0.55 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 100 | 10.204 | 0.51 | 0.76 |
| 1.2 | 0.01017 | 0.98983 | 20.08 | 120 | 12.245 | 0.61 | 1.02 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 140 | 14.286 | 0.71 | 1.27 |
| 1.8 | 0.01525 | 0.98475 | 20.18 | 150 | 15.306 | 0.76 | 1.53 |
| 2.05 | 0.01737 | 0.98263 | 20.22 | 170 | 17.347 | 0.86 | 1.74 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 210 | 21.429 | 1.05 | 2.20 |
| 2.8 | 0.02373 | 0.97627 | 20.35 | 220 | 22.449 | 1.10 | 2.37 |
| 3.5 | 0.02966 | 0.97034 | 20.48 | 230 | 23.469 | 1.15 | 2.97 |
| 3.9 | 0.03305 | 0.96695 | 20.55 | 230 | 23.469 | 1.14 | 3.31 |
| 4.3 | 0.03644 | 0.96356 | 20.62 | 230 | 23.469 | 1.14 | 3.64 |



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| AP-7 | Consoiltec s.a.s Ingenieros consultores y constructores |
|---|---|

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

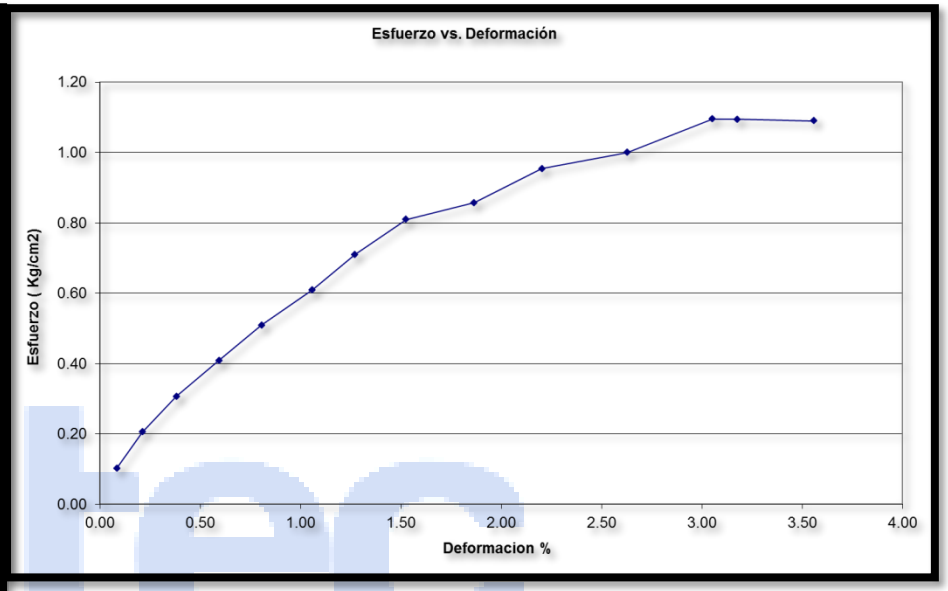
LOCALIZACION: CALLE 103 CARRERA 14B — APIQUE /PERF: 7

PERFORACIÓN: 7 — APIQUE 7 — Nº LAB: 7

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 436.89 | gr. |
| P. Unitario | 1.86 | gr/cm3 |
| Alt. Final | 11.38 | cm, |

| | | |
|---|---|---|
| γd max | 1.613 | gr/cm3 |
| Gs: | 1612 | |
| W% | 15.5 | % |
| Ang. friccion | 30.5 | º |
| qumax | 1.00 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.25 | 0.00212 | 0.99788 | 19.91 | 40 | 4.082 | 0.20 | 0.21 |
| 0.45 | 0.00381 | 0.99619 | 19.95 | 60 | 6.122 | 0.31 | 0.38 |
| 0.7 | 0.00593 | 0.99407 | 19.99 | 80 | 8.163 | 0.41 | 0.59 |
| 0.95 | 0.00805 | 0.99195 | 20.03 | 100 | 10.204 | 0.51 | 0.81 |
| 1.25 | 0.01059 | 0.98941 | 20.08 | 120 | 12.245 | 0.61 | 1.06 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 140 | 14.286 | 0.71 | 1.27 |
| 1.8 | 0.01525 | 0.98475 | 20.18 | 160 | 16.327 | 0.81 | 1.53 |
| 2.2 | 0.01864 | 0.98136 | 20.25 | 170 | 17.347 | 0.86 | 1.86 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 190 | 19.388 | 0.95 | 2.20 |
| 3.1 | 0.02627 | 0.97373 | 20.41 | 200 | 20.408 | 1.00 | 2.63 |
| 3.6 | 0.03051 | 0.96949 | 20.50 | 220 | 22.449 | 1.10 | 3.05 |
| 3.75 | 0.03178 | 0.96822 | 20.52 | 220 | 22.449 | 1.09 | 3.18 |
| 4.2 | 0.03559 | 0.96441 | 20.60 | 220 | 22.449 | 1.09 | 3.56 |



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AP-8

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## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

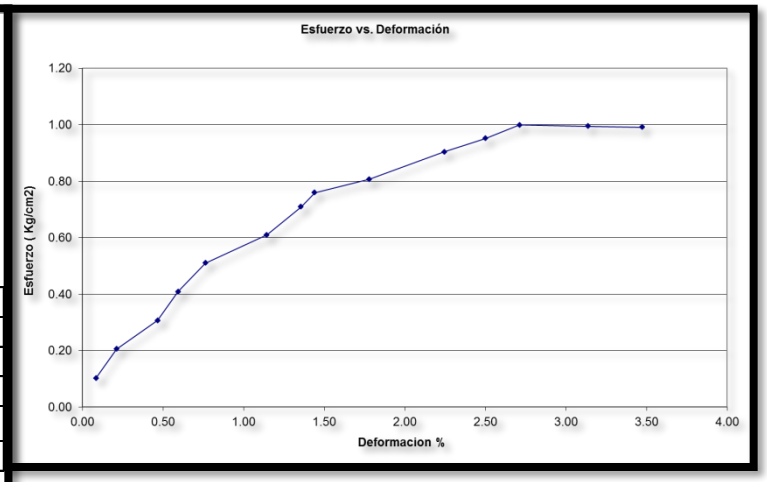
LOCALIZACION: SOBRE CRA 8 BIS ENTRE CABO YOYO Y CL 14 — APIQUE /PERF: 8

PERFORACIÓN: 8 — APIQUE Nº 8 — Nº LAB: 8

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 469.87 | gr. |
| P. Unitario | 2.00 | gr/cm3 |
| Alt. Final | 11.39 | cm, |

| | | |
|---|---|---|
| γd max | 1.720 | gr/cm3 |
| Gs: | 1612 | |
| W% | 16.5 | % |
| Ang. friccion | 28.5 | º |
| qumax | 0.95 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.25 | 0.00212 | 0.99788 | 19.91 | 40 | 4.082 | 0.20 | 0.21 |
| 0.55 | 0.00466 | 0.99534 | 19.96 | 60 | 6.122 | 0.31 | 0.47 |
| 0.7 | 0.00593 | 0.99407 | 19.99 | 80 | 8.163 | 0.41 | 0.59 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 100 | 10.204 | 0.51 | 0.76 |
| 1.35 | 0.01144 | 0.98856 | 20.10 | 120 | 12.245 | 0.61 | 1.14 |
| 1.6 | 0.01356 | 0.98644 | 20.14 | 140 | 14.286 | 0.71 | 1.36 |
| 1.7 | 0.01441 | 0.98559 | 20.16 | 150 | 15.306 | 0.76 | 1.44 |
| 2.1 | 0.01780 | 0.98220 | 20.23 | 160 | 16.327 | 0.81 | 1.78 |
| 2.65 | 0.02246 | 0.97754 | 20.33 | 180 | 18.367 | 0.90 | 2.25 |
| 2.95 | 0.02500 | 0.97500 | 20.38 | 190 | 19.388 | 0.95 | 2.50 |
| 3.2 | 0.02712 | 0.97288 | 20.43 | 200 | 20.408 | 1.00 | 2.71 |
| 3.7 | 0.03136 | 0.96864 | 20.51 | 200 | 20.408 | 0.99 | 3.14 |
| 4.1 | 0.03475 | 0.96525 | 20.59 | 200 | 20.408 | 0.99 | 3.47 |



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| AP-9 | Consoiltec s.a.s Ingenieros consultores y constructores |
|---|---|

**ENSAYO DE COMPRESIÓN SIMPLE**

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

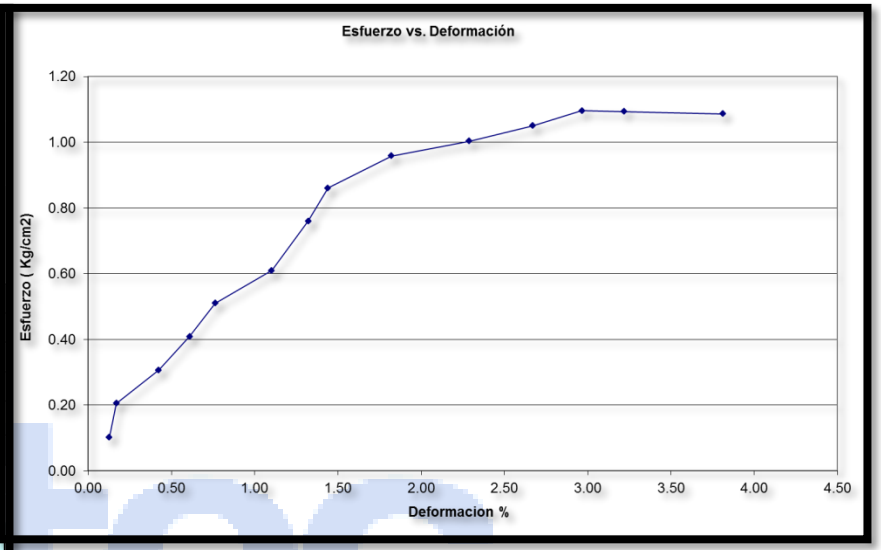
LOCALIZACION: CALLE 105 CRA 11 — APIQUE /PERF: 9

PERFORACIÓN: 9 — APIQUE Nº 9 — Nº LAB: 9

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 449.2 | gr. |
| P. Unitario | 1.92 | gr/cm3 |
| Alt. Final | 11.35 | cm, |

| | | |
|---|---|---|
| γd max | 1.644 | gr/cm3 |
| Gs: | 1623 | |
| W% | 16.5 | % |
| Ang. friccion | 29.5 | º |
| qumax | 1.05 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.15 | 0.00127 | 0.99873 | 19.90 | 20 | 2.041 | 0.10 | 0.13 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 60 | 6.122 | 0.31 | 0.42 |
| 0.72 | 0.00610 | 0.99390 | 19.99 | 80 | 8.163 | 0.41 | 0.61 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 100 | 10.204 | 0.51 | 0.76 |
| 1.3 | 0.01102 | 0.98898 | 20.09 | 120 | 12.245 | 0.61 | 1.10 |
| 1.56 | 0.01322 | 0.98678 | 20.14 | 150 | 15.306 | 0.76 | 1.32 |
| 1.7 | 0.01441 | 0.98559 | 20.16 | 170 | 17.347 | 0.86 | 1.44 |
| 2.15 | 0.01822 | 0.98178 | 20.24 | 190 | 19.388 | 0.96 | 1.82 |
| 2.7 | 0.02288 | 0.97712 | 20.34 | 200 | 20.408 | 1.00 | 2.29 |
| 3.15 | 0.02669 | 0.97331 | 20.42 | 210 | 21.429 | 1.05 | 2.67 |
| 3.5 | 0.02966 | 0.97034 | 20.48 | 220 | 22.449 | 1.10 | 2.97 |
| 3.8 | 0.03220 | 0.96780 | 20.53 | 220 | 22.449 | 1.09 | 3.22 |
| 4.5 | 0.03814 | 0.96186 | 20.66 | 220 | 22.449 | 1.09 | 3.81 |



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| AP-10 | Consoiltec s.a.s Ingenieros consultores y constructores |
|---|---|

## ENSAYO DE COMPRESIÓN SIMPLE

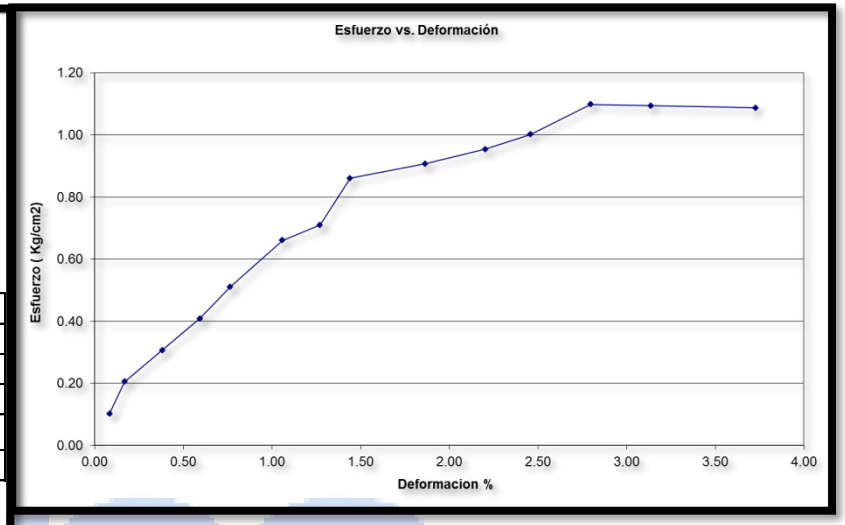
OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

LOCALIZACION: CALLE 106 CRA 14 — APIQUE /PERF: 10

PERFORACIÓN: 10 — APIQUE Nº 10 — Nº LAB: 10

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 451.23 | gr. |
| P. Unitario | 1.92 | gr/cm3 |
| Alt. Final | 11.36 | cm, |

| | | |
|---|---|---|
| γd max | 1.665 | gr/cm3 |
| Gs: | 1614 | |
| W% | 15.55 | % |
| Ang. friccion | 30.25 | º |
| qumax | 1.00 | (Kg/cm2) |
| Cohesión | | |




| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.45 | 0.00381 | 0.99619 | 19.95 | 60 | 6.122 | 0.31 | 0.38 |
| 0.7 | 0.00593 | 0.99407 | 19.99 | 80 | 8.163 | 0.41 | 0.59 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 100 | 10.204 | 0.51 | 0.76 |
| 1.25 | 0.01059 | 0.98941 | 20.08 | 130 | 13.265 | 0.66 | 1.06 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 140 | 14.286 | 0.71 | 1.27 |
| 1.7 | 0.01441 | 0.98559 | 20.16 | 170 | 17.347 | 0.86 | 1.44 |
| 2.2 | 0.01864 | 0.98136 | 20.25 | 180 | 18.367 | 0.91 | 1.86 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 190 | 19.388 | 0.95 | 2.20 |
| 2.9 | 0.02458 | 0.97542 | 20.37 | 200 | 20.408 | 1.00 | 2.46 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 220 | 22.449 | 1.10 | 2.80 |
| 3.7 | 0.03136 | 0.96864 | 20.51 | 220 | 22.449 | 1.09 | 3.14 |
| 4.4 | 0.03729 | 0.96271 | 20.64 | 220 | 22.449 | 1.09 | 3.73 |



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AP-11

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

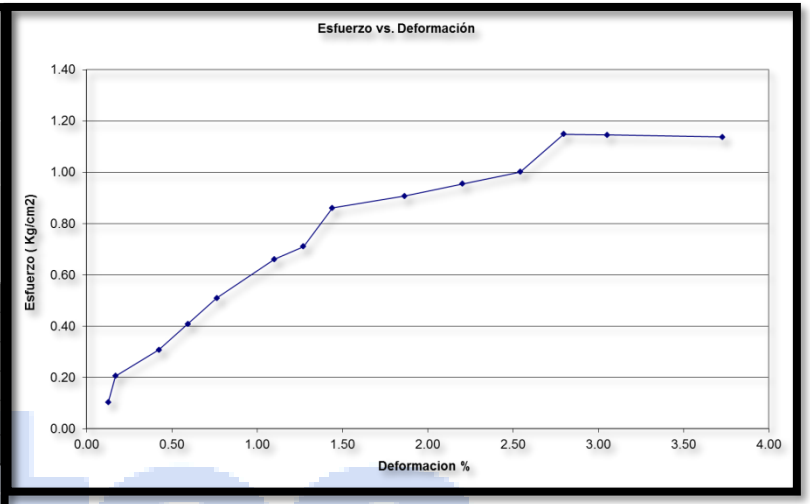
LOCALIZACION: CALLE 106 CRA 15 — APIQUE /PERF: 11

PERFORACIÓN: 11 — APIQUE Nº 11 — Nº LAB: 11

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 448.95 | gr. |
| P. Unitario | 1.91 | gr/cm3 |
| Alt. Final | 11.36 | cm, |

| | | |
|---|---|---|
| γd max | 1.671 | gr/cm3 |
| Gs: | 1605 | |
| W% | 14.55 | % |
| Ang. friccion | 30.1 | º |
| qumax | 1.00 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.15 | 0.00127 | 0.99873 | 19.90 | 20 | 2.041 | 0.10 | 0.13 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 60 | 6.122 | 0.31 | 0.42 |
| 0.7 | 0.00593 | 0.99407 | 19.99 | 80 | 8.163 | 0.41 | 0.59 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 100 | 10.204 | 0.51 | 0.76 |
| 1.3 | 0.01102 | 0.98898 | 20.09 | 130 | 13.265 | 0.66 | 1.10 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 140 | 14.286 | 0.71 | 1.27 |
| 1.7 | 0.01441 | 0.98559 | 20.16 | 170 | 17.347 | 0.86 | 1.44 |
| 2.2 | 0.01864 | 0.98136 | 20.25 | 180 | 18.367 | 0.91 | 1.86 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 190 | 19.388 | 0.95 | 2.20 |
| 3 | 0.02542 | 0.97458 | 20.39 | 200 | 20.408 | 1.00 | 2.54 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 230 | 23.469 | 1.15 | 2.80 |
| 3.6 | 0.03051 | 0.96949 | 20.50 | 230 | 23.469 | 1.15 | 3.05 |
| 4.4 | 0.03729 | 0.96271 | 20.64 | 230 | 23.469 | 1.14 | 3.73 |



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| AP-12 | Consoiltec s.a.s Ingenieros consultores y constructores |
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**ENSAYO DE COMPRESIÓN SIMPLE**

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

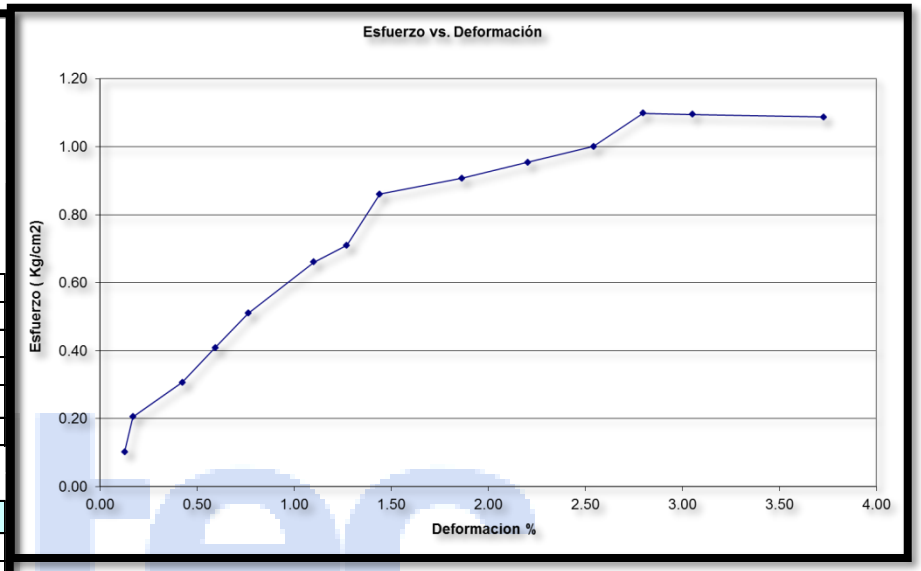
LOCALIZACION: CALLE 111 CRA 14 — APIQUE /PERF: 12

PERFORACIÓN: 12 — APIQUE Nº 12 — Nº LAB: 12

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 450.12 | gr. |
| P. Unitario | 1.92 | gr/cm3 |
| Alt. Final | 11.36 | cm, |

| | | |
|---|---|---|
| γd max | 1.647 | gr/cm3 |
| Gs: | 1578 | |
| W% | 16.55 | % |
| Ang. friccion | 29.55 | º |
| qumax | 1.00 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.15 | 0.00127 | 0.99873 | 19.90 | 20 | 2.041 | 0.10 | 0.13 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 60 | 6.122 | 0.31 | 0.42 |
| 0.7 | 0.00593 | 0.99407 | 19.99 | 80 | 8.163 | 0.41 | 0.59 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 100 | 10.204 | 0.51 | 0.76 |
| 1.3 | 0.01102 | 0.98898 | 20.09 | 130 | 13.265 | 0.66 | 1.10 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 140 | 14.286 | 0.71 | 1.27 |
| 1.7 | 0.01441 | 0.98559 | 20.16 | 170 | 17.347 | 0.86 | 1.44 |
| 2.2 | 0.01864 | 0.98136 | 20.25 | 180 | 18.367 | 0.91 | 1.86 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 190 | 19.388 | 0.95 | 2.20 |
| 3 | 0.02542 | 0.97458 | 20.39 | 200 | 20.408 | 1.00 | 2.54 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 220 | 22.449 | 1.10 | 2.80 |
| 3.6 | 0.03051 | 0.96949 | 20.50 | 220 | 22.449 | 1.10 | 3.05 |
| 4.4 | 0.03729 | 0.96271 | 20.64 | 220 | 22.449 | 1.09 | 3.73 |



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## ENSAYO DE COMPRESIÓN SIMPLE

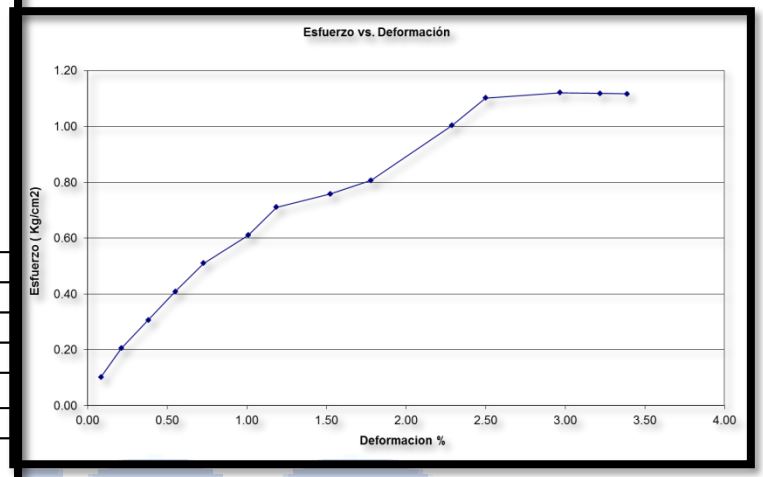
OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

LOCALIZACION: CALLE 98A CRA 10 — APIQUE /PERF: 13

PERFORACIÓN: 13 — APIQUE Nº 13 — Nº LAB: 13

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 442.45 | gr. |
| P. Unitario | 1.89 | gr/cm3 |
| Alt. Final | 11.40 | cm, |

| | | |
|---|---|---|
| γd max | 1.592 | gr/cm3 |
| Gs: | 1555 | |
| W% | 18.56 | % |
| Ang. friccion | 27.85 | º |
| qumax | 1.10 | (Kg/cm2) |
| Cohesión | | |




| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.25 | 0.00212 | 0.99788 | 19.91 | 40 | 4.082 | 0.20 | 0.21 |
| 0.45 | 0.00381 | 0.99619 | 19.95 | 60 | 6.122 | 0.31 | 0.38 |
| 0.65 | 0.00551 | 0.99449 | 19.98 | 80 | 8.163 | 0.41 | 0.55 |
| 0.86 | 0.00729 | 0.99271 | 20.02 | 100 | 10.204 | 0.51 | 0.73 |
| 1.19 | 0.01008 | 0.98992 | 20.07 | 120 | 12.245 | 0.61 | 1.01 |
| 1.4 | 0.01186 | 0.98814 | 20.11 | 140 | 14.286 | 0.71 | 1.19 |
| 1.8 | 0.01525 | 0.98475 | 20.18 | 150 | 15.306 | 0.76 | 1.53 |
| 2.1 | 0.01780 | 0.98220 | 20.23 | 160 | 16.327 | 0.81 | 1.78 |
| 2.7 | 0.02288 | 0.97712 | 20.34 | 200 | 20.408 | 1.00 | 2.29 |
| 2.95 | 0.02500 | 0.97500 | 20.38 | 220 | 22.449 | 1.10 | 2.50 |
| 3.5 | 0.02966 | 0.97034 | 20.48 | 225 | 22.959 | 1.12 | 2.97 |
| 3.8 | 0.03220 | 0.96780 | 20.53 | 225 | 22.959 | 1.12 | 3.22 |
| 4 | 0.03390 | 0.96610 | 20.57 | 225 | 22.959 | 1.12 | 3.39 |



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AP-14

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

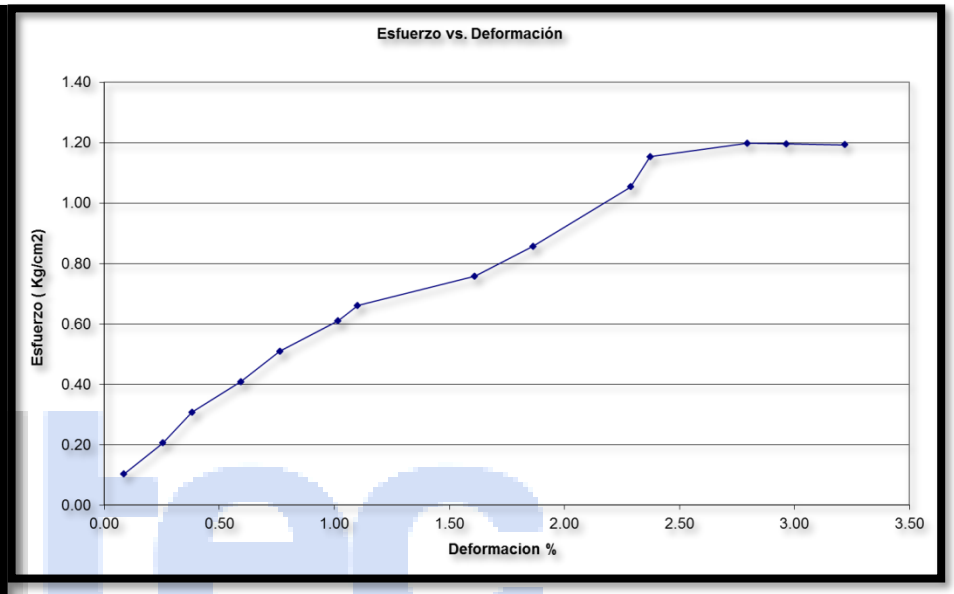
LOCALIZACION: CALLE 98 A CRA 12 SOBRE LA CL 98A — APIQUE /PERF: 14

PERFORACIÓN: 14 — APIQUE Nº 14 — Nº LAB: 14

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 435.56 | gr. |
| P. Unitario | 1.86 | gr/cm3 |
| Alt. Final | 11.42 | cm, |

| | | |
|---|---|---|
| γd max | 1.582 | gr/cm3 |
| Gs: | 1570 | |
| W% | 17.45 | % |
| Ang. friccion | 27.85 | º |
| qumax | 1.15 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.3 | 0.00254 | 0.99746 | 19.92 | 40 | 4.082 | 0.20 | 0.25 |
| 0.45 | 0.00381 | 0.99619 | 19.95 | 60 | 6.122 | 0.31 | 0.38 |
| 0.7 | 0.00593 | 0.99407 | 19.99 | 80 | 8.163 | 0.41 | 0.59 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 100 | 10.204 | 0.51 | 0.76 |
| 1.2 | 0.01017 | 0.98983 | 20.08 | 120 | 12.245 | 0.61 | 1.02 |
| 1.3 | 0.01102 | 0.98898 | 20.09 | 130 | 13.265 | 0.66 | 1.10 |
| 1.9 | 0.01610 | 0.98390 | 20.20 | 150 | 15.306 | 0.76 | 1.61 |
| 2.2 | 0.01864 | 0.98136 | 20.25 | 170 | 17.347 | 0.86 | 1.86 |
| 2.7 | 0.02288 | 0.97712 | 20.34 | 210 | 21.429 | 1.05 | 2.29 |
| 2.8 | 0.02373 | 0.97627 | 20.35 | 230 | 23.469 | 1.15 | 2.37 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 240 | 24.490 | 1.20 | 2.80 |
| 3.5 | 0.02966 | 0.97034 | 20.48 | 240 | 24.490 | 1.20 | 2.97 |
| 3.8 | 0.03220 | 0.96780 | 20.53 | 240 | 24.490 | 1.19 | 3.22 |



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AP-15

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

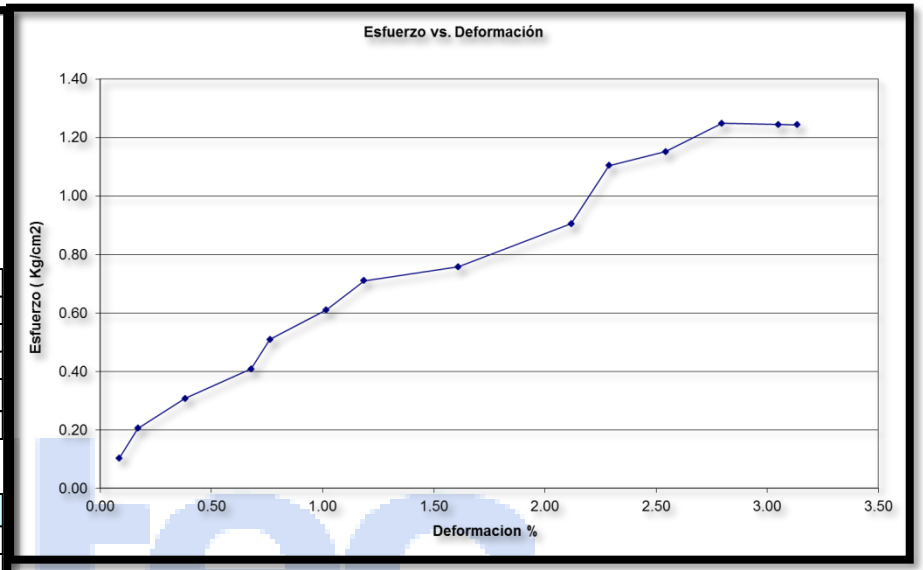
LOCALIZACION: CALLE 98 A ENTRE CRA 12 A Y CRA 13 — APIQUE /PERF: 15

PERFORACIÓN: 15 — APIQUE Nº 15 — Nº LAB: 15

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 447.58 | gr. |
| P. Unitario | 1.91 | gr/cm3 |
| Alt. Final | 11.43 | cm, |

| | | |
|---|---|---|
| γd max | 1.639 | gr/cm3 |
| Gs: | 1621 | |
| W% | 16.45 | % |
| Ang. friccion | 29.56 | º |
| qumax | 1.15 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.45 | 0.00381 | 0.99619 | 19.95 | 60 | 6.122 | 0.31 | 0.38 |
| 0.8 | 0.00678 | 0.99322 | 20.01 | 80 | 8.163 | 0.41 | 0.68 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 100 | 10.204 | 0.51 | 0.76 |
| 1.2 | 0.01017 | 0.98983 | 20.08 | 120 | 12.245 | 0.61 | 1.02 |
| 1.4 | 0.01186 | 0.98814 | 20.11 | 140 | 14.286 | 0.71 | 1.19 |
| 1.9 | 0.01610 | 0.98390 | 20.20 | 150 | 15.306 | 0.76 | 1.61 |
| 2.5 | 0.02119 | 0.97881 | 20.30 | 180 | 18.367 | 0.90 | 2.12 |
| 2.7 | 0.02288 | 0.97712 | 20.34 | 220 | 22.449 | 1.10 | 2.29 |
| 3 | 0.02542 | 0.97458 | 20.39 | 230 | 23.469 | 1.15 | 2.54 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 250 | 25.510 | 1.25 | 2.80 |
| 3.6 | 0.03051 | 0.96949 | 20.50 | 250 | 25.510 | 1.24 | 3.05 |
| 3.7 | 0.03136 | 0.96864 | 20.51 | 250 | 25.510 | 1.24 | 3.14 |



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| AP-16 | Consoiltec s.a.s Ingenieros consultores y constructores |
|---|---|

**ENSAYO DE COMPRESIÓN SIMPLE**

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

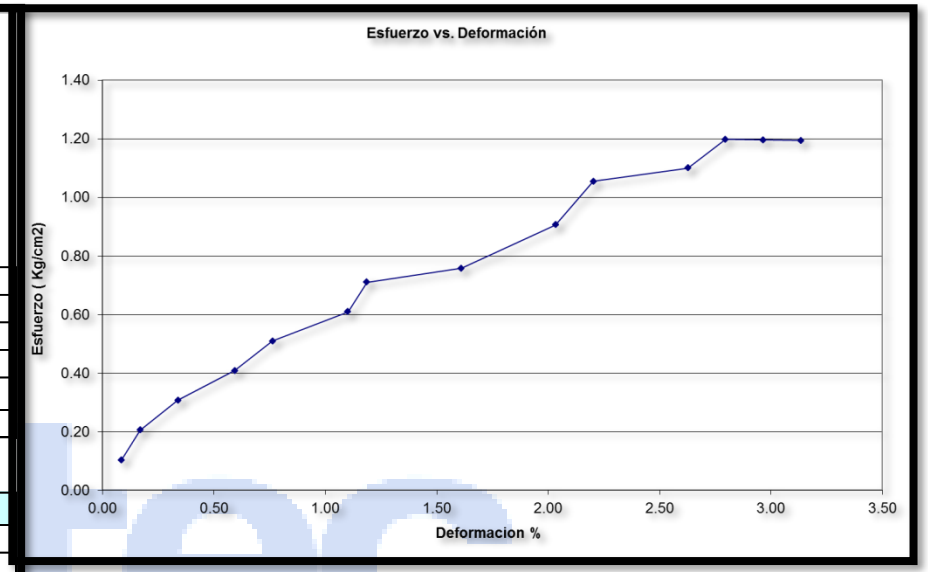
LOCALIZACION: CALLE 98 CRA 13 — APIQUE /PERF: 16

PERFORACIÓN: 16 — APIQUE Nº 16 — Nº LAB: 16

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 439.87 | gr. |
| P. Unitario | 1.88 | gr/cm3 |
| Alt. Final | 11.43 | cm, |

| | | |
|---|---|---|
| γd max | 1.633 | gr/cm3 |
| Gs: | 1635 | |
| W% | 14.85 | % |
| Ang. friccion | 28.75 | º |
| qumax | 1.10 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.4 | 0.00339 | 0.99661 | 19.94 | 60 | 6.122 | 0.31 | 0.34 |
| 0.7 | 0.00593 | 0.99407 | 19.99 | 80 | 8.163 | 0.41 | 0.59 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 100 | 10.204 | 0.51 | 0.76 |
| 1.3 | 0.01102 | 0.98898 | 20.09 | 120 | 12.245 | 0.61 | 1.10 |
| 1.4 | 0.01186 | 0.98814 | 20.11 | 140 | 14.286 | 0.71 | 1.19 |
| 1.9 | 0.01610 | 0.98390 | 20.20 | 150 | 15.306 | 0.76 | 1.61 |
| 2.4 | 0.02034 | 0.97966 | 20.28 | 180 | 18.367 | 0.91 | 2.03 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 210 | 21.429 | 1.05 | 2.20 |
| 3.1 | 0.02627 | 0.97373 | 20.41 | 220 | 22.449 | 1.10 | 2.63 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 240 | 24.490 | 1.20 | 2.80 |
| 3.5 | 0.02966 | 0.97034 | 20.48 | 240 | 24.490 | 1.20 | 2.97 |
| 3.7 | 0.03136 | 0.96864 | 20.51 | 240 | 24.490 | 1.19 | 3.14 |



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AP-17

## ENSAYO DE COMPRESIÓN SIMPLE

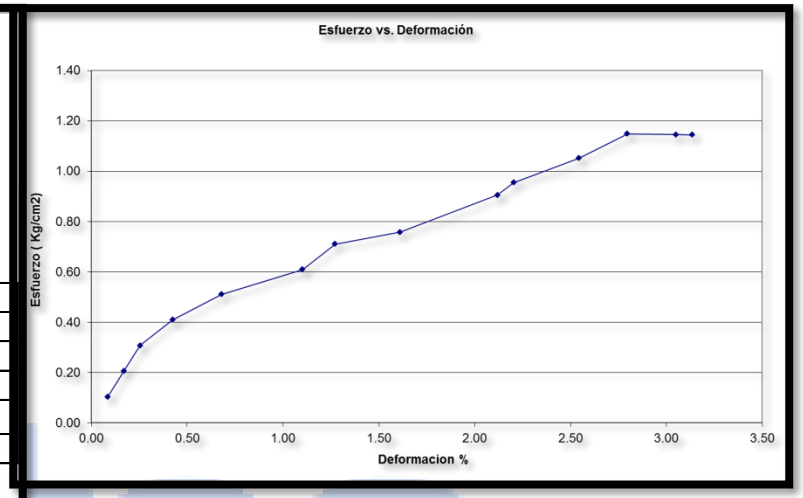
OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

LOCALIZACION: CALLE 97 CR 13 HACIA LA CRA 13 A 50 M — APIQUE /PERF: 17

PERFORACIÓN: 17 — APIQUE Nº 17 — Nº LAB: 17

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 439.87 | gr. |
| P. Unitario | 1.88 | gr/cm3 |
| Alt. Final | 11.43 | cm, |

| | | |
|---|---|---|
| γd max | 1.633 | gr/cm3 |
| Gs: | 1625 | |
| W% | 14.85 | % |
| Ang. friccion | 28.75 | º |
| qumax | 1.05 | (Kg/cm2) |
| Cohesión | | |




| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.3 | 0.00254 | 0.99746 | 19.92 | 60 | 6.122 | 0.31 | 0.25 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 80 | 8.163 | 0.41 | 0.42 |
| 0.8 | 0.00678 | 0.99322 | 20.01 | 100 | 10.204 | 0.51 | 0.68 |
| 1.3 | 0.01102 | 0.98898 | 20.09 | 120 | 12.245 | 0.61 | 1.10 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 140 | 14.286 | 0.71 | 1.27 |
| 1.9 | 0.01610 | 0.98390 | 20.20 | 150 | 15.306 | 0.76 | 1.61 |
| 2.5 | 0.02119 | 0.97881 | 20.30 | 180 | 18.367 | 0.90 | 2.12 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 190 | 19.388 | 0.95 | 2.20 |
| 3 | 0.02542 | 0.97458 | 20.39 | 210 | 21.429 | 1.05 | 2.54 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 230 | 23.469 | 1.15 | 2.80 |
| 3.6 | 0.03051 | 0.96949 | 20.50 | 230 | 23.469 | 1.15 | 3.05 |
| 3.7 | 0.03136 | 0.96864 | 20.51 | 230 | 23.469 | 1.14 | 3.14 |



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AP-18

Consoiltec s.a.s
Ingenieros consultores y constructores

## ENSAYO DE COMPRESIÓN SIMPLE

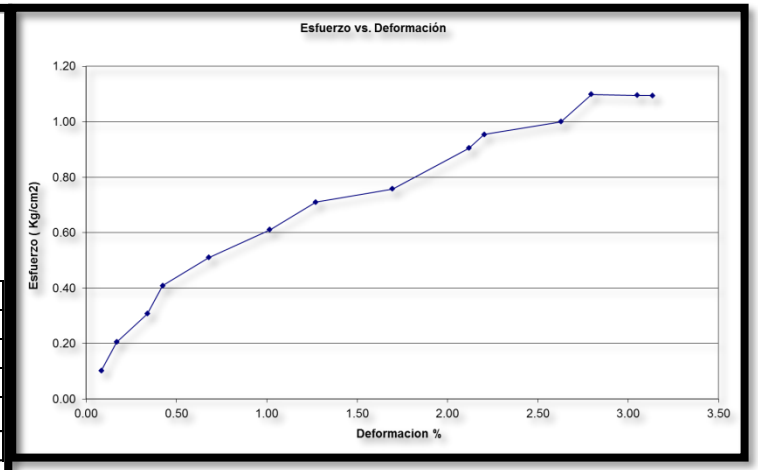
OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

LOCALIZACION: CALLE 96 CRA 13 — APIQUE /PERF: 18

PERFORACIÓN: 18 — APIQUE Nº 18 — Nº LAB: 18

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 445.21 | gr. |
| P. Unitario | 1.90 | gr/cm3 |
| Alt. Final | 11.43 | cm, |

| | | |
|---|---|---|
| γd max | 1.673 | gr/cm3 |
| Gs: | 1685 | |
| W% | 13.52 | % |
| Ang. friccion | 28.75 | º |
| qumax | 1.00 | (Kg/cm2) |
| Cohesión | | |




| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.4 | 0.00339 | 0.99661 | 19.94 | 60 | 6.122 | 0.31 | 0.34 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 80 | 8.163 | 0.41 | 0.42 |
| 0.8 | 0.00678 | 0.99322 | 20.01 | 100 | 10.204 | 0.51 | 0.68 |
| 1.2 | 0.01017 | 0.98983 | 20.08 | 120 | 12.245 | 0.61 | 1.02 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 140 | 14.286 | 0.71 | 1.27 |
| 2 | 0.01695 | 0.98305 | 20.21 | 150 | 15.306 | 0.76 | 1.69 |
| 2.5 | 0.02119 | 0.97881 | 20.30 | 180 | 18.367 | 0.90 | 2.12 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 190 | 19.388 | 0.95 | 2.20 |
| 3.1 | 0.02627 | 0.97373 | 20.41 | 200 | 20.408 | 1.00 | 2.63 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 220 | 22.449 | 1.10 | 2.80 |
| 3.6 | 0.03051 | 0.96949 | 20.50 | 220 | 22.449 | 1.10 | 3.05 |
| 3.7 | 0.03136 | 0.96864 | 20.51 | 220 | 22.449 | 1.09 | 3.14 |



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**ENSAYO DE COMPRESIÓN SIMPLE**

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

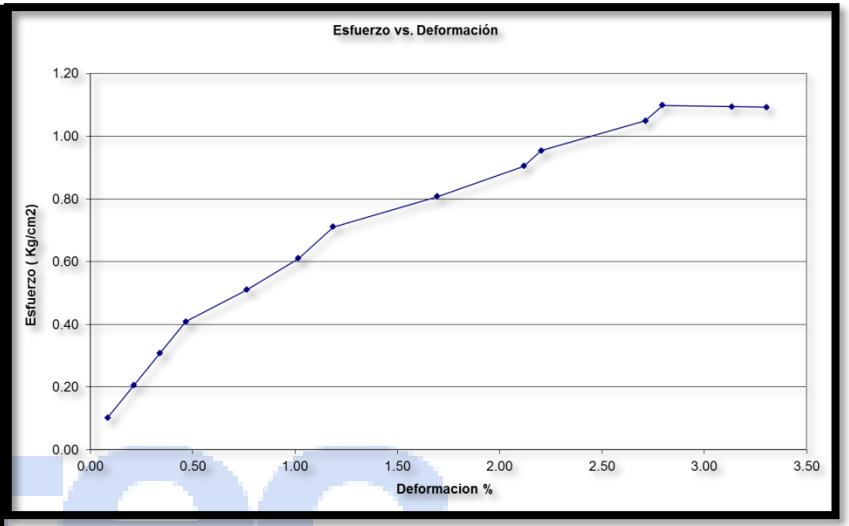
LOCALIZACION: CALLE 96 CRA 13 — APIQUE /PERF: 19

PERFORACIÓN: 19 — APIQUE Nº 19 — Nº LAB: 19

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 452.13 | gr. |
| P. Unitario | 1.93 | gr/cm3 |
| Alt. Final | 11.41 | cm, |

| | | |
|---|---|---|
| γd max | 1.673 | gr/cm3 |
| Gs: | 1568 | |
| W% | 15.24 | % |
| Ang. friccion | 29.56 | º |
| qumax | 1.05 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.25 | 0.00212 | 0.99788 | 19.91 | 40 | 4.082 | 0.20 | 0.21 |
| 0.4 | 0.00339 | 0.99661 | 19.94 | 60 | 6.122 | 0.31 | 0.34 |
| 0.55 | 0.00466 | 0.99534 | 19.96 | 80 | 8.163 | 0.41 | 0.47 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 100 | 10.204 | 0.51 | 0.76 |
| 1.2 | 0.01017 | 0.98983 | 20.08 | 120 | 12.245 | 0.61 | 1.02 |
| 1.4 | 0.01186 | 0.98814 | 20.11 | 140 | 14.286 | 0.71 | 1.19 |
| 2 | 0.01695 | 0.98305 | 20.21 | 160 | 16.327 | 0.81 | 1.69 |
| 2.5 | 0.02119 | 0.97881 | 20.30 | 180 | 18.367 | 0.90 | 2.12 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 190 | 19.388 | 0.95 | 2.20 |
| 3.2 | 0.02712 | 0.97288 | 20.43 | 210 | 21.429 | 1.05 | 2.71 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 220 | 22.449 | 1.10 | 2.80 |
| 3.7 | 0.03136 | 0.96864 | 20.51 | 220 | 22.449 | 1.09 | 3.14 |
| 3.9 | 0.03305 | 0.96695 | 20.55 | 220 | 22.449 | 1.09 | 3.31 |



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AP-20

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

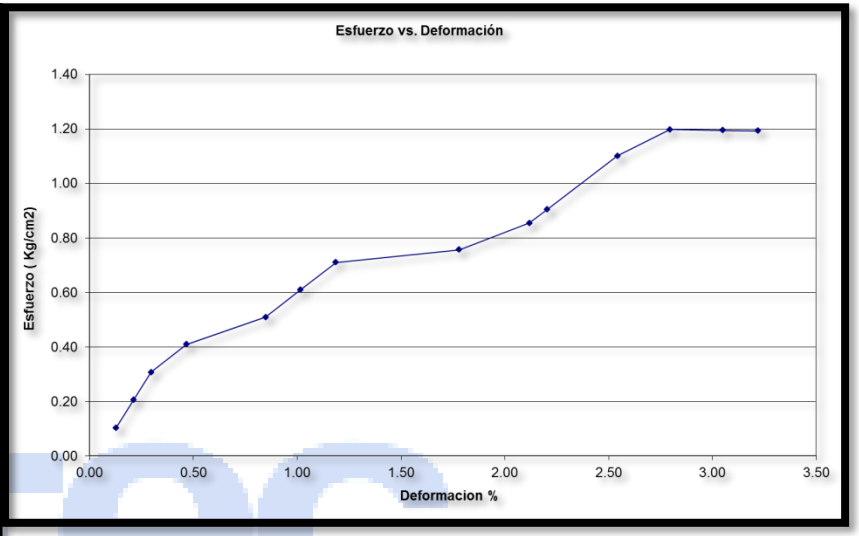
LOCALIZACION: CALLE 993 ENTRE CRA 13 Y CRA 14B — APIQUE /PERF: 20

PERFORACIÓN: 20 — APIQUE Nº 20 — Nº LAB: 20

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 465.89 | gr. |
| P. Unitario | 1.99 | gr/cm3 |
| Alt. Final | 11.42 | cm, |

| | | |
|---|---|---|
| γd max | 1.734 | gr/cm3 |
| Gs: | 1589 | |
| W% | 14.56 | % |
| Ang. friccion | 31.25 | º |
| qumax | 1.10 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.15 | 0.00127 | 0.99873 | 19.90 | 20 | 2.041 | 0.10 | 0.13 |
| 0.25 | 0.00212 | 0.99788 | 19.91 | 40 | 4.082 | 0.20 | 0.21 |
| 0.35 | 0.00297 | 0.99703 | 19.93 | 60 | 6.122 | 0.31 | 0.30 |
| 0.55 | 0.00466 | 0.99534 | 19.96 | 80 | 8.163 | 0.41 | 0.47 |
| 1 | 0.00847 | 0.99153 | 20.04 | 100 | 10.204 | 0.51 | 0.85 |
| 1.2 | 0.01017 | 0.98983 | 20.08 | 120 | 12.245 | 0.61 | 1.02 |
| 1.4 | 0.01186 | 0.98814 | 20.11 | 140 | 14.286 | 0.71 | 1.19 |
| 2.1 | 0.01780 | 0.98220 | 20.23 | 150 | 15.306 | 0.76 | 1.78 |
| 2.5 | 0.02119 | 0.97881 | 20.30 | 170 | 17.347 | 0.85 | 2.12 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 180 | 18.367 | 0.90 | 2.20 |
| 3 | 0.02542 | 0.97458 | 20.39 | 220 | 22.449 | 1.10 | 2.54 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 240 | 24.490 | 1.20 | 2.80 |
| 3.6 | 0.03051 | 0.96949 | 20.50 | 240 | 24.490 | 1.19 | 3.05 |
| 3.8 | 0.03220 | 0.96780 | 20.53 | 240 | 24.490 | 1.19 | 3.22 |



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AP-16

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

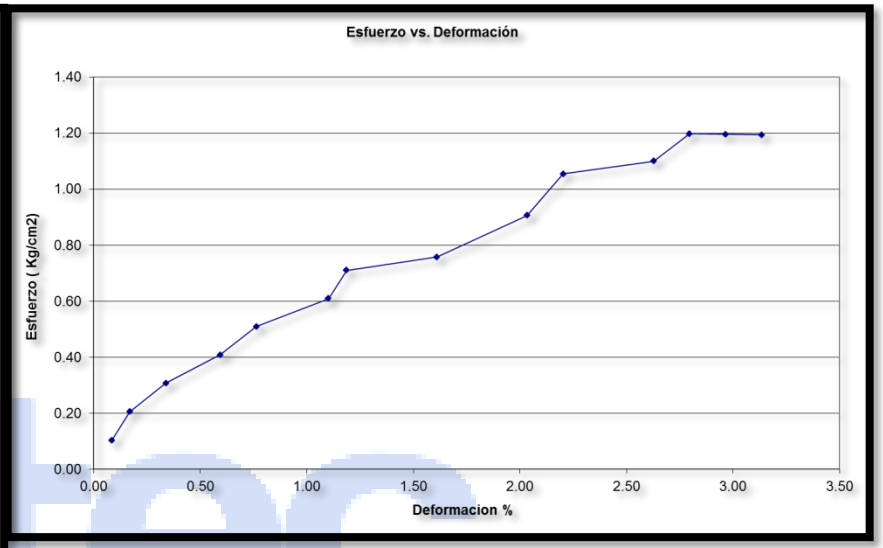
LOCALIZACION: CALLE 98 CRA 13 — APIQUE /PERF: 16

PERFORACIÓN: 16 — APIQUE Nº 16 — Nº LAB: 16

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 439.87 | gr. |
| P. Unitario | 1.88 | gr/cm3 |
| Alt. Final | 11.43 | cm, |

| | | |
|---|---|---|
| γd max | 1.633 | gr/cm3 |
| Gs: | 1635 | |
| W% | 14.85 | % |
| Ang. friccion | 28.75 | º |
| qumax | 1.10 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.4 | 0.00339 | 0.99661 | 19.94 | 60 | 6.122 | 0.31 | 0.34 |
| 0.7 | 0.00593 | 0.99407 | 19.99 | 80 | 8.163 | 0.41 | 0.59 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 100 | 10.204 | 0.51 | 0.76 |
| 1.3 | 0.01102 | 0.98898 | 20.09 | 120 | 12.245 | 0.61 | 1.10 |
| 1.4 | 0.01186 | 0.98814 | 20.11 | 140 | 14.286 | 0.71 | 1.19 |
| 1.9 | 0.01610 | 0.98390 | 20.20 | 150 | 15.306 | 0.76 | 1.61 |
| 2.4 | 0.02034 | 0.97966 | 20.28 | 180 | 18.367 | 0.91 | 2.03 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 210 | 21.429 | 1.05 | 2.20 |
| 3.1 | 0.02627 | 0.97373 | 20.41 | 220 | 22.449 | 1.10 | 2.63 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 240 | 24.490 | 1.20 | 2.80 |
| 3.5 | 0.02966 | 0.97034 | 20.48 | 240 | 24.490 | 1.20 | 2.97 |
| 3.7 | 0.03136 | 0.96864 | 20.51 | 240 | 24.490 | 1.19 | 3.14 |



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AP-22

## ENSAYO DE COMPRESIÓN SIMPLE

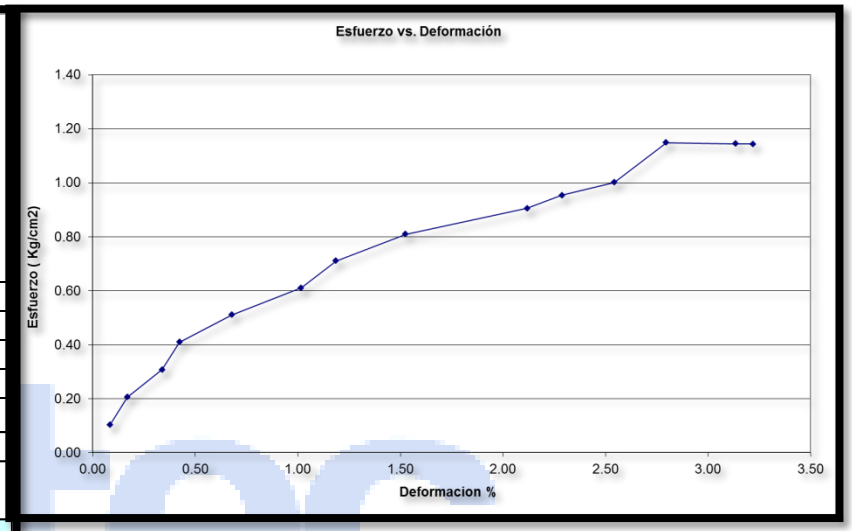
OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

LOCALIZACION: CALLE 91 CRA 15 HACIA LA CL 91 — APIQUE /PERF: 22

PERFORACIÓN: 22 — APIQUE Nº 22 — Nº LAB: 22

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 452.15 | gr. |
| P. Unitario | 1.93 | gr/cm3 |
| Alt. Final | 11.42 | cm, |

| | | |
|---|---|---|
| γd max | 1.682 | gr/cm3 |
| Gs: | 1589 | |
| W% | 14.62 | % |
| Ang. friccion | 26.58 | º |
| qumax | 1.00 | (Kg/cm2) |
| Cohesión | | |




| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.4 | 0.00339 | 0.99661 | 19.94 | 60 | 6.122 | 0.31 | 0.34 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 80 | 8.163 | 0.41 | 0.42 |
| 0.8 | 0.00678 | 0.99322 | 20.01 | 100 | 10.204 | 0.51 | 0.68 |
| 1.2 | 0.01017 | 0.98983 | 20.08 | 120 | 12.245 | 0.61 | 1.02 |
| 1.4 | 0.01186 | 0.98814 | 20.11 | 140 | 14.286 | 0.71 | 1.19 |
| 1.8 | 0.01525 | 0.98475 | 20.18 | 160 | 16.327 | 0.81 | 1.53 |
| 2.5 | 0.02119 | 0.97881 | 20.30 | 180 | 18.367 | 0.90 | 2.12 |
| 2.7 | 0.02288 | 0.97712 | 20.34 | 190 | 19.388 | 0.95 | 2.29 |
| 3 | 0.02542 | 0.97458 | 20.39 | 200 | 20.408 | 1.00 | 2.54 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 230 | 23.469 | 1.15 | 2.80 |
| 3.7 | 0.03136 | 0.96864 | 20.51 | 230 | 23.469 | 1.14 | 3.14 |
| 3.8 | 0.03220 | 0.96780 | 20.53 | 230 | 23.469 | 1.14 | 3.22 |



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AP-23

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Ingenieros consultores y constructores

## ENSAYO DE COMPRESIÓN SIMPLE

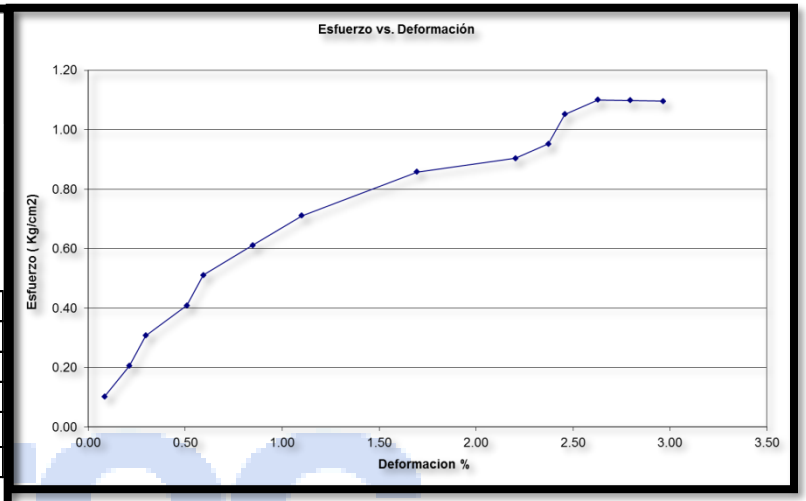
OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

LOCALIZACION: CALLE 91 CRA 17A — APIQUE /PERF: 23

PERFORACIÓN: 23 — APIQUE Nº 23 — Nº LAB: 23

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 449.45 | gr. |
| P. Unitario | 1.92 | gr/cm3 |
| Alt. Final | 11.45 | cm, |

| | | |
|---|---|---|
| γd max | 1.645 | gr/cm3 |
| Gs: | 1605 | |
| W% | 16.54 | % |
| Ang. friccion | 28.55 | º |
| qumax | 1.05 | (Kg/cm2) |
| Cohesión | | |




| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.25 | 0.00212 | 0.99788 | 19.91 | 40 | 4.082 | 0.20 | 0.21 |
| 0.35 | 0.00297 | 0.99703 | 19.93 | 60 | 6.122 | 0.31 | 0.30 |
| 0.6 | 0.00508 | 0.99492 | 19.97 | 80 | 8.163 | 0.41 | 0.51 |
| 0.7 | 0.00593 | 0.99407 | 19.99 | 100 | 10.204 | 0.51 | 0.59 |
| 1 | 0.00847 | 0.99153 | 20.04 | 120 | 12.245 | 0.61 | 0.85 |
| 1.3 | 0.01102 | 0.98898 | 20.09 | 140 | 14.286 | 0.71 | 1.10 |
| 2 | 0.01695 | 0.98305 | 20.21 | 170 | 17.347 | 0.86 | 1.69 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 180 | 18.367 | 0.90 | 2.20 |
| 2.8 | 0.02373 | 0.97627 | 20.35 | 190 | 19.388 | 0.95 | 2.37 |
| 2.9 | 0.02458 | 0.97542 | 20.37 | 210 | 21.429 | 1.05 | 2.46 |
| 3.1 | 0.02627 | 0.97373 | 20.41 | 220 | 22.449 | 1.10 | 2.63 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 220 | 22.449 | 1.10 | 2.80 |
| 3.5 | 0.02966 | 0.97034 | 20.48 | 220 | 22.449 | 1.10 | 2.97 |



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| AP-24 | |
|---|---|

## ENSAYO DE COMPRESIÓN SIMPLE

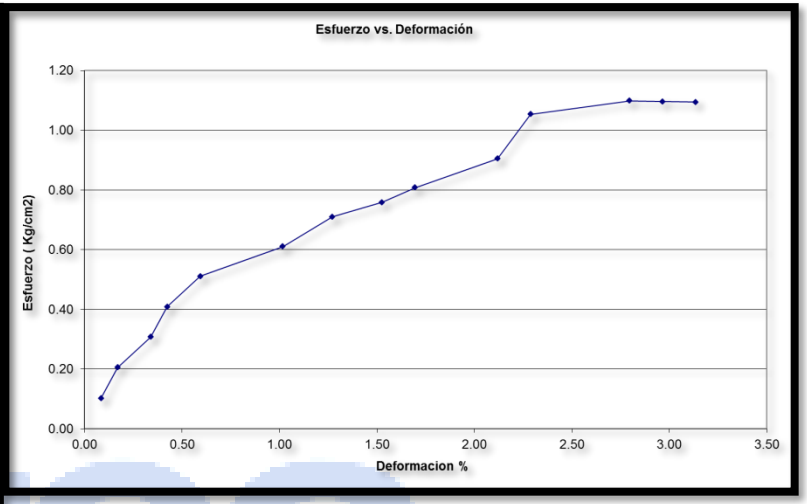
OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

LOCALIZACION: CALLE 91 CRA 19 HACIA LA CL 91 — APIQUE /PERF: 24

PERFORACIÓN: 24 — APIQUE Nº 24 — Nº LAB: 24

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 419.56 | gr. |
| P. Unitario | 1.79 | gr/cm3 |
| Alt. Final | 11.43 | cm, |

| | | |
|---|---|---|
| γd max | 1.479 | gr/cm3 |
| Gs: | 1578 | |
| W% | 21 | % |
| Ang. friccion | 28.56 | º |
| qumax | 1.05 | (Kg/cm2) |
| Cohesión | | |




| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.4 | 0.00339 | 0.99661 | 19.94 | 60 | 6.122 | 0.31 | 0.34 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 80 | 8.163 | 0.41 | 0.42 |
| 0.7 | 0.00593 | 0.99407 | 19.99 | 100 | 10.204 | 0.51 | 0.59 |
| 1.2 | 0.01017 | 0.98983 | 20.08 | 120 | 12.245 | 0.61 | 1.02 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 140 | 14.286 | 0.71 | 1.27 |
| 1.8 | 0.01525 | 0.98475 | 20.18 | 150 | 15.306 | 0.76 | 1.53 |
| 2 | 0.01695 | 0.98305 | 20.21 | 160 | 16.327 | 0.81 | 1.69 |
| 2.5 | 0.02119 | 0.97881 | 20.30 | 180 | 18.367 | 0.90 | 2.12 |
| 2.7 | 0.02288 | 0.97712 | 20.34 | 210 | 21.429 | 1.05 | 2.29 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 220 | 22.449 | 1.10 | 2.80 |
| 3.5 | 0.02966 | 0.97034 | 20.48 | 220 | 22.449 | 1.10 | 2.97 |
| 3.7 | 0.03136 | 0.96864 | 20.51 | 220 | 22.449 | 1.09 | 3.14 |



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AP-25

## ENSAYO DE COMPRESIÓN SIMPLE

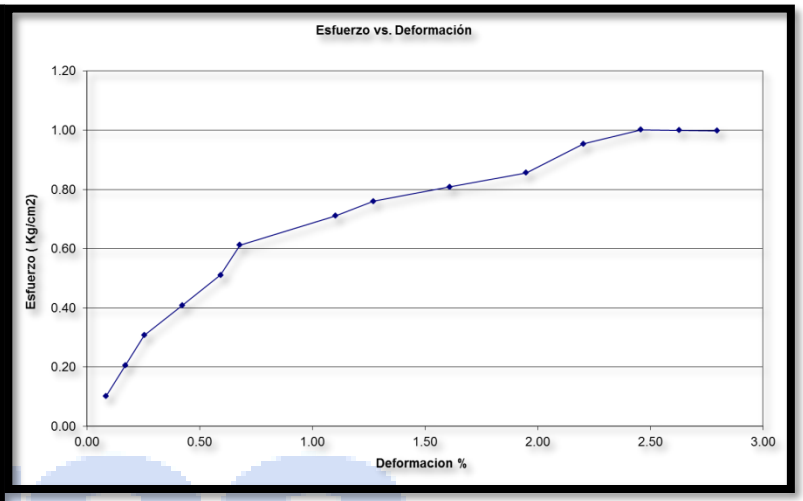
OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

LOCALIZACION: CALLE 91 ENTRE CRA 20 Y CRA 21 — APIQUE /PERF: 25

PERFORACIÓN: 25 — APIQUE Nº 25 — Nº LAB: 25

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 422.77 | gr. |
| P. Unitario | 1.80 | gr/cm3 |
| Alt. Final | 11.47 | cm, |

| | | |
|---|---|---|
| γd max | 1.522 | gr/cm3 |
| Gs: | 1586 | |
| W% | 18.45 | % |
| Ang. friccion | 29.65 | º |
| qumax | 0.95 | (Kg/cm2) |
| Cohesión | | |




| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.3 | 0.00254 | 0.99746 | 19.92 | 60 | 6.122 | 0.31 | 0.25 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 80 | 8.163 | 0.41 | 0.42 |
| 0.7 | 0.00593 | 0.99407 | 19.99 | 100 | 10.204 | 0.51 | 0.59 |
| 0.8 | 0.00678 | 0.99322 | 20.01 | 120 | 12.245 | 0.61 | 0.68 |
| 1.3 | 0.01102 | 0.98898 | 20.09 | 140 | 14.286 | 0.71 | 1.10 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 150 | 15.306 | 0.76 | 1.27 |
| 1.9 | 0.01610 | 0.98390 | 20.20 | 160 | 16.327 | 0.81 | 1.61 |
| 2.3 | 0.01949 | 0.98051 | 20.27 | 170 | 17.347 | 0.86 | 1.95 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 190 | 19.388 | 0.95 | 2.20 |
| 2.9 | 0.02458 | 0.97542 | 20.37 | 200 | 20.408 | 1.00 | 2.46 |
| 3.1 | 0.02627 | 0.97373 | 20.41 | 200 | 20.408 | 1.00 | 2.63 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 200 | 20.408 | 1.00 | 2.80 |



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## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

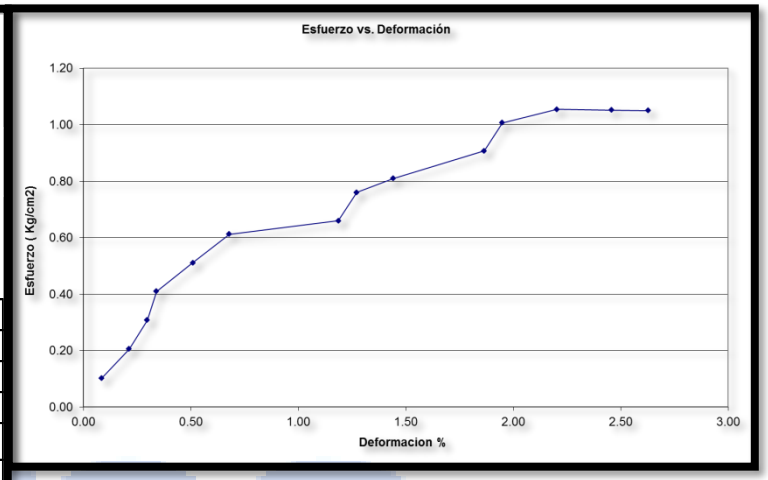
LOCALIZACION: CALLE 91 CRA 21 APIQUE /PERF: 26

PERFORACIÓN: 26 APIQUE Nº 26 Nº LAB: 26

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 429.57 | gr. |
| P. Unitario | 1.83 | gr/cm3 |
| Alt. Final | 11.49 | cm, |

| | | |
|---|---|---|
| γd max | 1.555 | gr/cm3 |
| Gs: | 1603 | |
| W% | 17.85 | % |
| Ang. friccion | 30.41 | º |
| qumax | 1.01 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.25 | 0.00212 | 0.99788 | 19.91 | 40 | 4.082 | 0.20 | 0.21 |
| 0.35 | 0.00297 | 0.99703 | 19.93 | 60 | 6.122 | 0.31 | 0.30 |
| 0.4 | 0.00339 | 0.99661 | 19.94 | 80 | 8.163 | 0.41 | 0.34 |
| 0.6 | 0.00508 | 0.99492 | 19.97 | 100 | 10.204 | 0.51 | 0.51 |
| 0.8 | 0.00678 | 0.99322 | 20.01 | 120 | 12.245 | 0.61 | 0.68 |
| 1.4 | 0.01186 | 0.98814 | 20.11 | 130 | 13.265 | 0.66 | 1.19 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 150 | 15.306 | 0.76 | 1.27 |
| 1.7 | 0.01441 | 0.98559 | 20.16 | 160 | 16.327 | 0.81 | 1.44 |
| 2.2 | 0.01864 | 0.98136 | 20.25 | 180 | 18.367 | 0.91 | 1.86 |
| 2.3 | 0.01949 | 0.98051 | 20.27 | 200 | 20.408 | 1.01 | 1.95 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 210 | 21.429 | 1.05 | 2.20 |
| 2.9 | 0.02458 | 0.97542 | 20.37 | 210 | 21.429 | 1.05 | 2.46 |
| 3.1 | 0.02627 | 0.97373 | 20.41 | 210 | 21.429 | 1.05 | 2.63 |



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AP-27

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

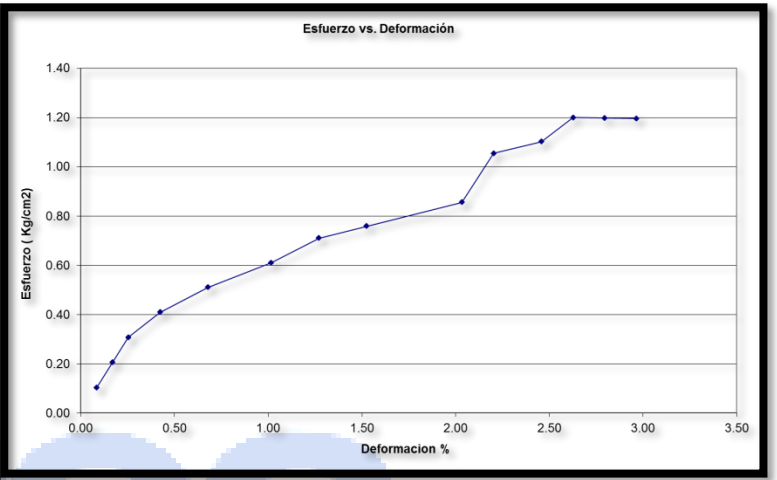
LOCALIZACION: CALLE 91 CRA 22 — APIQUE /PERF: 27

PERFORACIÓN: 27 — APIQUE Nº 27 — Nº LAB: 27

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 452.87 | gr. |
| P. Unitario | 1.93 | gr/cm3 |
| Alt. Final | 11.45 | cm, |

| | | |
|---|---|---|
| γd max | 1.668 | gr/cm3 |
| Gs: | 1642 | |
| W% | 15.78 | % |
| Ang. friccion | 31.25 | º |
| qumax | 1.10 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.3 | 0.00254 | 0.99746 | 19.92 | 60 | 6.122 | 0.31 | 0.25 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 80 | 8.163 | 0.41 | 0.42 |
| 0.8 | 0.00678 | 0.99322 | 20.01 | 100 | 10.204 | 0.51 | 0.68 |
| 1.2 | 0.01017 | 0.98983 | 20.08 | 120 | 12.245 | 0.61 | 1.02 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 140 | 14.286 | 0.71 | 1.27 |
| 1.8 | 0.01525 | 0.98475 | 20.18 | 150 | 15.306 | 0.76 | 1.53 |
| 2.4 | 0.02034 | 0.97966 | 20.28 | 170 | 17.347 | 0.86 | 2.03 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 210 | 21.429 | 1.05 | 2.20 |
| 2.9 | 0.02458 | 0.97542 | 20.37 | 220 | 22.449 | 1.10 | 2.46 |
| 3.1 | 0.02627 | 0.97373 | 20.41 | 240 | 24.490 | 1.20 | 2.63 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 240 | 24.490 | 1.20 | 2.80 |
| 3.5 | 0.02966 | 0.97034 | 20.48 | 240 | 24.490 | 1.20 | 2.97 |



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AP-28

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

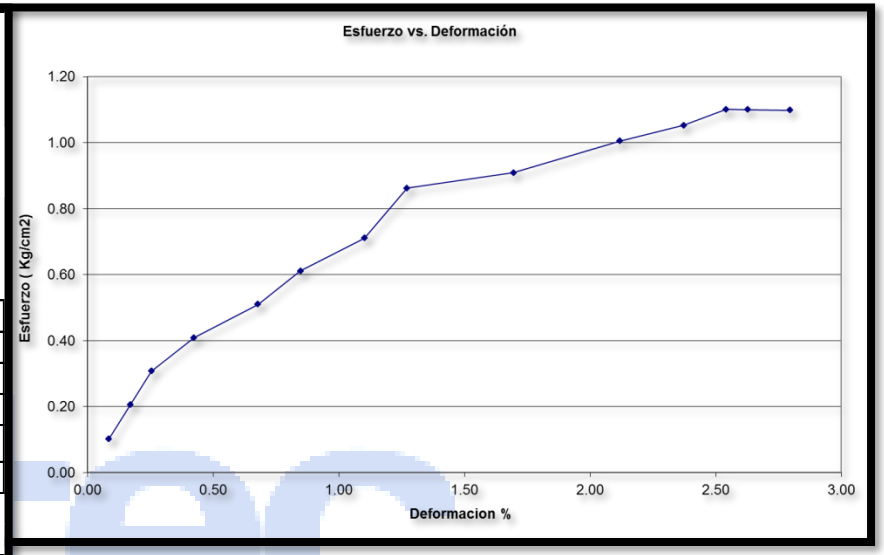
LOCALIZACION: ANTES DE CRUZAR PUENTE HACIA LA LAGUNA — APIQUE /PERF: 28

PERFORACIÓN: 28 — APIQUE Nº 28 — Nº LAB: 28

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 447.52 | gr. |
| P. Unitario | 1.91 | gr/cm3 |
| Alt. Final | 11.47 | cm, |

| | | |
|---|---|---|
| γd max | 1.666 | gr/cm3 |
| Gs: | 1685 | |
| W% | 14.55 | % |
| Ang. friccion | 29.45 | º |
| qumax | 1.05 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.3 | 0.00254 | 0.99746 | 19.92 | 60 | 6.122 | 0.31 | 0.25 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 80 | 8.163 | 0.41 | 0.42 |
| 0.8 | 0.00678 | 0.99322 | 20.01 | 100 | 10.204 | 0.51 | 0.68 |
| 1 | 0.00847 | 0.99153 | 20.04 | 120 | 12.245 | 0.61 | 0.85 |
| 1.3 | 0.01102 | 0.98898 | 20.09 | 140 | 14.286 | 0.71 | 1.10 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 170 | 17.347 | 0.86 | 1.27 |
| 2 | 0.01695 | 0.98305 | 20.21 | 180 | 18.367 | 0.91 | 1.69 |
| 2.5 | 0.02119 | 0.97881 | 20.30 | 200 | 20.408 | 1.01 | 2.12 |
| 2.8 | 0.02373 | 0.97627 | 20.35 | 210 | 21.429 | 1.05 | 2.37 |
| 3 | 0.02542 | 0.97458 | 20.39 | 220 | 22.449 | 1.10 | 2.54 |
| 3.1 | 0.02627 | 0.97373 | 20.41 | 220 | 22.449 | 1.10 | 2.63 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 220 | 22.449 | 1.10 | 2.80 |



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AP-29

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

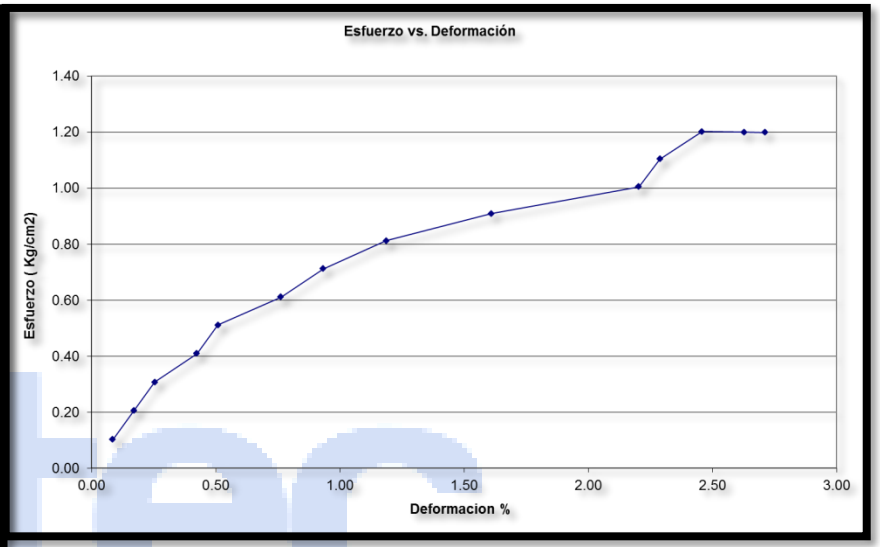
LOCALIZACION: LOTE FUTURA EBAR LA YUQUITA — APIQUE /PERF: 29

PERFORACIÓN: 29 — APIQUE Nº 29 — Nº LAB: 29

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 452.56 | gr. |
| P. Unitario | 1.93 | gr/cm3 |
| Alt. Final | 11.48 | cm, |

| | | |
|---|---|---|
| γd max | 1.715 | gr/cm3 |
| Gs: | 1645 | |
| W% | 12.52 | % |
| Ang. friccion | 28.66 | º |
| qumax | 1.10 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.3 | 0.00254 | 0.99746 | 19.92 | 60 | 6.122 | 0.31 | 0.25 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 80 | 8.163 | 0.41 | 0.42 |
| 0.6 | 0.00508 | 0.99492 | 19.97 | 100 | 10.204 | 0.51 | 0.51 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 120 | 12.245 | 0.61 | 0.76 |
| 1.1 | 0.00932 | 0.99068 | 20.06 | 140 | 14.286 | 0.71 | 0.93 |
| 1.4 | 0.01186 | 0.98814 | 20.11 | 160 | 16.327 | 0.81 | 1.19 |
| 1.9 | 0.01610 | 0.98390 | 20.20 | 180 | 18.367 | 0.91 | 1.61 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 200 | 20.408 | 1.00 | 2.20 |
| 2.7 | 0.02288 | 0.97712 | 20.34 | 220 | 22.449 | 1.10 | 2.29 |
| 2.9 | 0.02458 | 0.97542 | 20.37 | 240 | 24.490 | 1.20 | 2.46 |
| 3.1 | 0.02627 | 0.97373 | 20.41 | 240 | 24.490 | 1.20 | 2.63 |
| 3.2 | 0.02712 | 0.97288 | 20.43 | 240 | 24.490 | 1.20 | 2.71 |



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| AP-30 | Consoiltec s.a.s Ingenieros consultores y constructores |
|---|---|

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

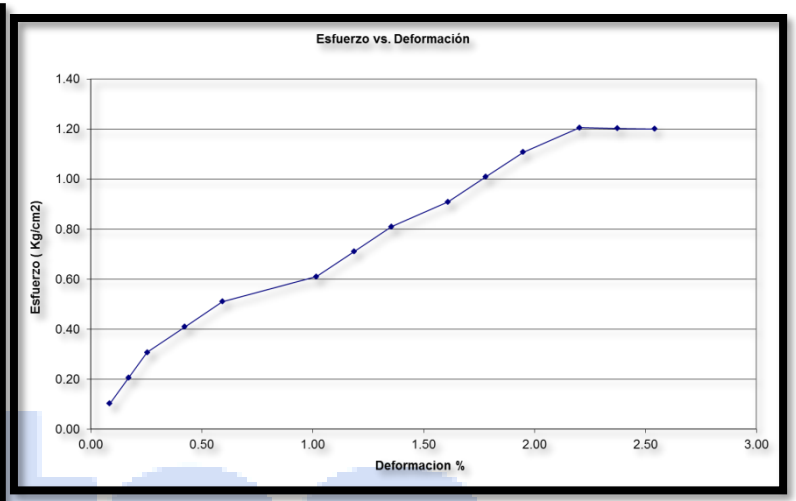
LOCALIZACION: LOTE FUTURA EBAR LA YUQUITA — APIQUE /PERF: 30

PERFORACIÓN: 30 — APIQUE Nº 30 — Nº LAB: 30

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 448.75 | gr. |
| P. Unitario | 1.91 | gr/cm3 |
| Alt. Final | 11.50 | cm, |

| | | |
|---|---|---|
| γd max | 1.638 | gr/cm3 |
| Gs: | 1625 | |
| W% | 16.85 | % |
| Ang. friccion | 29.55 | º |
| qumax | 1.11 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.3 | 0.00254 | 0.99746 | 19.92 | 60 | 6.122 | 0.31 | 0.25 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 80 | 8.163 | 0.41 | 0.42 |
| 0.7 | 0.00593 | 0.99407 | 19.99 | 100 | 10.204 | 0.51 | 0.59 |
| 1.2 | 0.01017 | 0.98983 | 20.08 | 120 | 12.245 | 0.61 | 1.02 |
| 1.4 | 0.01186 | 0.98814 | 20.11 | 140 | 14.286 | 0.71 | 1.19 |
| 1.6 | 0.01356 | 0.98644 | 20.14 | 160 | 16.327 | 0.81 | 1.36 |
| 1.9 | 0.01610 | 0.98390 | 20.20 | 180 | 18.367 | 0.91 | 1.61 |
| 2.1 | 0.01780 | 0.98220 | 20.23 | 200 | 20.408 | 1.01 | 1.78 |
| 2.3 | 0.01949 | 0.98051 | 20.27 | 220 | 22.449 | 1.11 | 1.95 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 240 | 24.490 | 1.21 | 2.20 |
| 2.8 | 0.02373 | 0.97627 | 20.35 | 240 | 24.490 | 1.20 | 2.37 |
| 3 | 0.02542 | 0.97458 | 20.39 | 240 | 24.490 | 1.20 | 2.54 |



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| AP-31 | Consoiltec s.a.s Ingenieros consultores y constructores |
|---|---|

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

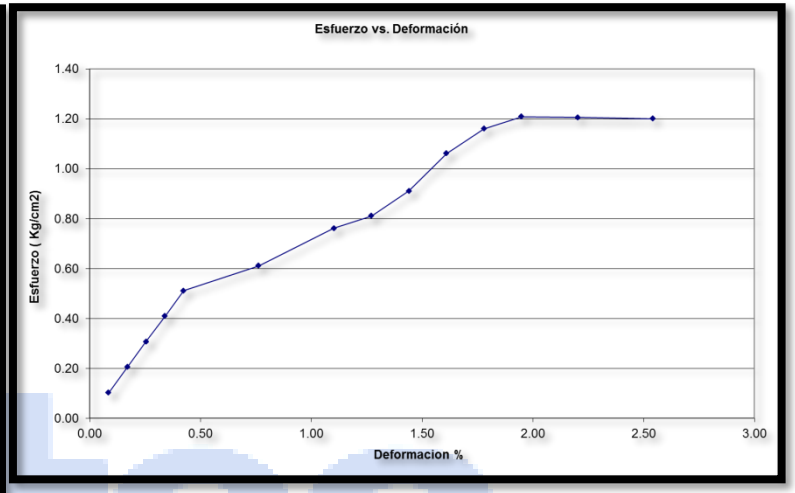
LOCALIZACION: CALLE 98 C CRA 11 — APIQUE /PERF: 31

PERFORACIÓN: 31 — APIQUE Nº 31 — Nº LAB: 31

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 425.86 | gr. |
| P. Unitario | 1.82 | gr/cm3 |
| Alt. Final | 11.50 | cm, |

| | | |
|---|---|---|
| γd max | 1.590 | gr/cm3 |
| Gs: | 1655 | |
| W% | 14.25 | % |
| Ang. friccion | 28.75 | º |
| qumax | 1.16 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.3 | 0.00254 | 0.99746 | 19.92 | 60 | 6.122 | 0.31 | 0.25 |
| 0.4 | 0.00339 | 0.99661 | 19.94 | 80 | 8.163 | 0.41 | 0.34 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 100 | 10.204 | 0.51 | 0.42 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 120 | 12.245 | 0.61 | 0.76 |
| 1.3 | 0.01102 | 0.98898 | 20.09 | 150 | 15.306 | 0.76 | 1.10 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 160 | 16.327 | 0.81 | 1.27 |
| 1.7 | 0.01441 | 0.98559 | 20.16 | 180 | 18.367 | 0.91 | 1.44 |
| 1.9 | 0.01610 | 0.98390 | 20.20 | 210 | 21.429 | 1.06 | 1.61 |
| 2.1 | 0.01780 | 0.98220 | 20.23 | 230 | 23.469 | 1.16 | 1.78 |
| 2.3 | 0.01949 | 0.98051 | 20.27 | 240 | 24.490 | 1.21 | 1.95 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 240 | 24.490 | 1.21 | 2.20 |
| 3 | 0.02542 | 0.97458 | 20.39 | 240 | 24.490 | 1.20 | 2.54 |



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AP-32

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

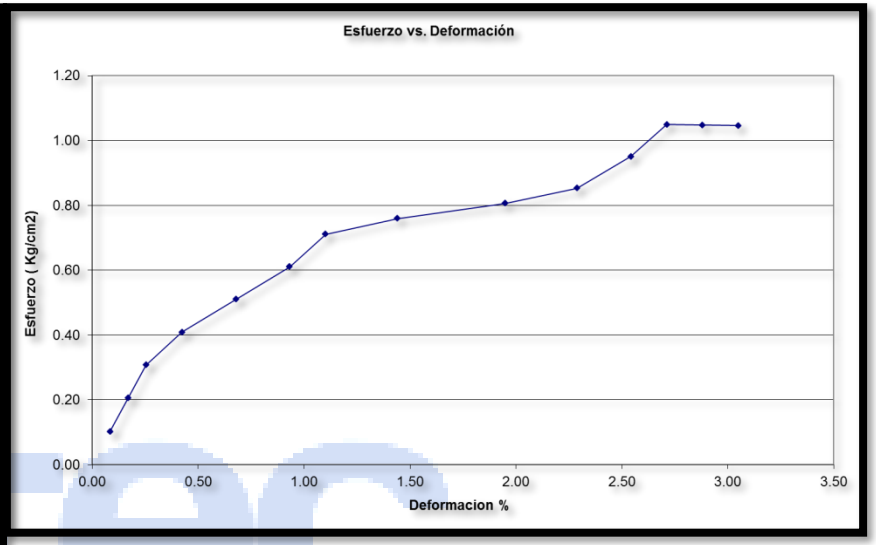
LOCALIZACION: CALLE 96 A CRA 17 — APIQUE /PERF: 32

PERFORACIÓN: 32 — APIQUE Nº 32 — Nº LAB: 32

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 452.12 | gr. |
| P. Unitario | 1.93 | gr/cm3 |
| Alt. Final | 11.44 | cm, |

| | | |
|---|---|---|
| γd max | 1.673 | gr/cm3 |
| Gs: | 1635 | |
| W% | 15.25 | % |
| Ang. friccion | 29.74 | º |
| qumax | 0.95 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.3 | 0.00254 | 0.99746 | 19.92 | 60 | 6.122 | 0.31 | 0.25 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 80 | 8.163 | 0.41 | 0.42 |
| 0.8 | 0.00678 | 0.99322 | 20.01 | 100 | 10.204 | 0.51 | 0.68 |
| 1.1 | 0.00932 | 0.99068 | 20.06 | 120 | 12.245 | 0.61 | 0.93 |
| 1.3 | 0.01102 | 0.98898 | 20.09 | 140 | 14.286 | 0.71 | 1.10 |
| 1.7 | 0.01441 | 0.98559 | 20.16 | 150 | 15.306 | 0.76 | 1.44 |
| 2.3 | 0.01949 | 0.98051 | 20.27 | 160 | 16.327 | 0.81 | 1.95 |
| 2.7 | 0.02288 | 0.97712 | 20.34 | 170 | 17.347 | 0.85 | 2.29 |
| 3 | 0.02542 | 0.97458 | 20.39 | 190 | 19.388 | 0.95 | 2.54 |
| 3.2 | 0.02712 | 0.97288 | 20.43 | 210 | 21.429 | 1.05 | 2.71 |
| 3.4 | 0.02881 | 0.97119 | 20.46 | 210 | 21.429 | 1.05 | 2.88 |
| 3.6 | 0.03051 | 0.96949 | 20.50 | 210 | 21.429 | 1.05 | 3.05 |



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| AP-33 | Consoiltec s.a.s Ingenieros consultores y constructores |
|---|---|

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

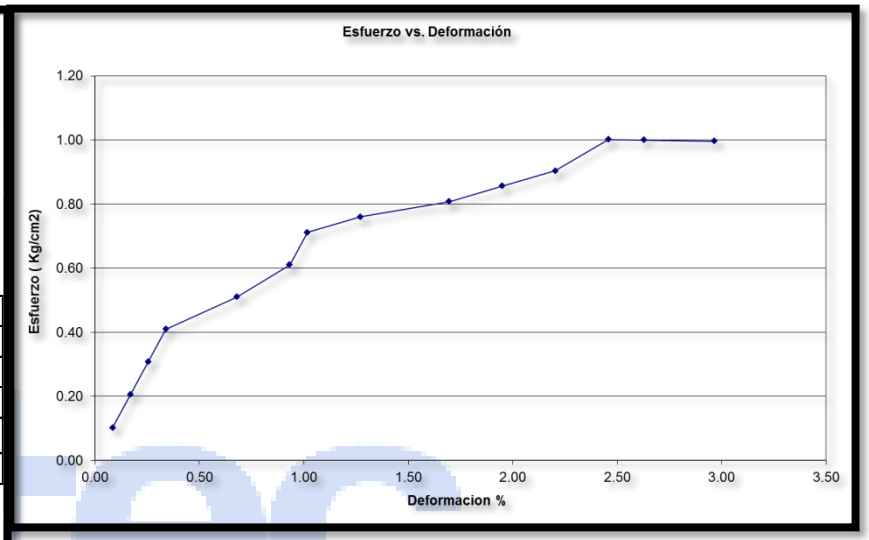
LOCALIZACION: CALLE 96 A CRA 21 — APIQUE /PERF: 33

PERFORACIÓN: 33 — APIQUE Nº 33 — Nº LAB: 33

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 235.47 | cm3, |
| P. Humedo | 447.25 | gr. |
| P. Unitario | 1.90 | gr/cm3 |
| Alt. Final | 11.45 | cm, |

| | | |
|---|---|---|
| γd max | 1.659 | gr/cm3 |
| Gs: | 1653 | |
| W% | 14.52 | % |
| Ang. friccion | 30.21 | º |
| qumax | 0.90 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.3 | 0.00254 | 0.99746 | 19.92 | 60 | 6.122 | 0.31 | 0.25 |
| 0.4 | 0.00339 | 0.99661 | 19.94 | 80 | 8.163 | 0.41 | 0.34 |
| 0.8 | 0.00678 | 0.99322 | 20.01 | 100 | 10.204 | 0.51 | 0.68 |
| 1.1 | 0.00932 | 0.99068 | 20.06 | 120 | 12.245 | 0.61 | 0.93 |
| 1.2 | 0.01017 | 0.98983 | 20.08 | 140 | 14.286 | 0.71 | 1.02 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 150 | 15.306 | 0.76 | 1.27 |
| 2 | 0.01695 | 0.98305 | 20.21 | 160 | 16.327 | 0.81 | 1.69 |
| 2.3 | 0.01949 | 0.98051 | 20.27 | 170 | 17.347 | 0.86 | 1.95 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 180 | 18.367 | 0.90 | 2.20 |
| 2.9 | 0.02458 | 0.97542 | 20.37 | 200 | 20.408 | 1.00 | 2.46 |
| 3.1 | 0.02627 | 0.97373 | 20.41 | 200 | 20.408 | 1.00 | 2.63 |
| 3.5 | 0.02966 | 0.97034 | 20.48 | 200 | 20.408 | 1.00 | 2.97 |



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| AP-34 | |
|---|---|

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

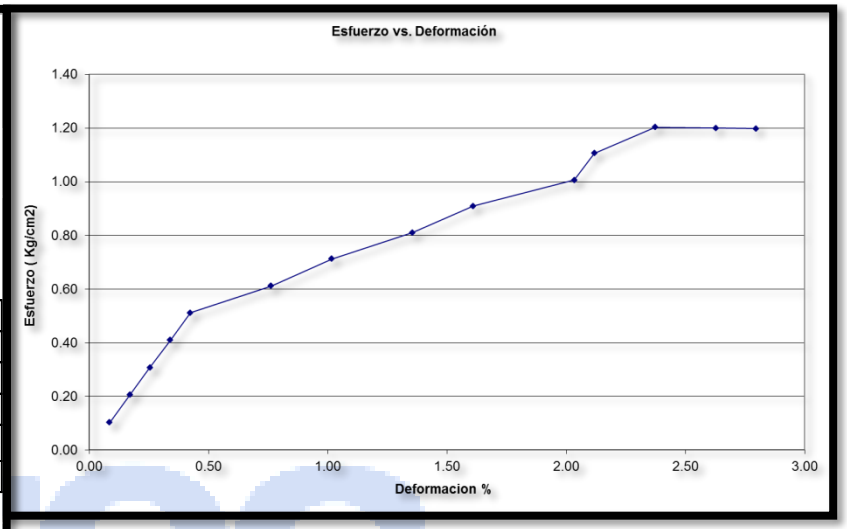
LOCALIZACION: CALLE 94 CR 17 A — APIQUE /PERF: 34

PERFORACIÓN: 34 — APIQUE Nº 34 — Nº LAB: 34

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 235.47 | cm3, |
| P. Humedo | 442.57 | gr. |
| P. Unitario | 1.88 | gr/cm3 |
| Alt. Final | 11.47 | cm, |

| | | |
|---|---|---|
| γd max | 1.622 | gr/cm3 |
| Gs: | 1596 | |
| W% | 15.88 | % |
| Ang. friccion | 29.45 | º |
| qumax | 1.11 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.3 | 0.00254 | 0.99746 | 19.92 | 60 | 6.122 | 0.31 | 0.25 |
| 0.4 | 0.00339 | 0.99661 | 19.94 | 80 | 8.163 | 0.41 | 0.34 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 100 | 10.204 | 0.51 | 0.42 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 120 | 12.245 | 0.61 | 0.76 |
| 1.2 | 0.01017 | 0.98983 | 20.08 | 140 | 14.286 | 0.71 | 1.02 |
| 1.6 | 0.01356 | 0.98644 | 20.14 | 160 | 16.327 | 0.81 | 1.36 |
| 1.9 | 0.01610 | 0.98390 | 20.20 | 180 | 18.367 | 0.91 | 1.61 |
| 2.4 | 0.02034 | 0.97966 | 20.28 | 200 | 20.408 | 1.01 | 2.03 |
| 2.5 | 0.02119 | 0.97881 | 20.30 | 220 | 22.449 | 1.11 | 2.12 |
| 2.8 | 0.02373 | 0.97627 | 20.35 | 240 | 24.490 | 1.20 | 2.37 |
| 3.1 | 0.02627 | 0.97373 | 20.41 | 240 | 24.490 | 1.20 | 2.63 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 240 | 24.490 | 1.20 | 2.80 |



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AP-35

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

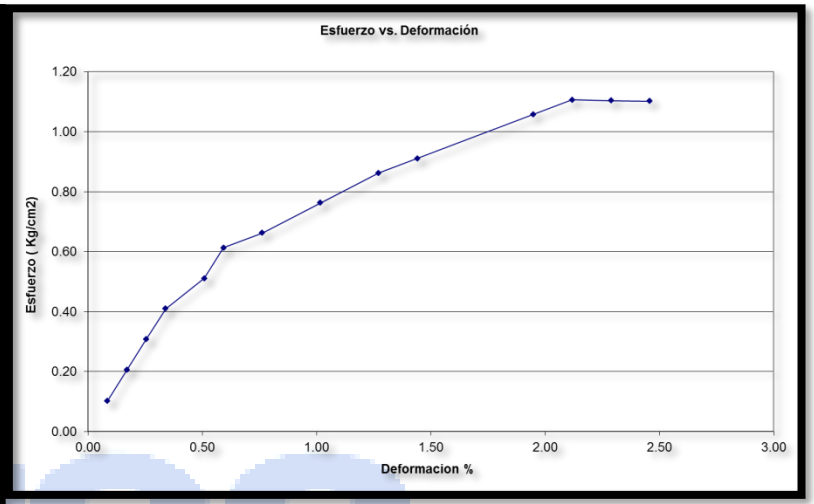
LOCALIZACION: CALLE 94 CRA 21 — APIQUE /PERF: 35

PERFORACIÓN: 35 — APIQUE Nº 35 — Nº LAB: 35

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 445.26 | gr. |
| P. Unitario | 1.90 | gr/cm3 |
| Alt. Final | 11.51 | cm, |

| | | |
|---|---|---|
| γd max | 1.602 | gr/cm3 |
| Gs: | 1645 | |
| W% | 18.52 | % |
| Ang. friccion | 28.56 | º |
| qumax | 1.06 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.3 | 0.00254 | 0.99746 | 19.92 | 60 | 6.122 | 0.31 | 0.25 |
| 0.4 | 0.00339 | 0.99661 | 19.94 | 80 | 8.163 | 0.41 | 0.34 |
| 0.6 | 0.00508 | 0.99492 | 19.97 | 100 | 10.204 | 0.51 | 0.51 |
| 0.7 | 0.00593 | 0.99407 | 19.99 | 120 | 12.245 | 0.61 | 0.59 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 130 | 13.265 | 0.66 | 0.76 |
| 1.2 | 0.01017 | 0.98983 | 20.08 | 150 | 15.306 | 0.76 | 1.02 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 170 | 17.347 | 0.86 | 1.27 |
| 1.7 | 0.01441 | 0.98559 | 20.16 | 180 | 18.367 | 0.91 | 1.44 |
| 2.3 | 0.01949 | 0.98051 | 20.27 | 210 | 21.429 | 1.06 | 1.95 |
| 2.5 | 0.02119 | 0.97881 | 20.30 | 220 | 22.449 | 1.11 | 2.12 |
| 2.7 | 0.02288 | 0.97712 | 20.34 | 220 | 22.449 | 1.10 | 2.29 |
| 2.9 | 0.02458 | 0.97542 | 20.37 | 220 | 22.449 | 1.10 | 2.46 |



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|---|---|

## ENSAYO DE COMPRESIÓN SIMPLE

OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

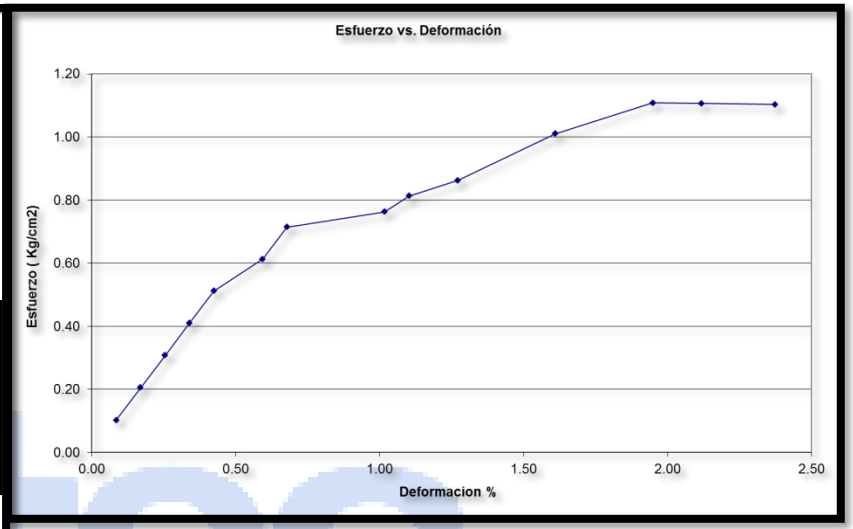
LOCALIZACION: CRA 10 ENTRE CL 102 Y 101 SECTOR PLAZA DE MERCADO — APIQUE /PERF: 36

PERFORACIÓN: 36 — APIQUE Nº 36 — Nº LAB: 36

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 456.25 | gr. |
| P. Unitario | 1.95 | gr/cm3 |
| Alt. Final | 11.52 | cm, |

| | | |
|---|---|---|
| γd max | 1.651 | gr/cm3 |
| Gs: | 1623 | |
| W% | 17.85 | % |
| Ang. friccion | 27.85 | º |
| qumax | 1.01 | (Kg/cm2) |
| Cohesión | | |

| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.1 | 0.00085 | 0.99915 | 19.89 | 20 | 2.041 | 0.10 | 0.08 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.3 | 0.00254 | 0.99746 | 19.92 | 60 | 6.122 | 0.31 | 0.25 |
| 0.4 | 0.00339 | 0.99661 | 19.94 | 80 | 8.163 | 0.41 | 0.34 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 100 | 10.204 | 0.51 | 0.42 |
| 0.7 | 0.00593 | 0.99407 | 19.99 | 120 | 12.245 | 0.61 | 0.59 |
| 0.8 | 0.00678 | 0.99322 | 20.01 | 140 | 14.286 | 0.71 | 0.68 |
| 1.2 | 0.01017 | 0.98983 | 20.08 | 150 | 15.306 | 0.76 | 1.02 |
| 1.3 | 0.01102 | 0.98898 | 20.09 | 160 | 16.327 | 0.81 | 1.10 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 170 | 17.347 | 0.86 | 1.27 |
| 1.9 | 0.01610 | 0.98390 | 20.20 | 200 | 20.408 | 1.01 | 1.61 |
| 2.3 | 0.01949 | 0.98051 | 20.27 | 220 | 22.449 | 1.11 | 1.95 |
| 2.5 | 0.02119 | 0.97881 | 20.30 | 220 | 22.449 | 1.11 | 2.12 |
| 2.8 | 0.02373 | 0.97627 | 20.35 | 220 | 22.449 | 1.10 | 2.37 |



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AP-37

## ENSAYO DE COMPRESIÓN SIMPLE

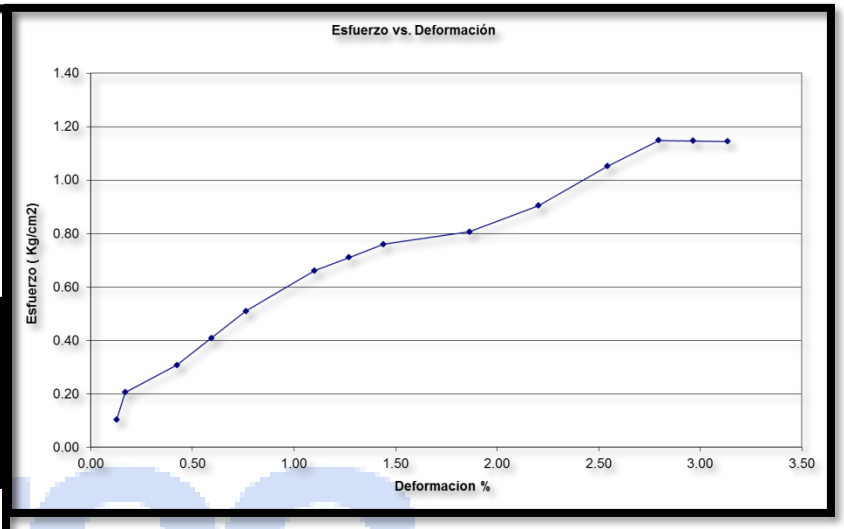
OBRA: REPOSICION Y OPTIMIZACION SISTEMA ALCANTARILLADO MUNICIPIO DE TURBO

LOCALIZACION: CALLE 101 CRA 8B SECTOR PLAZA DE MERCADO — APIQUE /PERF: 37

PERFORACIÓN: 37 — APIQUE Nº 37 — Nº LAB: 37

| | | |
|---|---|---|
| Diámetro | 5.03 | cm. |
| Alt. Inicial | 11.8 | cm. |
| Area | 19.87 | cm2, |
| Volumen | 234.48 | cm3, |
| P. Humedo | 463.25 | gr. |
| P. Unitario | 1.98 | gr/cm3 |
| Alt. Final | 11.43 | cm, |

| | | |
|---|---|---|
| γd max | 1.682 | gr/cm3 |
| Gs: | 1625 | |
| W% | 17.45 | % |
| Ang. friccion | 30.25 | º |
| qumax | 1.05 | (Kg/cm2) |
| Cohesión | | |




| Δh (m.m.) | ε | 1-ε | Ac (cm2) | C (Nw) | C (kg) | σ (Kg/cm2) | ε % |
|---|---|---|---|---|---|---|---|
| 0.15 | 0.00127 | 0.99873 | 19.90 | 20 | 2.041 | 0.10 | 0.13 |
| 0.2 | 0.00169 | 0.99831 | 19.91 | 40 | 4.082 | 0.21 | 0.17 |
| 0.5 | 0.00424 | 0.99576 | 19.96 | 60 | 6.122 | 0.31 | 0.42 |
| 0.7 | 0.00593 | 0.99407 | 19.99 | 80 | 8.163 | 0.41 | 0.59 |
| 0.9 | 0.00763 | 0.99237 | 20.02 | 100 | 10.204 | 0.51 | 0.76 |
| 1.3 | 0.01102 | 0.98898 | 20.09 | 130 | 13.265 | 0.66 | 1.10 |
| 1.5 | 0.01271 | 0.98729 | 20.13 | 140 | 14.286 | 0.71 | 1.27 |
| 1.7 | 0.01441 | 0.98559 | 20.16 | 150 | 15.306 | 0.76 | 1.44 |
| 2.2 | 0.01864 | 0.98136 | 20.25 | 160 | 16.327 | 0.81 | 1.86 |
| 2.6 | 0.02203 | 0.97797 | 20.32 | 180 | 18.367 | 0.90 | 2.20 |
| 3 | 0.02542 | 0.97458 | 20.39 | 210 | 21.429 | 1.05 | 2.54 |
| 3.3 | 0.02797 | 0.97203 | 20.44 | 230 | 23.469 | 1.15 | 2.80 |
| 3.5 | 0.02966 | 0.97034 | 20.48 | 230 | 23.469 | 1.15 | 2.97 |
| 3.7 | 0.03136 | 0.96864 | 20.51 | 230 | 23.469 | 1.14 | 3.14 |



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