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**GOVERNO DO
ESTADO DO CEARÁ**



SRH Secretaria dos Recursos Hídricos

Programa de Gerenciamento e Integração dos Recursos Hídricos do Estado do Ceará - PROGERIRH

Contrato

Nº 02/ PROGERIRH-PILOTO/CE/SRH 2001

Estudos de Alternativas, EIAS/RIMAS, Projetos Executivos, Levantamentos Cadastrais, Planos de Reassentamento e Avaliação Financeira e Econômica dos Projetos das Barragens João Guerra / Umari, Riacho da Serra, Ceará e Missi, e dos Projetos das Adutoras de Madalena, Lagoa do Mato, Alto Santo e Amontada

BARRAGEM RIACHO DA SERRA VOLUME I - ESTUDOS BÁSICOS Tomo 3B - Estudos Cartográficos - Memória de Cálculo



MONTGOMERY WATSON





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1. APRESENTAÇÃO



1. APRESENTAÇÃO

O consórcio **Montgomery-Watson / Engesoft** e a **Secretaria dos Recursos Hídricos do Estado do Ceará (SRH-CE)** celebraram o contrato nº 02/PROGERIRH-PILOTO/CE/SRH 2001, que tem como objetivo o Estudo de Alternativas, EIA/RIMAS, Levantamentos Cadastrais, Planos de Reassentamento e Avaliação Financeira e Econômica dos Projetos das Barragens João Guerra / Umari, Riacho da Serra, Ceará e Missi, e dos Projetos das Adutoras de Madalena, Lagoa do Mato, Alto Santo e Amontada.

A ordem de serviço foi emitida em 05 de março de 2001 e imediatamente as equipes do consórcio iniciaram as atividades previstas no cronograma aprovado.

O presente relatório, denominado **Tomo 3B – Estudos Cartográficos – Memória de Cálculo**, é parte integrante do **Volume 1 – Estudos Básicos** e diz respeito à **Barragem Riacho da Serra**, a qual tem por finalidade a criação de um reservatório no rio de mesmo nome, para o abastecimento da população da sede municipal de Alto Santo, Ceará.

Este tomo apresenta os anexos referentes à memória de cálculo relativa à transporte de coordenadas e apoio básico e suplementar para o levantamento aerofotogramétrico da bacia hidráulica.



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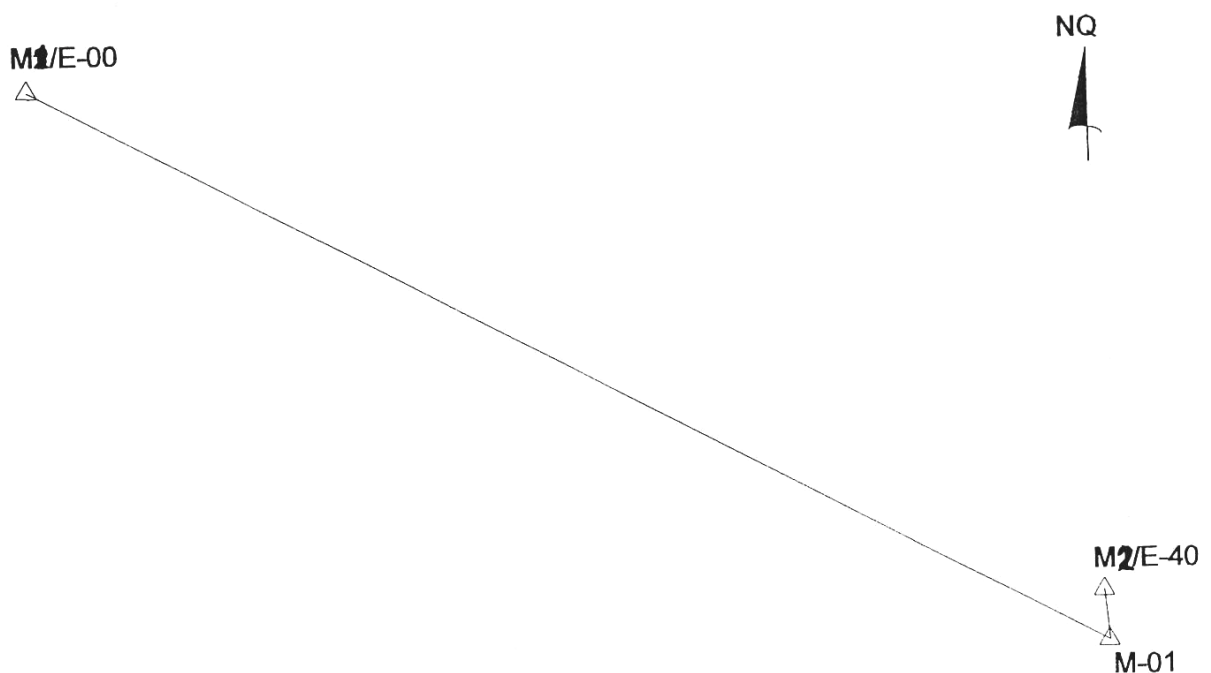
2. TRANSPORTE DE COORDENADAS



ENGESOFT ENGENHARIA E CONSULTORIA LTDA

Projeto: Riacho da Serra	Município: Alto Santo	Estado: Ceará
Origem M-01	Marco Poligonal Marco_M1/E_00	Projeção/Datum UTM/SAD-69
Coordenada NORTE 9.385.207,289m	Coordenada ESTE 574.516,419m	Altitude Ortométrica 93,116m
Latitude Geodésica 5°33'41.92085" S		Longitude Geodésica 38°19'37.96074" WGr

Projeto: Riacho da Serra	Município: Alto Santo	Estado: Ceará
Origem M-01	Marco Poligonal Marco_M2/E_40	Projeção/Datum UTM/SAD-69
Coordenada NORTE 9.384.854,704m	Coordenada ESTE 575.236,492m	Altitude Ortométrica 87,121m
Latitude Geodésica 5°33'53.37570" S		Longitude Geodésica 38°19'14.54384" WGr





ENGESOFT ENGENHARIA E CONSULTORIA LTDA

Vértice: M-01	Ponto Visado:	Obra/Ano: O-739/2001
Estado: Ceará	Município: Alto Santo	Local: Fazenda Cacimba da Cunha
Origem: V. Caraubinha (IBGE)	MC: 39° W	Datum: SAD-69
Coordenada Geodésica Latitude: 05° 33' 54,50663"S	Coordenada Geodésica Longitude: 38° 19' 14,44356"W	
Coordenada UTM Norte: 9.384.819,975m	Coordenada UTM Este: 575.239,533m	Altura Geométrica: 88,397m Altitude Ortométrica: 87,453m
Descrição: Marco de concreto de formato tronco piramidal medindo, (10x12x50) cm, com chapa de bronze no centro do topo, constando: ENGESOFT - M-01, 06/2001 e eleva-se 10cm do solo.		
ITINERÁRIO	CROQUIS	
Partindo-se com 0,0Km da Igreja Matriz do Alto Santo pela CE-205 em direção a Iracema com 6,4Km toma-se a direita pela estrada carroçavel, com 9,0Km toma-se a direita, com 10,9Km chega-se a uma porteira com 12,4km chega-se na Fazenda do Sr. José Nilton Diogênes Maia no canto da cerca ao lado do estábulo.		



Ashtech, Inc. GPPS-L

Program: LINECOMP
Wed Sep 19 20:21:00 2001

Version: 5.2.00

```

Project information
GPS Survey          |25-character project name [ The | is in column 26.
]
2601A              |5-character session name
Project information

Known-station parameters
00                 |Receiver identifier used in "LOGTIMES" file
000000            |Project station number
M-01              |4-character short name
FIXED STATION     |25-character long name
-----          |25-character comment field
0                 |Position extraction (0=below,1=U-file,2=proj. file)
S 5 33 55.92522  |Latitude deg-min-sec (g=good;b=bad)
E 321 40 44.32045 |E-Longitude deg-min-sec (g=good;b=bad)
W 38 19 15.67955 |W-Longitude deg-min-sec (g=good;b=bad)
  87.4530         |Ellipsoidal height (m) (g=good;b=bad)
  0.0000          |North antenna offset(m)
  0.0000          |East antenna offset (m)
  1.6700 0.1318 0.0000 |Vert antenna offset (m): slant/radius/added_offset
  20.0           |Temperature (degrees C)
  50.0           |Humidity (percent)
  1010.0         |Pressure (millibars)
UBASEA01.260     |Measurement filename (restricted to 24 characters)
Known-station parameters

Unknown-station parameters
00                 |Receiver identifier used in "LOGTIMES" file
000000            |Project station number
Marco M1/E_00    |4-character short name
UNKNOWN STATION  |25-character long name
-----          |25-character comment field
0                 |Position extraction (0=below,1=U-file,2=proj. file)
S 5 33 43.47744  |Latitude deg-min-sec (g=good;b=bad)
E 321 40 20.76843 |E-Longitude deg-min-sec (g=good;b=bad)
W 38 19 39.23157 |W-Longitude deg-min-sec (g=good;b=bad)
  123.3103       |Ellipsoidal height (m) (g=good;b=bad)
  0.0000         |North antenna offset(m)
  0.0000         |East antenna offset (m)
  1.8680 0.1318 0.0000 |Vert antenna offset (m): slant/radius/added_offset
  20.0           |Temperature (degrees C)
  50.0           |Humidity (percent)
  1010.0         |Pressure (millibars)
UESTOA01.260    |Measurement filename (restricted to 24 characters)
Unknown-station parameters

Run-time parameters
  1               |First epoch to process
 -1              |Final epoch to process (-1 = last available)
15.0            |Elevation cutoff angle (degrees)
1               |Data to process (0=Wdln;1=L1;2=L2;3=L1c;6=RpdSt)
0.010000       |Convergence criterion (meters)
00 00 00 00 00 00 00 |Omit these satellites (up to 7)
10             |Maximum iterations for tlsq and dlsq
00 00 00 00 00 00 00 |Forbidden reference SVs (up to 7)
yes            |Apply tropo delay correction
Run-time parameters

LINECOMP 5.2.00 7-18-94

FIXED U-File from L1 only receiver.
UNKW N U-File from L1 only receiver.

FIXED U-File used BROADCAST orbits.

```



UNKWN U-File used BROADCAST orbits.

Common start of two UFILES: 2001/09/17 19:33:10.00
Common end of two UFILES: 2001/09/17 20:00:45.00

Selected first epoch: 1
Selected last epoch: 332
For SV 6 there are 331 triple-difference measurements.
For SV 14 there are 313 triple-difference measurements.
For SV 15 there are 331 triple-difference measurements.
For SV 17 there are 331 triple-difference measurements.
For SV 18 there are 331 triple-difference measurements.
For SV 21 there are 277 triple-difference measurements.
For SV 22 there are 175 triple-difference measurements.
For SV 23 there are 24 triple-difference measurements.
For SV 29 there are 283 triple-difference measurements.
For SV 30 there are 76 triple-difference measurements.
Epoch interval (seconds): 5.000000

THE TRIPLE DIFFERENCE SOLUTION (L1)

Measure of geometry: 6.569626
num_meas = 2141 num_used = 2139 rms_resid = 0.002440 (m)
Post-Fit Chisq = 4700.423 NDF = 4.951

Sigmax (m): 3.642393
Sigmay (m): 3.235273
Sigmaz (m): 1.368835
x y z
x 1.00
y 0.51y 1.00
z 0.22z-0.03z 1.00

del_station: -0.000822 -0.002215 -0.001616
Station1: FIXED STATION Station2: UNKNOWN STATION
M-01 Marco_M1/E_00
Latitude: -5.56553478 -5 33 55.92522 -5.56203747 -5 33 43.33489
E-Long : 321.67897790 321 40 44.32045 321.67244660 321 40 20.80775
W-Long : 38.32102210 38 19 15.67955 38.32755340 38 19 39.19225
E-Height: 87.4530 93.1502

Baseline vector: -414.8901 -594.4972 384.3806

Mark1_xyz : 4980596.5010 -3936406.1352 -614465.4781
Az1 E11 D1 : 298.12134 0.3941 820.5542
E1 N1 U1 : -723.6669 386.7549 5.6972
Mark2_xyz : 4980181.6109 -3937000.6325 -614081.0975
Az2 E12 D2 : 118.12197 -0.4015 820.5542
E2 N2 U2 : 723.6718 -386.7552 -5.6972

Double-Difference Epochs:
Prn: 6 Start epoch: 2 End epoch: 332
Prn: 14 Start epoch: 20 End epoch: 332
Prn: 15 Start epoch: 2 End epoch: 332
Prn: 17 Start epoch: 2 End epoch: 332
Prn: 18 Start epoch: 2 End epoch: 332
Prn: 21 Start epoch: 56 End epoch: 332
Prn: 22 Start epoch: 158 End epoch: 332
Prn: 23 Start epoch: 169 End epoch: 192
Prn: 29 Start epoch: 50 End epoch: 332
Prn: 30 Start epoch: 2 End epoch: 77
Satellite 23 dropped due to insuff. good obs.
Number of measurements = 24

THE FLOAT DOUBLE DIFFERENCE SOLUTION (L1)
Measure of geometry: 0.249853 Wavelength = 0.190294 (m/cycle)



num meas = 2048 num_used = 2047 rms_resid = 0.012591(m)
 Post-Fit Chisq = 9578.077 NDF = 4.738

Reference SV: 14

SV	Ambiguity	FIT	Meas	SV	Ambiguity	FIT	Meas
6	-6446546.127f	0.021	313	15	-4601573.175f	0.074	313
17	-5441692.238f	0.071	313	18	-8081256.163f	0.079	313
21	-5058086.979f	0.046	278	22	-1917211.773f	0.119	176
29	759075.121f	0.032	284	30	-9019334.061f	0.060	57

Sigmax (m): 0.187762
 Sigmay (m): 0.182410
 Sigmaz (m): 0.101681
 SigmaN (cy): 0.718803
 SigmaN (cy): 0.952649
 SigmaN (cy): 1.085176
 SigmaN (cy): 0.847974
 SigmaN (cy): 0.796535
 SigmaN (cy): 1.167731
 SigmaN (cy): 0.360466
 SigmaN (cy): 0.558132

x 1.00 y 1.00 z 1.00
 N 0.71N 0.90N-0.11N 1.00
 N-0.13N 0.49N-0.89N 0.43N 1.00
 N 0.16N 0.76N-0.70N 0.73N 0.93N 1.00
 N-0.18N 0.36N-0.94N 0.32N 0.99N 0.87N 1.00
 N-0.70N-0.44N-0.78N-0.50N 0.53N 0.19N 0.64N 1.00
 N-0.92N-0.61N-0.43N-0.79N 0.19N-0.16N 0.29N 0.89N 1.00
 N-0.93N-0.49N 0.09N-0.78N-0.16N-0.41N-0.11N 0.49N 0.81N 1.00
 N 0.27N 0.91N 0.19N 0.75N 0.26N 0.53N 0.12N-0.54N-0.56N-0.27N 1.00

del_station: -0.000000 0.000000 0.000000

Station1: FIXED STATION
M-01

Station2: UNKNOWN STATION

Marc0 M1/E 00

Latitude: -5.56553478 -5 33 55.92522 -5.56203847 -5 33 43.33848
 E-Long : 321.67897790 321 40 44.32045 321.67244497 321 40 20.80188
 W-Long : 38.32102210 38 19 15.67955 38.32755503 38 19 39.19812
 E-Height: 87.4530 93.0992

Baseline vector: -415.0503 -594.6008 384.2758

Mark1_xyz : 4980596.5010 -3936406.1352 -614465.4781
 Az1 El1 D1 : 298.10861 0.3905 820.6612
 E1 N1 U1 : -723.8475 386.6446 5.6462
 Mark2_xyz : 4980181.4507 -3937000.7361 -614081.2023
 Az2 El2 D2 : 118.10924 -0.3979 820.6612
 E2 N2 U2 : 723.8524 -386.6449 -5.6462

AMBIGUITY RESOLUTION

	1	2	3	4
Abs Contrast	33.893	0.031	0.006	0.003
Contrast		99.910	99.984	99.990
Change Chi2	1082.410	13820.966	16854.062	17727.478
Bias S14: 6	-6446546	-6446546	-6446546	-6446547
Bias S14:15	-4601573	-4601574	-4601572	-4601573
Bias S14:18	-8081256	-8081257	-8081255	-8081256
Bias S14:21	-5058087	-5058088	-5058086	-5058086
Bias S14:29	759075	759075	759075	759076
Bias S14:30	-9019334	-9019334	-9019334	-9019334
NDF=59.1750 Chi2=9578.0771				
	1	2	3	4
Abs Contrast	41.161	0.000	0.000	0.000
Contrast		100.000	100.000	100.000



```

Change Chi2      607.936 149228.561 189609.144 320673.234
Bias S14:17     -5441692 -5441692 -5441692 -5441691
Bias S14:22     -1917212 -1917211 -1917213 -1917212
NDF=65.1750 Chi2=10660.4868
  
```

THE FIXED DOUBLE DIFFERENCE SOLUTION (L1)

```

Measure of geometry: 0.025403      Wavelength = 0.190294 (m/cycle)
num_meas = 2048      num_used = 2047      rms_resid = 0.013657(m)
Post-Fit Chisq = 11268.407      NDF = 4.738
  
```

```

Reference SV: 14      Integer Search Ratio = 99.910
SV    Ambiguity    FIT    Meas    SV    Ambiguity    FIT    Meas
 6   -6446546.000X 0.051  313    15   -4601573.000X 0.072  313
17   -5441692.000X 0.072  313    18   -8081256.000X 0.081  313
21   -5058087.000X 0.048  278    22   -1917212.000X 0.132  176
29     759075.000X 0.032  284    30   -9019334.000X 0.090   57
  
```

```

Sigmax (m):      0.023249
Sigmay (m):      0.018965
Sigmaz (m):      0.007676
x      y      z
x 1.00
y-0.78y 1.00
z-0.48z 0.57z 1.00
  
```

```

del_station: 0.000000 0.000000 -0.000000
  
```

```

      Station1: FIXED STATION      Station2: UNKNOWN STATION
             M-01                      Marco_M1/E_00
Latitude:  -5.56553478  -5 33 55.92522      -5.56203863  -5 33 43.33907
E-Long   : 321.67897790 321 40 44.32045      321.67244540 321 40 20.80343
W-Long   :  38.32102210  38 19 15.67955      38.32755460  38 19 39.19657
E-Height :  87.4530                            93.1161
  
```

```

Baseline vector:      -415.0090      -594.5729      384.2559
  
```

```

Mark1_xyz : 4980596.5010 -3936406.1352 -614465.4781
Az1 E11 D1 : 298.10904 0.3917 820.6107
E1 N1 U1 : -723.8000 386.6263 5.6631
Mark2_xyz : 4980181.4919 -3937000.7081 -614081.2222
Az2 E12 D2 : 118.10967 -0.3991 820.6107
E2 N2 U2 : 723.8049 -386.6266 -5.6631
  
```

```

Wed Sep 19 20:21:08 2001
  
```



```

Project information
GPS Survey          |25-character project name [ The | is in column 26.
]
2601A              |5-character session name
Project information

Known-station parameters
00                 |Receiver identifier used in "LOGTIMES" file
000000            |Project station number
M-01              |4-character short name
FIXED STATION     |25-character long name
-----          |25-character comment field
0                 |Position extraction (0=below,1=U-file,2=proj. file)
S   5 33 55.92522 |Latitude deg-min-sec (g=good;b=bad)
E 321 40 44.32045 |E-Longitude deg-min-sec (g=good;b=bad)
W  38 19 15.67955 |W-Longitude deg-min-sec (g=good;b=bad)
      87.4530      |Ellipsoidal height (m) (g=good;b=bad)
      0.0000      |North antenna offset(m)
      0.0000      |East antenna offset (m)
      1.6700 0.1318 0.0000 |Vert antenna offset (m): slant/radius/added_offset
      20.0        |Temperature (degrees C)
      50.0        |Humidity (percent)
      1010.0     |Pressure (millibars)
UBASEA01.260     |Measurement filename (restricted to 24 characters)
Known-station parameters

Unknown-station parameters
00                 |Receiver identifier used in "LOGTIMES" file
000000            |Project station number
Marco_M2/E 40    |4-character short name
UNKNOWN STATION  |25-character long name
-----          |25-character comment field
0                 |Position extraction (0=below,1=U-file,2=proj. file)
S   5 33 54.93980 |Latitude deg-min-sec (g=good;b=bad)
E 321 40 44.19180 |E-Longitude deg-min-sec (g=good;b=bad)
W  38 19 15.80820 |W-Longitude deg-min-sec (g=good;b=bad)
      109.5426    |Ellipsoidal height (m) (g=good;b=bad)
      0.0000      |North antenna offset(m)
      0.0000      |East antenna offset (m)
      1.8140 0.1318 0.0000 |Vert antenna offset (m): slant/radius/added_offset
      20.0        |Temperature (degrees C)
      50.0        |Humidity (percent)
      1010.0     |Pressure (millibars)
UES40A01.260     |Measurement filename (restricted to 24 characters)
Unknown-station parameters

Run-time parameters
  1                |First epoch to process
 -1               |Final epoch to process (-1 = last available)
15.0             |Elevation cutoff angle (degrees)
1                |Data to process (0=Wdln;1=L1;2=L2;3=Llc;6=RpdSt)
0.010000        |Convergence criterion (meters)
00 00 00 00 00 00 |Omit these satellites (up to 7)
10              |Maximum iterations for tlsq and dlsq
00 00 00 00 00 00 |Forbidden reference SVs (up to 7)
yes             |Apply tropo delay correction
Run-time parameters

LINECOMP 5.2.00 7-18-94

FIXED U-File from L1 only receiver.
UNKWN U-File from L1 only receiver.

FIXED U-File used BROADCAST orbits.

```



UNKWN U-File used BROADCAST orbits.

Common start of two UFILES: 2001/09/17 20:17:10.00
Common end of two UFILES: 2001/09/17 20:45:30.00

Selected first epoch: 1
Selected last epoch: 341
For SV 3 there are 322 triple-difference measurements.
For SV 6 there are 340 triple-difference measurements.
For SV 14 there are 340 triple-difference measurements.
For SV 15 there are 340 triple-difference measurements.
For SV 17 there are 340 triple-difference measurements.
For SV 18 there are 340 triple-difference measurements.
For SV 21 there are 340 triple-difference measurements.
For SV 22 there are 340 triple-difference measurements.
For SV 25 there are 76 triple-difference measurements.
For SV 29 there are 340 triple-difference measurements.
Epoch interval (seconds): 5.000000

THE TRIPLE DIFFERENCE SOLUTION (L1)
Measure of geometry: 6.191078
num_meas = 2778 num_used = 2778 rms_resid = 0.002440(m)
Post-Fit Chisq = 8152.305 NDF = 6.431

Sigmax (m): 4.144754
Sigmay (m): 3.443836
Sigmaz (m): 1.153682
x y z
x 1.00
y 0.48y 1.00
z-0.18z-0.56z 1.00

del_station: -0.000041 -0.000001 0.000001
Station1: FIXED STATION Station2: UNKNOWN STATION
M-01 Marco_M2/E_40
Latitude: -5.56553478 -5 33 55.92522 -5.56522062 -5 33 54.79422
E-Long : 321.67897790 321 40 44.32045 321.67895028 321 40 44.22100
W-Long : 38.32102210 38 19 15.67955 38.32104972 38 19 15.77900
E-Height: 87.4530 87.1353

Baseline vector: 0.4975 -4.2944 34.6095
Mark1_xyz : 4980596.5010 -3936406.1352 -614465.4781
Az1 E11 D1 : 354.96542 -0.5220 34.8784
E1 N1 U1 : -3.0607 34.7424 -0.3177
Mark2_xyz : 4980596.9985 -3936410.4297 -614430.8687
Az2 E12 D2 : 174.96542 0.5217 34.8784
E2 N2 U2 : 3.0607 -34.7424 0.3177

Double-Difference Epochs:
Prn: 3 Start epoch: 20 End epoch: 341
Prn: 6 Start epoch: 2 End epoch: 341
Prn: 14 Start epoch: 2 End epoch: 341
Prn: 15 Start epoch: 2 End epoch: 341
Prn: 17 Start epoch: 2 End epoch: 341
Prn: 18 Start epoch: 2 End epoch: 341
Prn: 21 Start epoch: 2 End epoch: 341
Prn: 22 Start epoch: 2 End epoch: 341
Prn: 25 Start epoch: 266 End epoch: 341
Prn: 29 Start epoch: 2 End epoch: 341

THE FLOAT DOUBLE DIFFERENCE SOLUTION (L1)
Measure of geometry: 0.174800 Wavelength = 0.190294 (m/cycle)
num_meas = 2780 num_used = 2772 rms_resid = 0.004115(m)
Post-Fit Chisq = 1850.366 NDF = 6.417



Reference SV: 14

SV	Ambiguity	FIT	Meas	SV	Ambiguity	FIT	Meas
3	-14284525.015f	0.014	323	6	-17661845.986f	0.022	340
15	-8936573.992f	0.017	340	17	-11517174.997f	0.025	339
18	-20305062.995f	0.032	333	21	-14045595.011f	0.016	340
22	-9002755.016f	0.026	340	25	-6890502.988f	0.023	77
29	.2302720.997f	0.012	340				

Sigmax (m): 0.054297
 Sigmay (m): 0.045229
 Sigmaz (m): 0.022651
 SigmaN (cy): 0.248466
 SigmaN (cy): 0.170033
 SigmaN (cy): 0.208913
 SigmaN (cy): 0.265410
 SigmaN (cy): 0.206742
 SigmaN (cy): 0.182558
 SigmaN (cy): 0.318546
 SigmaN (cy): 0.177506
 SigmaN (cy): 0.105208

x 1.00
 y 0.50y 1.00
 z 0.04z-0.09z 1.00
 N-0.89N-0.44N-0.48N 1.00
 N 0.52N 0.95N 0.20N-0.58N 1.00
 N 0.28N 0.82N-0.63N 0.00N 0.62N 1.00
 N 0.46N 0.94N-0.41N-0.26N 0.80N 0.95N 1.00
 N-0.07N 0.62N-0.74N 0.36N 0.39N 0.93N 0.80N 1.00
 N-0.75N-0.26N-0.68N 0.96N-0.46N 0.25N-0.03N 0.57N 1.00
 N-0.97N-0.67N-0.01N 0.87N-0.67N-0.44N-0.62N-0.09N 0.70N 1.00
 N-0.85N-0.28N 0.38N 0.56N-0.16N-0.33N-0.39N-0.09N 0.38N 0.79N 1.00
 N-0.88N-0.64N 0.33N 0.64N-0.52N-0.60N-0.69N-0.31N 0.43N 0.92N 0.88N 1.00

del_station: -0.000134 -0.001131 0.000044

Station1: FIXED STATION
M-01

Station2: UNKNOWN STATION

Marco_M2/E_40

Latitude: -5.56553478 -5 33 55.92522 -5.56522067 -5 33 54.79442
 E-Long : 321.67897790 321 40 44.32045 321.67895018 321 40 44.22066
 W-Long : 38.32102210 38 19 15.67955 38.32104982 38 19 15.77934
 E-Height: 87.4530 87.1206

Baseline vector: 0.4790 -4.2933 34.6050

Mark1_xyz : 4980596.5010 -3936406.1352 -614465.4781
 Az1 E11 D1 : 354.94725 -0.5463 34.8736
 E1 N1 U1 : -3.0713 34.7365 -0.3324
 Mark2_xyz : 4980596.9800 -3936410.4285 -614430.8732
 Az2 E12 D2 : 174.94725 0.5460 34.8736
 E2 N2 U2 : 3.0713 -34.7365 0.3324

AMBIGUITY RESOLUTION

	1	2	3	4
Abs Contrast	37.750	0.000	0.000	0.000
Contrast		100.000	100.000	100.000
Change Chi2	133.830	114215.388	118536.914	136009.692
Bias S14: 3	-14284525	-14284526	-14284524	-14284525
Bias S14: 6	-17661846	-17661846	-17661846	-17661845
Bias S14:15	-8936574	-8936575	-8936573	-8936573
Bias S14:17	-11517175	-11517176	-11517174	-11517174
Bias S14:18	-20305063	-20305064	-20305062	-20305062
Bias S14:21	-14045595	-14045596	-14045594	-14045595
Bias S14:22	-9002755	-9002755	-9002755	-9002755
Bias S14:25	-6890503	-6890503	-6890503	-6890502
Bias S14:29	2302721	2302721	2302721	2302721



NDF=78.3000 Chi2=1850.3658

THE FIXED DOUBLE DIFFERENCE SOLUTION (L1)

Measure of geometry: 0.016365 Wavelength = 0.190294 (m/cycle)
num_meas = 2780 num_used = 2770 rms_resid = 0.004246(m)
Post-Fit Chisq = 1969.899 NDF = 6.412

Table with columns: Reference SV, Ambiguity, FIT, Meas, Integer Search Ratio, SV, Ambiguity, FIT, Meas. Rows include SV 3, 15, 18, 22, 29 and SV 6, 17, 21, 25.

Sigmax (m): 0.005399
Sigmay (m): 0.004183
Sigmaz (m): 0.002185

x 1.00
y-0.77y 1.00
z-0.45z 0.52z 1.00

del_station: -0.000006 0.000027 0.000001

Station1: FIXED STATION M-01
Latitude: -5.56553478 -5 33 55.92522
E-Long : 321.67897790 321 40 44.32045
W-Long : 38.32102210 38 19 15.67955
E-Height: 87.4530
Station2: UNKNOWN STATION Marco_M2/E_40
Latitude: -5.56522068 -5 33 54.79446
E-Long : 321.67895015 321 40 44.22055
W-Long : 38.32104985 38 19 15.77945
E-Height: 87.1214

Baseline vector: 0.4774 -4.2964 34.6037

Mark1_xyz : 4980596.5010 -3936406.1352 -614465.4781
Az1 E11 D1 : 354.94153 -0.5450 34.8727
E1 N1 U1 : -3.0747 34.7353 -0.3316
Mark2_xyz : 4980596.9784 -3936410.4316 -614430.8744
Az2 E12 D2 : 174.94153 0.5447 34.8727
E2 N2 U2 : 3.0747 -34.7353 0.3316

Wed Sep 19 20:21:00 2001



MONTGOMERY WATSON



3. APOIO BÁSICO E SUPLEMENTAR PARA O LEVANTAMENTO AEROFOTOGRAMÉTRICO



ENGESOFT ENGENHARIA E CONSULTORIA LTDA

Vértice: M-01	Ponto Visado:	Obra/Ano: O-739/2001
Estado: Ceará	Município: Alto Santo	Local: Fazenda Cacimba da Cunha
Origem: V. Caraubinha (IBGE)	MC: 39° W	Datum: SAD-69
Coordenada Geodésica Latitude: 05° 33' 54,50663"S	Coordenada Geodésica Longitude: 38° 19' 14,44356"W	
Coordenada UTM Norte: 9.384.819,975m	Coordenada UTM Este: 575.239,533m	Altura Geométrica: 88,397m Altitude Ortométrica: 87,453m
Descrição: Marco de concreto de formato tronco piramidal medindo, (10x12x50) cm, com chapa de bronze no centro do topo, constando: ENGESOFT - M-01, 06/2001 e eleva-se 10cm do solo.		
ITINERÁRIO	CROQUIS	
Partindo-se com 0,0Km da Igreja Matriz do Alto Santo pela CE-205 em direção a Iracema com 6,4Km toma-se a direita pela estrada carroçavel, com 9,0Km toma-se a direita, com 10,9Km chega-se a uma porteira com 12,4km chega-se na Fazenda do Sr. José Nilton Diogênes Maia no canto da cerca ao lado do estábulo.		



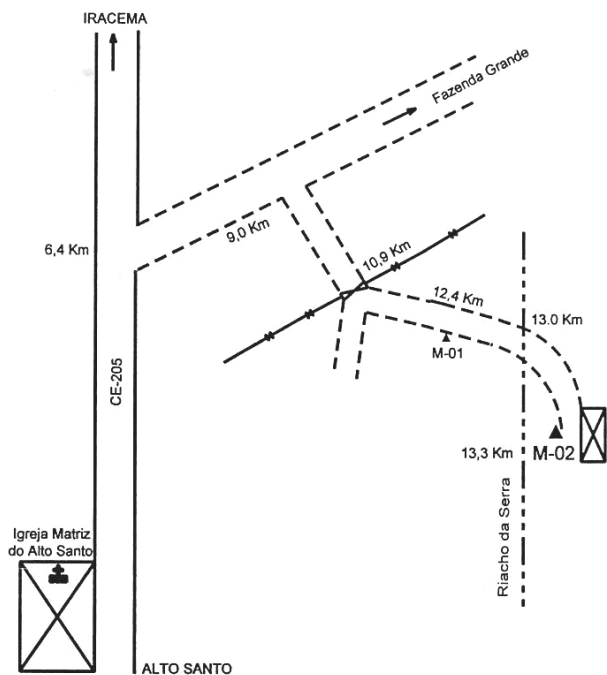
ENGESOFT ENGENHARIA E CONSULTORIA LTDA

Vértice: M-02	Ponto Visado:	Obra/Ano: O-739/2001
Estado: Ceará	Município: Alto Santo	Local: Fazenda Cacimba da Cunha
Origem: V. Caraubinha (IBGE)	MC: 39° W	Datum: SAD-69
Coordenada Geodésica Latitude: 05° 33' 48,24614"S	Coordenada Geodésica Longitude: 38° 19' 40,99549"W	
Coordenada UTM Norte: 9.385.013,155m	Coordenada UTM Este: 574.422,822m	Altura Geométrica: 87,088m Altitude Ortométrica: 86,199m
Descrição: Marco de concreto de formato tronco piramidal medindo, (10x12x50) cm, com chapa de bronze no centro do topo, constando: ENGESOFT - M-02, 06/2001 e eleva-se 10cm do solo.		

ITINERÁRIO

Partindo-se com 0,0Km da Igreja Matriz do Alto Santo pela CE-205 em direção a Iracema com 6,4Km toma-se a direita pela estrada carroçavel, com 9,0Km toma-se a direita, com 10,9Km chega-se a uma porteira com 12,4km passa-se pela estação M-01, com 13,0Km passa pelo Riacho da Serra e com 13,3Km chega-se ao local do marco em frente a uma casa.

CROQUIS





ENGESOFT ENGENHARIA E CONSULTORIA LTDA

Vértice: M-03	Ponto Visado:	Obra/Ano: O-739/2001
Estado: Ceará	Município: Alto Santo	Local: Fazenda Grande
Origem: V. Caraubinha (IBGE)	MC: 39° W	Datum: SAD-69
Coordenada Geodésica Latitude: 05° 37' 12,18776"S	Coordenada Geodésica Longitude: 38° 21' 14,50277"W	
Coordenada UTM Norte: 9.378.753,775m	Coordenada UTM Este: 571.538,985m	Altura Geométrica: 112,920m
		Altitude Ortométrica: 112,114m
Descrição: Marco de concreto de formato tronco piramidal medindo, (10x12x50) cm, com chapa de bronze no centro do topo, constando: ENGESOFT - M-03, 06/2001 e eleva-se 10cm do solo.		

ITINERÁRIO	CROQUIS
<p>Partindo-se com 0,0Km da Igreja Matriz do Alto Santo pela CE-205 em direção a Iracema com 6,4Km toma-se a direita pela estrada carroçavel, com 14,7Km toma-se a esquerda, com 17,9Km chega-se a uma porteira e mais 15m a direita, encontra-se o marco que está no canto da cerca da Fazenda Grande.</p>	





ENGESOFT Engenharia e Projetos S/A
MAPEAMENTO AEROFOTOGRAMÉTRICO
APOIO BÁSICO

Cliente: ENGESOFT Local: RIACHO DA SERRA/CE
Obra: O-739 Operador: WIVEAR Data: 12-Jul-2001

Transformação de Sistemas Geodésicos

Elipsóide de origem: WGS_84 a=6378137.000 b=6356752.314
Elipsóide de destino: SAD_69 a=6378160.000 b=6356774.719
Parâmetros para transformação: dX = 66.870 dY = -4.370 dZ = 38.520

Coordenadas referidas ao Sistema WGS_84

Ponto	Latitude	Longitude	h
M01	5°33'55.92515"S	38°19'15.67936"W	60.214
M02	5°33'49.66460"S	38°19'42.23152"W	58.909
M03	5°37'13.60776"S	38°21'15.73973"W	84.801
RN1897F	5°36'57.59014"S	38°17'39.83492"W	84.760
RN1897G	5°35'32.16002"S	38°17'24.42902"W	59.114
SB241018	5°33'49.59756"S	38°17'25.54547"W	83.923
VCARAUBINHA	5°28'46.88233"S	38°35'08.40138"W	122.238



ENGESOFT Engenharia e Projetos S/A
MAPEAMENTO AEROFOTOGRAMÉTRICO
APOIO BÁSICO

Cliente: ENGESOFT Local: RIACHO DA SERRA/CE
Obra: O-739 Operador: WIVEAR Data: 12-Jul-2001

Transformação de Sistemas Geodésicos

Elipsóide de origem: WGS_84 a=6378137.000 b=6356752.314
Elipsóide de destino: SAD_69 a=6378160.000 b=6356774.719
Parâmetros para transformação: dX = 66.870 dY = -4.370 dZ = 38.520

Coordenadas referidas ao Sistema SAD_69

Ponto	Latitude	Longitude	h
M01	5°33'54.50663"S	38°19'14.44356"W	088.397
M02	5°33'48.24614"S	38°19'40.99549"W	087.088
M03	5°37'12.18776"S	38°21'14.50277"W	112.920
RN1897F	5°36'56.17014"S	38°17'38.59985"W	112.921
RN1897G	5°35'30.74068"S	38°17'23.19413"W	087.296
SB241018	5°33'48.17903"S	38°17'24.31063"W	112.126
VCARAUBINHA	5°28'45.46681"S	38°35'07.15750"W	150.310



ENGESOFT Engenharia e Projetos S/A
MAPEAMENTO AEROFOTOGRAMÉTRICO
APOIO BÁSICO

Cliente: ENGESOFT Local: RIACHO DA SERRA/CE
Obra: O-739 Operador: WIVEAR Data: 12-Jul-2001

Transformação de Coordenadas Geodésicas em Planoretangulares TM

Elipsóide: SAD_69 a=6378160.000 b=6356774.719

Meridiano Central: 39°00'00.00"W Hemisfério Sul

Coordenadas UTM

Ponto	N(m)	E(m)	h(m)	Convergência	kapa
M01	9384819.975	575239.533	88.397	0°03'57.17"	0.99967007
M02	9385013.155	574422.822	87.088	0°03'54.53"	0.99966855
M03	9378753.775	571538.985	112.920	0°03'47.75"	0.99966334
RN1897F	9379237.972	578181.691	112.921	0°04'08.70"	0.99967565
RN1897G	9381860.781	578658.820	87.296	0°04'09.15"	0.99967658
SB241018	9385010.299	578628.263	112.126	0°04'07.78"	0.99967652
VCARAUBINHA	9394336.659	545934.456	150.310	0°02'22.55"	0.99962612

OBS.: Alturas Geométricas, referidas ao elipsóide.



ENGESOFT Engenharia e Projetos S/A
MAPEAMENTO AEROFOTOGRAMÉTRICO
APOIO BÁSICO

Cliente: ENGESOFT Local: RIACHO DA SERRA/CE
Obra: O-739 Operador: WIVEAR Data: 12-Jul-2001

Coordenadas Geodésicas Planoretangulares - UTM

Elipsóide: SAD_69 a=6378160.000 b=6356774.719
Meridiano Central: 39°00'00.00"W Hemisfério Sul

Ponto	N (m)	E (m)	H (m)
M01	9384819.975	575239.533	87.453
M02	9385013.155	574422.822	86.199
M03	9378753.775	571538.985	112.114
RN1897F	9379237.972	578181.691	111.933
RN1897G	9381860.781	578658.820	86.233
SB241018	9385010.299	578628.263	111.10
VCARAUBINHA	9394336.659	545934.456	150.31

OBS.: Altitudes Ortométricas, com milímetros, obtidas
por nivelamento geométrico e com centímetros,
obtidas por diferença geoidal.



ENGESOFT Engenharia e Projetos S/A
MAPEAMENTO AEROFOTOGRAMÉTRICO
APOIO SUPLEMENTAR

Cliente: ENGESOFT Local: RIACHO DA SERRA/CE
Obra: O-739 Operador: WIVEAR Data: 12-Jul-2001

Coordenadas Geodésicas Planoretangulares - UTM

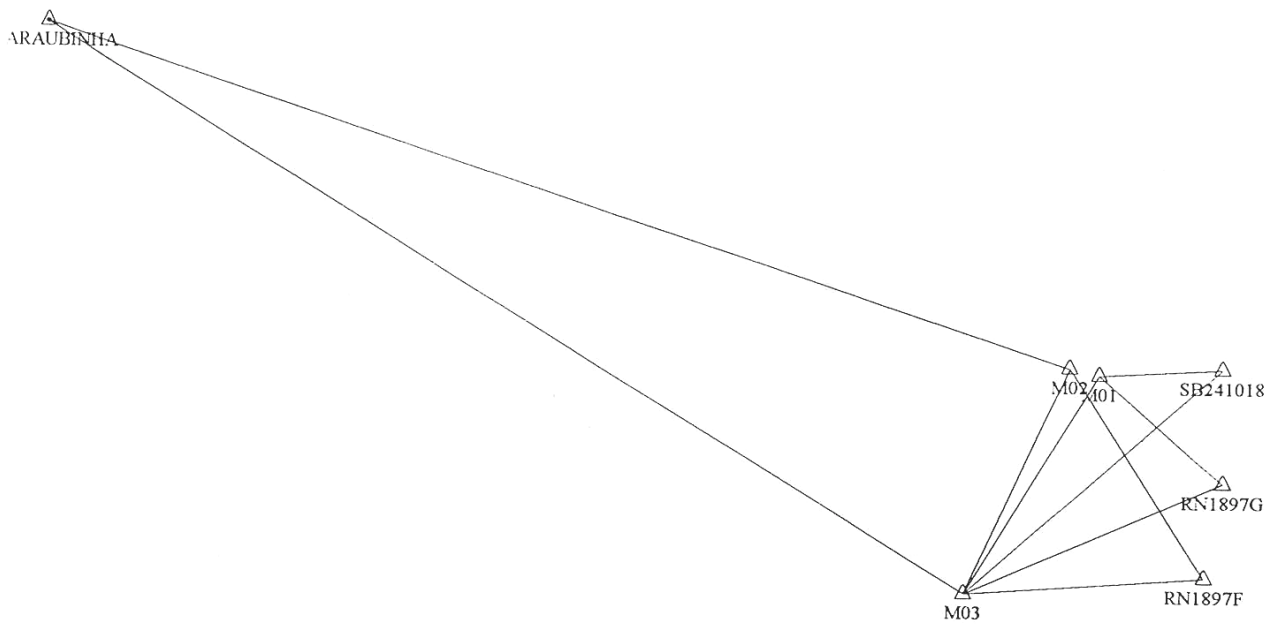
Elipsóide: SAD_69 a=6378160.000 b=6356774.719
Meridiano Central: 39°00'00.00"W Hemisfério Sul

Ponto	N(m)	E(m)	H(m)
HV01	9377047.336	571303.773	112.70
HV02	9379858.736	574122.601	110.00
HV03	9381568.864	573872.867	102.22
HV04	9384055.059	576986.393	104.22
HV05	9376516.266	570335.153	119.09
HV06	9377076.461	569546.075	116.16
HV07	9379802.286	571183.486	89.80
HV08	9383463.793	573624.127	91.12
HV09	9386174.295	575142.334	74.99
HV10	9381104.886	569367.237	121.79
HV11	9384640.998	571889.368	111.98
HV12	9386776.550	572814.576	101.79
HV13	9389242.298	575587.600	90.93
HV14	9388294.158	576969.077	66.85
HV15	9386993.218	578524.601	94.54
M01	9384819.975	575239.533	87.453
M02	9385013.155	574422.822	86.199
M03	9378753.775	571538.985	112.114
RN1897F	9379237.972	578181.691	111.933
RN1897G	9381860.781	578658.820	86.233
SB241018	9385010.299	578628.263	111.10
VCARAUBINHA	9394336.659	545934.456	150.31

OBS.: Altitudes Ortométricas, com milímetros, obtidas
por nivelamento geométrico e com centímetros,
obtidas por diferença geoidal.



Network Map: RS178





COORDINATE ADJUSTMENT SUMMARY
NETWORK = RS178
TIME = Thu Jul 12 11:28:42 2001

Datum = WGS-84
Coordinate System = Geographic
Zone = Global

Network Adjustment Constraints:
1 fixed coordinates in y
1 fixed coordinates in x
1 fixed coordinates in H

POINT	NAME	OLD COORDS	ADJUST	NEW COORDS	1.00σ
1	M01				
	LAT=	5° 33' 55.925135"	-0.000011"	5° 33' 55.925146"	0.004150m
	LON=	38° 19' 15.679369"	+0.000006"	38° 19' 15.679363"	0.004223m
	ELL HT=	60.2146m	-0.0002m	60.2144m	0.004136m
	ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN
-	M02				
	LAT=	5° 33' 49.664598"	+0.000002"	5° 33' 49.664596"	0.002922m
	LON=	38° 19' 42.231519"	+0.000001"	38° 19' 42.231518"	0.002943m
	ELL HT=	58.9096m	-0.0009m	58.9087m	0.002747m
	ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN
3	M03				
	LAT=	5° 37' 13.607760"	+0.000000"	5° 37' 13.607761"	0.002919m
	LON=	38° 21' 15.739726"	+0.000000"	38° 21' 15.739726"	0.002936m
	ELL HT=	84.8007m	+0.0007m	84.8014m	0.002692m
	ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN
4	RN1897F				
	LAT=	5° 36' 57.590143"	+0.000004"	5° 36' 57.590139"	0.003918m
	LON=	38° 17' 39.834920"	-0.000004"	38° 17' 39.834924"	0.003940m
	ELL HT=	84.7583m	+0.0012m	84.7596m	0.004864m
	ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN
	RN1897G				
	LAT=	5° 35' 32.160016"	-0.000007"	5° 35' 32.160023"	0.005346m
	LON=	38° 17' 24.429022"	+0.000003"	38° 17' 24.429019"	0.005543m
	ELL HT=	59.1135m	+0.0001m	59.1136m	0.013145m
	ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN
6	SB241018				
	LAT=	5° 33' 49.597549"	-0.000006"	5° 33' 49.597555"	0.004631m
	LON=	38° 17' 25.545478"	+0.000004"	38° 17' 25.545474"	0.004898m
	ELL HT=	83.9223m	+0.0003m	83.9225m	0.006365m
	ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN
7	VCARAUBINHA				
	LAT=	5° 28' 46.882332"	+0.000000"	5° 28' 46.882332"	FIXED
	LON=	38° 35' 08.401377"	+0.000000"	38° 35' 08.401377"	FIXED
	ELL HT=	122.2380m	+0.0000m	122.2380m	FIXED
	ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN



SUMMARY OF COVARIANCES
NETWORK = RS178
TIME = Thu Jul 12 11:28:44 2001

inition of precision $(E \times S)^2 = C^2 + P^2$:
Horizontal:

Precision (P) expressed as: ratio
Propagated linear error (E): U.S.
(standard error of adjusted horizontal distance)
Scalar (S) on propagated linear error: 1.0000
Constant error term (C): 0.0000

3-Dimensional:

Precision (P) expressed as: ratio
Propagated linear error (E): U.S.
(standard error of adjusted slope distance)
Scalar (S) on propagated linear error: 1.0000
Constant error term (C): 0.0000
Using orthometric height errors

FROM/ TO	AZIMUTH/ DELTA H	1.00σ 1.00σ	DISTANCE/ DELTA h	1.00σ 1.00σ	HOR PREC/ 3-D PREC
	283°14'31" -1.3057m	0.98" 0.0043m	839.528m -**-	0.0040m -**-	1: 207800 1: 207800
	211°19'05" +24.5870m	0.09" 0.0031m	7108.232m -**-	0.0030m -**-	1: 2383659 1: 2383659
897F	152°08'28" +24.5451m	0.14" 0.0053m	6312.010m -**-	0.0044m -**-	1: 1449969 1: 1449969
897G	130°48'30" -1.1008m	0.20" 0.0128m	4523.484m -**-	0.0047m -**-	1: 959465 1: 959465
41018	86°43'10" +23.7081m	0.22" 0.0057m	3395.195m -**-	0.0039m -**-	1: 868927 1: 868927
RAUBINHA	287°55'32" +62.0236m	0.03" 0.0041m	30822.639m -**-	0.0042m -**-	1: 7316444 1: 7316444
	204°40'16" +25.8928m	0.08" 0.0029m	6894.094m -**-	0.0027m -**-	1: 2597324 1: 2597324
897F	146°52'33" +25.8509m	0.10" 0.0048m	6892.997m -**-	0.0034m -**-	1: 2048794 1: 2048794
897G	126°35'27" +0.2049m	0.20" 0.0132m	5282.013m -**-	0.0055m -**-	1: 967118 1: 967118
41018	89°58'26" +25.0138m	0.22" 0.0065m	4206.838m -**-	0.0047m -**-	1: 886793 1: 886793
RAUBINHA	288°03'26" +63.3293m	0.02" 0.0027m	29985.993m -**-	0.0029m -**-	1:10193000 1:10193000
897F	85°46'04" -0.0419m	0.10" 0.0043m	6662.561m -**-	0.0032m -**-	1: 2112622 1: 2112622
	66°21'40"	0.12"	7770.839m	0.0046m	1: 1704235



RN1897G	-25.6879m	0.0129m	-**-	-**-	1: 1704235
M03	48°30'27"	0.08"	9458.426m	0.0039m	1: 2450492
SB241018	-0.8789m	0.0058m	-**-	-**-	1: 2450492
M03	301°15'44"	0.02"	29984.450m	0.0029m	1:10222227
VCARAUBINHA	+37.4366m	0.0027m	-**-	-**-	1:10222227
RN1897F	10°14'29"	0.44"	2666.730m	0.0054m	1: 491603
RN1897G	-25.6460m	0.0136m	-**-	-**-	1: 491603
RN1897F	4°21'18"	0.18"	5791.478m	0.0048m	1: 1211203
SB241018	-0.8370m	0.0072m	-**-	-**-	1: 1211203
RN1897F	295°01'17"	0.02"	35619.613m	0.0040m	1: 8961099
VCARAUBINHA	+37.4784m	0.0049m	-**-	-**-	1: 8961099
RN1897G	359°22'30"	0.37"	3150.700m	0.0053m	1: 590230
SB241018	+24.8090m	0.0139m	-**-	-**-	1: 590230
RN1897G	290°48'01"	0.03"	35034.319m	0.0056m	1: 6257831
VCARAUBINHA	+63.1244m	0.0131m	-**-	-**-	1: 6257831
SB241018	285°51'11"	0.03"	34010.112m	0.0048m	1: 7018110
VCARAUBINHA	+38.3155m	0.0064m	-**-	-**-	1: 7018110

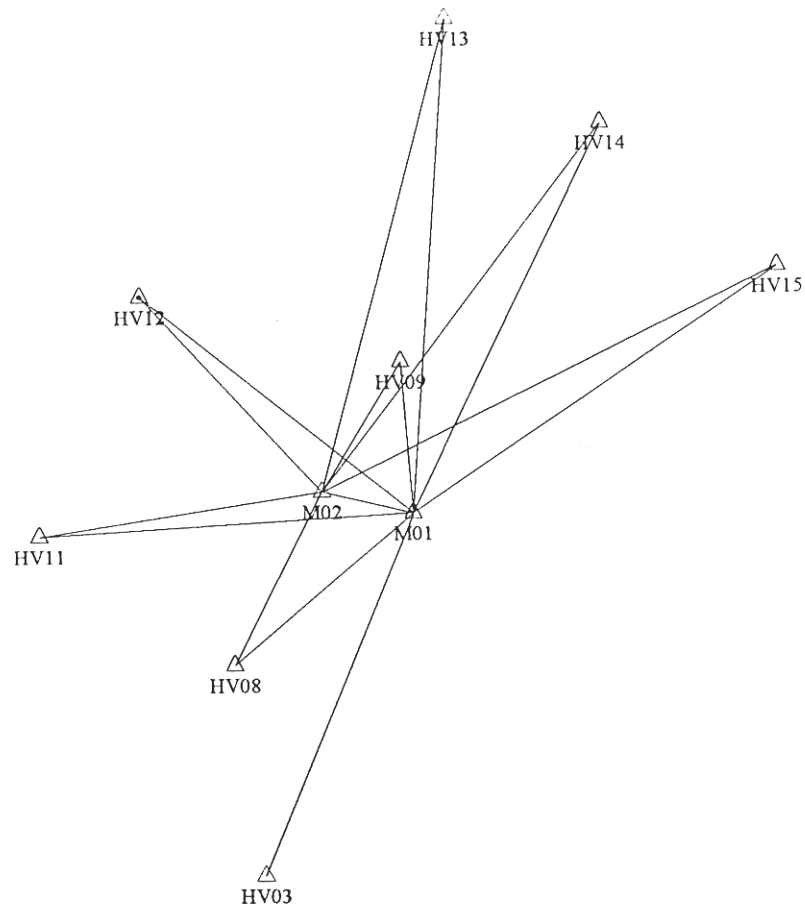


From Station Short Name	To Station Short Name	Solution Type	Slope	Ratio	Reference Variance	Entered Ant. Ht. (From)	Entered Ant. Ht. (To)
M01	RN1897G	L1 fixed	4523.529	4.3	17.457	1.410	1.410
M01	SB241018	L1 fixed	3395.313	3.2	24.290	1.410	1.410
M02	RN1897F	L1 fixed	6893.125	2.7	34.478	1.410	1.410
M03	M01	L1 fixed	7108.354	6.2	31.594	1.420	1.410
M03	M02	L1 fixed	6894.219	2.6	21.290	1.420	1.410
M03	RN1897F	L1 fixed	6662.648	18.8	17.763	1.420	1.410
M03	RN1897G	L1 fixed	7770.971	3.8	19.373	1.420	1.410
M03	SB241018	L1 fixed	9458.550	3.1	25.222	1.420	1.410
VCARAUBINHA	M02	L1 fixed	29986.459	1.5	64.623	1.410	1.410
VCARAUBINHA	M03	L1 fixed	29984.933	2.2	80.038	1.410	1.420

***** End of Report *****



Network Map: RS176





COORDINATE ADJUSTMENT SUMMARY
NETWORK = RS176
TIME = Thu Jul 12 14:47:40 2001

um = WGS-84
rdinate System = Geographic
e = Global

work Adjustment Constraints:
fixed coordinates in y
fixed coordinates in x
fixed coordinates in H

NT	NAME	OLD COORDS	ADJUST	NEW COORDS	1.00σ
1	HV03				
	LAT=	5° 35' 41.848770"	+0.000003"	5° 35' 41.848767"	0.013721m
	LON=	38° 19' 59.979709"	+0.000000"	38° 19' 59.979709"	0.012989m
	ELL HT=	75.0924m	+0.0000m	75.0924m	0.005044m
	ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN
2	H08				
	LAT=	5° 34' 40.149262"	-0.000002"	5° 34' 40.149265"	0.007938m
	LON=	38° 20' 08.134301"	+0.000001"	38° 20' 08.134300"	0.007740m
	ELL HT=	63.9778m	+0.0009m	63.9787m	0.004679m
	ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN
3	HV09				
	LAT=	5° 33' 11.825192"	-0.000001"	5° 33' 11.825193"	0.006226m
	LON=	38° 19' 18.889006"	+0.000001"	38° 19' 18.889005"	0.006047m
	ELL HT=	47.8261m	+0.0007m	47.8268m	0.009823m
	ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN
4	HV11				
	LAT=	5° 34' 01.876179"	+0.000000"	5° 34' 01.876179"	0.012056m
	LON=	38° 21' 04.561480"	-0.000023"	38° 21' 04.561503"	0.013638m
	ELL HT=	84.8366m	+0.0030m	84.8396m	0.020616m
	ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN
5	H02				
	LAT=	5° 32' 52.298066"	-0.000002"	5° 32' 52.298068"	0.009568m
	LON=	38° 20' 34.566924"	+0.000002"	38° 20' 34.566922"	0.009777m
	ELL HT=	74.6305m	-0.0005m	74.6300m	0.003441m
	ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN
6	HV13				
	LAT=	5° 31' 31.898718"	-0.000002"	5° 31' 31.898721"	0.017061m
	LON=	38° 19' 04.531697"	+0.000000"	38° 19' 04.531697"	0.015830m
	ELL HT=	63.7405m	-0.0002m	63.7403m	0.014319m
	ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN
7	HV14				
	LAT=	5° 32' 02.722889"	-0.000005"	5° 32' 02.722894"	0.015009m
	LON=	38° 18' 19.597592"	+0.000002"	38° 18' 19.597589"	0.014439m
	ELL HT=	39.6610m	+0.0020m	39.6630m	0.008845m
	ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN
8	HV15				



LAT=	5° 32' 45.028054"	-0.000002"	5° 32' 45.028056"	0.016131m
LON=	38° 17' 28.991850"	-0.000002"	38° 17' 28.991851"	0.016775m
ELL HT=	67.3488m	+0.0002m	67.3490m	0.014485m
ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN
9 M01				
LAT=	5° 33' 55.925146"	+0.000000"	5° 33' 55.925146"	FIXED
LON=	38° 19' 15.679363"	+0.000000"	38° 19' 15.679363"	FIXED
ELL HT=	60.2144m	+0.0000m	60.2144m	FIXED
ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN
10 M02				
LAT=	5° 33' 49.664596"	+0.000000"	5° 33' 49.664596"	FIXED
LON=	38° 19' 42.231518"	+0.000000"	38° 19' 42.231518"	FIXED
ELL HT=	58.9087m	+0.0000m	58.9087m	FIXED
ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN

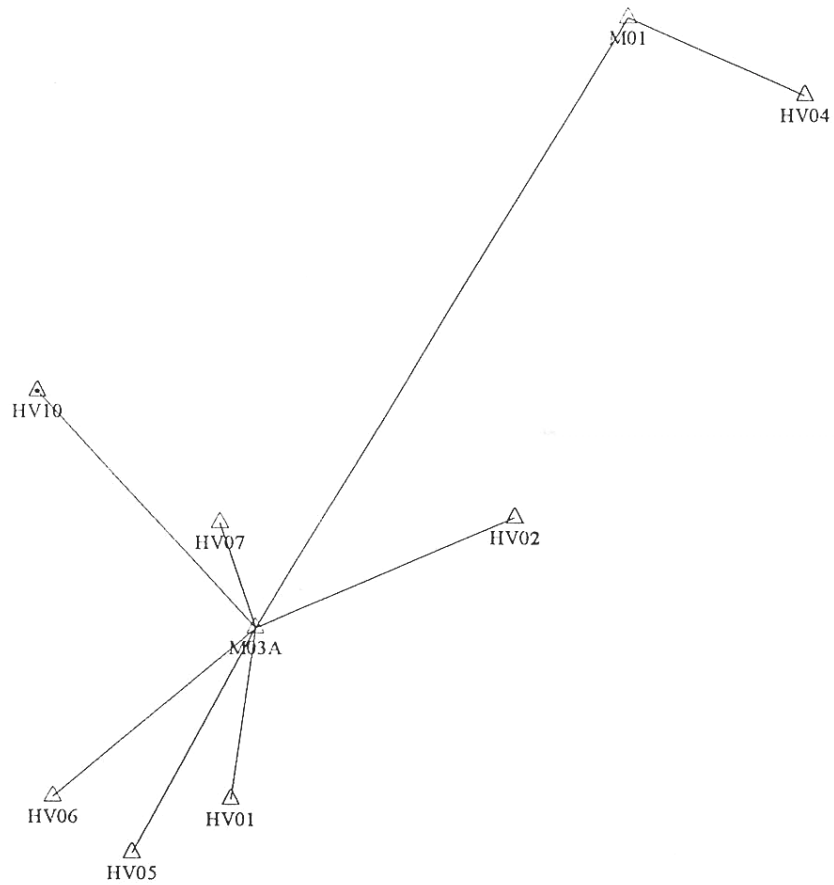


From Station Short Name	To Station Short Name	Solution Type	Slope	Ratio	Reference Variance	Entered Ant. Ht. (From)	Entered Ant. Ht. (To)
M01	HV03	L1 fixed	3527.934	1.8	7.134	1.390	1.410
M01	HV08	L1 fixed	2109.941	2.0	13.332	1.390	1.410
M01	HV09	L1 fixed	1358.324	8.0	5.636	1.390	3.560
M01	HV11	L1 fixed	3356.209	1.8	16.745	1.390	1.410
M01	HV12	L1 fixed	3116.979	3.2	13.783	1.390	2.460
M01	HV13	L1 fixed	4437.523	3.7	5.619	1.390	1.410
M01	HV14	L1 fixed	3882.259	10.9	3.705	1.390	1.410
M01	HV15	L1 fixed	3940.213	1.6	18.899	1.390	3.560
M01	M02	L1 fixed	839.534	14.0	5.416	1.390	1.410
M02	HV08	L1 fixed	1743.720	1.6	17.298	1.410	1.410
M02	HV09	L1 fixed	1366.509	8.1	5.823	1.410	3.560
M02	HV11	L1 fixed	2561.659	1.7	20.763	1.410	1.410
M02	HV12	L1 fixed	2387.514	4.9	9.432	1.410	2.460
M02	HV13	L1 fixed	4388.122	4.7	4.996	1.410	1.410
M02	HV14	L1 fixed	4154.577	6.1	6.360	1.410	1.410
M02	HV15	L1 fixed	4556.257	1.6	23.323	1.410	3.560

***** End of Report *****



Network Map: RS177





SUB-NETWORK 2

Network Adjustment Constraints:

- 1 fixed coordinates in y
- 1 fixed coordinates in x
- 1 fixed coordinates in H

POINT	NAME	OLD COORDS	ADJUST	NEW COORDS	1.00σ
3	HV04				
	LAT=	5° 34' 20.768496"	+0.000029"	5° 34' 20.768467"	0.004286m
	LON=	38° 18' 18.873329"	+0.000194"	38° 18' 18.873134"	0.004306m
	ELL HT=	77.0531m	-0.0002m	77.0529m	0.003553m
	ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN
8	M01				
	LAT=	5° 33' 55.925146"	+0.000000"	5° 33' 55.925146"	FIXED
	LON=	38° 19' 15.679363"	+0.000000"	38° 19' 15.679363"	FIXED
	ELL HT=	60.2144m	+0.0000m	60.2144m	FIXED
	ORTHO HT=	0.0000m	+0.0000m	0.0000m	NOT KNOWN



From Station Short Name	To Station Short Name	Solution Type	Slope	Ratio	Reference Variance	Entered Ant. Ht. (From)	Entered Ant. Ht. (To)
M01	HV04	L1 fixed	1907.721	8.7	3.681	1.410	2.460
M01	M03	L1 fixed	7108.375	4.7	13.199	1.410	1.410
M03A	HV01	L1 fixed	1723.185	8.3	6.087	1.390	3.560
M03A	HV02	L1 fixed	2810.975	3.9	5.034	1.390	2.460
M03A	HV05	L1 fixed	2541.713	5.4	4.405	1.390	2.460
M03A	HV06	L1 fixed	2605.750	1.9	11.259	1.390	1.410
M03A	HV07	L1 fixed	1107.750	2.7	10.023	1.390	2.460
M03A	HV10	L1 fixed	3201.816	2.3	11.081	1.390	1.410

***** End of Report *****

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Geométrico ✓

Trigonométrico

Taqueométrico

Cliente: ENGESOFT ENGENHARIA e PROJETOS S/A

Folha:

Local: RIACHO DA SERRA/CE

Obra: 0-739

Estacas	Desnível		Desnível Médio	Comp.(m)	Desnível Compens.	Atitudes	Estacas
	Ida	Volta					
RN18974 (BGE)						100,9295	
PS01	+3,279			-0,0011	+3,2779	104,2074	809,60
PS02	+1,462			-0,0035	+1,4585	105,6659	2.502,85
PS03	+19,259			-0,0027	+19,2563	124,9222	1.955,89
M01	-37,467			-0,0019	-37,4689	87,4533	1.385,60
M02	-1,253			-0,0013	-1,2543	86,1990	941,09
PS04	+4,668			-0,0028	+4,6652	90,8642	2.025,26
PS05	+12,399			-0,0017	+12,3973	103,2615	1.203,35
PS06	+16,188			-0,0023	+16,1852	119,4472	1.627,05
PS07	-6,779			-0,0023	-6,7813	112,6659	1.637,65
M03	-0,550			-0,0021	-0,5521	112,1138	1.488,35
PS08	+0,544			-0,0021	+0,5419	112,6557	1.493,81
PS09	+6,777			-0,0023	+6,7747	119,4304	1.638,02
PS10	-16,183			-0,0023	-16,1853	103,2451	1.627,93
PS11	-2,657			-0,0018	-2,6588	100,5863	1.277,23
PS12	+21,744			-0,0020	+21,7420	122,3283	1.439,01
PS13	-16,662			-0,0017	-16,6637	105,6646	1.249,17
PS14	-1,460			-0,0035	-1,4635	104,2011	2.505,13
RN18975	-17,965			-0,0032	-17,9682	86,2329	2.293,95
(BGE) $\sum H = -14,656$		$\sum V = +0,0406m$		$P = 7mm$		$\sum H = -14,6966m$	$\sum V = 29.100,94m$

Calculado por:

Verificado por:

Data: 10/09/2001

Consórcio



MONTGOMERY WATSON

