
VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A.
Superintendência de Planejamento
e Desenvolvimento

**ESTUDOS DE VIABILIDADE
TÉCNICA, ECONÔMICA E AMBIENTAL**

Ferrovia: EF-151/FNS

Trecho: Açailândia (MA) - Belém (PA)

RELATÓRIO FINAL
Volume 2.6 - Estudos de Engenharia
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QUADRO DE CURVAS - ALTERNATIVA 3

| CURVA Nº | DEFLEXÃO AC | T | Transição | | | | Curva Circular | | | | Quilômetro | | | | Coordenadas | | | | |
|----------|--------------|---------|-----------|-------|---------|--------|----------------|--------------|---------|------------|------------|------------|------------|-----|-------------|-------------|-------------|-------------|-------------|
| | | | Lc | Sc | Xc | Yc | R | θ | Dc | TS/PC | SC | CS | ST/PT | Pto | PI | TS/PC | SC | CS | ST/PT |
| 1 | 19°8'13.88" | 223.195 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 16°8'14.01" | 322.749 | 0+545.324 | 0+605.324 | 0+928.73 | 0+988.73 | N | 9454956 | 9454763.946 | 9454815.838 | 9455116.031 | 9455174.72 |
| | | | | | | | | | | | | | | E | 234553.503 | 234667.219 | 234637.102 | 234521.499 | 234509.032 |
| 2 | 41°28'53.75" | 231.749 | 200 | 0.291 | 198.315 | 19.273 | 343.823 | 8°9'10.62" | 48.925 | 1+715.393 | 1+915.393 | 1+964.318 | 2+164.318 | N | 9456114.559 | 9456887.457 | 9456085.635 | 9456133.883 | 9456315.282 |
| | | | | | | | | | | | | | | E | 234317.942 | 234364.117 | 234343.49 | 234351.346 | 234433.777 |
| 3 | 59°1'5.14" | 365.077 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 44°56'8.2" | 414.815 | 3+281.875 | 3+411.875 | 3+826.690 | 3+956.690 | N | 9457599.425 | 9457283.224 | 9457398.309 | 9457802.56 | 9457918.638 |
| | | | | | | | | | | | | | | E | 235174.842 | 234992.366 | 235052.638 | 235056.023 | 234997.686 |
| 4 | 42°25'13.83" | 270.746 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 28°20'16.89" | 261.598 | 4+239.732 | 4+369.732 | 4+631.329 | 4+761.329 | N | 9458402.854 | 9458166.122 | 9458282.2 | 9458538.732 | 9458666.239 |
| | | | | | | | | | | | | | | E | 234728.956 | 234860.338 | 234802.001 | 234766.773 | 234791.661 |
| 5 | 88°33'49.11" | 582.085 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 74°28'52.16" | 687.56 | 5+516.13 | 5+646.13 | 6+333.572 | 6+463.572 | N | 9459966.662 | 9459400.403 | 9459527.91 | 9460077.263 | 9460115.624 |
| | | | | | | | | | | | | | | E | 235101.254 | 234966.444 | 234991.331 | 234662.672 | 234538.552 |
| 6 | 65°4'54.25" | 403.304 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 50°59'57.31" | 470.791 | 6+730.894 | 6+860.894 | 7+331.685 | 7+461.685 | N | 9460287.244 | 9460184.034 | 9460222.395 | 9460557.445 | 9460684.309 |
| | | | | | | | | | | | | | | E | 233890.258 | 234280.131 | 234156.011 | 233847.576 | 233819.596 |
| 7 | 41°23'57.1" | 310.027 | 100 | 0.073 | 99.947 | 2.423 | 687.574 | 33°3'58.17" | 396.808 | 8+530.683 | 8+630.683 | 9+027.491 | 9+127.491 | N | 9462042.003 | 9461736.771 | 9461834.748 | 9462170.913 | 9462235.042 |
| | | | | | | | | | | | | | | E | 233577.98 | 233632.299 | 233612.402 | 233412.084 | 233335.384 |
| 8 | 53°54'29.69" | 399.943 | 100 | 0.073 | 99.947 | 2.423 | 687.574 | 45°34'30.76" | 546.922 | 10+963.252 | 11+063.252 | 11+610.174 | 11+710.174 | N | 9463627.108 | 9463378.082 | 9463442.211 | 9463926.734 | 9464026.694 |
| | | | | | | | | | | | | | | E | 231585.949 | 231898.904 | 231822.204 | 231601.029 | 231602.825 |
| 9 | 12°34'47.6" | 156.322 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 9°34'47.73" | 191.601 | 12+209.67 | 12+269.67 | 12+460.668 | 12+520.668 | N | 9464681.325 | 9464525.142 | 9464585.062 | 9464774.234 | 9464832.322 |
| | | | | | | | | | | | | | | E | 231630.472 | 231623.876 | 231626.93 | 231655.906 | 231670.926 |
| 10 | 19°3'2.18" | 222.304 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 16°3'2.32" | 321.017 | 14+072.659 | 14+132.659 | 14+453.676 | 14+513.676 | N | 9466546.174 | 9466331.443 | 9466389.26 | 9466680.364 | 9466730.367 |
| | | | | | | | | | | | | | | E | 232130.094 | 232072.564 | 232088.596 | 23221.405 | 232254.562 |
| 11 | 84°10'2.73" | 543.808 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 70°5'5.79" | 646.977 | 15+879.259 | 16+009.259 | 16+656.236 | 16+786.236 | N | 9468312.414 | 9467861.836 | 9467972.365 | 9468573.791 | 9468661.104 |
| | | | | | | | | | | | | | | E | 233323.629 | 233019.151 | 233087.42 | 233002.522 | 232906.325 |
| 12 | 69°30'58.34" | 527.543 | 100 | 0.073 | 99.947 | 2.423 | 687.574 | 61°10'59.42" | 734.224 | 18+957.5 | 19+057.5 | 19+791.230 | 19+891.230 | N | 9470391.263 | 9470053.002 | 9470118.948 | 9470793.782 | 9470888.86 |
| | | | | | | | | | | | | | | E | 230835.712 | 231240.534 | 231165.391 | 230980.011 | 231010.92 |
| 13 | 40°27'25.76" | 260.36 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 26°22'28.82" | 243.473 | 20+938.342 | 21+068.342 | 21+311.815 | 21+441.815 | N | 9472122.116 | 9471876.535 | 9472000.737 | 9472242.041 | 9472365.087 |
| | | | | | | | | | | | | | | E | 231445.16 | 231358.688 | 231396.781 | 231393.281 | 231351.602 |
| 14 | 45°3'45.08" | 335.485 | 100 | 0.073 | 99.947 | 2.423 | 687.574 | 36°43'46.16" | 440.77 | 21+891.357 | 21+991.357 | 22+432.127 | 22+532.127 | N | 9473097.679 | 9472784.602 | 9472878.744 | 9473311.863 | 9473404.152 |
| | | | | | | | | | | | | | | E | 231069.512 | 231190.065 | 231156.411 | 231167.539 | 231205.982 |
| 15 | 11°53'56.65" | 149.435 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 8°53'56.78" | 177.984 | 23+351.992 | 23+411.992 | 23+589.977 | 23+649.977 | N | 9474289.632 | 9474153.12 | 9474207.714 | 9474361.772 | 9474410.677 |
| | | | | | | | | | | | | | | E | 231600.278 | 231539.49 | 231564.374 | 231653.149 | 231687.906 |
| 16 | 32°54'45.17" | 368.527 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 29°54'45.31" | 598.259 | 26+156.877 | 26+216.877 | 26+815.136 | 26+875.136 | N | 9476739.833 | 9476441.319 | 9476490.224 | 9477047.972 | 9477107.859 |
| | | | | | | | | | | | | | | E | 233374.06 | 233157.955 | 233192.713 | 233389.628 | 233393.28 |
| 17 | 23°35'23.88" | 269.319 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 20°35'24.02" | 411.805 | 29+034.354 | 29+094.354 | 29+506.159 | 29+566.159 | N | 9479533.091 | 9479264.138 | 9479324.025 | 9479720.057 | 9479773.947 |
| | | | | | | | | | | | | | | E | 233519.934 | 233505.888 | 233509.54 | 233614.062 | 233640.438 |
| 18 | 21°39'2.47" | 249.148 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 18°39'2.61" | 373.019 | 30+881.146 | 30+941.146 | 31+314.165 | 31+374.165 | N | 9481172.775 | 9480949.959 | 9481003.38 | 9481298.386 | 9481338.743 |
| | | | | | | | | | | | | | | E | 234340.291 | 234228.813 | 234256.126 | 234481.715 | 234526.112 |
| 19 | 48°50'31.65" | 305.733 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 34°45'34.71" | 320.878 | 32+077.621 | 32+207.621 | 32+528.499 | 32+658.499 | N | 9482011.004 | 9481807.343 | 9481897.778 | 9482186.866 | 9482316.719 |
| | | | | | | | | | | | | | | E | 235278.792 | 235050.768 | 235144.036 | 235271.594 | 235275.526 |
| 20 | 21°40'21.19" | 166.465 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 7°35'24.25" | 70.066 | 33+247.296 | 33+377.296 | 33+447.363 | 33+577.363 | N | 9483071.939 | 9482905.483 | 9483035.336 | 9483104.24 | 9483227.284 |
| | | | | | | | | | | | | | | E | 235267.459 | 235269.237 | 235273.17 | 235285.598 | 235327.279 |

QUADRO DE CURVAS - ALTERNATIVA 3

| CURVA Nº | DEFLEXÃO AC | T | Transição | | | | Curva Circular | | | | Quilômetro | | | | Coordenadas | | | |
|----------|---------------|---------|-----------|-------|---------|-------|----------------|--------------|----------|-------------|-------------|-------------|-------------|-------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| | | | Lc | Sc | Xc | Yc | R | θ | Dc | TS/PC | SC | CS | ST/PT | Pto | PI | TS/PC | SC | CS |
| 21 | 37°22'11.19" | 417.583 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 34°22'11.33" | 687.405 | 38+179.46 | 38+239.46 | 38+926.451 | 38+986.451 | N 9487911.269 E 237130.975 | 9487521.58 236980.915 | 9487577.756 237001.986 | 9488254.319 237030.055 | 9488312.048 237013.709 |
| 22 | 39°22'33.33" | 440.077 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 36°22'33.46" | 727.528 | 43+970.412 | 44+030.412 | 44+757.941 | 44+817.941 | N 9493517.824 E 235490.525 | 9493095.456 235614.108 | 9493153.184 235597.762 | 9493867.312 235639.924 | 9493922.716 235662.948 |
| 23 | 42°15'41.51" | 472.935 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 39°15'41.64" | 785.241 | 47+301.132 | 47+361.132 | 48+146.374 | 48+206.374 | N 9496642.498 E 236821.166 | 9496207.375 236635.869 | 9496262.779 236658.894 | 9497032.308 236684.905 | 9497089.14 236665.674 |
| 24 | 13°29'20.05" | 286.034 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 12°44'20.06" | 509.588 | 51+605.469 | 51+635.469 | 52+145.26 | 52+175.26 | N 9500569.399 E 235454.073 | 9500299.266 235548.116 | 9500327.62 235538.314 | 9500824.17 235428.683 | 9500854.015 235425.635 |
| 25 | 33°20'0.65" | 373.109 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 30°20'0.79" | 606.679 | 54+270.210 | 54+330.210 | 54+936.888 | 54+996.888 | N 9503310.078 E 235180.231 | 9502938.818 235217.327 | 9502998.464 235210.841 | 9503552.948 234982.608 | 9503599.877 234945.226 |
| 26 | 35°31'16.95" | 397.092 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 32°31'17.09" | 650.436 | 58+634.151 | 58+694.151 | 59+344.587 | 59+404.587 | N 9506733.411 E 232404.168 | 9506424.985 232654.278 | 9506471.914 232616.896 | 9507069.904 232384.005 | 9507129.755 232379.801 |
| 27 | 70°3'26.2" | 833.334 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 67°3'26.34" | 1341.163 | 77+617.488 | 77+677.488 | 79+018.651 | 79+078.651 | N 9526140.097 E 231211.065 | 9525308.334 231262.201 | 9525368.249 231259.042 | 9526447.499 231920.682 | 9526471.865 231975.509 |
| 28 | 13°30'35.76" | 286.46 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 12°45'35.77" | 510.399 | 80+816.912 | 80+846.912 | 81+357.311 | 81+387.311 | N 9527277.95 E 233832.852 | 9527163.904 233570.073 | 9527175.907 233597.567 | 9527432.239 234037.71 | 9527450.229 234061.718 |
| 29 | 30°59'0.47" | 650.231 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 30°14'0.48" | 1209.342 | 84+812.15 | 84+842.15 | 86+051.357 | 86+081.357 | N 9529900.922 E 237317.359 | 9529509.869 236797.861 | 9529527.963 236821.79 | 9530475.829 237550.101 | 9530503.611 237561.422 |
| 30 | 26°5'2.31" | 295.619 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 23°5'2.45" | 461.964 | 93+648.39 | 93+708.39 | 94+170.3 | 94+230.3 | N 9537791.052 E 240512.521 | 9537517.047 240401.561 | 9537572.853 240423.595 | 9538026.05 240495.349 | 9538085.932 240491.632 |
| 31 | 44°36'23.43" | 500.109 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 41°36'23.57" | 832.141 | 100+997.420 | 101+057.420 | 101+889.561 | 101+949.561 | N 9545535.291 E 239978.079 | 9544836.432 240013.429 | 9544896.315 240009.712 | 9545669.344 240264.637 | 9545715.269 240303.247 |
| 32 | 23°11'4.27" | 485.127 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 22°26'4.28" | 897.384 | 103+394.600 | 103+424.600 | 104+321.983 | 104+351.983 | N 9547181.786 E 241558.184 | 9546813.192 241242.769 | 9546836.028 241262.224 | 9547616.178 241693.996 | 9547644.79 241703.014 |
| 33 | 58°15'45.41" | 668.709 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 55°15'45.55" | 1105.267 | 107+292.253 | 107+352.253 | 108+457.520 | 108+517.520 | N 9551089.189 E 242780.44 | 9550450.975 242580.803 | 9550508.392 242598.215 | 9551548.996 242381.554 | 9551594.692 242342.673 |
| 34 | 28°7'4.8" | 316.998 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 25°7'4.94" | 502.367 | 118+085.733 | 118+145.733 | 118+648.100 | 118+708.100 | N 9559067.291 E 235871.379 | 9558827.66 236078.9 | 9558872.67 236099.228 | 9559158.859 235631.242 | 9559180.838 235575.414 |
| 35 | 46°21'3.5" | 291.963 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 32°16'6.55" | 297.881 | 123+417.688 | 123+547.688 | 123+845.569 | 123+975.569 | N 9560972.364 E 230905.731 | 9560867.785 231178.321 | 9560919.246 231059.035 | 9561124.055 230848.167 | 9561241.79 230793.25 |
| 36 | 108°33'7.62" | 802.233 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 94°28'10.67" | 872.08 | 124+074.25 | 124+204.25 | 125+076.105 | 125+206.105 | N 9562072.954 E 230446.253 | 9561332.646 230755.319 | 9561454.479 230710.22 | 9562115.814 231117.336 | 9562130.418 231246.426 |
| 37 | 50°17'31.49" | 313.873 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 36°12'34.54" | 334.263 | 125+677.298 | 125+807.298 | 126+141.561 | 126+271.561 | N 9562186.651 E 232029.475 | 9562164.169 231716.409 | 9562178.773 231845.498 | 9562339.414 232132.302 | 9562441.86 232212.189 |
| 38 | 28°0'6.71" | 197.182 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 13°55'9.77" | 128.494 | 126+803.670 | 126+933.670 | 127+062.164 | 127+192.164 | N 9563034.845 E 232636.73 | 9562874.517 232521.945 | 9562976.963 232601.832 | 9563060.036 232689.447 | 9563122.512 232813.351 |
| 39 | 101°56'36.58" | 719.108 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 87°51'39.64" | 811.074 | 127+435.322 | 127+565.322 | 128+376.395 | 128+506.395 | N 9563550.336 E 233675.28 | 9563230.62 233031.155 | 9563293.096 233145.058 | 9564009.244 233305.536 | 9564114.353 233229.186 |
| 40 | 40°19'1.88" | 259.625 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 26°14'4.93" | 242.181 | 129+099.429 | 129+229.429 | 129+471.610 | 129+601.610 | N 9564783.118 E 232700.243 | 9564579.487 232861.3 | 9564684.596 232784.95 | 9564912.679 232710.036 | 9565042.589 232709.195 |

QUADRO DE CURVAS - ALTERNATIVA 3

| CURVA Nº | DEFLEXÃO AC | T | Transição | | | | Curva Circular | | | | Quilômetro | | | | | | Coordenadas | | | | | |
|----------|--------------|---------|-----------|-------|---------|--------|----------------|--------------|----------|-------------|-------------|-------------|-------------|-----|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----|----|-------|
| | | | Lc | Sc | Xc | Yc | R | θ | Dc | TS/PC | SC | CS | ST/PT | Pto | PI | TS/PC | SC | CS | ST/PT | CS | SC | TS/PC |
| 41 | 32°18'18.13" | 218.542 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 18°13'21.19" | 168.218 | 129+902.575 | 130+032.575 | 130+200.793 | 130+330.793 | N | 9565561.787 232727.107 | 9565343.375 232719.572 | 9565472.918 232729.364 | 9565632.114 232781.484 | 9565742.365 232850.201 | | | |
| 42 | 70°52'38.95" | 347.85 | 200 | 0.291 | 198.315 | 19.273 | 343.823 | 37°32'55.81" | 225.325 | 130+927.758 | 131+127.758 | 131+353.83 | 131+553.83 | N | 9566623.052 233382.369 | 9566235.628 233186.442 | 9566410.349 233282.218 | 9566631.617 233277.746 | 9566802.325 233174.989 | | | |
| 43 | 72°55'35.59" | 357.365 | 200 | 0.291 | 198.315 | 19.273 | 343.823 | 39°35'52.46" | 237.621 | 131+667.556 | 131+867.556 | 132+105.177 | 132+305.177 | N | 9567181.142 232893.69 | 9566894.231 233106.743 | 9567064.939 233003.985 | 9567297.858 233003.443 | 9567469.042 233105.405 | | | |
| 44 | 72°0'26.16" | 353.066 | 200 | 0.291 | 198.315 | 19.273 | 343.823 | 38°40'43.03" | 232.104 | 133+595.781 | 133+795.781 | 134+027.885 | 134+227.885 | N | 9568793.212 234079.173 | 9568508.776 233870.004 | 9568657.124 234003.02 | 9568726.231 234220.002 | 9568882.134 234414.31 | | | |
| 45 | 110°8'11.72" | 598.916 | 200 | 0.291 | 198.315 | 19.273 | 343.823 | 76°48'28.58" | 460.912 | 134+955.23 | 135+155.23 | 135+615.935 | 135+815.935 | N | 9568264.944 235673.028 | 9568453.369 235104.525 | 9568409.272 235298.833 | 9568664.743 235641.186 | 9568863.565 235654.223 | | | |
| 46 | 33°11'9.8" | 222.97 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 19°6'12.86" | 176.351 | 136+526.551 | 136+656.551 | 136+832.903 | 136+962.903 | N | 9569796.691 235624.909 | 9569573.831 235631.911 | 9569703.404 235622.518 | 9569869.973 235567.132 | 9569979.371 235497.066 | | | |
| 47 | 79°54'4.59" | 509.119 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 65°49'7.64" | 607.595 | 137+502.2 | 137+632.2 | 138+239.597 | 138+369.597 | N | 9570838.175 234896.051 | 9570421.054 235187.964 | 9570530.452 235117.897 | 9571103.028 235167.641 | 9571198.704 235255.524 | | | |
| 48 | 94°17'54.14" | 636.564 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 80°12'57.19" | 740.499 | 138+783.82 | 138+913.82 | 139+653.581 | 139+783.581 | N | 9571942.29 235996.93 | 9571491.511 235547.473 | 9571587.187 235635.356 | 9572268.156 235608.8 | 9572356.697 235513.732 | | | |
| 49 | 49°46'51.47" | 310.993 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 35°41'54.53" | 329.544 | 140+369.679 | 140+499.679 | 140+829.224 | 140+959.224 | N | 9572940.709 234832.776 | 9572738.251 235068.841 | 9572826.792 234973.774 | 9573121.857 234839.355 | 9573251.694 234834.939 | | | |
| 50 | 23°14'43.05" | 265.724 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 20°14'43.18" | 404.912 | 143+616.5 | 143+676.5 | 144+080.917 | 144+140.917 | N | 9576174.129 234855.265 | 9575908.412 234853.31 | 9575968.41 234853.31 | 9576363.514 234774.904 | 9576419.006 234752.092 | | | |
| 51 | 31°50'14.2" | 356.866 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 28°50'14.34" | 576.754 | 146+182.926 | 146+242.926 | 146+819.679 | 146+879.679 | N | 9578629.681 233820.685 | 9578300.812 233959.245 | 9578355.898 233935.468 | 9578800.87 233578.143 | 9578835.98 233529.49 | | | |
| 52 | 30°34'54.53" | 641.589 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 29°49'54.54" | 1193.276 | 152+557.266 | 152+587.266 | 153+780.542 | 153+810.542 | N | 9582488.997 228373.188 | 9582118.104 228896.71 | 9582135.393 228872.193 | 9582539.408 227763.679 | 9582541.949 227733.787 | | | |
| 53 | 35°56'37.79" | 401.756 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 32°56'37.93" | 658.886 | 159+373.280 | 159+433.280 | 160+092.166 | 160+152.166 | N | 9583034.209 221789.642 | 9583001.052 222190.028 | 9583006.525 222130.28 | 9583257.368 221530.797 | 9583296.077 221484.956 | | | |
| 54 | 44°52'37.16" | 503.273 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 41°52'37.3" | 837.551 | 165+937.611 | 165+997.611 | 166+835.162 | 166+895.162 | N | 9587395.104 216715.684 | 9587067.068 217097.359 | 9587105.776 217051.518 | 9587362.124 216273.636 | 9587368.253 216213.763 | | | |
| 55 | 26°11'20.77" | 296.581 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 23°11'20.91" | 463.789 | 181+445.419 | 181+505.419 | 181+969.207 | 182+029.207 | N | 9586271.143 201406.779 | 9586292.859 201702.564 | 9586288.989 201642.691 | 9586360.217 201187.601 | 9586382.197 201131.774 | | | |
| 56 | 52°41'5.74" | 327.521 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 38°36'8.79" | 356.352 | 184+741.830 | 184+871.830 | 185+228.182 | 185+358.182 | N | 9587520.565 198312.805 | 9587397.927 198616.498 | 9587451.464 198498.129 | 9587712.658 198265.68 | 9587836.44 198226.243 | | | |
| 57 | 60°16'58.81" | 372.854 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 46°12'1.86" | 426.492 | 186+277.370 | 186+407.370 | 186+833.862 | 186+963.862 | N | 9589082.54 197884.764 | 9588722.944 197983.307 | 9588846.727 197943.87 | 9589137.799 197648.019 | 9589175.215 197523.611 | | | |
| 58 | 27°54'58.33" | 196.761 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 13°50'1.39" | 127.704 | 187+669.318 | 187+799.318 | 187+927.21 | 188+057.21 | N | 9589399.464 196649.708 | 9589350.558 196840.294 | 9589387.974 196715.886 | 9589448.468 196603.772 | 9589531.907 196504.197 | | | |
| 59 | 17°3'42.1" | 201.91 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 14°3'42.24" | 281.238 | 189+380.422 | 189+440.422 | 189+721.661 | 189+781.661 | N | 9590588.622 195376.175 | 9590422.713 195525.495 | 9590462.71 195480.773 | 9590618.677 195247.593 | 9590644.74 195193.551 | | | |
| 60 | 11°52'18.7" | 253.293 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 11°7'18.71" | 444.876 | 194+569.330 | 194+599.330 | 195+044.206 | 195+074.206 | N | 9592794.777 190634.095 | 9592686.744 190863.194 | 9592699.599 190836.087 | 9592929.578 190456.083 | 9592947.63 190432.122 | | | |

QUADRO DE CURVAS - ALTERNATIVA 3

| CURVA Nº | DEFLEXÃO AC | T | Transição | | | | Curva Circular | | | | Quilômetro | | | | | | Coordenadas | | | | | | |
|----------|---------------|----------|-----------|-------|---------|-------|----------------|--------------|---------|-------------|-------------|-------------|-------------|-----|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|
| | | | Lc | Sc | Xc | Yc | R | θ | Dc | TS/PC | SC | CS | ST/PT | Pto | PI | TS/PC | SC | CS | ST/PT | TS/PC | SC | CS | ST/PT |
| 61 | 40°26'16.69" | 452.099 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 37°26'16.82" | 748.77 | 197+518.972 | 197+578.972 | 198+327.741 | 198+387.741 | N | 9594695.781 | 9594422.956 | 9594459.579 | 959078.786 | 9594422.956 | 9594459.579 | 959078.786 | 9595137.26 | 188024.771 |
| 62 | 35°11'42.38" | 393.497 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 32°11'42.52" | 643.911 | 202+548.842 | 202+608.842 | 203+252.753 | 203+312.753 | N | 9599584.862 | 9599200.609 | 9599259.308 | 9599892.212 | 9599200.609 | 9599259.308 | 9599892.212 | 9599947.742 | 187195.525 |
| 63 | 28°21'14.46" | 198.914 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 14°16'17.52" | 131.745 | 204+486.834 | 204+616.834 | 204+748.579 | 204+878.579 | N | 9601213.906 | 9601030.47 | 960148.116 | 9601253.16 | 9601030.47 | 960148.116 | 9601253.16 | 9601338.802 | 187881.324 |
| 64 | 135°33'36.65" | 1363.007 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 121°28'39.7" | 1121.4 | 204+972.697 | 205+102.697 | 206+224.97 | 206+354.97 | N | 9602253.716 | 9601397.898 | 9601483.541 | 9602367.588 | 9601397.898 | 9601483.541 | 9602367.588 | 9602385.426 | 187668.78 |
| 65 | 30°16'4.04" | 208.375 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 16°11'17.09" | 149.412 | 206+649.321 | 206+779.321 | 206+928.733 | 207+058.733 | N | 9602434.09 | 9602413.954 | 9602431.792 | 9602484.379 | 9602413.954 | 9602431.792 | 9602484.379 | 9602556.019 | 186988.56 |
| 66 | 7°3'16.85" | 156.274 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 6°18'16.86" | 252.188 | 208+577.129 | 208+607.129 | 208+859.317 | 208+889.317 | N | 9603535.939 | 9603444.497 | 9603462.104 | 9603621.892 | 9603444.497 | 9603462.104 | 9603621.892 | 9603642.253 | 185515.982 |
| 67 | 54°16'52.14" | 336.782 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 40°11'55.19" | 371.087 | 210+497.334 | 210+627.334 | 210+998.421 | 211+128.421 | N | 9604965.316 | 9604736.2 | 9604828.405 | 9605170.023 | 9604736.2 | 9604828.405 | 9605170.023 | 9605299.48 | 184132.5 |
| 68 | 6°16'55.84" | 140.771 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 5°31'55.85" | 221.288 | 213+019.999 | 213+049.999 | 213+271.287 | 213+301.287 | N | 9607316.03 | 9607176.354 | 9607206.128 | 9607426.789 | 9607176.354 | 9607206.128 | 9607426.789 | 9607456.785 | 184387.551 |
| 69 | 8°51'30.5" | 192.525 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 8°6'30.51" | 324.34 | 217+027.529 | 217+057.529 | 217+381.869 | 217+411.869 | N | 9611375.103 | 9611182.6 | 9611212.598 | 9611536.041 | 9611375.103 | 9611212.598 | 9611536.041 | 9611565.758 | 184420.06 |
| 70 | 17°17'41.58" | 154.652 | 100 | 0.073 | 99.947 | 2.423 | 687.574 | 8°57'42.65" | 107.546 | 221+570.348 | 221+670.348 | 221+777.894 | 221+877.894 | N | 9615836.983 | 9615683.834 | 9615783.147 | 9615890.576 | 9615836.983 | 9615783.147 | 9615890.576 | 9615989.601 | 183845.282 |
| 71 | 21°43'9.9" | 182.012 | 100 | 0.073 | 99.947 | 2.423 | 687.574 | 13°23'10.98" | 160.642 | 222+276.617 | 222+376.617 | 222+537.260 | 222+637.260 | N | 9616562.697 | 9616383.08 | 9616482.104 | 9616642.322 | 9616562.697 | 9616383.08 | 9616642.322 | 9616740.452 | 183900.027 |
| 72 | 22°20'13.14" | 209.744 | 80 | 0.047 | 79.983 | 1.241 | 859.456 | 17°0'13.57" | 255.062 | 223+226.263 | 223+306.263 | 223+561.325 | 223+641.325 | N | 9617520.518 | 9617315.679 | 9617393.524 | 9617626.424 | 9617520.518 | 9617315.679 | 9617626.424 | 9617692.846 | 183608.722 |
| 73 | 14°10'37.52" | 146.912 | 80 | 0.047 | 79.983 | 1.241 | 859.456 | 8°50'37.96" | 132.661 | 224+545.347 | 224+625.347 | 224+758.8 | 224+838.8 | N | 9618545.302 | 9618429.74 | 9618493.421 | 9618606.971 | 9618545.302 | 9618493.421 | 9618606.971 | 9618679.561 | 182935.092 |
| 74 | 15°52'36.03" | 159.886 | 80 | 0.047 | 79.983 | 1.241 | 859.456 | 10°32'36.46" | 158.155 | 225+204.267 | 225+284.267 | 225+442.422 | 225+522.422 | N | 9619163.876 | 9619015.093 | 9619089.067 | 9619226.638 | 9619163.876 | 9619089.067 | 9619226.638 | 9619290.969 | 182632.793 |
| 75 | 11°40'1.41" | 165.499 | 50 | 0.018 | 49.998 | 0.303 | 1375.111 | 9°35'1.47" | 230.012 | 226+118.843 | 226+168.843 | 226+398.854 | 226+448.854 | N | 9619881.763 | 9619754.828 | 9619792.982 | 9619953.295 | 9619881.763 | 9619792.982 | 9619953.295 | 9619984.601 | 182022.248 |
| 76 | 14°55'46.13" | 152.649 | 80 | 0.047 | 79.983 | 1.241 | 859.456 | 9°35'46.57" | 143.947 | 226+894.153 | 226+974.153 | 227+118.100 | 227+198.100 | N | 9620356.151 | 9620261.298 | 9620311.97 | 9620415.189 | 9620356.151 | 9620311.97 | 9620415.189 | 9620478.615 | 181462.621 |
| 77 | 33°40'21.87" | 225.426 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 19°35'24.92" | 180.844 | 228+558.203 | 228+688.203 | 228+869.47 | 228+999.47 | N | 9621750.617 | 9621569.768 | 9621670.728 | 9621777.8 | 9621750.617 | 9621670.728 | 9621777.8 | 9621826.509 | 180303.828 |
| 78 | 26°32'11.54" | 212.268 | 100 | 0.073 | 99.947 | 2.423 | 687.574 | 18°12'12.62" | 218.45 | 229+311.276 | 229+411.276 | 229+629.726 | 229+729.726 | N | 9622003.085 | 9621931.623 | 9621967.553 | 9622085.844 | 9622003.085 | 9621967.553 | 9622085.844 | 9622156.317 | 179663.055 |
| 79 | 23°38'43.63" | 219.968 | 80 | 0.047 | 79.983 | 1.241 | 859.456 | 18°18'44.06" | 274.69 | 230+092.265 | 230+172.265 | 230+446.955 | 230+526.955 | N | 9622576.818 | 9622418.028 | 9622474.907 | 9622629.388 | 9622576.818 | 9622474.907 | 9622629.388 | 9622661.225 | 179056.822 |
| 80 | 28°52'25.51" | 261.338 | 80 | 0.047 | 79.983 | 1.241 | 859.456 | 23°32'25.94" | 353.116 | 230+810.281 | 230+890.281 | 231+243.397 | 231+323.397 | N | 9622870.225 | 9622769.944 | 9622801.781 | 9623012.807 | 9622870.225 | 9622769.944 | 9623012.807 | 9623074.575 | 178390.947 |

QUADRO DE CURVAS - ALTERNATIVA 3

| CURVA Nº | DEFLEXÃO AC | Transição | | | | Curva Circular | | | | Quilômetro | | | | | | | Coordenadas | | | | | | | | | | | | |
|----------|--------------|-----------|-----|-------|---------|----------------|----------|--------------|---------|-------------|-------------|-------------|-------------|-----|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|------------|------------|------------|------------|
| | | T | Lc | Sc | Xc | Yc | R | θ | Dc | TS/PC | SC | CS | ST/PT | Pto | PI | TS/PC | SC | CS | ST/PT | CS | SC | TS/PC | SC | CS | ST/PT | | | | |
| 81 | 12°33'6.02" | 134.549 | 80 | 0.047 | 79.983 | 1.241 | 859.456 | 7°13'6.45" | 108.279 | 231+795.548 | 231+875.548 | 231+983.827 | 232+063.827 | N | 9623548.976 | 9623443.767 | 9623507.082 | 9623598.56 | 9623507.082 | 9623507.082 | 9623443.767 | 9623507.082 | 9623598.56 | 9623669.898 | 178012.757 | 178096.629 | 178047.741 | 177989.943 | 177953.753 |
| 82 | 31°58'36.01" | 247.172 | 100 | 0.073 | 99.947 | 2.423 | 687.574 | 23°38'37.08" | 283.734 | 232+749.960 | 232+849.960 | 233+133.693 | 233+233.693 | N | 9624508.675 | 9624286.537 | 9624375.299 | 9624584.667 | 9624375.299 | 9624375.299 | 9624286.537 | 9624375.299 | 9624584.667 | 9624639.705 | 177544.472 | 177652.864 | 177606.857 | 177418.352 | 177334.889 |
| 83 | 14°47'29.19" | 139.318 | 100 | 0.073 | 99.947 | 2.423 | 687.574 | 6°27'30.26" | 77.504 | 233+458.754 | 233+558.754 | 233+636.257 | 233+736.257 | N | 9624832.868 | 9624759.013 | 9624814.051 | 9624863.229 | 9624814.051 | 9624814.051 | 9624759.013 | 9624814.051 | 9624863.229 | 9624934.434 | 177025.924 | 177144.055 | 177060.592 | 177000.741 | 176930.562 |
| 84 | 8°15'46.28" | 361.161 | --- | --- | --- | --- | 5000 | 8°15'46.28" | 721.07 | 234+118.852 | --- | --- | 234+839.923 | N | 9625476.651 | 9625213.355 | --- | --- | --- | --- | 9625213.355 | --- | --- | 9625272.741 | 176421.471 | 176668.681 | --- | --- | 176214.667 |
| 85 | 37°57'50.88" | 424.219 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 34°57'51.01" | 699.292 | 235+179.963 | 235+239.963 | 235+939.255 | 235+999.255 | N | 9626525.36 | 9626177.574 | 9626226.461 | 9626663.197 | 9626226.461 | 9626226.461 | 9626177.574 | 9626226.461 | 9626663.197 | 9626650.122 | 175931.911 | 175897.128 | 175340.731 | 175283.542 | 175283.542 |
| 86 | 12°15'18.05" | 261.041 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 11°30'18.05" | 460.202 | 237+727.397 | 237+757.397 | 238+217.598 | 238+247.598 | N | 9627235.137 | 9627158.366 | 9627167.251 | 9627348.468 | 9627167.251 | 9627167.251 | 9627158.366 | 9627167.251 | 9627348.468 | 9627363.119 | 173631.827 | 173603.173 | 173180.993 | 173154.814 | 173154.814 |
| 87 | 7°0'18.49" | 155.279 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 6°15'18.5" | 250.206 | 240+394.795 | 240+424.795 | 240+675.1 | 240+705.1 | N | 9628491.959 | 9628415.83 | 9628430.595 | 9628566.291 | 9628430.595 | 9628430.595 | 9628415.83 | 9628430.595 | 9628566.291 | 9628584.025 | 171148.047 | 171283.384 | 171257.269 | 171047.203 | 171023.006 |
| 88 | 15°54'43.24" | 190.17 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 12°54'43.38" | 258.244 | 246+999.640 | 247+059.640 | 247+317.884 | 247+377.884 | N | 9632433.667 | 9632319.981 | 9632355.427 | 9632479.407 | 9632355.427 | 9632355.427 | 9632319.981 | 9632355.427 | 9632479.407 | 9632501.203 | 832644.294 | 832796.741 | 832748.333 | 832522.419 | 832466.519 |
| 89 | 59°21'20.08" | 367.142 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 45°16'23.13" | 417.931 | 250+463.473 | 250+593.473 | 251+011.404 | 251+141.404 | N | 9633727.381 | 9633596.997 | 9633648.067 | 9633962.135 | 9633648.067 | 9633648.067 | 9633596.997 | 9633648.067 | 9633962.135 | 9634089.119 | 829238.851 | 829582.062 | 829462.608 | 829203.52 | 829176.09 |
| 90 | 29°50'29.1" | 206.26 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 15°45'32.15" | 145.476 | 253+075.990 | 253+205.990 | 253+351.465 | 253+481.465 | N | 9636198.452 | 9635995.528 | 9636122.212 | 9636253.894 | 9635995.528 | 9635995.528 | 9636122.212 | 9636253.894 | 9636357.185 | 828810.12 | 828845.379 | 828817.949 | 828757.204 | 828678.411 | |
| 91 | 46°13'59.29" | 291.318 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 32°9'2.34" | 296.793 | 254+505.859 | 254+635.859 | 254+932.652 | 255+062.652 | N | 9637369.724 | 9637145.533 | 9637248.823 | 9637529.577 | 9637248.823 | 9637248.823 | 9637145.533 | 9637248.823 | 9637529.577 | 9637659.141 | 827838.255 | 828024.278 | 827945.485 | 827861.961 | 827817.48 |
| 92 | 60°32'17.97" | 374.436 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 46°27'21.02" | 428.849 | 255+921.402 | 256+051.402 | 256+480.251 | 256+610.251 | N | 9638884.28 | 9638512.287 | 9638664.851 | 9639023.804 | 9638664.851 | 9638664.851 | 9638512.287 | 9638664.851 | 9639023.804 | 9639104.423 | 828012.126 | 827969.421 | 827978.941 | 827811.114 | 827709.242 |
| 93 | 3°52'14.3" | 116.164 | --- | --- | --- | --- | 3437.752 | 3°52'14.3" | 232.239 | 257+234.331 | --- | --- | 257+466.570 | N | 9639539.638 | 9639471.341 | 9639471.341 | 9639601.436 | 9639471.341 | 9639471.341 | 9639471.341 | 9639471.341 | 9639601.436 | 827110.452 | 827204.418 | --- | --- | 827012.09 | |
| 94 | 10°24'15.64" | 312.991 | --- | --- | --- | --- | 3437.752 | 10°24'15.64" | 624.262 | 259+213.89 | --- | --- | 259+837.350 | N | 9640697.071 | 9640530.563 | 9640530.563 | 9640812.979 | 9640530.563 | 9640530.563 | 9640530.563 | 9640530.563 | 9640812.979 | 825268.197 | 825533.223 | --- | --- | 824977.458 | |
| 95 | 10°16'38.37" | 309.15 | --- | --- | --- | --- | 3437.752 | 10°16'38.37" | 616.64 | 260+954.790 | --- | --- | 261+571.430 | N | 9641341.279 | 9641226.793 | 9641226.793 | 9641402.692 | 9641226.793 | 9641226.793 | 9641226.793 | 9641226.793 | 9641402.692 | 823652.296 | 823939.466 | --- | --- | 823349.308 | |
| 96 | 34°1'43.82" | 227.226 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 19°56'46.87" | 184.131 | 263+924.148 | 264+054.148 | 264+238.279 | 264+366.279 | N | 9641915.208 | 9641870.068 | 9641901.068 | 9641988.408 | 9641870.068 | 9641870.068 | 9641901.068 | 9641988.408 | 9642077.241 | 820820.783 | 821043.48 | 820917.32 | 820756.277 | 820661.482 | |
| 97 | 37°45'51.36" | 246.327 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 23°40'54.42" | 218.614 | 264+784.107 | 264+914.107 | 265+132.721 | 265+262.721 | N | 9642549.418 | 9642373.765 | 9642462.597 | 9642559.805 | 9642373.765 | 9642373.765 | 9642373.765 | 9642462.597 | 9642559.805 | 9642582.52 | 820197.265 | 820369.957 | 820275.162 | 820081.084 | 819953.173 |
| 98 | 59°16'39.43" | 366.665 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 45°11'42.48" | 417.211 | 266+149.354 | 266+279.354 | 266+696.565 | 266+826.565 | N | 9642750.939 | 9642701.666 | 9642713.838 | 9642863.138 | 9642701.666 | 9642701.666 | 9642713.838 | 9642863.138 | 9642934.434 | 818711.243 | 819074.582 | 818945.241 | 818568.138 | 818483.264 | |
| 99 | 44°9'49.07" | 280.082 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 30°4'52.13" | 277.689 | 267+429.41 | 267+559.41 | 267+836.730 | 267+966.730 | N | 9641772.543 | 9641991.905 | 9641893.549 | 9641758.487 | 9641991.905 | 9641991.905 | 9641893.549 | 9641758.487 | 9641736.513 | 817934.519 | 818108.665 | 818023.791 | 817784.805 | 817656.764 | |
| 100 | 43°54'12.66" | 278.682 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 29°49'15.71" | 275.288 | 270+039.391 | 270+169.391 | 270+444.679 | 270+574.679 | N | 9641434.029 | 9641469.88 | 9641458.457 | 9641526.887 | 9641434.029 | 9641469.88 | 9641458.457 | 9641526.887 | 9641599.844 | 815324.959 | 815601.325 | 815471.915 | 815208.467 | 815100.975 | |

QUADRO DE CURVAS - ALTERNATIVA 3

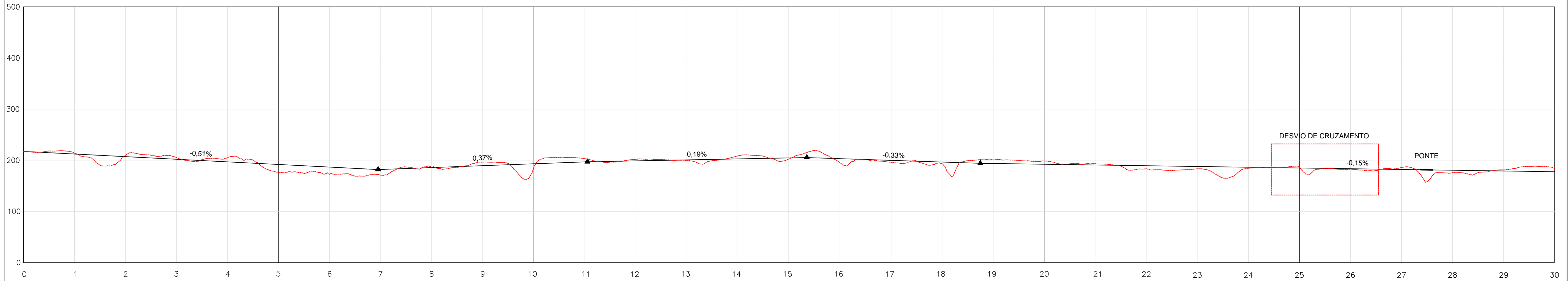
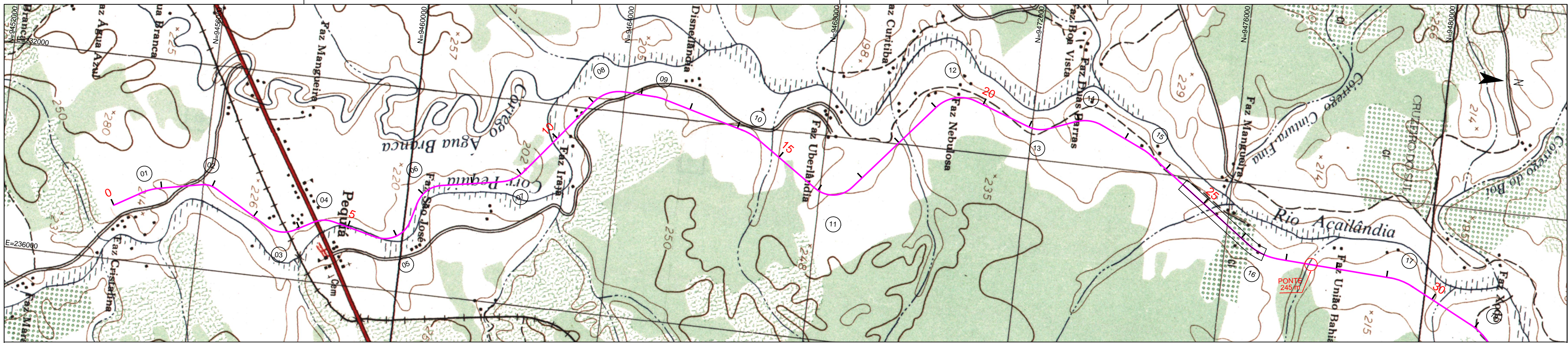
| CURVA Nº | DEFLEXÃO AC | Transição | | | | Curva Circular | | | | Quilômetro | | | | | | | Coordenadas | | | | | | | | | | |
|----------|--------------|-----------|-----|-------|---------|----------------|----------|--------------|----------|-------------|-------------|-------------|-------------|----|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|------------|------------|------------|------------|
| | | Lc | Sc | Xc | Yc | R | θ | Dc | TS/PC | SC | CS | ST/PT | Pto | PI | TS/PC | SC | CS | ST/PT | TS/PC | SC | CS | ST/PT | | | | | |
| 101 | 19°34'48" | 154.001 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 4°58'50.54" | 45.979 | 270+637.79 | 270+767.79 | 270+813.58 | 270+943.58 | N | 9641728.602 | 9641636.972 | 9641709.929 | 9641730.783 | 9641709.929 | 9641636.972 | 9641730.783 | 9641774.78 | 814927.046 | 815050.821 | 814943.329 | 814902.368 | 814780.132 |
| 102 | 20°4'12.71" | 158.799 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 5°59'15.77" | 55.275 | 270+953.664 | 271+083.664 | 271+138.939 | 271+268.939 | N | 9641825.578 | 9641777.961 | 9641821.959 | 9641847.456 | 9641821.959 | 9641777.961 | 9641847.456 | 9641922.292 | 814618.522 | 814770.014 | 814647.778 | 814598.764 | 814492.571 |
| 103 | 19°14'10.22" | 154.824 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 5°9'13.27" | 47.575 | 271+332.151 | 271+462.151 | 271+509.726 | 271+639.726 | N | 9642055.082 | 9641960.789 | 9642035.624 | 9642057.88 | 9642035.624 | 9641960.789 | 9642057.88 | 9642103.652 | 814319.637 | 814442.435 | 814336.241 | 814294.211 | 814172.628 |
| 104 | 10°53'13.91" | 139.214 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 7°53'14.04" | 157.747 | 272+003.608 | 272+063.608 | 272+221.355 | 272+281.355 | N | 9642261.48 | 9642217.807 | 9642237.126 | 9642300.549 | 9642237.126 | 9642217.807 | 9642300.549 | 9642329.334 | 813694.93 | 813827.116 | 813770.313 | 813626.014 | 813573.372 |
| 105 | 26°17'36.94" | 188.816 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 12°12'39.99" | 112.725 | 272+826.585 | 272+956.585 | 273+069.309 | 273+199.309 | N | 9642687.114 | 9642595.084 | 9642653.706 | 9642684.763 | 9642653.706 | 9642595.084 | 9642684.763 | 9642696.591 | 812932.422 | 813097.291 | 812981.357 | 812873.217 | 812743.844 |
| 106 | 23°27'51.54" | 175.086 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 9°22'54.59" | 86.607 | 274+001.919 | 274+131.919 | 274+218.526 | 274+348.526 | N | 9642745.659 | 9642736.872 | 9642748.7 | 9642770.519 | 9642748.7 | 9642736.872 | 9642770.519 | 9642823.348 | 811767.38 | 811942.246 | 811812.873 | 811729.159 | 811610.473 |
| 107 | 25°15'27.51" | 183.772 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 11°10'30.56" | 103.162 | 274+884.476 | 275+014.476 | 275+117.637 | 275+247.637 | N | 9643142.698 | 9643061.156 | 9643123.519 | 9643188.296 | 9643123.519 | 9643061.156 | 9643188.296 | 9643286.716 | 810965.481 | 811130.171 | 811016.206 | 810936.127 | 810851.329 |
| 108 | 37°47'54.27" | 246.503 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 23°42'57.32" | 218.929 | 275+515.416 | 275+645.416 | 275+864.345 | 275+994.345 | N | 9643689.749 | 9643496.569 | 9643601.598 | 9643806.498 | 9643601.598 | 9643496.569 | 9643806.498 | 9643936.238 | 810531.875 | 810684.994 | 810608.533 | 810535.966 | 810529.281 |
| 109 | 37°54'55.58" | 247.108 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 23°49'58.64" | 220.01 | 276+630.147 | 276+760.147 | 276+980.157 | 277+110.157 | N | 9644819.099 | 9644572.004 | 9644701.745 | 9644907.566 | 9644701.745 | 9644572.004 | 9644907.566 | 9645012.439 | 810519.991 | 810522.591 | 810515.906 | 810442.776 | 810366.101 |
| 110 | 24°21'23.18" | 179.4 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 10°16'26.23" | 94.842 | 277+349.803 | 277+479.803 | 277+574.645 | 277+704.645 | N | 9645340.304 | 9645199.94 | 9645298.187 | 9645358.182 | 9645298.187 | 9645199.94 | 9645358.182 | 9645422.099 | 810105.134 | 810216.858 | 810131.859 | 810058.568 | 809945.466 |
| 111 | 25°53'10.05" | 186.829 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 11°48'13.1" | 108.963 | 278+923.272 | 279+053.272 | 279+162.236 | 279+292.236 | N | 9646062.9 | 9645977.717 | 9646041.634 | 964611.65 | 9646041.634 | 9645977.717 | 964611.65 | 9646212.131 | 808694.593 | 808860.874 | 808747.772 | 808664.532 | 808582.186 |
| 112 | 19°17'39.36" | 224.811 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 16°17'39.5" | 325.89 | 281+919.964 | 281+979.964 | 282+305.854 | 282+365.854 | N | 9648490.611 | 9648311.042 | 9648359.279 | 9648647.788 | 9648359.279 | 9648311.042 | 9648647.788 | 9648704.786 | 806865.938 | 807001.197 | 806965.518 | 806816.343 | 806797.609 |
| 113 | 10°23'51.02" | 223.525 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 9°38'51.03" | 385.901 | 286+979.337 | 287+009.337 | 287+395.238 | 287+425.238 | N | 9653312.962 | 9653100.012 | 9653128.613 | 9653504.928 | 9653128.613 | 9653100.012 | 9653504.928 | 9653534.677 | 805327.454 | 805395.392 | 805386.336 | 805302.939 | 805299.064 |
| 114 | 14°47'54.13" | 446.436 | --- | --- | --- | --- | 3437.752 | 14°47'54.13" | 887.903 | 292+471.891 | --- | --- | 293+359.794 | N | 9658983.28 | 9658540.459 | --- | --- | --- | 9658540.459 | --- | 9659396.93 | 804601.388 | 804658.09 | --- | --- | 804433.462 |
| 115 | 18°16'55.06" | 383.777 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 17°31'55.07" | 701.281 | 294+878.157 | 294+908.157 | 295+609.437 | 295+639.437 | N | 9661159.376 | 9660803.784 | 9660831.605 | 9661512.375 | 9660831.605 | 9660803.784 | 9661512.375 | 9661542.304 | 803717.979 | 803862.335 | 803851.112 | 803694.516 | 803692.456 |
| 116 | 20°52'56.23" | 633.498 | --- | --- | --- | --- | 3437.752 | 20°52'56.23" | 1252.939 | 296+164.794 | --- | --- | 297+417.733 | N | 9662698.593 | 9662066.498 | --- | --- | --- | 9662066.498 | --- | 9663274.151 | 803615.387 | 803657.517 | --- | --- | 803350.714 |
| 117 | 27°53'1.71" | 192.719 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 13°0'34.77" | 120.096 | 322+431.692 | 322+561.692 | 322+681.788 | 322+811.788 | N | 9686175.446 | 9686000.352 | 9686120.507 | 9686238.084 | 9686120.507 | 9686000.352 | 9686238.084 | 9686367.996 | 792819.46 | 792899.977 | 792850.579 | 792827.406 | 792827.519 |
| 118 | 44°13'28.67" | 280.411 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 30°8'31.72" | 278.252 | 322+947.4 | 323+077.4 | 323+355.256 | 323+485.256 | N | 9686783.259 | 9686503.094 | 9686633.006 | 9686891.937 | 9686503.094 | 9686633.006 | 9686891.937 | 9686992.208 | 792844.899 | 792833.173 | 792833.286 | 792740.496 | 792657.894 |
| 119 | 53°38'15.5" | 333.033 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 39°33'18.56" | 365.147 | 325+060.544 | 325+190.544 | 325+555.690 | 325+685.690 | N | 9688414.193 | 9688166.033 | 9688266.304 | 9688612.031 | 9688166.033 | 9688266.304 | 9688612.031 | 9688740.176 | 791385.241 | 791607.339 | 791524.737 | 791432.041 | 791453.399 |
| 120 | 22°35'29.98" | 170.881 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 8°30'33.04" | 78.551 | 327+040.445 | 327+170.445 | 327+248.996 | 327+378.996 | N | 9690233.518 | 9690066.255 | 9690192.222 | 9690264.406 | 9690192.222 | 9690066.255 | 9690264.406 | 9690374.512 | 791765.636 | 791730.664 | 791762.437 | 791793.234 | 791862.182 |

QUADRO DE CURVAS - ALTERNATIVA 3

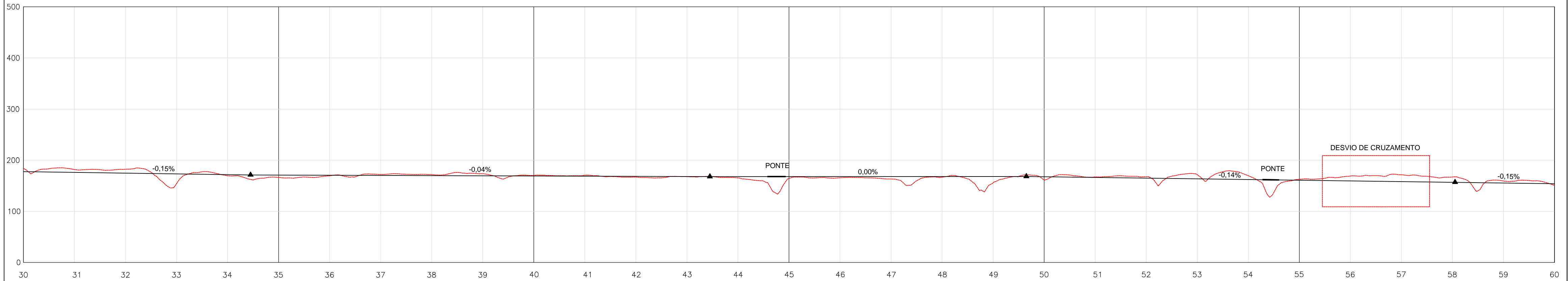
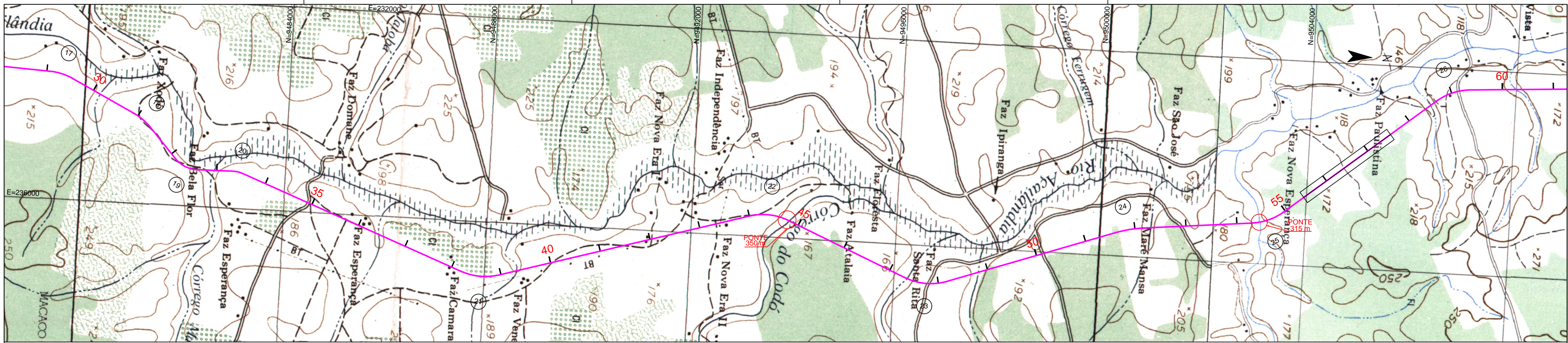
| CURVA Nº | DEFLEXÃO AC | Transição | | | | Curva Circular | | | | Quilômetro | | | | | | | Coordenadas | | | | |
|----------|--------------|-----------|-----|-------|---------|----------------|----------|--------------|---------|-------------|-------------|-------------|-------|-------------|-------------|-------------|-------------|-------------|-------|--|--|
| | | T | Lc | Sc | Xc | Yc | R | θ | Dc | TS/PC | SC | CS | ST/PT | Pto | PI | TS/PC | SC | CS | ST/PT | | |
| 121 | 56°56'38.08" | 352.532 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 42°51'41.14" | 395.668 | 328+141.935 | 328+271.935 | 328+797.603 | N | 9691294.889 | 9691004.015 | 9691114.121 | 9691498.56 | 9691620.485 | | | |
| | | | | | | | | | | | | | E | 792492.407 | 792293.231 | 792362.179 | 792402.106 | 792357.256 | | | |
| 122 | 30°11'17.95" | 207.967 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 16°6'11.01" | 148.653 | 330+368.303 | 330+498.303 | 330+776.955 | N | 9693263.252 | 9693071.175 | 9693189.022 | 9693306.354 | 9693389.196 | | | |
| | | | | | | | | | | | | | E | 791675.368 | 791755.096 | 791700.42 | 791609.946 | 791509.874 | | | |
| 123 | 26°35'44.71" | 190.292 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 12°30'47.77" | 115.514 | 331+178.552 | 331+308.552 | 331+554.66 | N | 9693747.642 | 9693632.402 | 9693715.244 | 9693804.29 | 9693918.482 | | | |
| | | | | | | | | | | | | | E | 791038.866 | 791190.295 | 791090.222 | 791017 | 790955.053 | | | |
| 124 | 18°30'5.47" | 216.663 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 15°30'5.61" | 310.035 | 334+546.486 | 334+606.486 | 334+916.521 | N | 9696799.527 | 9696605.012 | 9696659.106 | 9696954.876 | 9697014.271 | | | |
| | | | | | | | | | | | | | E | 789541.621 | 789637.05 | 789611.095 | 789521.336 | 789512.851 | | | |
| 125 | 3°45'25.57" | 225.507 | --- | --- | --- | --- | 6875.504 | 3°45'25.57" | 450.853 | 337+375.773 | --- | 337+826.626 | N | 9699615.786 | 9699392.276 | --- | --- | 9699840.779 | | | |
| | | | | | | | | | | | | | E | 789164.306 | 789194.252 | | | 789149.071 | | | |
| 126 | 17°37'28.47" | 207.671 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 14°37'28.61" | 292.496 | 341+567.358 | 341+627.358 | 341+979.854 | N | 9703780.16 | 9703572.964 | 9703632.787 | 9703917.369 | 9703973.382 | | | |
| | | | | | | | | | | | | | E | 788882.321 | 788896.351 | 788891.776 | 788827.715 | 788806.215 | | | |
| 127 | 20°1'24.23" | 232.322 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 17°1'24.37" | 340.473 | 343+436.531 | 343+496.531 | 343+897.4 | N | 9705544.875 | 9705328.716 | 9705384.73 | 9705717.157 | 9705777.12 | | | |
| | | | | | | | | | | | | | E | 788187.24 | 788272.38 | 788250.88 | 788183.327 | 788181.26 | | | |
| 128 | 17°27'34.66" | 366.924 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 16°42'34.66" | 668.387 | 365+950.466 | 365+980.466 | 366+678.854 | N | 9728190.077 | 9727823.275 | 9727853.263 | 9728508.748 | 9728537.146 | | | |
| | | | | | | | | | | | | | E | 787604.153 | 787613.597 | 787612.76 | 787494.763 | 787485.09 | | | |
| 129 | 21°39'34.58" | 249.24 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 18°39'34.72" | 373.198 | 369+403.902 | 369+463.902 | 369+897.100 | N | 9731350.495 | 9731114.741 | 9731171.321 | 9731493.854 | 9731539.752 | | | |
| | | | | | | | | | | | | | E | 786519.967 | 786600.843 | 786580.88 | 786396.429 | 786357.787 | | | |
| 130 | 25°19'51.06" | 287.549 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 22°19'51.2" | 446.623 | 372+761.260 | 372+821.260 | 373+327.884 | N | 9733932.962 | 9733714.615 | 9733760.513 | 9734152.626 | 9734210.367 | | | |
| | | | | | | | | | | | | | E | 784306.978 | 784494.085 | 784455.444 | 784247.579 | 784231.279 | | | |
| 131 | 17°48'41.06" | 209.585 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 14°48'41.19" | 296.233 | 374+889.935 | 374+949.935 | 375+306.167 | N | 9735919.51 | 9735717.319 | 9735775.336 | 9736068.928 | 9736128.887 | | | |
| | | | | | | | | | | | | | E | 783764.885 | 783820.06 | 783804.771 | 783772.059 | 783774.203 | | | |
| 132 | 12°45'45.21" | 158.171 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 9°45'45.34" | 195.254 | 379+514.544 | 379+574.544 | 379+829.799 | N | 9740491.119 | 9740333.104 | 9740393.063 | 9740587.045 | 9740646.783 | | | |
| | | | | | | | | | | | | | E | 783968.328 | 783961.296 | 783963.44 | 783950.402 | 783940.278 | | | |
| 133 | 10°52'11.02" | 327.074 | --- | --- | --- | --- | 3437.752 | 10°52'11.02" | 652.185 | 384+996.26 | --- | 385+648.211 | N | 9746053.02 | 9745731.13 | --- | --- | 9746380.073 | | | |
| | | | | | | | | | | | | | E | 782966.13 | 783024.131 | | | 782969.87 | | | |
| 134 | 21°12'14.52" | 244.521 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 18°12'14.65" | 364.086 | 387+707.856 | 387+767.856 | 388+191.942 | N | 9748684.087 | 9748439.583 | 9748499.581 | 9748856.688 | 9748913.05 | | | |
| | | | | | | | | | | | | | E | 782996.219 | 782993.423 | 782993.585 | 782930.96 | 782910.391 | | | |
| 135 | 19°43'8.08" | 229.183 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 16°43'8.21" | 334.383 | 392+161.182 | 392+221.182 | 392+615.565 | N | 9752844.342 | 9752629.741 | 9752685.736 | 9752973.1 | 9753019.217 | | | |
| | | | | | | | | | | | | | E | 781436.722 | 781517.167 | 781495.618 | 781326.967 | 781288.587 | | | |
| 136 | 4°43'10.95" | 109.448 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 3°58'10.95" | 158.789 | 396+018.899 | 396+048.899 | 396+237.688 | N | 9755699.584 | 9755616.071 | 9755639.005 | 9755764.264 | 9755788.635 | | | |
| | | | | | | | | | | | | | E | 779018.065 | 779088.808 | 779069.468 | 778971.928 | 778954.434 | | | |
| 137 | 48°14'8.32" | 302.356 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 34°9'11.38" | 315.279 | 400+164.340 | 400+294.340 | 400+739.619 | N | 9759229.477 | 9758983.471 | 9759085.99 | 9759242.873 | 9759262.217 | | | |
| | | | | | | | | | | | | | E | 776495.752 | 776671.537 | 776591.743 | 776323.638 | 776195.173 | | | |
| 138 | 88°56'14.25" | 441.967 | 200 | 0.291 | 198.315 | 19.273 | 343.823 | 55°36'31.11" | 333.699 | 400+989.413 | 401+189.413 | 401+723.112 | N | 9759337.122 | 9759289.265 | 9759329.899 | 9759578.058 | 9759777.303 | | | |
| | | | | | | | | | | | | | E | 775507.48 | 775946.848 | 775751.786 | 775548.561 | 775547.18 | | | |
| 139 | 53°21'1.55" | 331.366 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 39°16'4.6" | 362.495 | 402+520.723 | 402+650.723 | 403+143.218 | N | 9760901.716 | 9760571.689 | 9760701.446 | 9761032.107 | 9761122.596 | | | |
| | | | | | | | | | | | | | E | 775648.593 | 775618.827 | 775625.189 | 775494.794 | 775401.579 | | | |
| 140 | 17°20'52.86" | 204.839 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 14°20'53" | 286.965 | 406+637.130 | 406+697.130 | 407+044.95 | N | 9763588.088 | 9763451.548 | 9763491.93 | 9763712.708 | 9763763.947 | | | |
| | | | | | | | | | | | | | E | 772644.386 | 772797.081 | 772752.707 | 772570.564 | 772539.35 | | | |

QUADRO DE CURVAS - ALTERNATIVA 3

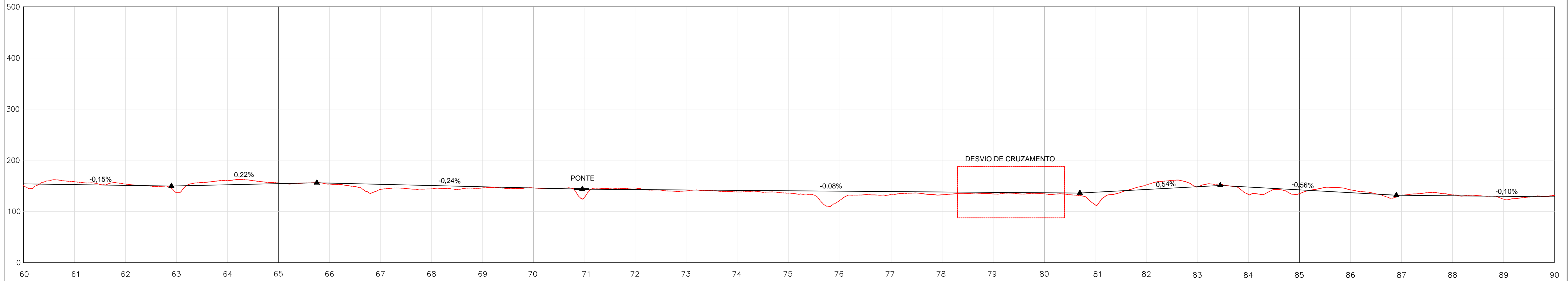
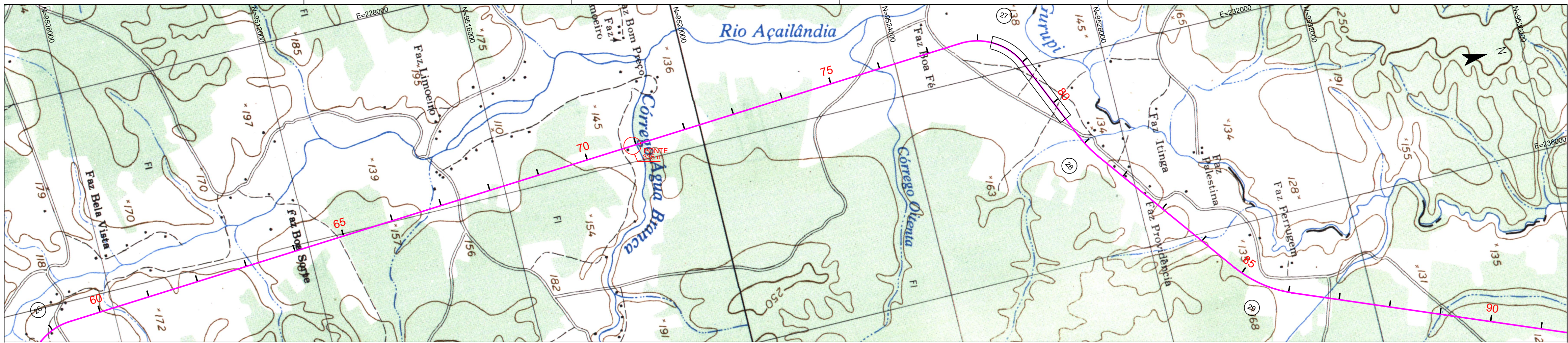
| CURVA Nº | DEFLEXÃO AC | T | Transição | | | | Curva Circular | | | | Quilômetro | | | | | | Coordenadas | | | | | | |
|----------|--------------|---------|-----------|-------|---------|-------|----------------|--------------|---------|-------------|-------------|-------------|-------------|-----|-------------|-------------|-------------|-------------|------------|------------|------------|------------|------------|
| | | | Lc | Sc | Xc | Yc | R | θ | Dc | TS/PC | SC | CS | ST/PT | Pto | PI | TS/PC | SC | CS | ST/PT | PI | TS/PC | SC | CS |
| 141 | 5°25'57.11" | 123.733 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 4°40'57.12" | 187.302 | 409+933.296 | 409+963.296 | 410+150.598 | 410+180.598 | N | 9766350.623 | 9766244.395 | 9766270.184 | 9766435.312 | 770994.396 | 771057.843 | 771042.516 | 770954.225 | 770941.29 |
| 142 | 5°21'59.23" | 122.409 | 30 | 0.007 | 30 | 0.065 | 2291.838 | 4°36'59.24" | 184.659 | 415+517.971 | 415+547.971 | 415+732.630 | 415+762.630 | N | 9771393.729 | 9771283.168 | 9771310.293 | 9771480.56 | 768597.999 | 768650.536 | 768637.719 | 768556.379 | 768556.033 |
| 143 | 15°12'27.46" | 182.994 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 12°12'27.59" | 244.156 | 425+894.375 | 425+954.375 | 426+198.531 | 426+258.531 | N | 9781198.334 | 9781026.43 | 9781082.61 | 9781298.468 | 765019.761 | 765082.498 | 765061.438 | 764948.333 | 764914.127 |
| 144 | 20°26'58.26" | 236.72 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 17°26'58.4" | 348.996 | 427+906.970 | 427+966.970 | 428+315.965 | 428+375.965 | N | 9782887.118 | 9782693.82 | 9782743.113 | 9783058.106 | 763825.918 | 763962.565 | 763928.36 | 763781.257 | 763765.418 |
| 145 | 39°54'45.43" | 257.504 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 25°49'48.49" | 238.446 | 429+461.632 | 429+591.632 | 429+830.78 | 429+960.78 | N | 9784414.536 | 9784165.585 | 9784289.718 | 9784483.949 | 763422.131 | 763487.944 | 763449.626 | 763314.812 | 763211.92 |
| 146 | 52°12'41.73" | 324.799 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 38°7'44.79" | 351.982 | 431+523.812 | 431+653.812 | 432+005.795 | 432+135.795 | N | 9785654.012 | 9785466.42 | 9785545.733 | 9785849.053 | 761670.226 | 761935.374 | 761832.482 | 761667.004 | 761656.008 |
| 147 | 42°43'51" | 272.4 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 28°38'54.06" | 264.462 | 434+379.672 | 434+509.672 | 434+774.134 | 434+904.134 | N | 9788492.365 | 9788220.226 | 9788349.673 | 9788588.995 | 761545.857 | 761557.782 | 761546.785 | 761440.86 | 761352.437 |
| 148 | 16°22'26.51" | 194.884 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 13°22'26.65" | 267.485 | 436+293.58 | 436+353.58 | 436+620.543 | 436+680.543 | N | 9789799.397 | 9789662.171 | 9789704.789 | 9789917.779 | 760227.839 | 760366.218 | 760323.986 | 760163.179 | 760133.757 |
| 149 | 35°41'35.56" | 235.687 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 21°36'38.61" | 199.496 | 437+953.477 | 438+083.477 | 438+282.973 | 438+412.973 | N | 9791291.248 | 9791084.844 | 9791201.089 | 9791395.747 | 759405.457 | 759519.237 | 759461.232 | 759423.326 | 759433.475 |
| 150 | 20°14'45.44" | 234.618 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 17°14'45.58" | 344.924 | 439+505.817 | 439+565.817 | 439+910.741 | 439+970.741 | N | 9792843.312 | 9792610.358 | 9792669.99 | 9793013.046 | 759591.284 | 759563.393 | 759570.005 | 759556.252 | 759536.838 |
| 151 | 19°40'53.35" | 228.798 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 16°40'53.49" | 333.635 | 440+977.65 | 441+037.65 | 441+370.699 | 441+430.699 | N | 9794272.929 | 9794050.377 | 9794108.614 | 9794414.052 | 759250.214 | 759303.309 | 759288.877 | 759157.592 | 759125.267 |
| 152 | 23°29'49.28" | 268.349 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 20°29'49.42" | 409.946 | 442+694.322 | 442+754.322 | 443+164.268 | 443+224.268 | N | 9795747.959 | 9795523.158 | 9795573.703 | 9795953.48 | 758288.655 | 758435.201 | 758402.876 | 758254.414 | 758243.889 |
| 153 | 43°22'23.43" | 275.834 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 29°17'26.49" | 270.392 | 444+333.592 | 444+463.592 | 444+733.984 | 444+863.984 | N | 9797378.296 | 9797106.327 | 9797233.425 | 9797461.981 | 758012.818 | 758058.832 | 758031.933 | 757893.026 | 757792.596 |
| 154 | 21°14'59.18" | 164.439 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 7°10'2.24" | 66.164 | 446+357.23 | 446+487.23 | 446+553.187 | 446+683.187 | N | 9798542.436 | 9798443.42 | 9798517.334 | 9798546.732 | 756469.291 | 756600.576 | 756493.739 | 756434.514 | 756311.045 |
| 155 | 70°57'11.46" | 442.862 | 130 | 0.123 | 129.804 | 5.32 | 528.916 | 56°52'14.52" | 524.992 | 448+526.737 | 448+656.737 | 449+181.729 | 449+311.729 | N | 9799208.688 | 9799088.298 | 9799128.704 | 9799521.539 | 754110.737 | 754536.921 | 754413.452 | 754098.176 | 754085.455 |
| 156 | 11°37'3.44" | 146.59 | 60 | 0.026 | 59.996 | 0.524 | 1145.93 | 8°37'3.58" | 172.355 | 453+072.540 | 453+132.540 | 453+304.895 | 453+364.895 | N | 9803551.856 | 9803405.505 | 9803465.374 | 9803635.408 | 753862.387 | 753870.755 | 753866.808 | 753839.629 | 753824.718 |



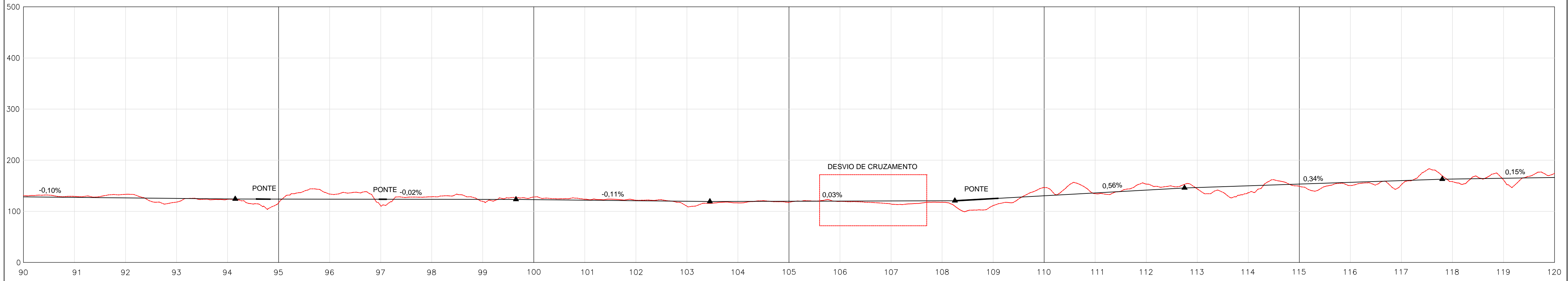
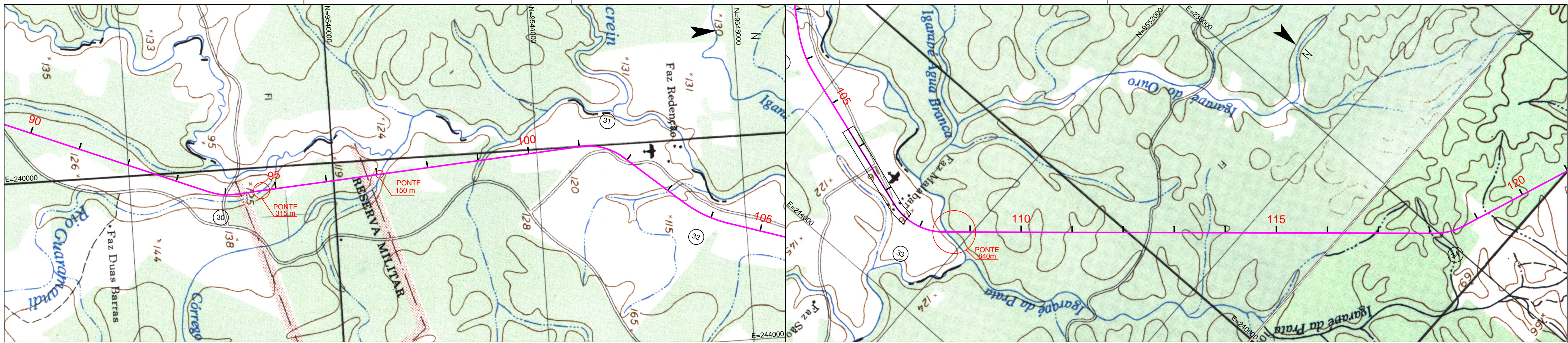
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| VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A. | | | |
| FERROVIA NORTE SUL - TRECHO - AÇAILÂNDIA (MA) - BELÉM (PA) | | | |
| ESTUDOS DE ENGENHARIA | | | |
| ALTERNATIVA 3 | | | |
| km 0=PP AO km 30 | | | |
| ESCALA: H= 1:50.000 V= 1:5.000 | DATA: SETEMBRO/2011 | APROVAÇÃO: | ARG. TÉCNICO: ET-07 DWG |
| ELABORADO POR: | | FOUN: ET-037 | |



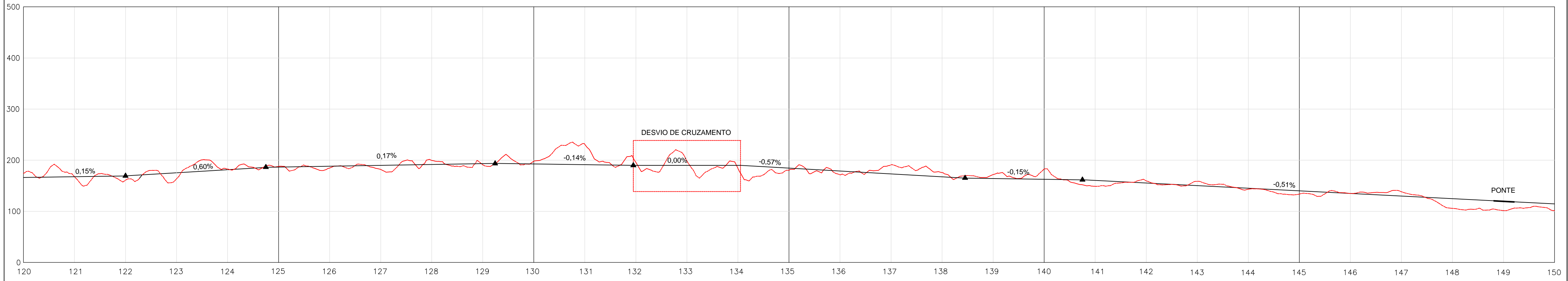
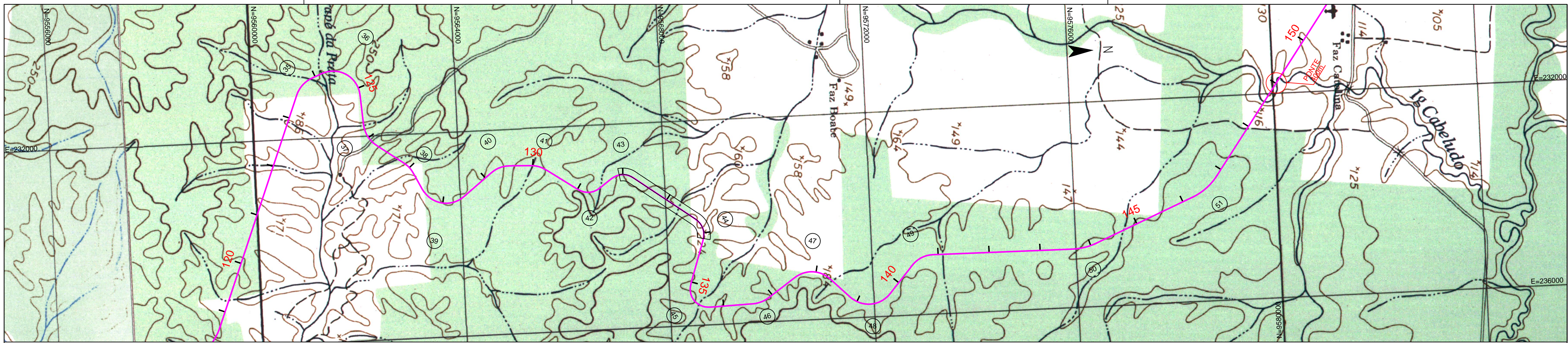
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| VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A. | | | |
| FERROVIA NORTE SUL - TRECHO - AÇAILÂNDIA (MA) - BELÉM (PA) | | | |
| ESTUDOS DE ENGENHARIA | | | |
| ALTERNATIVA 3 | | | |
| km 30 AO km 60 | | | |
| ESCALA: H= 1:50.000 V= 1:5.000 | DATA: SETEMBRO/2011 | APROVAÇÃO: | ARG. TÉCNICO: ET-38.DWG |
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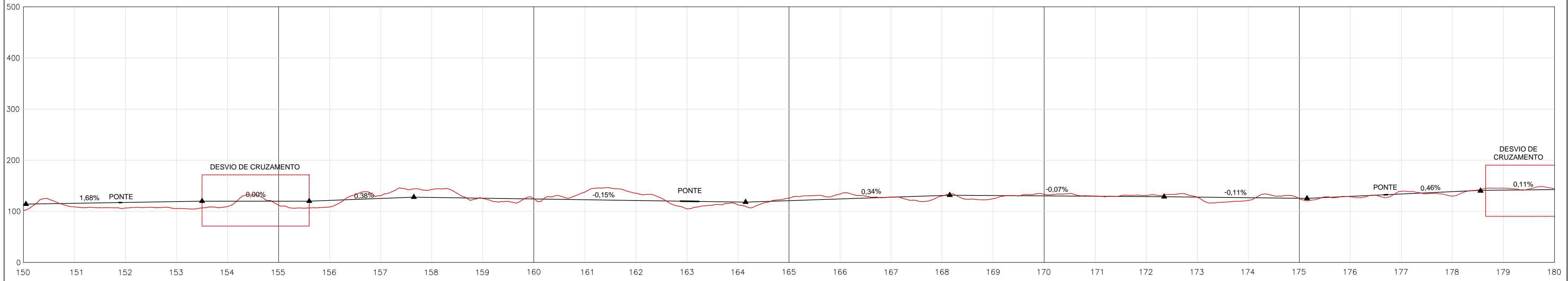
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| VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A. | | | |
| FERROVIA NORTE SUL - TRECHO - AÇAILÂNDIA (MA) - BELÉM (PA) | | | |
| ESTUDOS DE ENGENHARIA | | | |
| ALTERNATIVA 3 | | | |
| km 60 AO km 90 | | | |
| ESCALA: H= 1:50.000 V= 1:90.000 | DATA: SETEMBRO 2011 | APROVAÇÃO: | ARG. TÉCNICO: ET-39.DWG |
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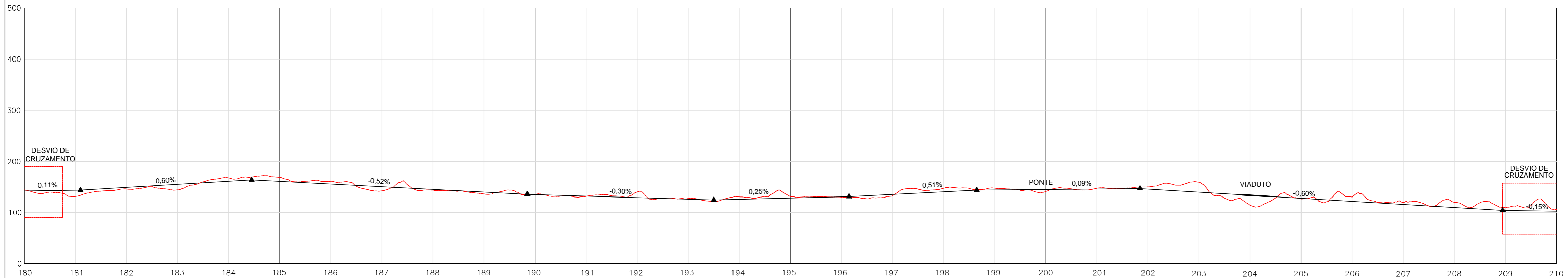
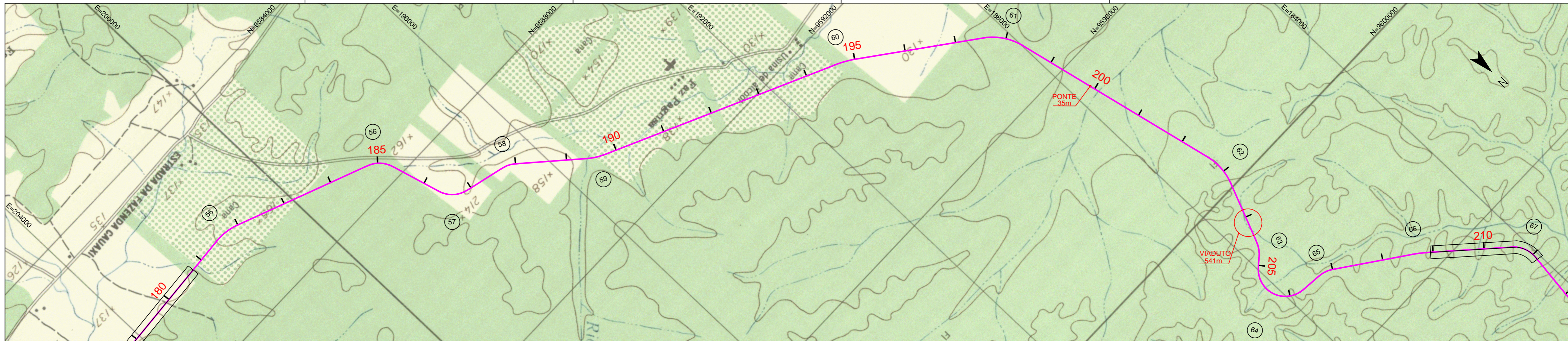
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| VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A. | | | |
| FERROVIA NORTE SUL - TRECHO - AÇAILÂNDIA (MA) - BELÉM (PA) | | | |
| ESTUDOS DE ENGENHARIA | | | |
| ALTERNATIVA 3 | | | |
| km 90 AO km 120 | | | |
| ESCALA: H= 1:50.000 V= 1:5.000 | DATA: SETEMBRO 2011 | APROVAÇÃO: | ARG. TÉCNICO: ET-40.DWG |
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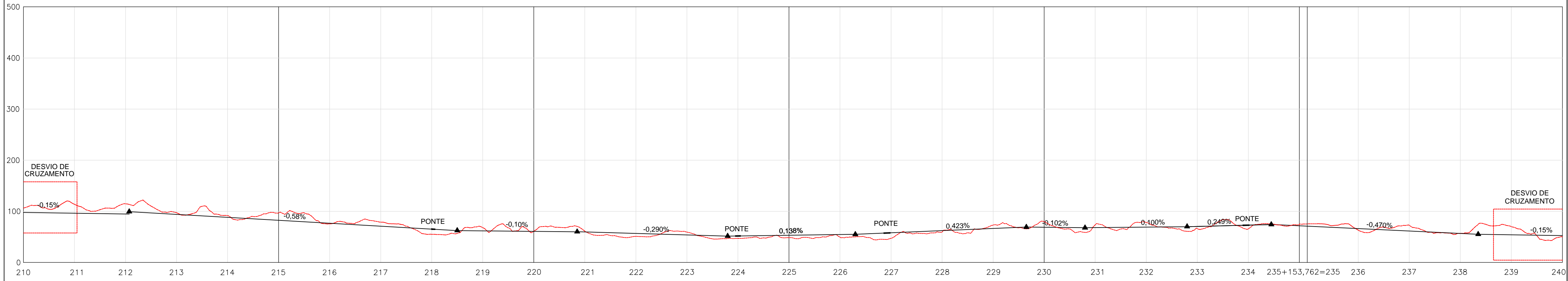
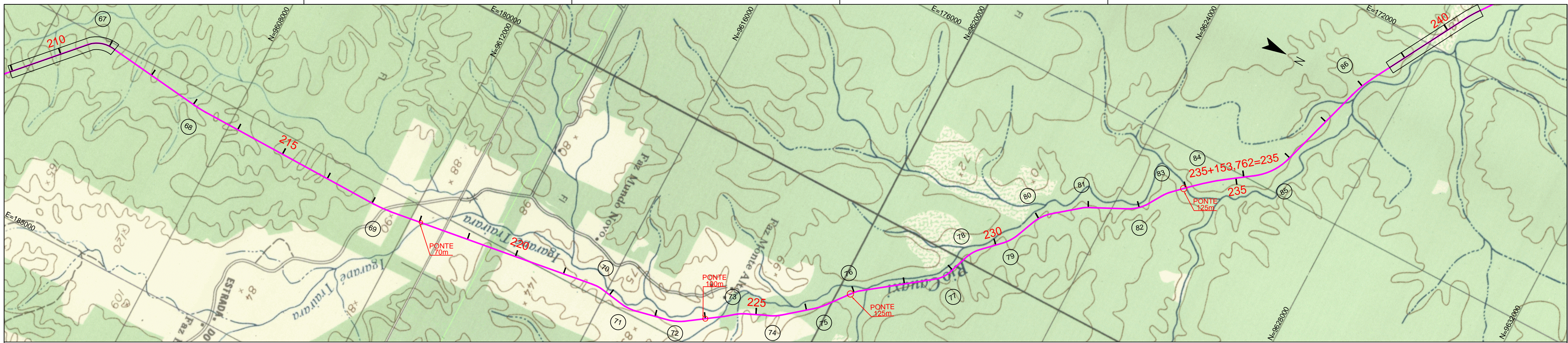
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| VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A. | | | |
| FERROVIA NORTE SUL - TRECHO - AÇAILÂNDIA (MA) - BELÉM (PA) | | | |
| ESTUDOS DE ENGENHARIA | | | |
| ALTERNATIVA 3 | | | |
| km 120 AO km 150 | | | |
| ESCALA: H= 1:50.000 V= 1:5.000 | DATA: SETEMBRO 2011 | APROVAÇÃO: | ARG. TÉCNICO: ET-41.DWG |
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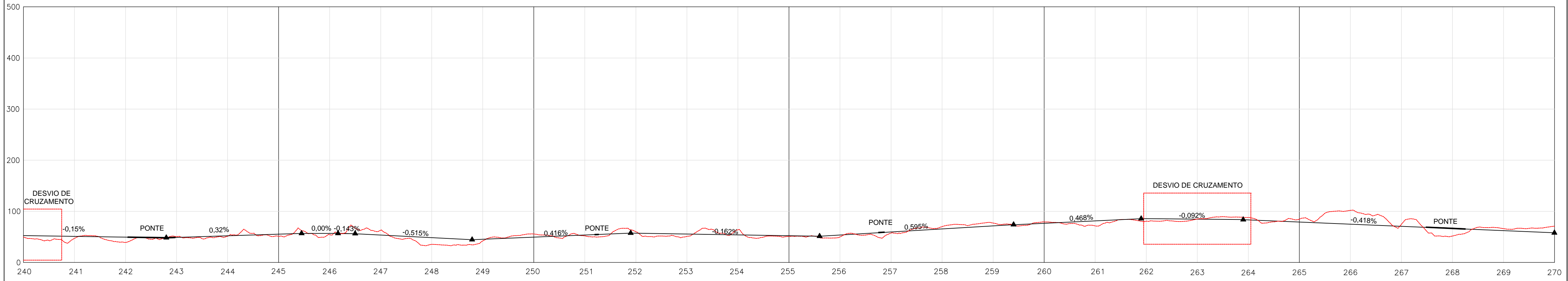
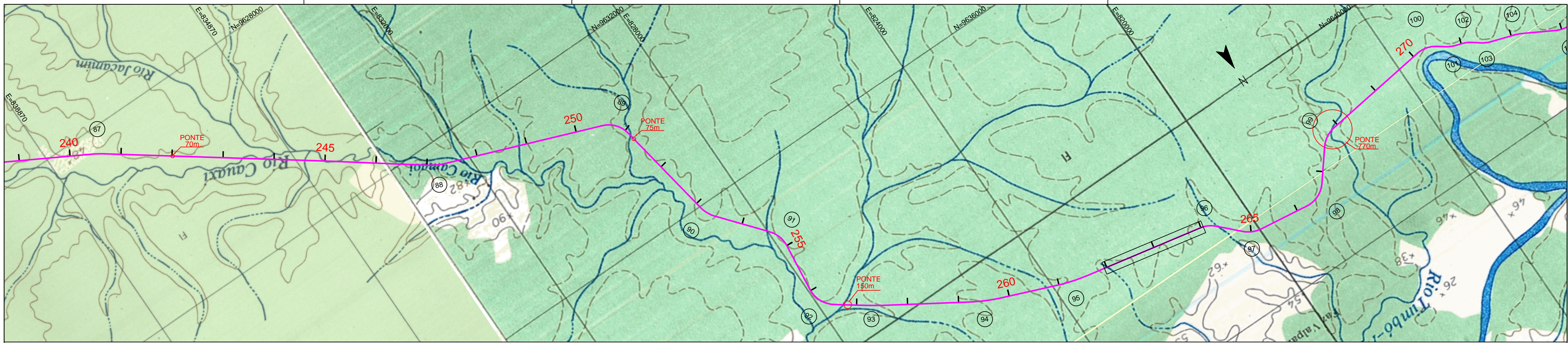
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| VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A. | | | |
| FERROVIA NORTE SUL - TRECHO - AÇAILÂNDIA (MA) - BELÉM (PA) | | | |
| ESTUDOS DE ENGENHARIA | | | |
| ALTERNATIVA 3 | | | |
| km 150 AO km 180 | | | |
| ESCALA: H= 1:50.000 V= 1:5.000 | DATA: SETEMBRO 2011 | APROVAÇÃO: | ARG. TÉCNICO: ET-42.DWG |
| ELABORADO POR: | | FOUN: | ET-042 |



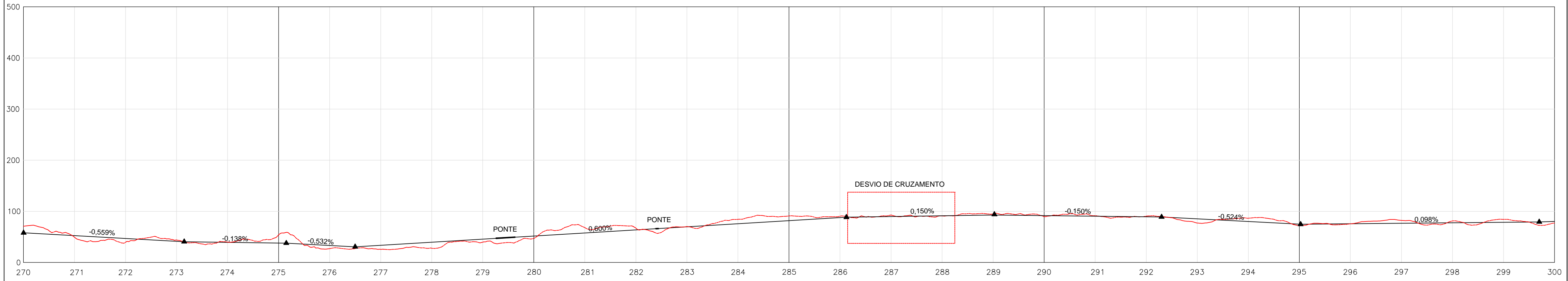
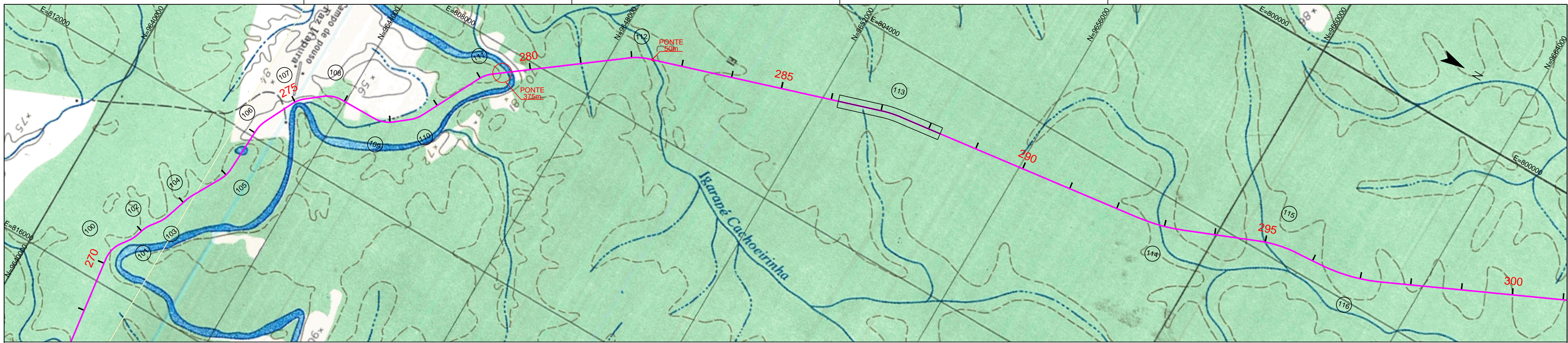
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| VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A. | | | |
| FERROVIA NORTE SUL - TRECHO - AÇAILÂNDIA (MA) - BELÉM (PA) | | | |
| ESTUDOS DE ENGENHARIA | | | |
| ALTERNATIVA 3 | | | |
| km 180 AO km 210 | | | |
| ESCALA: H= 1:50.000 V= 1:5.000 | DATA: SETEMBRO/2011 | APROVAÇÃO: | ARG. TÉCNICO: ET-43.DWG |
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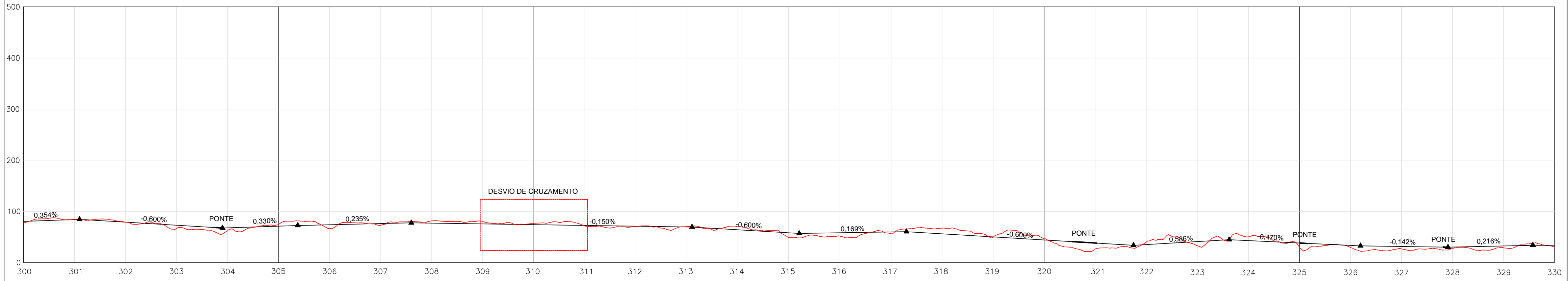
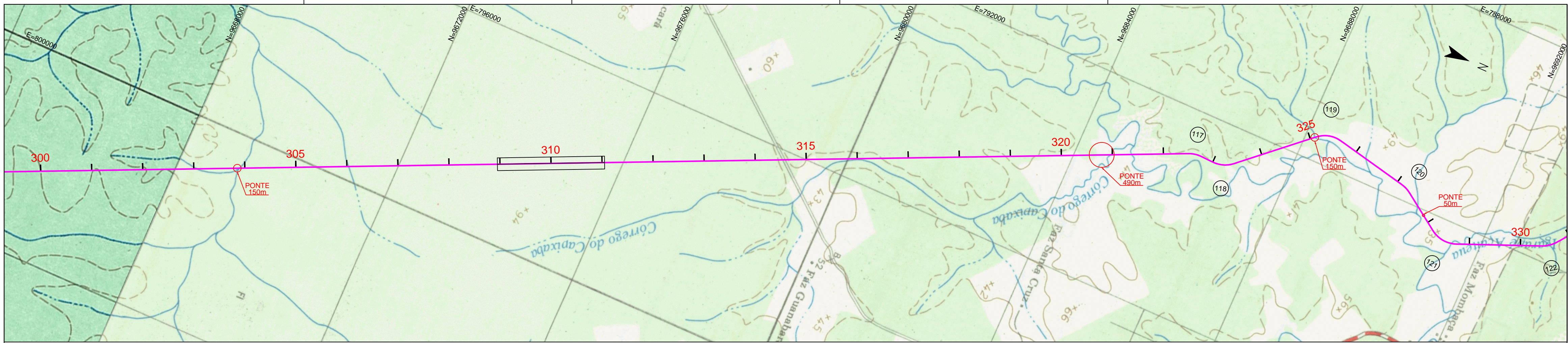
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| VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A. | | | |
| FERROVIA NORTE SUL - TRECHO - AÇAILÂNDIA (MA) - BELÉM (PA) | | | |
| ESTUDOS DE ENGENHARIA | | | |
| ALTERNATIVA 3 | | | |
| km 210 AO km 240 | | | |
| ESCALA: H= 1:50.000 V= 1:5.000 | DATA: SETEMBRO 2011 | APROVAÇÃO: | ARG. TÉCNICO: ET-44.DWG |
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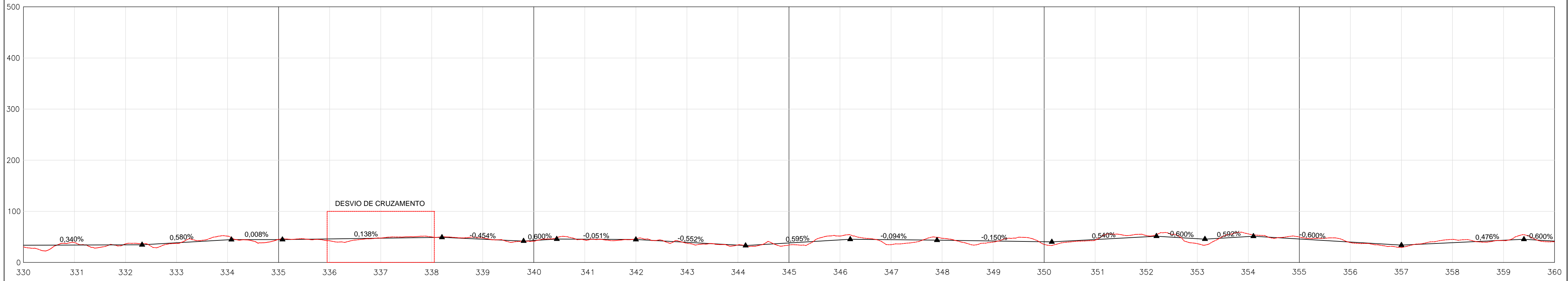
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| VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A. | | | |
| FERROVIA NORTE SUL - TRECHO - AÇAILÂNDIA (MA) - BELÉM (PA) | | | |
| ESTUDOS DE ENGENHARIA | | | |
| ALTERNATIVA 3 | | | |
| km 240 AO km 270 | | | |
| ESCALA: H= 1:50.000 V= 1:5.000 | DATA: SETEMBRO2011 | APROVAÇÃO: | ARG. TÉCNICO: ET-45.DWG |
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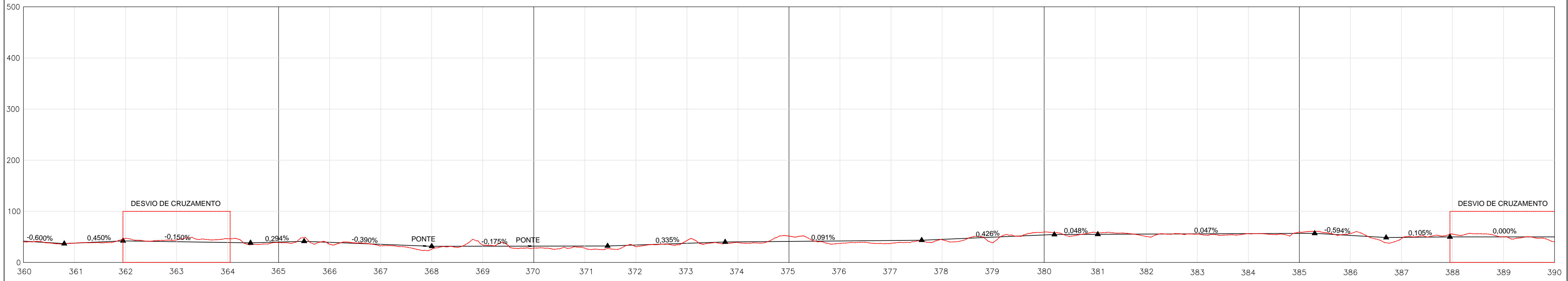
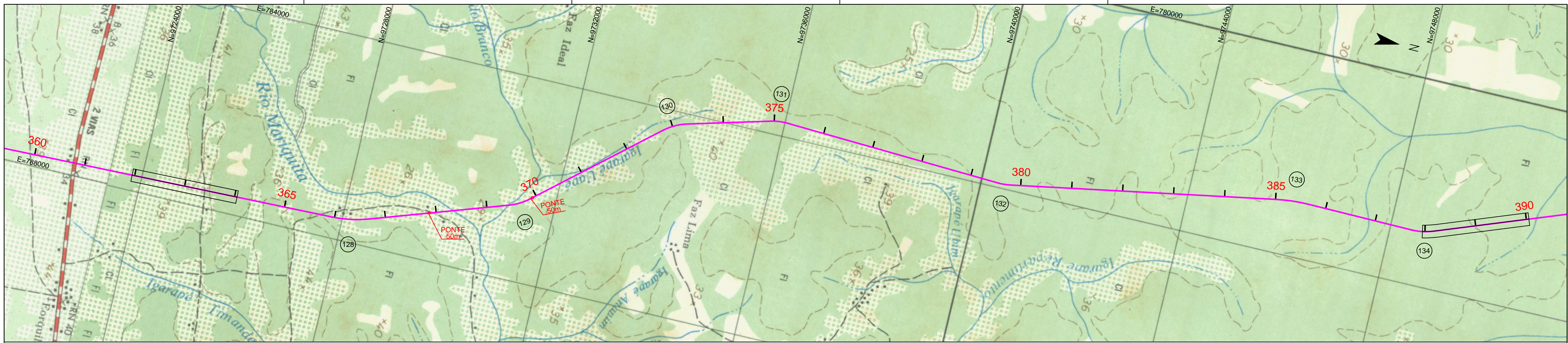
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| VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A. | | | |
| FERROVIA NORTE SUL - TRECHO - AÇAILÂNDIA (MA) - BELÉM (PA) | | | |
| ESTUDOS DE ENGENHARIA | | | |
| ALTERNATIVA 3 | | | |
| km 270 AO km 300 | | | |
| ESCALA: H= 1:50.000 V= 1:5.000 | DATA: SETEMBRO 2011 | APROVAÇÃO: | ARG. TÉCNICO: ET-46.DWG |
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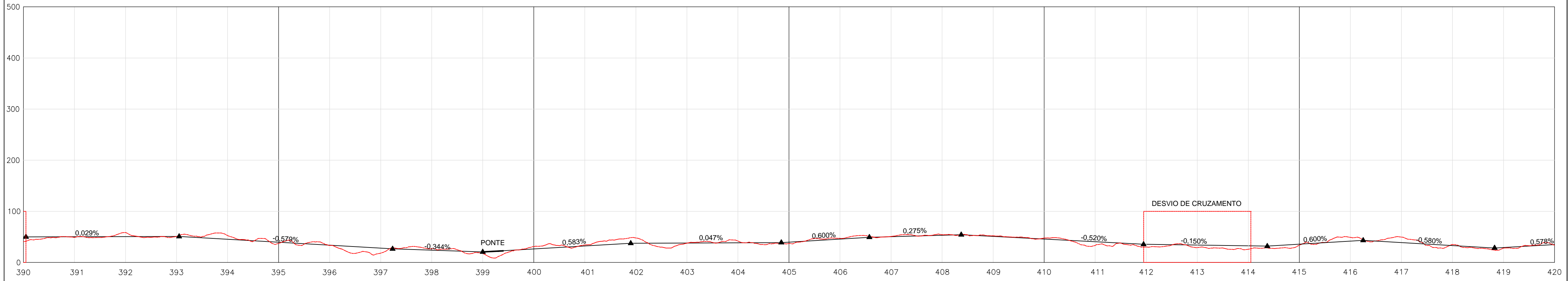
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| VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A. | | | |
| FERROVIA NORTE SUL - TRECHO - AÇAILÂNDIA (MA) - BELÉM (PA) | | | |
| ESTUDOS DE ENGENHARIA | | | |
| ALTERNATIVA 3 | | | |
| km 300 AO km 330 | | | |
| ESCALA: H= 1:50.000 V= 1:5.000 | DATA: SETEMBRO/2011 | APROVAÇÃO: | ARG. TÉCNICO: ET-47.DWG |
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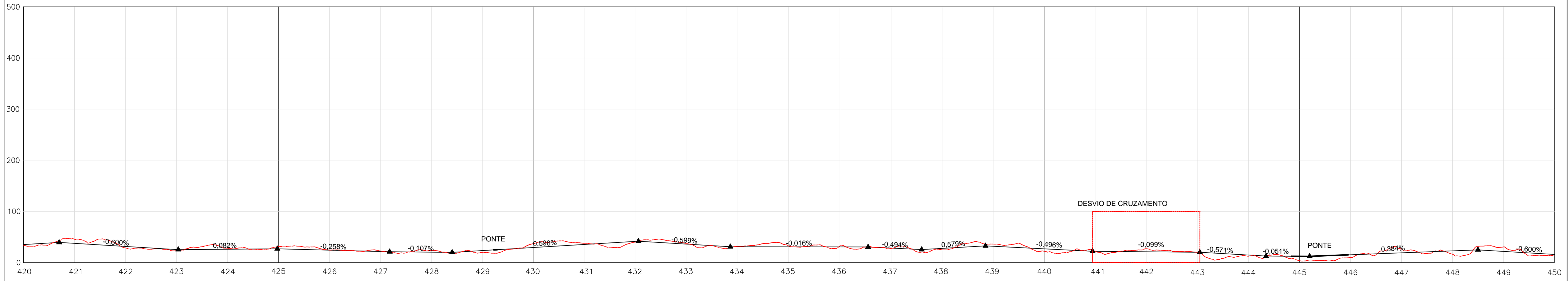
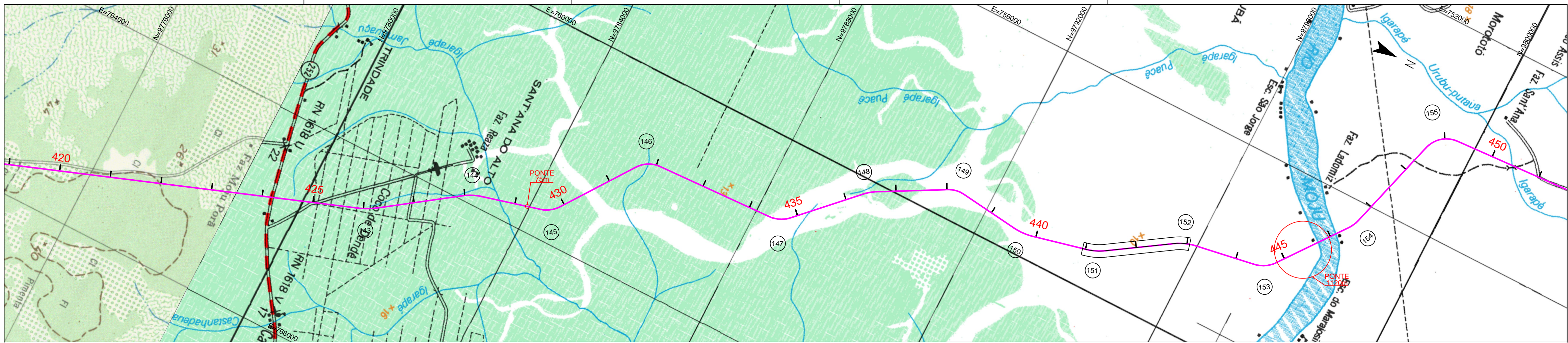
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| VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A. | | | |
| FERROVIA NORTE SUL - TRECHO - AÇAILÂNDIA (MA) - BELÉM (PA) | | | |
| ESTUDOS DE ENGENHARIA | | | |
| ALTERNATIVA 3 | | | |
| km 330 AO km 360 | | | |
| ESCALA: H= 1:50.000 V= 1:5.000 | DATA: SETEMBRO 2011 | APROVAÇÃO: | ARG. TÉCNICO: ET-48.DWG |
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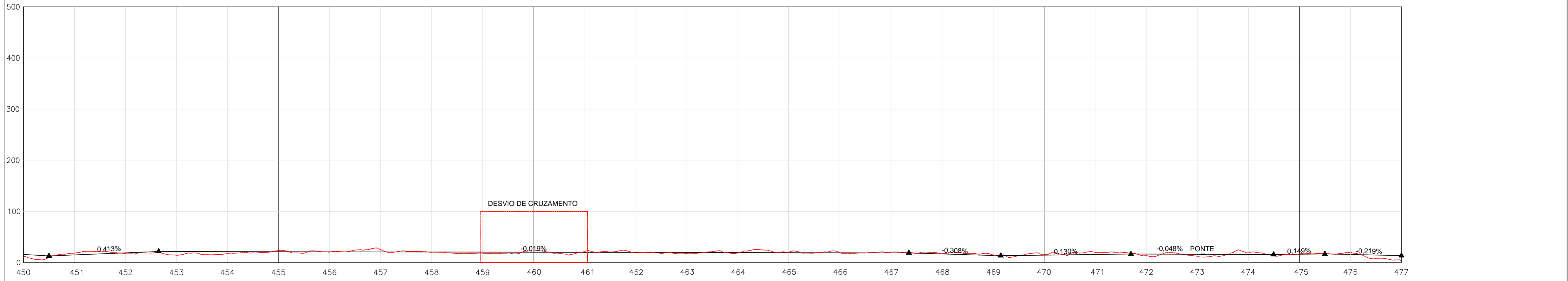
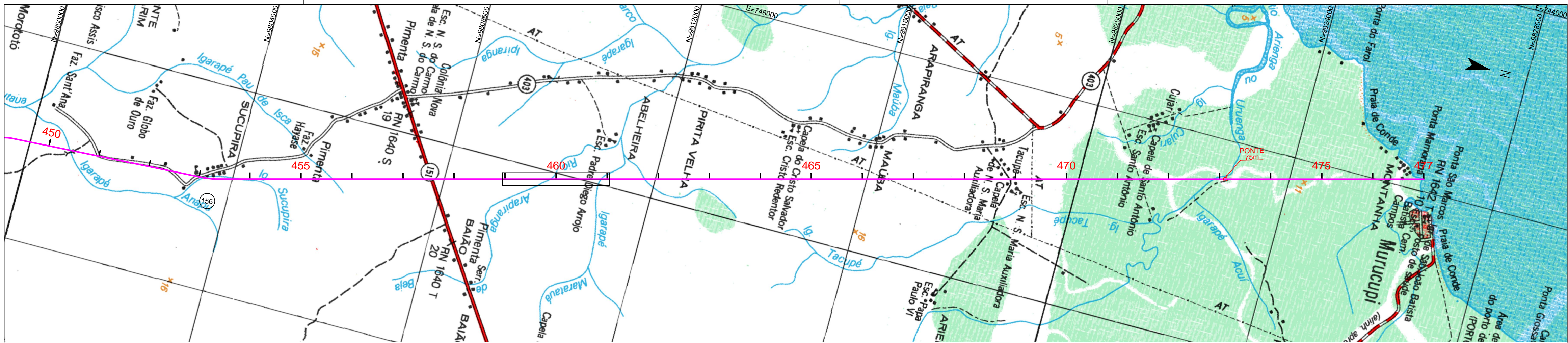
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| VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A. | | | |
| FERROVIA NORTE SUL - TRECHO - AÇAILÂNDIA (MA) - BELÉM (PA) | | | |
| ESTUDOS DE ENGENHARIA | | | |
| ALTERNATIVA 3 | | | |
| km 360 AO km 390 | | | |
| ESCALA: H= 1:50.000 V= 1:5.000 | DATA: SETEMBRO 2011 | APROVAÇÃO: | ARG. TÉCNICO: ET-49.DWG |
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| VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A. | | | |
| FERROVIA NORTE SUL - TRECHO - AÇAILÂNDIA (MA) - BELÉM (PA) | | | |
| ESTUDOS DE ENGENHARIA | | | |
| ALTERNATIVA 3 | | | |
| km 390 AO km 420 | | | |
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| ELABORADO POR: | | FOUN: | ET-050 |



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| VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A. | | | |
| FERROVIA NORTE SUL - TRECHO - AÇAILÂNDIA (MA) - BELÉM (PA) | | | |
| ESTUDOS DE ENGENHARIA | | | |
| ALTERNATIVA 3 | | | |
| km 420 AO km 450 | | | |
| ESCALA: H= 1:50.000 V= 1:5.000 | DATA: SETEMBRO 2011 | APROVAÇÃO: | ARG. TÉCNICO: ET-01.DWG |
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|--|------------------------|-----------------|----------------------------|
| VALEC - ENGENHARIA, CONSTRUÇÕES E FERROVIAS S.A. | | | |
| FERROVIA NORTE SUL - TRECHO - AÇAILÂNDIA (MA) - BELÉM (PA) | | | |
| ESTUDOS DE ENGENHARIA | | | |
| ALTERNATIVA 3 | | | |
| km 450 AO km 477+000=PF | | | |
| ESCALA: H= 1:50.000 V= 1:5.000 | DATA: SETEMBRO/2011 | APROVAÇÃO: | ARG. TÉCNICO: ET-02.DWG |
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