

APPENDIX B

NETWORK ADJUSTMENT REPORT

2003

GEODETIC CONTROL DENSIFICATION

of

JEFFERSON COUNTY, KENTUCKY

JUNE 2003

Fuller, Mossbarger, Scott & May
1901 Nelson Miller Parkway
Louisville, Kentucky 40223-2177



Jacobi, Toombs and Lanz, Inc.
401 West Main Street, Suite 600
Louisville, Kentucky 40202



Network Adjustment Report

Project : 2003_00661

User name	MikeG	Date & Time	12:13:54 PM 6/5/03
Coordinate System	US State Plane 1983	Zone	Kentucky North 1601
Project Datum	NAD 1983 (Conus)		
Vertical Datum		Geoid Model	GEOID99 (Conus)
Coordinate Units	US survey feet		
Distance Units	US survey feet		
Height Units	US survey feet		

Adjustment Style Settings - 95% Confidence Limits

Residual Tolerances

To End Iterations : 0.000033sft
Final Convergence Cutoff : 0.016404sft

Covariance Display

Horizontal

Propagated Linear Error [E] : U.S.
Constant Term [C] : 0.00000000sft
Scale on Linear Error [S] : 1.96

Three-Dimensional

Propagated Linear Error [E] : U.S.
Constant Term [C] : 0.00000000sft
Scale on Linear Error [S] : 1.96

Elevation Errors were used in the calculations.

Adjustment Controls

Compute Correlations for Geoid : False
Horizontal and Vertical adjustment performed

Set-up Errors

GPS

Error in Height of Antenna : 0.000sft

Centering Error : 0.000sft

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Statistical Summary

Successful Adjustment in 1 iteration(s)

Network Reference Factor : 1.01

Chi Square Test ($\alpha=95\%$) : PASS

Degrees of Freedom : 85.00

GPS Observation Statistics

Reference Factor : 1.01

Redundancy Number (r) : 84.01

Individual GPS Observation Statistics

Observation ID	Reference Factor	Redundancy Number
B1	1.18	1.14
B5	0.31	0.24
B6	0.76	0.25
B7	0.60	0.38
B9	1.15	2.62
B10	0.72	0.24
B13	0.33	1.16
B15	1.52	1.62
B16	0.67	2.43
B17	0.49	1.23

B18	0.67	1.20
B19	0.30	1.80
B24	0.80	0.54
B28	0.79	1.80
B30	0.64	1.53
B32	0.43	1.62
B36	0.42	0.38
B37	0.99	2.34
B50	0.85	0.62
B51	1.19	2.12
B54	0.25	1.27
B59	1.29	0.10
B60	0.54	0.86
B62	1.59	1.29
B63	1.20	1.81
B64	0.71	2.33
B65	1.00	2.71
B68	0.87	1.14
B69	0.74	1.06
B73	1.52	1.49
B74	0.55	0.87
B75	1.19	1.54
B76	1.34	0.94
B78	0.41	2.30
B79	1.60	2.67
B80	1.17	1.03
B81	1.28	2.40
B82	0.66	2.14
B86	1.29	1.66
B87	1.19	0.75
B88	0.83	1.95

B89	0.72	1.69
B90	0.54	2.60
B91	1.65	0.29
B92	1.76	1.80
B93	1.47	2.69
B94	0.81	2.55
B95	0.44	2.17
B96	0.78	2.58
B97	1.07	2.48
B98	1.11	2.43
B99	1.48	1.75
B102	0.76	1.75
B103	0.68	1.63

Geoid Model Statistics

Reference Factor : 0.05

Redundancy Number (r) : 0.99

Weighting Strategies

GPS Observations

User-defined Scalar Applied to All Observations

Scalar : 3.14

Geoid Observations

Default Scalar Applied to All Observations

Scalar : 1.00

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Adjusted Coordinates

Adjustment performed in NAD 1983 (Conus)

Number of Points : 29

Number of Constrained Points : 5

Horizontal Only : 3

Horizontal and Elevation Only : 2

Adjusted Grid CoordinatesErrors are reported using 1.96σ .

Point Name	Northing	N error	Easting	E error	Elevation	e error	Fix
STA053-2003	280285.674sft	0.022sft	1218741.523sft	0.017sft	448.153sft	1.067sft	
GPS86-43	278083.413sft	0.024sft	1206849.513sft	0.021sft	460.470sft	1.067sft	
STA048-2003	273702.519sft	0.030sft	1267141.479sft	0.024sft	660.312sft	1.069sft	
AZI048-2003	273466.082sft	0.019sft	1268346.517sft	0.016sft	694.145sft	1.067sft	
AZI052-2003	267026.575sft	0.025sft	1207885.661sft	0.020sft	455.747sft	1.067sft	
STA052-2003	265994.563sft	0.023sft	1207706.375sft	0.018sft	452.229sft	1.067sft	
AZI050-2003	204418.617sft	0.018sft	1166278.688sft	0.018sft	438.371sft	1.068sft	
STA050-2003	205024.040sft	0.022sft	1166763.993sft	0.019sft	440.136sft	1.068sft	
SOUTH BASE	240989.436sft	0.000sft	1185268.161sft	0.000sft	470.199sft	0.000sft	NE e
STA051-2003	222672.764sft	0.020sft	1170595.718sft	0.018sft	438.797sft	1.068sft	
BK09-01	250101.274sft	0.028sft	1176693.419sft	0.022sft	443.585sft	1.067sft	
BL09-01	248929.260sft	0.031sft	1178679.333sft	0.023sft	445.243sft	1.068sft	
TEMP	277936.264sft	0.028sft	1206864.415sft	0.032sft	462.396sft	1.068sft	
STA047-2003	310294.853sft	0.021sft	1253780.446sft	0.017sft	591.981sft	1.067sft	
GOSHEN	333339.967sft	0.000sft	1263875.189sft	0.000sft	714.802sft	0.000sft	NE e
GPS86-24	237527.392sft	0.000sft	1302799.212sft	0.000sft	652.468sft	1.069sft	NE
STA011-2001	227786.339sft	0.034sft	1247653.925sft	0.026sft	687.165sft	1.069sft	
AZI005-2001	250267.255sft	0.018sft	1170553.096sft	0.016sft	448.176sft	1.067sft	
AZI047-2003	310590.090sft	0.018sft	1252768.223sft	0.015sft	586.433sft	1.067sft	
STA049-2003	230622.890sft	0.024sft	1289663.018sft	0.018sft	720.819sft	1.070sft	

AZI051-2003	222252.173sft	0.030sft	1171228.422sft	0.028sft	447.099sft	1.068sft	
GPS86-15	195754.799sft	0.000sft	1160612.803sft	0.000sft	441.150sft	1.067sft	N E
BO08-02	243749.934sft	0.018sft	1173995.014sft	0.015sft	442.605sft	1.067sft	
AZI049-2003	231390.559sft	0.022sft	1289710.799sft	0.017sft	748.027sft	1.070sft	
AZI031-2001	234337.103sft	0.023sft	1204231.716sft	0.017sft	451.691sft	1.067sft	
BOWMAN RESET	266533.002sft	0.031sft	1233750.641sft	0.023sft	537.390sft	1.068sft	
AZI053-2003	280107.852sft	0.027sft	1219388.837sft	0.020sft	457.224sft	1.068sft	
J-334	186450.843sft	0.014sft	1152251.396sft	0.010sft	437.521sft	1.068sft	
EDWARD 2	289720.146sft	0.000sft	1164992.601sft	0.000sft	917.091sft	1.071sft	N E

Adjusted Geodetic Coordinates

Errors are reported using 1.96σ .

Point Name	Latitude	N error	Longitude	E error	Height	h error	Fix
STA053-2003	38°15'37.59309"N	0.022sft	85°43'07.08751"W	0.017sft	338.796sft	0.618sft	
GPS86-43	38°15'13.92446"N	0.024sft	85°45'35.71407"W	0.021sft	351.163sft	0.618sft	
STA048-2003	38°14'39.71214"N	0.030sft	85°32'59.15564"W	0.024sft	550.979sft	0.620sft	
AZI048-2003	38°14'37.54287"N	0.019sft	85°32'44.01031"W	0.016sft	584.812sft	0.618sft	
AZI052-2003	38°13'24.80294"N	0.025sft	85°45'20.46011"W	0.020sft	346.520sft	0.618sft	
STA052-2003	38°13'14.57321"N	0.023sft	85°45'22.49503"W	0.018sft	343.011sft	0.618sft	
AZI050-2003	38°02'58.93066"N	0.018sft	85°53'47.74541"W	0.018sft	329.950sft	0.619sft	
STA050-2003	38°03'05.00051"N	0.022sft	85°53'41.81452"W	0.019sft	331.707sft	0.619sft	
SOUTH BASE	38°09'03.69569"N	0.000sft	85°49'58.24028"W	0.000sft	361.357sft	0.617sft	Lat Long e
STA051-2003	38°06'00.11783"N	0.020sft	85°52'57.82970"W	0.018sft	330.220sft	0.619sft	
BK09-01	38°10'32.28839"N	0.028sft	85°51'47.56799"W	0.022sft	334.728sft	0.618sft	
BL09-01	38°10'21.04708"N	0.031sft	85°51'22.44595"W	0.023sft	336.376sft	0.619sft	
TEMP	38°15'12.47241"N	0.028sft	85°45'35.49704"W	0.032sft	353.091sft	0.620sft	
STA047-2003	38°20'39.51238"N	0.021sft	85°35'53.33164"W	0.017sft	482.411sft	0.618sft	
GOSHEN	38°24'28.74243"N	0.000sft	85°33'50.75965"W	0.000sft	605.021sft	0.617sft	Lat Long e

GPS86-24	38°08'46.86246"N	0.000sft	85°25'26.44277"W	0.000sft	542.742sft	0.622sft	Lat Long
STA011-2001	38°07'03.05980"N	0.034sft	85°36'54.87413"W	0.026sft	577.911sft	0.621sft	
AZI005-2001	38°10'32.85881"N	0.018sft	85°53'04.48890"W	0.016sft	339.390sft	0.618sft	
AZI047-2003	38°20'42.28399"N	0.018sft	85°36'06.09035"W	0.015sft	476.857sft	0.618sft	
STA049-2003	38°07'36.92506"N	0.024sft	85°28'09.72431"W	0.018sft	611.175sft	0.623sft	
AZI051-2003	38°05'56.07143"N	0.030sft	85°52'49.82259"W	0.028sft	338.517sft	0.620sft	
GPS86-15	38°01'32.28886"N	0.000sft	85°54'56.60713"W	0.000sft	332.838sft	0.618sft	Lat Long
BO08-02	38°09'29.04215"N	0.018sft	85°52'19.95446"W	0.015sft	333.831sft	0.618sft	
AZI049-2003	38°07'44.51961"N	0.022sft	85°28'09.25356"W	0.017sft	638.389sft	0.623sft	
AZI031-2001	38°08'01.09595"N	0.023sft	85°45'59.49839"W	0.017sft	342.714sft	0.618sft	
BOWMAN RESET	38°13'23.97899"N	0.031sft	85°39'56.27888"W	0.023sft	428.099sft	0.620sft	
AZI053-2003	38°15'35.93739"N	0.027sft	85°42'58.93717"W	0.020sft	347.867sft	0.619sft	
J-334	37°59'58.81971"N	0.014sft	85°56'38.94635"W	0.010sft	329.350sft	0.619sft	
EDWARD 2	38°17'01.83168"N	0.000sft	85°54'22.99743"W	0.000sft	808.096sft	0.624sft	Lat Long

Coordinate Deltas

Point Name	Δ Northing	Δ Easting	Δ Elevation	Δ Height	Δ Geoid Separation
STA053-2003	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
GPS86-43	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
STA048-2003	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
AZI048-2003	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
AZI052-2003	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
STA052-2003	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
AZI050-2003	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
STA050-2003	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
SOUTH BASE	0.000sft	0.000sft	0.000sft	0.014sft	-0.014sft
STA051-2003	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
BK09-01	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft

BL09-01	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
TEMP	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
STA047-2003	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
GOSHEN	0.000sft	0.000sft	0.000sft	0.014sft	-0.014sft
GPS86-24	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
STA011-2001	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
AZI005-2001	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
AZI047-2003	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
STA049-2003	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
AZI051-2003	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
GPS86-15	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
BO08-02	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
AZI049-2003	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
AZI031-2001	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
BOWMAN RESET	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
AZI053-2003	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
J-334	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft
EDWARD 2	0.000sft	0.000sft	0.014sft	0.014sft	0.000sft

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Control Coordinate Comparisons

Values shown are control coord minus adjusted coord.

Point Name	Δ Northing	Δ Easting	Δ Elevation	Δ Height
SOUTH BASE	N/A	N/A	N/A	N/A
GOSHEN	N/A	N/A	N/A	N/A
GPS86-24	N/A	N/A	N/A	N/A
GPS86-15	N/A	N/A	N/A	N/A
BOWMAN RESET	-0.001sft	-0.018sft	N/A	N/A

J-334	N/A	N/A	-0.331sft	N/A
EDWARD 2	N/A	N/A	N/A	N/A

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Adjusted Observations

Adjustment performed in **NAD 1983 (Conus)**

GPS Observations

GPS Transformation Group: <GPS Default>

Azimuth Rotation : -0°00'00.0498" (1.96σ) : 0°00'00.0364"

Network Scale : 0.99999977 (1.96σ) : 0.00000017

Number of Observations : 54

Number of Outliers : 0

Observation Adjustment (Critical Tau = 3.54). Any outliers are in red.

Obs. ID	From Pt.	To Pt.		Observation	A-posteriori Error (1.96σ)	Residual	Stand. Residual
B62	AZI031-2001	STA052-2003	Az.	5°19'12.7987"	0°00'00.1276"	0°00'00.1354"	2.39
			ΔHt.	0.296sft	0.057sft	-0.019sft	-0.65
			Dist.	31848.366sft	0.025sft	0.017sft	1.26
B92	STA051-2003	J-334	Az.	205°50'37.4758"	0°00'00.1088"	-0°00'00.1815"	-2.34
			ΔHt.	-0.870sft	0.049sft	0.011sft	0.40
			Dist.	40602.692sft	0.021sft	-0.009sft	-0.64
B79	AZI005-2001	BO08-02	Az.	151°08'37.7965"	0°00'00.2359"	0°00'00.4037"	1.06
			ΔHt.	-5.559sft	0.021sft	-0.072sft	-2.24
			Dist.	7370.542sft	0.011sft	-0.014sft	-0.99

B93	SOUTH BASE	STA051-2003	Az.	217°42'41.2787"	0°00'00.1854"	0°00'00.0777"	0.24
			ΔHt.	-31.137sft	0.055sft	0.163sft	2.16
			Dist.	23469.194sft	0.018sft	-0.014sft	-0.45
B15	GPS86-43	STA047-2003	Az.	54°35'48.6004"	0°00'00.1151"	0°00'00.0980"	1.09
			ΔHt.	131.248sft	0.069sft	0.060sft	1.50
			Dist.	56923.678sft	0.025sft	0.032sft	2.14
B86	BOWMAN RESET	AZI053-2003	Az.	312°30'20.6515"	0°00'00.3161"	-0°00'00.0042"	-0.02
			ΔHt.	-80.231sft	0.081sft	0.094sft	2.10
			Dist.	19762.626sft	0.030sft	0.017sft	0.74
B76	STA011-2001	AZI031-2001	Az.	277°43'45.9212"	0°00'00.1608"	0°00'00.0332"	0.46
			ΔHt.	-235.197sft	0.081sft	0.009sft	0.29
			Dist.	43914.439sft	0.027sft	-0.018sft	-1.94
B91	GPS86-15	J-334	Az.	220°54'34.3495"	0°00'00.1950"	0°00'00.0544"	1.93
			ΔHt.	-3.487sft	0.034sft	-0.006sft	-0.85
			Dist.	12509.146sft	0.012sft	0.003sft	1.49
B63	AZI031-2001	STA050-2003	Az.	231°01'05.7278"	0°00'00.1027"	-0°00'00.0402"	-0.75
			ΔHt.	-11.008sft	0.068sft	-0.090sft	-1.80
			Dist.	47572.681sft	0.026sft	-0.007sft	-0.36
B73	GOSHEN	AZI047-2003	Az.	205°12'18.3848"	0°00'00.1239"	0°00'00.1601"	1.72
			ΔHt.	-128.164sft	0.039sft	-0.022sft	-1.45
			Dist.	25317.350sft	0.018sft	0.001sft	0.12
B99	EDWARD 2	STA053-2003	Az.	98°55'31.7101"	0°00'00.0902"	-0°00'00.2033"	-1.67
			ΔHt.	-469.300sft	0.098sft	0.050sft	1.44
			Dist.	54572.392sft	0.019sft	0.006sft	0.39
B81	STA050-2003	SOUTH BASE	Az.	26°12'09.5964"	0°00'00.1033"	0°00'00.1851"	1.64
			ΔHt.	29.650sft	0.067sft	-0.050sft	-0.75
			Dist.	40447.132sft	0.022sft	0.016sft	0.64

B51	BO08-02	SOUTH BASE	Az.	102°45'01.5213"	0°00'00.3088"	0°00'00.0713"	0.29
			ΔHt.	27.526sft	0.044sft	0.048sft	1.64
			Dist.	11606.479sft	0.015sft	0.017sft	1.14
B65	STA051-2003	BO08-02	Az.	8°08'45.7195"	0°00'00.2097"	-0°00'00.5731"	-1.62
			ΔHt.	3.611sft	0.058sft	-0.006sft	-0.07
			Dist.	21349.961sft	0.023sft	-0.011sft	-0.33
B37	STA051-2003	AZI005-2001	Az.	358°53'44.9366"	0°00'00.1570"	-0°00'00.0545"	-0.32
			ΔHt.	9.170sft	0.057sft	0.080sft	1.62
			Dist.	27595.109sft	0.023sft	-0.017sft	-0.80
B1	STA053-2003	GPS86-43	Az.	258°35'40.8828"	0°00'00.4063"	-0°00'00.0530"	-0.29
			ΔHt.	12.367sft	0.054sft	0.042sft	1.58
			Dist.	12094.582sft	0.020sft	-0.013sft	-1.16
B80	BO08-02	AZI005-2001	Az.	331°09'05.3168"	0°00'00.2358"	-0°00'00.0812"	-0.95
			ΔHt.	5.559sft	0.021sft	-0.009sft	-1.54
			Dist.	7370.542sft	0.011sft	0.004sft	0.85
B75	STA049-2003	STA011- 2001	Az.	265°22'41.6441"	0°00'00.1869"	-0°00'00.0354"	-0.26
			ΔHt.	-33.264sft	0.096sft	0.015sft	0.29
			Dist.	42105.577sft	0.029sft	-0.029sft	-1.54
B9	SOUTH BASE	STA051- 2003	Az.	217°42'41.2787"	0°00'00.1854"	-0°00'00.3039"	-1.22
			ΔHt.	-31.137sft	0.055sft	-0.035sft	-0.54
			Dist.	23469.194sft	0.018sft	-0.042sft	-1.49
B87	STA053-2003	AZI053-2003	Az.	104°26'49.3170"	0°00'07.1707"	0°00'02.2515"	1.07
			ΔHt.	9.072sft	0.062sft	-0.025sft	-1.43
			Dist.	671.316sft	0.020sft	0.009sft	1.42
B98	EDWARD 2	AZI005-2001	Az.	170°56'49.9239"	0°00'00.0920"	-0°00'00.0683"	-0.49
			ΔHt.	-468.707sft	0.111sft	-0.036sft	-0.46
			Dist.	39843.968sft	0.021sft	0.052sft	1.41
B24	AZI005-2001	BK09-01	Az.	90°31'53.8133"	0°00'00.8321"	0°00'00.0163"	0.08
			ΔHt.	-4.662sft	0.041sft	-0.011sft	-1.37

			Dist.	6142.719sft	0.019sft	-0.003sft	-0.55
B96	SOUTH BASE	AZI005-2001	Az.	301°14'47.7278"	0°00'00.2014"	-0°00'00.1248"	-0.39
			ΔHt.	-21.967sft	0.045sft	-0.008sft	-0.14
			Dist.	17396.132sft	0.017sft	-0.028sft	-1.31
B68	BL09-01	STA052-2003	Az.	58°32'57.3815"	0°00'00.2047"	0°00'00.0414"	0.41
			ΔHt.	6.635sft	0.058sft	-0.033sft	-1.27
			Dist.	33672.748sft	0.019sft	-0.005sft	-0.69
B97	STA051-2003	AZI005-2001	Az.	358°53'44.9366"	0°00'00.1570"	0°00'00.7937"	1.23
			ΔHt.	9.170sft	0.057sft	-0.294sft	-1.19
			Dist.	27595.109sft	0.023sft	-0.031sft	-0.59
B10	BK09-01	BL09-01	Az.	119°32'38.5031"	0°00'01.3223"	0°00'00.1082"	0.46
			ΔHt.	1.648sft	0.028sft	-0.005sft	-1.19
			Dist.	2306.021sft	0.020sft	0.000sft	0.11
B59	AZI047-2003	STA047-2003	Az.	105°25'10.7807"	0°00'02.2551"	0°00'00.2979"	1.19
			ΔHt.	5.554sft	0.020sft	-0.002sft	-1.00
			Dist.	1054.438sft	0.010sft	-0.001sft	-0.58
B28	AZI047-2003	GOSHEN	Az.	25°10'54.3679"	0°00'00.1238"	-0°00'00.0625"	-1.17
			ΔHt.	128.164sft	0.039sft	-0.024sft	-0.72
			Dist.	25317.350sft	0.018sft	0.000sft	0.02
B6	AZI052-2003	STA052-2003	Az.	188°55'07.2305"	0°00'01.9758"	0°00'00.1873"	0.67
			ΔHt.	-3.510sft	0.030sft	0.006sft	1.16
			Dist.	1047.500sft	0.014sft	0.002sft	0.66
B69	AZI052-2003	GPS86-43	Az.	353°42'35.0381"	0°00'00.3346"	0°00'00.0952"	0.80
			ΔHt.	4.643sft	0.050sft	-0.025sft	-1.16
			Dist.	11105.612sft	0.023sft	0.005sft	0.50
B102	BOWMAN RESET	AZI031-2001	Az.	221°38'07.6000"	0°00'00.0955"	0°00'00.0353"	0.53
			ΔHt.	-85.385sft	0.058sft	-0.026sft	-0.66
			Dist.	43681.095sft	0.018sft	-0.009sft	-1.06

B64	GPS86-15	STA051-2003	Az.	19°18'42.8822"	0°00'00.1426"	0°00'00.1847"	1.04
			ΔHt.	-2.618sft	0.045sft	0.044sft	1.00
			Dist.	28709.870sft	0.020sft	-0.007sft	-0.34
B88	SOUTH BASE	AZI053-2003	Az.	40°06'42.6099"	0°00'00.0910"	-0°00'00.0379"	-0.78
			ΔHt.	-13.489sft	0.080sft	-0.032sft	-0.55
			Dist.	51909.705sft	0.025sft	0.023sft	1.01
B50	GPS86-15	AZI050-2003	Az.	32°08'50.5253"	0°00'00.3913"	0°00'00.1584"	1.00
			ΔHt.	-2.887sft	0.038sft	0.010sft	1.01
			Dist.	10352.105sft	0.016sft	0.000sft	0.11
B89	GPS86-15	AZI031-2001	Az.	47°28'13.5650"	0°00'00.0742"	0°00'00.0033"	0.07
			ΔHt.	9.877sft	0.059sft	-0.023sft	-0.65
			Dist.	58234.905sft	0.022sft	0.017sft	1.01
B30	GOSHEN	STA053-2003	Az.	219°34'13.6696"	0°00'00.0684"	-0°00'00.0142"	-0.38
			ΔHt.	-266.225sft	0.066sft	0.010sft	0.33
			Dist.	69657.325sft	0.023sft	0.013sft	0.94
B90	SOUTH BASE	GPS86-15	Az.	207°36'28.6318"	0°00'00.0364"	0°00'00.0660"	0.58
			ΔHt.	-28.519sft	0.055sft	0.016sft	0.30
			Dist.	51518.372sft	0.009sft	-0.017sft	-0.89
B16	GOSHEN	AZI048-2003	Az.	174°54'42.0192"	0°00'00.0588"	0°00'00.0564"	0.82
			ΔHt.	-20.209sft	0.044sft	0.039sft	0.87
			Dist.	60042.671sft	0.021sft	0.002sft	0.08
B103	BOWMAN RESET	AZI031-2001	Az.	221°38'07.6000"	0°00'00.0955"	-0°00'00.0456"	-0.86
			ΔHt.	-85.385sft	0.058sft	-0.010sft	-0.30
			Dist.	43681.095sft	0.018sft	0.006sft	0.53
B82	SOUTH BASE	STA052-2003	Az.	40°55'06.7668"	0°00'00.1375"	-0°00'00.0612"	-0.37
			ΔHt.	-18.346sft	0.058sft	0.010sft	0.21
			Dist.	33597.436sft	0.019sft	-0.012sft	-0.84
B94	AZI005-2001	BO08-02	Az.	151°08'37.7965"	0°00'00.2359"	-0°00'00.0456"	-0.17

			ΔHt.	-5.559sft	0.021sft	0.026sft	0.74
			Dist.	7370.542sft	0.011sft	0.010sft	0.82
B18	GPS86-24	AZI048-2003	Az.	315°28'43.6532"	0°00'00.0814"	0°00'00.0044"	0.09
			ΔHt.	42.070sft	0.074sft	-0.011sft	-0.49
			Dist.	49786.627sft	0.021sft	-0.008sft	-0.76
B17	GOSHEN	AZI048-2003	Az.	174°54'42.0192"	0°00'00.0588"	0°00'00.0040"	0.15
			ΔHt.	-20.209sft	0.044sft	-0.001sft	-0.05
			Dist.	60042.671sft	0.021sft	-0.008sft	-0.73
B74	GPS86-24	AZI049-2003	Az.	244°08'55.8549"	0°00'00.3058"	0°00'00.0029"	0.03
			ΔHt.	95.647sft	0.055sft	0.010sft	0.53
			Dist.	14456.007sft	0.018sft	-0.004sft	-0.69
B60	STA049-2003	AZI049-2003	Az.	2°48'11.1151"	0°00'04.4819"	-0°00'00.8748"	-0.62
			ΔHt.	27.214sft	0.055sft	-0.009sft	-0.50
			Dist.	769.170sft	0.022sft	-0.002sft	-0.32
B7	AZI050-2003	STA050-2003	Az.	37°41'28.2654"	0°00'02.9579"	0°00'00.2524"	0.53
			ΔHt.	1.757sft	0.041sft	0.005sft	0.57
			Dist.	775.933sft	0.017sft	0.002sft	0.51
B78	AZI051-2003	GPS86-15	Az.	200°49'05.0943"	0°00'00.2210"	0°00'00.1313"	0.55
			ΔHt.	-5.679sft	0.060sft	-0.002sft	-0.03
			Dist.	28545.106sft	0.028sft	0.005sft	0.17
B36	AZI051-2003	STA051-2003	Az.	302°35'58.9237"	0°00'05.8913"	0°00'00.4460"	0.37
			ΔHt.	-8.297sft	0.046sft	-0.001sft	-0.06
			Dist.	759.757sft	0.026sft	-0.003sft	-0.53
B95	SOUTH BASE	BO08-02	Az.	282°46'29.0701"	0°00'00.3088"	0°00'00.1358"	0.47
			ΔHt.	-27.526sft	0.044sft	0.025sft	0.49
			Dist.	11606.479sft	0.015sft	0.003sft	0.27
B32	GPS86-24	STA049-2003	Az.	241°32'33.8913"	0°00'00.3219"	-0°00'00.0810"	-0.45
			ΔHt.	68.433sft	0.060sft	0.005sft	0.14
			Dist.	14840.521sft	0.019sft	-0.005sft	-0.47

B5	STA048-2003	AZI048-2003	Az.	100°17'32.2473"	0°00'03.8439"	0°00'00.1070"	0.18
			ΔHt.	33.833sft	0.056sft	-0.004sft	-0.44
			Dist.	1228.052sft	0.022sft	0.000sft	-0.01
B19	STA048-2003	STA011-2001	Az.	202°11'18.4627"	0°00'00.1641"	0°00'00.0086"	0.07
			ΔHt.	26.932sft	0.095sft	0.028sft	0.42
			Dist.	49881.712sft	0.036sft	-0.006sft	-0.23
B13	TEMP	GPS86-43	Az.	353°16'41.8312"	0°00'40.2482"	0°00'08.5347"	0.27
			ΔHt.	-1.928sft	0.066sft	-0.001sft	-0.03
			Dist.	147.906sft	0.023sft	0.002sft	0.12
B54	STA052-2003	TEMP	Az.	355°01'47.9168"	0°00'00.4740"	0°00'00.0114"	0.02
			ΔHt.	10.080sft	0.070sft	0.007sft	0.08
			Dist.	11971.701sft	0.023sft	0.000sft	0.01

Geoid Observations

Number of Observations : 29

Number of Outliers : 0

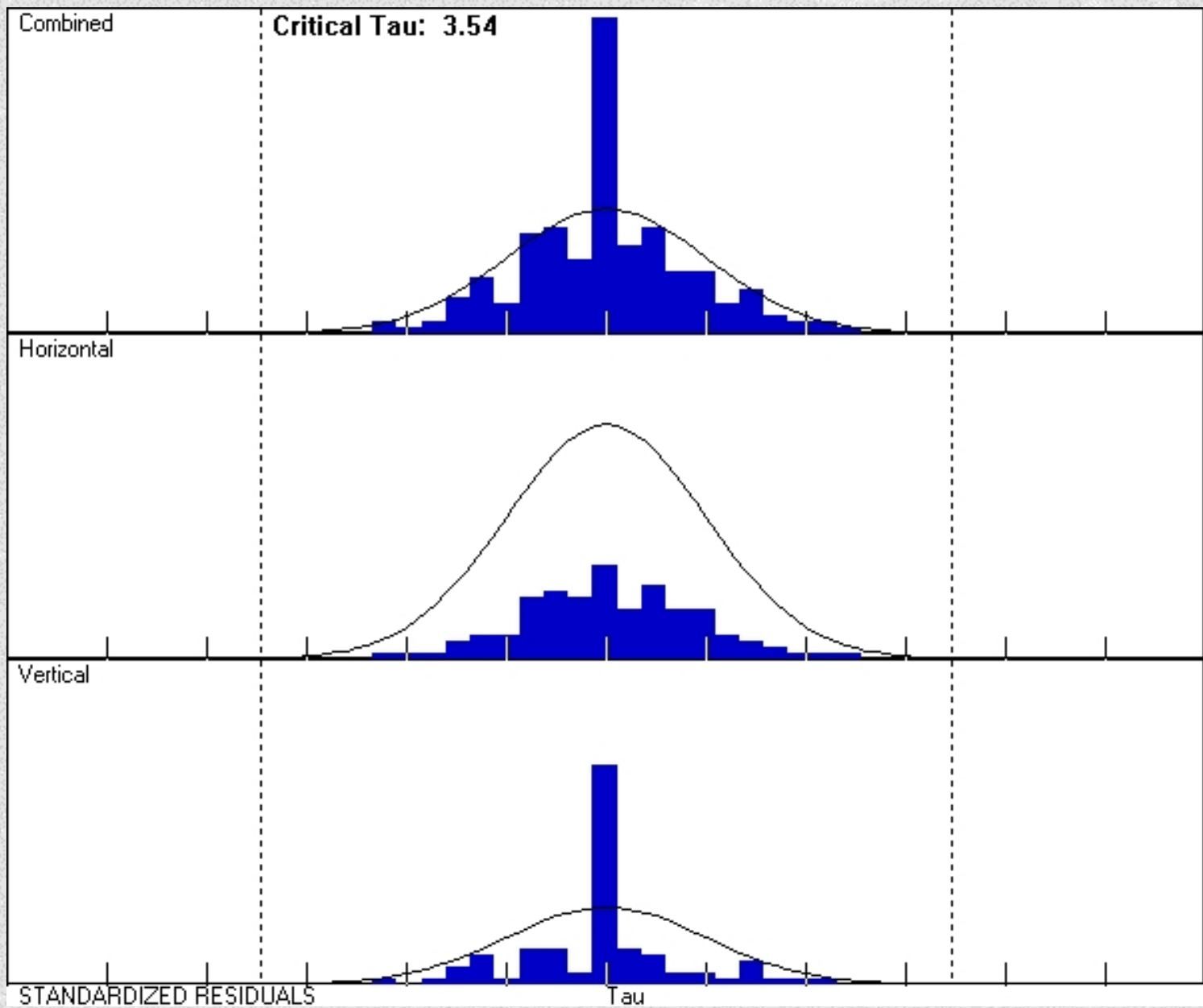
Observation Adjustment (Critical Tau = 3.54). Any outliers are in **red**.

Observation ID	Point Name	Separation	A-posteriori Error (1.96σ)	Residual	Standardized Residual
G40	GOSHEN	-109.781sft	0.617sft	-0.014sft	-0.04
G34	SOUTH BASE	-108.843sft	0.617sft	0.014sft	0.04
G48	BO08-02	-108.774sft	0.870sft	0.000sft	0.00
G46	AZI051-2003	-108.582sft	0.870sft	0.000sft	0.00
G54	EDWARD 2	-108.995sft	0.870sft	0.000sft	0.00
G53	J-334	-108.171sft	0.870sft	0.000sft	0.00
G52	AZI053-2003	-109.357sft	0.870sft	0.000sft	0.00
G51	BOWMAN RESET	-109.291sft	0.870sft	0.000sft	0.00
G50	AZI031-2001	-108.977sft	0.870sft	0.000sft	0.00
G49	AZI049-2003	-109.638sft	0.870sft	0.000sft	0.00

G47	GPS86-15	-108.312sft	0.870sft	0.000sft	0.00
G45	STA049-2003	-109.644sft	0.870sft	0.000sft	0.00
G44	AZI047-2003	-109.575sft	0.870sft	0.000sft	0.00
G43	AZI005-2001	-108.786sft	0.870sft	0.000sft	0.00
G42	STA011-2001	-109.254sft	0.870sft	0.000sft	0.00
G41	GPS86-24	-109.725sft	0.870sft	0.000sft	0.00
G39	STA047-2003	-109.570sft	0.870sft	0.000sft	0.00
G38	TEMP	-109.306sft	0.870sft	0.000sft	0.00
G37	BL09-01	-108.867sft	0.870sft	0.000sft	0.00
G36	BK09-01	-108.857sft	0.870sft	0.000sft	0.00
G35	STA051-2003	-108.577sft	0.870sft	0.000sft	0.00
G33	STA050-2003	-108.430sft	0.870sft	0.000sft	0.00
G32	AZI050-2003	-108.421sft	0.870sft	0.000sft	0.00
G31	STA052-2003	-109.218sft	0.870sft	0.000sft	0.00
G30	AZI052-2003	-109.227sft	0.870sft	0.000sft	0.00
G29	AZI048-2003	-109.333sft	0.870sft	0.000sft	0.00
G28	STA048-2003	-109.332sft	0.870sft	0.000sft	0.00
G27	GPS86-43	-109.307sft	0.870sft	0.000sft	0.00
G26	STA053-2003	-109.357sft	0.870sft	0.000sft	0.00

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Histograms of Standardized Residuals



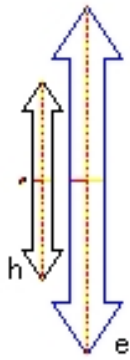
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Point Error Ellipses

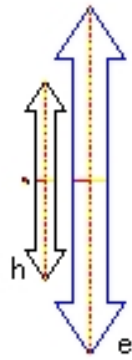
STA053-2003

GPS86-43

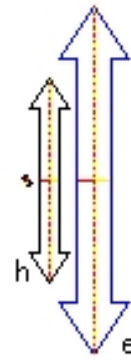
STA048-2003



-83°



-65°



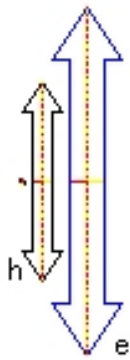
-60°

Tick Size: 0.0100sft Horizontal Bivariate Scalar: 2.45σ Vertical Univariate Scalar: 1.96σ

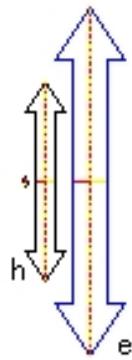
AZI048-2003

AZI052-2003

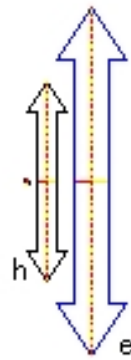
STA052-2003



-72°



-73°



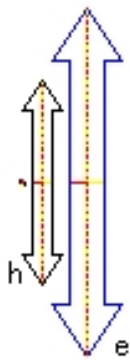
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Tick Size: 0.0100sft Horizontal Bivariate Scalar: 2.45σ Vertical Univariate Scalar: 1.96σ

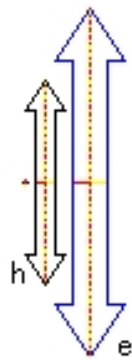
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STA050-2003

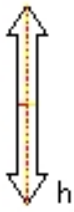
SOUTH BASE



-49°



-89°



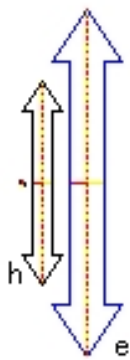
0°

Tick Size: 0.0100sft Horizontal Bivariate Scalar: 2.45σ Vertical Univariate Scalar: 1.96σ

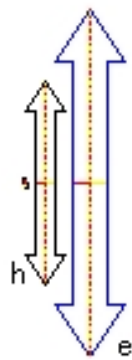
STA051-2003

BK09-01

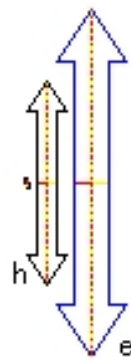
BL09-01



-62°



-64°



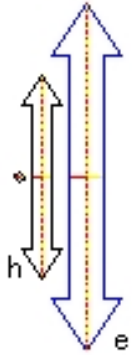
-64°

Tick Size: 0.0100sft Horizontal Bivariate Scalar: 2.45σ Vertical Univariate Scalar: 1.96σ

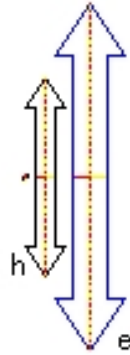
TEMP

STA047-2003

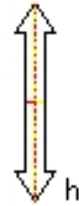
GOSHEN



-28°



-80°



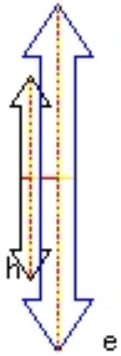
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Tick Size: 0.0100sft Horizontal Bivariate Scalar: 2.45σ Vertical Univariate Scalar: 1.96σ

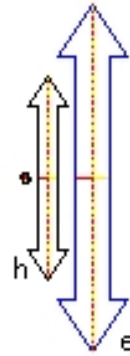
GPS86-24

STA011-2001

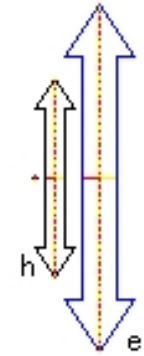
AZI005-2001



0°



-72°



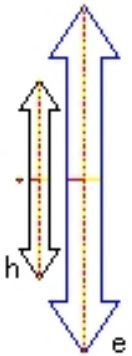
-79°

Tick Size: 0.0100sft Horizontal Bivariate Scalar: 2.45σ Vertical Univariate Scalar: 1.96σ

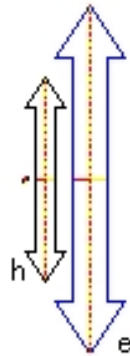
AZI047-2003

STA049-2003

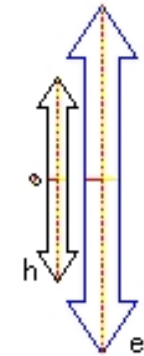
AZI051-2003



87°



-86°



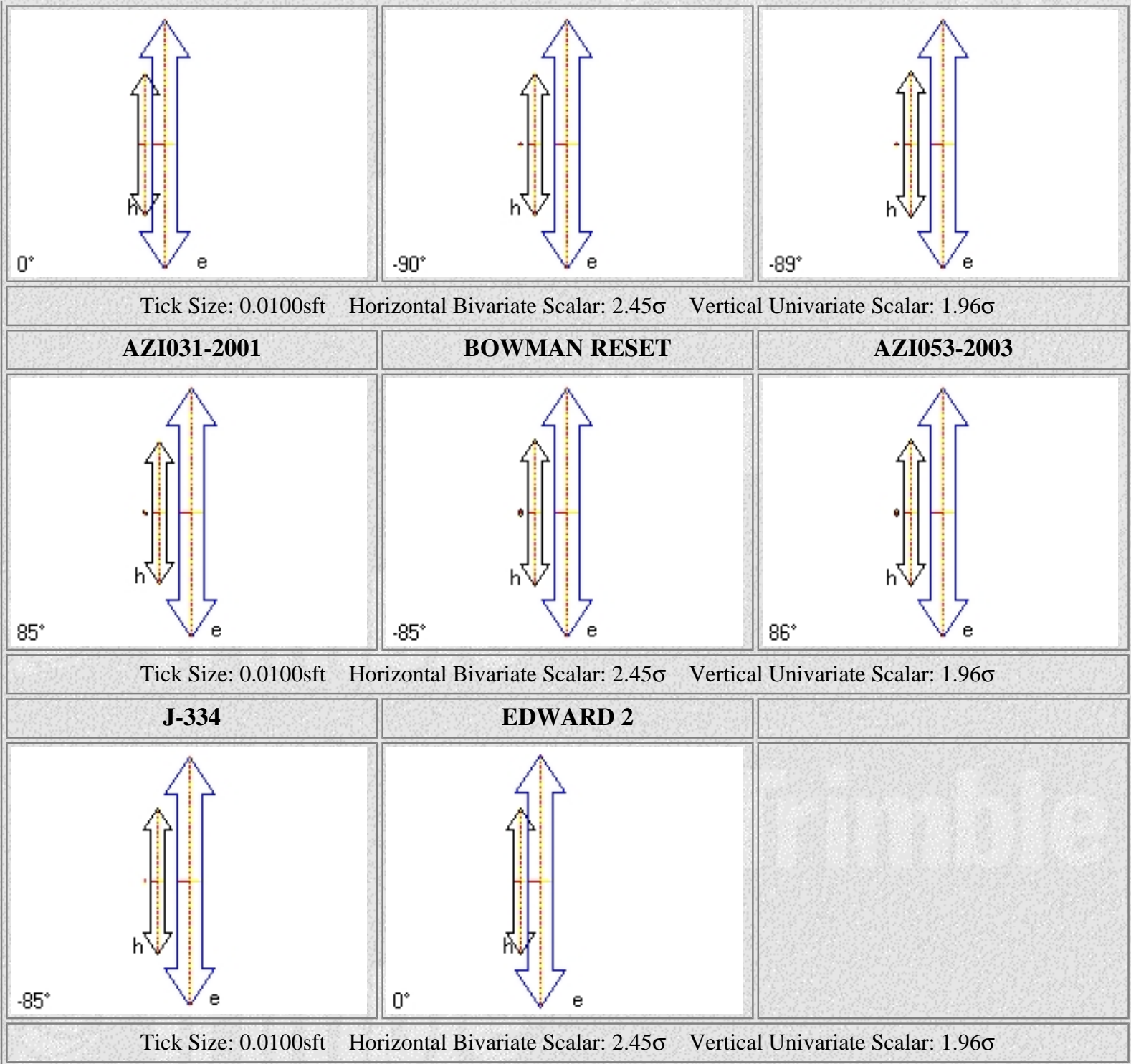
-53°

Tick Size: 0.0100sft Horizontal Bivariate Scalar: 2.45σ Vertical Univariate Scalar: 1.96σ

GPS86-15

BO08-02

AZI049-2003



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Covariant Terms

Adjustment performed in **NAD 1983 (Conus)**

From Point	To Point		Components	A-posteriori Error (1.96σ)	Horiz. Precision (Ratio)	3D Precision (Ratio)
STA053-2003	GPS86-43	Az.	258°35'40.9326"	0°00'00.4042"	1:586457	1:586457
		ΔHt.	12.367sft	0.054sft		
		ΔElev.	12.316sft	1.509sft		
		Dist.	12094.585sft	0.021sft		
STA053-2003	GOSHEN	Az.	39°28'28.6580"	0°00'00.0590"	1:3537423	1:3537423
		ΔHt.	266.225sft	0.066sft		
		ΔElev.	266.648sft	1.067sft		
		Dist.	69657.340sft	0.020sft		
STA053-2003	AZI053-2003	Az.	104°26'49.3668"	0°00'07.1741"	1:34353	1:34353
		ΔHt.	9.071sft	0.062sft		
		ΔElev.	9.071sft	1.510sft		
		Dist.	671.316sft	0.020sft		
STA053-2003	EDWARD 2	Az.	279°02'30.4170"	0°00'00.0819"	1:3064193	1:3064193
		ΔHt.	469.300sft	0.098sft		
		ΔElev.	468.938sft	1.512sft		
		Dist.	54572.404sft	0.018sft		
GPS86-43	AZI052-2003	Az.	173°42'25.6466"	0°00'00.3323"	1:489881	1:489881
		ΔHt.	-4.643sft	0.050sft		
		ΔElev.	-4.723sft	1.509sft		
		Dist.	11105.615sft	0.023sft		
GPS86-43	TEMP	Az.	173°16'41.7466"	0°00'40.2481"	1:6354	1:6354
		ΔHt.	1.928sft	0.066sft		
		ΔElev.	1.927sft	1.510sft		
		Dist.	147.906sft	0.023sft		
GPS86-43	STA047-2003	Az.	54°35'48.6502"	0°00'00.1059"	1:2412667	1:2412667
		ΔHt.	131.248sft	0.069sft		
		ΔElev.	131.511sft	1.509sft		
		Dist.	56923.691sft	0.024sft		

STA048-2003	AZI048-2003	Az.	100°17'32.2971"	0°00'03.8431"	1:55551	1:55551
		ΔHt.	33.833sft	0.056sft		
		ΔElev.	33.834sft	1.510sft		
		Dist.	1228.052sft	0.022sft		
STA048-2003	STA011-2001	Az.	202°11'18.5125"	0°00'00.1577"	1:1416995	1:1416995
		ΔHt.	26.932sft	0.095sft		
		ΔElev.	26.854sft	1.511sft		
		Dist.	49881.723sft	0.035sft		
AZI048-2003	GOSHEN	Az.	354°55'23.4625"	0°00'00.0544"	1:3064497	1:3064497
		ΔHt.	20.209sft	0.044sft		
		ΔElev.	20.656sft	1.067sft		
		Dist.	60042.684sft	0.020sft		
AZI048-2003	GPS86-24	Az.	135°24'13.1371"	0°00'00.0687"	1:2617685	1:2617685
		ΔHt.	-42.069sft	0.074sft		
		ΔElev.	-41.678sft	1.511sft		
		Dist.	49786.638sft	0.019sft		
AZI052-2003	STA052-2003	Az.	188°55'07.2803"	0°00'01.9739"	1:75664	1:75664
		ΔHt.	-3.510sft	0.030sft		
		ΔElev.	-3.518sft	1.509sft		
		Dist.	1047.500sft	0.014sft		
STA052-2003	SOUTH BASE	Az.	220°57'57.2864"	0°00'00.1384"	1:1809918	1:1809918
		ΔHt.	18.346sft	0.058sft		
		ΔElev.	17.970sft	1.067sft		
		Dist.	33597.443sft	0.019sft		
STA052-2003	BL09-01	Az.	238°36'40.0113"	0°00'00.2061"	1:1745248	1:1745248
		ΔHt.	-6.635sft	0.058sft		
		ΔElev.	-6.986sft	1.509sft		
		Dist.	33672.756sft	0.019sft		
STA052-2003	TEMP	Az.	355°01'47.9666"	0°00'00.4721"	1:524368	1:524368
		ΔHt.	10.080sft	0.070sft		
		ΔElev.	10.167sft	1.510sft		

		Dist.	11971.704sft	0.023sft		
STA052-2003	AZI031-2001	Az.	185°19'35.7201"	0°00'00.1258"	1:1254023	1:1254023
		ΔHt.	-0.296sft	0.057sft		
		ΔElev.	-0.538sft	1.509sft		
		Dist.	31848.373sft	0.025sft		
AZI050-2003	STA050-2003	Az.	37°41'28.3152"	0°00'02.9555"	1:46986	1:46986
		ΔHt.	1.756sft	0.041sft		
		ΔElev.	1.765sft	1.510sft		
		Dist.	775.933sft	0.017sft		
AZI050-2003	GPS86-15	Az.	212°09'33.0062"	0°00'00.3869"	1:636829	1:636829
		ΔHt.	2.887sft	0.038sft		
		ΔElev.	2.779sft	1.510sft		
		Dist.	10352.107sft	0.016sft		
STA050-2003	SOUTH BASE	Az.	26°12'09.6462"	0°00'00.1007"	1:1900865	1:1900865
		ΔHt.	29.650sft	0.067sft		
		ΔElev.	30.063sft	1.068sft		
		Dist.	40447.141sft	0.021sft		
STA050-2003	AZI031-2001	Az.	50°56'20.5593"	0°00'00.1038"	1:1845339	1:1845339
		ΔHt.	11.008sft	0.068sft		
		ΔElev.	11.555sft	1.510sft		
		Dist.	47572.692sft	0.026sft		
SOUTH BASE	STA051-2003	Az.	217°42'41.3285"	0°00'00.1809"	1:1325349	1:1325349
		ΔHt.	-31.137sft	0.055sft		
		ΔElev.	-31.402sft	1.068sft		
		Dist.	23469.199sft	0.018sft		
SOUTH BASE	AZI005-2001	Az.	301°14'47.7776"	0°00'00.2039"	1:1031306	1:1031306
		ΔHt.	-21.967sft	0.045sft		
		ΔElev.	-22.024sft	1.067sft		
		Dist.	17396.136sft	0.017sft		
SOUTH BASE	GPS86-15	Az.	207°36'28.6816"	0°00'00.0000"	1:0	1:0
		ΔHt.	-28.519sft	0.055sft		

		ΔElev.	-29.049sft	1.067sft		
		Dist.	51518.384sft	0.000sft		
SOUTH BASE	BO08-02	Az.	282°46'29.1200"	0°00'00.3102"	1:768681	1:768681
		ΔHt.	-27.526sft	0.044sft		
		ΔElev.	-27.594sft	1.067sft		
		Dist.	11606.482sft	0.015sft		
SOUTH BASE	AZI053-2003	Az.	40°06'42.6597"	0°00'00.0907"	1:2100632	1:2100632
		ΔHt.	-13.489sft	0.080sft		
		ΔElev.	-12.975sft	1.068sft		
		Dist.	51909.716sft	0.025sft		
STA051-2003	AZI005-2001	Az.	358°53'44.9864"	0°00'00.1541"	1:1215412	1:1215412
		ΔHt.	9.170sft	0.057sft		
		ΔElev.	9.378sft	1.509sft		
		Dist.	27595.115sft	0.023sft		
STA051-2003	AZI051-2003	Az.	122°35'54.0329"	0°00'05.8914"	1:29257	1:29257
		ΔHt.	8.297sft	0.046sft		
		ΔElev.	8.301sft	1.510sft		
		Dist.	759.757sft	0.026sft		
STA051-2003	GPS86-15	Az.	199°19'56.1613"	0°00'00.1395"	1:1511363	1:1511363
		ΔHt.	2.618sft	0.045sft		
		ΔElev.	2.353sft	1.510sft		
		Dist.	28709.876sft	0.019sft		
STA051-2003	BO08-02	Az.	8°08'45.7693"	0°00'00.2056"	1:954800	1:954800
		ΔHt.	3.611sft	0.058sft		
		ΔElev.	3.808sft	1.509sft		
		Dist.	21349.966sft	0.022sft		
STA051-2003	J-334	Az.	205°50'37.5256"	0°00'00.1081"	1:1981092	1:1981092
		ΔHt.	-0.870sft	0.049sft		
		ΔElev.	-1.276sft	1.510sft		
		Dist.	40602.701sft	0.020sft		
BK09-01	BL09-01	Az.	119°32'38.5529"	0°00'01.3221"	1:114751	1:114751

		ΔHt.	1.648sft	0.028sft		
		ΔElev.	1.658sft	1.510sft		
		Dist.	2306.021sft	0.020sft		
BK09-01	AZI005-2001	Az.	270°32'41.4060"	0°00'00.8320"	1:325712	1:325712
		ΔHt.	4.662sft	0.041sft		
		ΔElev.	4.591sft	1.509sft		
		Dist.	6142.720sft	0.019sft		
STA047-2003	AZI047-2003	Az.	285°25'18.7459"	0°00'02.2567"	1:100658	1:100658
		ΔHt.	-5.554sft	0.020sft		
		ΔElev.	-5.548sft	1.509sft		
		Dist.	1054.438sft	0.010sft		
GOSHEN	AZI047-2003	Az.	205°12'18.4346"	0°00'00.1266"	1:1431775	1:1431775
		ΔHt.	-128.164sft	0.039sft		
		ΔElev.	-128.369sft	1.067sft		
		Dist.	25317.356sft	0.018sft		
GPS86-24	STA049-2003	Az.	241°32'33.9411"	0°00'00.3214"	1:763557	1:763557
		ΔHt.	68.433sft	0.060sft		
		ΔElev.	68.351sft	1.513sft		
		Dist.	14840.524sft	0.019sft		
GPS86-24	AZI049-2003	Az.	244°08'55.9047"	0°00'00.3065"	1:799249	1:799249
		ΔHt.	95.646sft	0.055sft		
		ΔElev.	95.560sft	1.513sft		
		Dist.	14456.011sft	0.018sft		
STA011-2001	STA049-2003	Az.	85°17'17.4973"	0°00'00.1802"	1:1506089	1:1506089
		ΔHt.	33.264sft	0.096sft		
		ΔElev.	33.654sft	1.512sft		
		Dist.	42105.586sft	0.028sft		
STA011-2001	AZI031-2001	Az.	277°43'45.9710"	0°00'00.1568"	1:1665253	1:1665253
		ΔHt.	-235.197sft	0.081sft		
		ΔElev.	-235.474sft	1.511sft		
		Dist.	43914.449sft	0.026sft		

AZI005-2001	BO08-02	Az.	151°08'37.8463"	0°00'00.2385"	1:645130	1:645130
		ΔHt.	-5.559sft	0.021sft		
		ΔElev.	-5.571sft	1.509sft		
		Dist.	7370.543sft	0.011sft		
AZI005-2001	EDWARD 2	Az.	350°57'38.5562"	0°00'00.0795"	1:2149579	1:2149579
		ΔHt.	468.707sft	0.111sft		
		ΔElev.	468.916sft	1.512sft		
		Dist.	39843.977sft	0.019sft		
STA049-2003	AZI049-2003	Az.	2°48'11.1649"	0°00'04.4827"	1:34509	1:34509
		ΔHt.	27.214sft	0.055sft		
		ΔElev.	27.208sft	1.513sft		
		Dist.	769.170sft	0.022sft		
AZI051-2003	GPS86-15	Az.	200°49'05.1441"	0°00'00.2195"	1:1036317	1:1036317
		ΔHt.	-5.679sft	0.060sft		
		ΔElev.	-5.949sft	1.510sft		
		Dist.	28545.112sft	0.028sft		
GPS86-15	AZI031-2001	Az.	47°28'13.6148"	0°00'00.0701"	1:2860691	1:2860691
		ΔHt.	9.877sft	0.059sft		
		ΔElev.	10.541sft	1.510sft		
		Dist.	58234.919sft	0.020sft		
GPS86-15	J-334	Az.	220°54'34.3993"	0°00'00.1996"	1:1047238	1:1047238
		ΔHt.	-3.488sft	0.034sft		
		ΔElev.	-3.629sft	1.510sft		
		Dist.	12509.149sft	0.012sft		
AZI031-2001	BOWMAN RESET	Az.	41°34'23.1390"	0°00'00.0996"	1:2281553	1:2281553
		ΔHt.	85.385sft	0.058sft		
		ΔElev.	85.699sft	1.510sft		
		Dist.	43681.105sft	0.019sft		
BOWMAN RESET	AZI053-2003	Az.	312°30'20.7013"	0°00'00.3171"	1:656804	1:656804

		ΔHt.	-80.232sft	0.081sft
		ΔElev.	-80.165sft	1.511sft
		Dist.	19762.631sft	0.030sft

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