

Network and Local Accuracies

Earl F. Burkholder, PS, PE, F.ASCE – May 2014

This is an example printout of the Local Accuracy program used to compute network and local accuracies between points in a given network. Notes and explanations include:

1. The first portion of the printout below is an echo of a BURKORD™ data file which contains point “p” records and correlation “c” records.
2. The next portion shows the point records and correlations separately for reading convenience.
3. The correlations are shown and used both ways in order to document “very close” bi-directional agreement in the results. When written out in matrix form, the correlation matrix “here” to “there” is the transpose of the correlation matrix “there” to “here.” Therefore, half of the “c” records could be deleted.
4. As a practical matter, half of the network/local accuracies listed could be eliminated because the bi-directional differences are insignificant.
5. This printout is based upon holding the control values at FOLA and KEHA to be 0.010 meters in each component. Other printouts show results for computations that hold 0.002 meters, 1.00 meters, and 5.00 meters in each component at those two stations.

Program name/version: Local Accuracy - version 2013-B

The user is: Earl F. Burkholder
Program used on: May 16, 2014

The input file for program is: TB0.010.dat
The name of this output file is: TB0.010.sol

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p 109 170846.0946 -4702276.0649 4291680.3127 1.09217605E-4 1.31203269E-4 1.21916747E-4 -8.37336906E-7 2.77933774E-7 -1.53856464E-5 KEHA
p 108 115561.9561 -4706440.2961 4289090.7452 1.10192529E-4 1.53422234E-4 1.36187291E-4 -7.47875808E-7 3.89619804E-7 -3.14478773E-5 WATH
p 106 114970.9411 -4680260.7496 4317398.7854 1.0987937E-4 1.517579E-4 1.35365829E-4 -7.12571941E-7 -5.77986864E-8 -3.06527366E-5 PARO
p 105 153059.6323 -4666858.8083 4330615.8009 1.10010394E-4 1.55066315E-4 1.38501012E-4 -1.47419501E-6 6.6791457E-7 -3.36968194E-5 RASN
p 101 182409.4842 -4611414.9374 4387983.545 1.10063388E-4 1.53999507E-4 1.37406106E-4 -2.17241702E-6 1.42046665E-6 -3.23835785E-5 SHAN
p 103 149899.2141 -4637713.1665 4361716.0367 1.09849164E-4 1.51213014E-4 1.36218057E-4 -1.69243396E-6 8.68755477E-7 -3.09260904E-5 WEBE
p 104 102706.4182 -4657769.2208 4341771.6011 1.10846416E-4 1.59764544E-4 1.38742734E-4 3.56292993E-7 -7.5039656E-7 -3.53554737E-5 WAWN
p 107 164796.2539 -4679186.5046 4316889.7231 1.09393455E-4 1.4547964E-4 1.30684673E-4 -1.40504072E-6 6.98765659E-7 -2.61812405E-5 FRSI
p 102 124517.648 -4609735.8116 4391808.831 1.09217605E-4 1.31203269E-4 1.21916747E-4 -8.37336906E-7 2.77933774E-7 -1.53856464E-5 FOLA
c 109 108 1.0725005E-4 5.86380911E-7 -3.58472095E-7 4.09128543E-7 1.05718831E-4 -1.5204407E-7 -1.76108575E-7 -8.75191319E-7 1.0985627E-4
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c 109 105 1.06616203E-4 8.59374753E-7 -4.49727095E-7 6.72728062E-7 9.72180794E-5 5.99806749E-6 -3.02447709E-7 5.74667064E-6 1.02700252E-4
c 109 101 1.06339257E-4 8.34677115E-7 -5.25867707E-7 8.20813335E-7 9.13555741E-5 9.55152326E-6 -5.26099157E-7 9.26598533E-6 9.89456268E-5
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c 107 108 1.08829966E-4 -1.0486379E-6 5.54125657E-7 -9.48711292E-7 1.34740818E-4 -1.80354732E-5 4.20226599E-7 -1.80631662E-5 1.22579158E-4
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c 102 106 1.07574551E-4 -7.98968495E-7 3.96489303E-7 -6.28093201E-7 1.13668255E-4 -3.4036366E-6 2.36312695E-7 -2.918301E-6 1.08777213E-4
c 102 105 1.07821847E-4 -8.59374753E-7 4.49727095E-7 -6.72728062E-7 1.17219971E-4 -5.99806749E-6 3.02447709E-7 -5.74667064E-6 1.11737799E-4
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c 102 103 1.08278234E-4 -7.50612598E-7 3.30414256E-7 -6.6524728E-7 1.22705187E-4 -9.65330409E-6 2.80029307E-7 -9.60774741E-6 1.15831843E-4
c 102 104 1.08035865E-4 -1.06761796E-6 5.37629616E-7 -8.10706153E-7 1.2065289E-4 -8.29270173E-6 2.94379336E-7 -8.09470156E-6 1.14197888E-4
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The points in the project file are:

PT	X/Y/Z			Station
109	170846.0946	-4702276.0649	4291680.3127	KEHA
108	115561.9561	-4706440.2961	4289090.7452	WATH
106	114970.9411	-4680260.7496	4317398.7854	PARO
105	153059.6323	-4666858.8083	4330615.8009	RASN
101	182409.4842	-4611414.9374	4387983.545	SHAN
103	149899.2141	-4637713.1665	4361716.0367	WEBE
104	102706.4182	-4657769.2208	4341771.6011	WAWN
107	164796.2539	-4679186.5046	4316889.7231	FRSI
102	124517.648	-4609735.8116	4391808.831	FOLA

List of stored correlations:

109	108	106	105	101	103	104	107
109	106	106	101	101	104	104	102
109	105	106	103	101	107	107	109
109	101	106	104	101	102	107	108
109	103	106	107	103	109	107	106
109	104	106	102	103	108	107	105
109	107	105	109	103	106	107	101
109	102	105	108	103	105	107	103
108	109	105	106	103	101	107	104
108	106	105	101	103	104	107	102
108	105	105	103	103	107	102	109
108	101	105	104	103	102	102	108
108	103	105	107	104	109	102	106
108	104	105	102	104	108	102	105
108	107	101	109	104	106	102	101
108	102	101	108	104	105	102	103
106	109	101	106	104	101	102	104
106	108	101	105	104	103	102	107

These accuracies (std. dev. in meters) are based on 0.010 m uncertainties at station FOLA and KEHA.

Sta to Sta	Accuracies based on - - -			3-D Slope Distance	GSDM Hor. Dist.	Soler/Smith Not based on dist.
KEHA - WATH	Hor. Dist. =	55,500.951	network	0.014811	0.014811	0.01481
	3-D Dist. =	55,501.195	local	0.002185	0.002186	0.002186
KEHA - PARO	Hor. Dist. =	65,330.343	network	0.014859	0.014858	0.01486
	3-D Dist. =	65,331.055	local	0.002747	0.002735	0.002758
KEHA - RASN	Hor. Dist. =	55,557.785	network	0.014945	0.014943	0.014946
	3-D Dist. =	55,558.191	local	0.003378	0.003364	0.003385
KEHA - SHAN	Hor. Dist. =	132,897.326	network	0.014955	0.014947	0.014956
	3-D Dist. =	132,905.113	local	0.003745	0.0037	0.003759
KEHA - WEBE	Hor. Dist. =	97,527.583	network	0.014944	0.014939	0.014944
	3-D Dist. =	97,530.212	local	0.003651	0.003623	0.00366
KEHA - WAWN	Hor. Dist. =	95,564.196	network	0.014916	0.014913	0.014918
	3-D Dist. =	95,566.793	local	0.003343	0.00332	0.003358
KEHA - FRSI	Hor. Dist. =	34,716.439	network	0.014911	0.014909	0.014911
	3-D Dist. =	34,716.606	local	0.002946	0.002932	0.002947
KEHA - FOLA	Hor. Dist. =	143,989.819	network	0.014894	0.014888	0.014893
	3-D Dist. =	143,999.11	local	0.003842	0.003802	0.00385
WATH - KEHA	Hor. Dist. =	55,500.287	network	0.014811	0.01481	0.01481
	3-D Dist. =	55,501.195	local	0.002185	0.002183	0.002186
WATH - PARO	Hor. Dist. =	38,562.109	network	0.015006	0.015002	0.015004
	3-D Dist. =	38,562.457	local	0.001989	0.001986	0.00199
WATH - RASN	Hor. Dist. =	68,534.138	network	0.014945	0.014941	0.014945
	3-D Dist. =	68,535.393	local	0.002216	0.002209	0.00222
WATH - SHAN	Hor. Dist. =	152,559.416	network	0.014979	0.014969	0.014978
	3-D Dist. =	152,571.939	local	0.00287	0.002847	0.002886
WATH - WEBE	Hor. Dist. =	105,716.823	network	0.014977	0.014971	0.014976
	3-D Dist. =	105,720.852	local	0.002714	0.002701	0.002719
WATH - WAWN	Hor. Dist. =	72,864.113	network	0.015033	0.015027	0.015032
	3-D Dist. =	72,865.705	local	0.002766	0.002754	0.002772

Sta to Sta	Accuracies based on - - -			3-D Slope Distance	GSDM Hor. Dist.	Soler/Smith Not based on dist.
WATH - FRSI	Hor. Dist.= 62,764.719	network	0.014864	0.014861	0.014863	
	3-D Dist.= 62,765.981	local	0.001638	0.001631	0.00164	
WATH - FOLA	Hor. Dist.= 141,351.452	network	0.014957	0.014949	0.014954	
	3-D Dist.= 141,361.122	local	0.003112	0.00309	0.003113	
PARO - KEHA	Hor. Dist.= 65,330.042	network	0.014859	0.014861	0.014859	
	3-D Dist.= 65,331.055	local	0.002747	0.002762	0.00275	
PARO - WATH	Hor. Dist.= 38,562.394	network	0.015006	0.015007	0.015004	
	3-D Dist.= 38,562.457	local	0.001989	0.001991	0.00199	
PARO - RASN	Hor. Dist.= 42,485.647	network	0.01484	0.014839	0.014841	
	3-D Dist.= 42,485.879	local	0.001352	0.001349	0.001355	
PARO - SHAN	Hor. Dist.= 119,450.705	network	0.014933	0.014925	0.014932	
	3-D Dist.= 119,456.734	local	0.00243	0.002411	0.002443	
PARO - WEBE	Hor. Dist.= 70,669.283	network	0.014929	0.014925	0.014929	
	3-D Dist.= 70,670.36	local	0.002147	0.002139	0.00215	
PARO - WAWN	Hor. Dist.= 35,359.696	network	0.015016	0.015013	0.015016	
	3-D Dist.= 35,359.886	local	0.002181	0.002175	0.002184	
PARO - FRSI	Hor. Dist.= 49,838.93	network	0.014807	0.014806	0.014806	
	3-D Dist.= 49,839.492	local	0.001186	0.001184	0.001188	
PARO - FOLA	Hor. Dist.= 102,961.184	network	0.014942	0.014936	0.01494	
	3-D Dist.= 102,964.855	local	0.002737	0.00272	0.002736	
RASN - KEHA	Hor. Dist.= 55,557.522	network	0.014945	0.014948	0.014946	
	3-D Dist.= 55,558.191	local	0.003378	0.003398	0.003385	
RASN - WATH	Hor. Dist.= 68,534.635	network	0.014945	0.014948	0.014944	
	3-D Dist.= 68,535.393	local	0.002216	0.002222	0.002217	
RASN - PARO	Hor. Dist.= 42,485.641	network	0.01484	0.014842	0.01484	
	3-D Dist.= 42,485.879	local	0.001352	0.001355	0.001353	
RASN - SHAN	Hor. Dist.= 85,006.316	network	0.014984	0.014978	0.014983	
	3-D Dist.= 85,008.792	local	0.002506	0.002489	0.00251	
RASN - WEBE	Hor. Dist.= 42,739.455	network	0.015004	0.015001	0.015004	
	3-D Dist.= 42,739.693	local	0.002002	0.001998	0.002002	

Sta to Sta	Accuracies based on - - -			3-D Slope Distance	GSDM Hor. Dist.	Soler/Smith Not based on dist.
RASN - WAWN	Hor. Dist. = 52,368.543	network		0.014884	0.014884	0.014884
	3-D Dist. = 52,369.062	local		0.001687	0.001686	0.001688
RASN - FRSI	Hor. Dist. = 21,865.935	network		0.014942	0.014944	0.014943
	3-D Dist. = 21,866.083	local		0.001775	0.001778	0.001777
RASN - FOLA	Hor. Dist. = 88,441.188	network		0.014953	0.014948	0.014951
	3-D Dist. = 88,443.59	local		0.002559	0.002545	0.002558
SHAN - KEHA	Hor. Dist. = 132,898.397	network		0.014955	0.014961	0.014956
	3-D Dist. = 132,905.113	local		0.003745	0.00379	0.003758
SHAN - WATH	Hor. Dist. = 152,562.475	network		0.014979	0.014987	0.014977
	3-D Dist. = 152,571.939	local		0.00287	0.002894	0.002878
SHAN - PARO	Hor. Dist. = 119,452.216	network		0.014933	0.014939	0.014931
	3-D Dist. = 119,456.734	local		0.00243	0.002449	0.002434
SHAN - RASN	Hor. Dist. = 85,007.403	network		0.014984	0.014988	0.014983
	3-D Dist. = 85,008.792	local		0.002506	0.00252	0.002508
SHAN - WEBE	Hor. Dist. = 49,381.015	network		0.014911	0.014912	0.014909
	3-D Dist. = 49,381.135	local		0.001952	0.001958	0.001949
SHAN - WAWN	Hor. Dist. = 103,132.188	network		0.014922	0.014928	0.014919
	3-D Dist. = 103,135.067	local		0.002306	0.002328	0.002299
SHAN - FRSI	Hor. Dist. = 99,784.717	network		0.014968	0.014974	0.014968
	3-D Dist. = 99,787.488	local		0.002517	0.00253	0.002526
SHAN - FOLA	Hor. Dist. = 58,041.956	network		0.014808	0.014808	0.014808
	3-D Dist. = 58,042.372	local		0.001762	0.001762	0.001767
WEBE - KEHA	Hor. Dist. = 97,527.109	network		0.014944	0.014948	0.014944
	3-D Dist. = 97,530.212	local		0.003651	0.003682	0.003659
WEBE - WATH	Hor. Dist. = 105,717.577	network		0.014977	0.014983	0.014976
	3-D Dist. = 105,720.852	local		0.002714	0.002727	0.002716
WEBE - PARO	Hor. Dist. = 70,669.265	network		0.014929	0.014933	0.014928
	3-D Dist. = 70,670.36	local		0.002147	0.002156	0.002147
WEBE - RASN	Hor. Dist. = 42,739.449	network		0.015004	0.015006	0.015004
	3-D Dist. = 42,739.693	local		0.002002	0.002006	0.002002

Sta to Sta	Accuracies based on - - -		3-D Slope Distance	GSDM Hor. Dist.	Soler/Smith Not based on dist.
WEBE - SHAN	Hor. Dist. = 49,380.378	network	0.014911	0.014907	0.01491
	3-D Dist. = 49,381.135	local	0.001952	0.001938	0.001953
WEBE - WAWN	Hor. Dist. = 55,019.27	network	0.014884	0.014887	0.014883
	3-D Dist. = 55,019.867	local	0.001776	0.001782	0.00177
WEBE - FRSI	Hor. Dist. = 62,858.83	network	0.014963	0.014967	0.014963
	3-D Dist. = 62,859.828	local	0.002337	0.002344	0.002341
WEBE - FOLA	Hor. Dist. = 48,295.792	network	0.014928	0.014925	0.014927
	3-D Dist. = 48,296.3	local	0.002046	0.002039	0.002044
WAWN - KEHA	Hor. Dist. = 95,564.021	network	0.014916	0.014919	0.014916
	3-D Dist. = 95,566.793	local	0.003343	0.003369	0.003349
WAWN - WATH	Hor. Dist. = 72,864.854	network	0.015033	0.015037	0.015032
	3-D Dist. = 72,865.705	local	0.002766	0.002776	0.002771
WAWN - PARO	Hor. Dist. = 35,359.794	network	0.015016	0.015018	0.015016
	3-D Dist. = 35,359.886	local	0.002181	0.002185	0.002183
WAWN - RASN	Hor. Dist. = 52,368.694	network	0.014884	0.014885	0.014883
	3-D Dist. = 52,369.062	local	0.001687	0.001687	0.001686
WAWN - SHAN	Hor. Dist. = 103,131.17	network	0.014922	0.014916	0.014921
	3-D Dist. = 103,135.067	local	0.002306	0.002283	0.002308
WAWN - WEBE	Hor. Dist. = 55,019.436	network	0.014884	0.014882	0.014884
	3-D Dist. = 55,019.867	local	0.001776	0.001772	0.001773
WAWN - FRSI	Hor. Dist. = 70,233.8	network	0.014887	0.014889	0.014886
	3-D Dist. = 70,235.003	local	0.001923	0.001927	0.001926
WAWN - FOLA	Hor. Dist. = 72,708.142	network	0.014957	0.014952	0.014955
	3-D Dist. = 72,709.439	local	0.002468	0.00245	0.00246
FRSI - KEHA	Hor. Dist. = 34,716.51	network	0.014911	0.014913	0.014911
	3-D Dist. = 34,716.606	local	0.002946	0.002957	0.002947
FRSI - WATH	Hor. Dist. = 62,765.598	network	0.014864	0.014866	0.014862
	3-D Dist. = 62,765.981	local	0.001638	0.001643	0.001636
FRSI - PARO	Hor. Dist. = 49,839.26	network	0.014807	0.014807	0.014806
	3-D Dist. = 49,839.492	local	0.001186	0.001188	0.001189

Sta to Sta	Accuracies based on - - -			3-D Slope Distance	GSDM Hor. Dist.	Soler/Smith Not based on dist.
FRSI - RASN	Hor. Dist. =	21,866.082	network	0.014942	0.014942	0.014943
	3-D Dist. =	21,866.083	local	0.001775	0.001775	0.001778
FRSI - SHAN	Hor. Dist. =	99,784.116	network	0.014968	0.014962	0.014968
	3-D Dist. =	99,787.488	local	0.002517	0.002504	0.002527
FRSI - WEBE	Hor. Dist. =	62,859.263	network	0.014963	0.01496	0.014964
	3-D Dist. =	62,859.828	local	0.002337	0.002331	0.002341
FRSI - WAWN	Hor. Dist. =	70,234.071	network	0.014887	0.014885	0.014887
	3-D Dist. =	70,235.003	local	0.001923	0.001922	0.001931
FRSI - FOLA	Hor. Dist. =	109,807.793	network	0.014911	0.014906	0.01491
	3-D Dist. =	109,811.828	local	0.002624	0.002611	0.002629
FOLA - KEHA	Hor. Dist. =	143,989.989	network	0.014894	0.014898	0.014893
	3-D Dist. =	143,999.11	local	0.003842	0.003884	0.003848
FOLA - WATH	Hor. Dist. =	141,353.315	network	0.014957	0.014964	0.014954
	3-D Dist. =	141,361.122	local	0.003112	0.003134	0.003113
FOLA - PARO	Hor. Dist. =	102,961.779	network	0.014942	0.014947	0.01494
	3-D Dist. =	102,964.855	local	0.002737	0.002754	0.002735
FOLA - RASN	Hor. Dist. =	88,441.71	network	0.014953	0.014957	0.014951
	3-D Dist. =	88,443.59	local	0.002559	0.002571	0.002557
FOLA - SHAN	Hor. Dist. =	58,041.558	network	0.014808	0.014809	0.014807
	3-D Dist. =	58,042.372	local	0.001762	0.001763	0.001764
FOLA - WEBE	Hor. Dist. =	48,296.083	network	0.014928	0.01493	0.014927
	3-D Dist. =	48,296.3	local	0.002046	0.002052	0.002043
FOLA - WAWN	Hor. Dist. =	72,708.361	network	0.014957	0.014961	0.014954
	3-D Dist. =	72,709.439	local	0.002468	0.002485	0.002459
FOLA - FRSI	Hor. Dist. =	109,807.7	network	0.014911	0.014916	0.014909
	3-D Dist. =	109,811.828	local	0.002624	0.002638	0.002626