BASELINE / TRIBRACH LOG

CREW	DATE	PAGES
715	8/23&24 2011	1-3
716	12/8 2011	4&5&6
711	4/18 2012	7&8
713	5/9	9&10
714	6/21	11&12
712	10/16	13&14
715	11/21	15-17
711	10/14 2013	18,19
715	12/3	20,21
714	3/5 2014	22,23
715	4/14	24,25
712	10/13	26,27
711	10/28 2015	28-30
716	10/28	31-32
711	5/7 2020	33-35

(1)

TRIBRACH CHECK LOG **DATE:** 8-23-11

CREW: 715

TRIBRACH (S/N: / COT #) 30801
OPTICAL PLUMMET:
PASS ✓ **ADJUSTED** _____ **NOT APPLICABLE** ____
CIRCULAR VIAL:
PASS ✓ **ADJUSTED** _____

TRIBRACH (S/N: / COT #) 25299
OPTICAL PLUMMET:
PASS ✓ **ADJUSTED** _____ **NOT APPLICABLE** ____
CIRCULAR VIAL:
PASS ✓ **ADJUSTED** _____

TRIBRACH (S/N: / COT #) 711300
OPTICAL PLUMMET:
PASS _____ **ADJUSTED** ✓ **NOT APPLICABLE** ____
CIRCULAR VIAL:
PASS ✓ **ADJUSTED** _____

TRIBRACH (S/N: / COT #) _____
OPTICAL PLUMMET:
PASS _____ **ADJUSTED** _____ **NOT APPLICABLE** ____
CIRCULAR VIAL:
PASS _____ **ADJUSTED** _____

(2)

2011 TOTAL STATION CALIBRATION LOG

TOPCON	MODEL#	GTS-605	START TIME: 6:15 AM	END TIME:	DATE: AUG 24, 2011
	S/N:	55 0412			
	COT#	031379	PARTY CHIEF: FRANK VALENZUELA		CHAINMAN: MATT KALE
	PRISM OFFSET	-30mm			
TRIBRACH CAILBRATION		DATE: 8/23/2011	INSTRUMENT: STEVE SHORIE		OBSERVER: SCOTT PRECHTEL
WEATHER METER		KESTREL 3500			
	S/N:	#1654072	WEATHER CONDITIONS: CLEAR, CALM		WET BULB (°C) / RELATIVE HUMIDITY (%)
PRISM	MODEL#	TOPCON TRIPLE			START / END / AVG
TRIBRACH CAILBRATION		DATE: FEB 28,2011		bulb=	19.9
	S/N:	TOPCON #655330		RH=	48.8

NOTES:

OBS #	FROM: STATION:	TO: STATION:	OBSERVED DISTANCE: DIRECT	REVERSED					
1	0	150	150.003	150.004	meters (0035)	HI @ (0)	HR @ (150)	HR @ (420)	HR @ (1390)
2	0	420	420.008	420.008	meters (0080)	1.665	5401	1.590	1.290
3	0	1390	1390.025	1390.025	meters (0250)	Temp (°C)	27.8	28.3	29.8
						P (hPa)	920.4	920.5	920.6
						HI @ (150)	HR @ (1390)	HR @ (420)	HR @ (0)
4	150	1390	1240.019	1240.021	meters (0200)	1.662	1.290	1.600	1.586
5	150	420	270.006	270.006	meters (0060)	Temp (°C)	30.0	30.2	30.8
6	150	0	150.001	150.001	meters (0010)	P (hPa)	920.8	920.8	920.8
						HI @ (420)	HR @ (0)	HR @ (150)	HR @ (1390)
7	420	0	420.005	420.004	meters (0045)	1653	1.586	1.577	1.240
8	420	150	270.004	270.003	meters (0035)	Temp (°C)	31.1	31.4	31.3
9	420	1390	970.016	970.016	meters (0160)	P (hPa)	921.0	921.2	921.3
						HI @ (1390)	HR @ (420)	HR @ (150)	HR @ (0)
10	1390	420	970.015	970.014	meters (0145)	1.516	1.520	1.516	1.473
11	1390	150	1240.020	1240.019	meters (0195)	Temp (°C)	32.0	32.5	32.9
12	1390	0	1390.024	1390.022	meters (0230)	P (hPa)	921.8	921.7	921.9

RESET INSTRUMENT TO MEASURE IN ***METERS, °C & hPa*** AT THE BEGINNING OF THE CALIBRATION TEST

ALL MEASUREMENTS CONVERTED FROM FEET TO METERS ARE UNACCEPTABLE

(3)

BASELINE CALIBRATION TEST
LEAST SQUARES ANALYSIS

8/24/2011 ERD

ACQUISITION DATE: 8/24/11

PROCESS DATE: ~~8/4/2010~~

FIELD CREW MEMBERS: 715 Valenzuela Schorie Kale

TOPCON
Model# GTS-605
S/N: SS-0412
COT# 031379

DATA PROCESSOR: Prechtel

*** 2004 NGS PUBLISHED DATA BETWEEN 0 & 420 MONUMENTS**

OBS #	FROM STATION	TO STATION	D_{PUB}*(m)	D_{MEAS}(m)	Delta (D_{PUB}-D_{MEAS})(m)	Residual V (m)
1	0	150	150.0055	150.0035	0.0020	0.0003
2	0	420	420.0090	420.0080	0.0010	-0.0005
3	0	1390	0.0000		0 0	
4	150	1390	0.0000		0 0	
5	150	420	270.0036	270.0060	-0.0024	-0.0040
6	150	0	150.0055	150.0010	0.0045	0.0028
7	420	0	420.0090	420.0045	0.0045	0.0030
8	420	150	270.0036	270.0035	0.0001	-0.0015
9	420	1390	0.0000		0 0	
10	1390	420	0.0000		0 0	
11	1390	150	0.0000		0 0	
12	1390	0	0.0000		0 0	

N= 6

S= -0.0000007 parts
or S= -0.7 ppm
C= 0.0018 meters

σ_0^2= 0.0000089
σ_s= 0.0000110
σ_c= 0.0033

t (Student) Distribution

t_S=	0.064
t_C=	0.547

"Degrees of Freedom"
99% Confidence level

N-2	$t_{0.01}$
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169
11	3.106
12	3.055

STATUS= PASS

CORRECTION FACTOR = 1.82mm + -0.710ppm
or 0.006ft + -0.710ppm

$D_{PUB}=D_{MEAS}+CF$

LEAST SQUARES ANALYSIS USING ONLY THE DISTANCES BETWEEN THE 0, 150 AND 420 METER MONUMENTS

(4)

2011 TOTAL STATION CALIBRATION LOG

TOPCON	MODEL#	GTS 233W	START TIME: 8:00 AM	END TIME: 10:15 AM	DATE: DEC. 8, 2011
	S/N:	261012			
	COT#	190263	PARTY CHIEF: RUGG		CHAINMAN: —
	PRISM OFFSET	-30mm			
TRIBRACH CAILBRATION	DATE:		INSTRUMENT: LUKE		OBSERVER: PRECHTEL
WEATHER METER		KESTREL 3500			
	S/N:	#1654072	WEATHER CONDITIONS: COOL - CLEAR		
PRISM	MODEL#	TOPCON TRIPLE			
TRIBRACH CAILBRATION	DATE:	FEB 28,2011			
	S/N:	TOPCON #655330			

WET BULB (°C) / RELATIVE HUMIDITY (%)

	START	END	AVG
bulb=	0.7	6.4	
RH=	56.9	34.0	

NOTES:

OBS #	FROM: STATION:	TO: STATION:	OBSERVED DISTANCE: DIRECT	OBSERVED DISTANCE: REVERSED		HI @ (0)	HR @ (150)	HR @ (420)	HR @ (1390)
4 12	0	150	150.007	150.007	meters (007)	1.584	1.418	1.386	1.321
2 11	0	420	420.010	420.010	meters (010)	Temp (°C)	11.2	12.5	12.9
3 10	0	1390	1390.027	1390.028	meters (0275)	P (hPa)	925.3	925.4	925.3
						HI @ (150)	HR @ (1390)	HR @ (420)	HR @ (0)
4 9	150	1390	1240.020	1240.021	meters (0205)	1.592	1.321	1.462	1.468
5 8	150	420	270.007	270.007	meters (007)	Temp (°C)	9.9	8.9	7.7
6 7	150	0	150.006	150.006	meters (006)	P (hPa)	925.5	925.4	925.5
						HI @ (420)	HR @ (0)	HR @ (150)	HR @ (1390)
7 6	420	0	420.009	420.009	meters (009)	1.613	1.468	1.509	1.448
8 5	420	150	270.006	270.005	meters (005)	Temp (°C)	6.0	5.6	5.0
9 4	420	1390	970.017	970.017	meters (017)	P (hPa)	925.4	925.2	925.4
						HI @ (1390)	HR @ (420)	HR @ (150)	HR @ (0)
10 3	1390	420	970.015	970.014	meters (0145)	1.524	1.441	1.507	1.450
11 2	1390	150	1240.017	1240.016	meters (0165)	Temp (°C)	3.9	4.1	4.6
12 1	1390	0	1390.024	1390.024	meters (.024)	P (hPa)	925.9	925.9	1925.9

RESET INSTRUMENT TO MEASURE IN ***METERS, °C & hPa*** AT THE BEGINNING OF THE CALIBRATION TEST

ALL MEASUREMENTS CONVERTED FROM FEET TO METERS ARE UNACCEPTABLE

(5)

DEC, 2011 (2011)

BASELINE CALIBRATION TEST
ANGULAR MEASUREMENT CHECK

OCCUPY: 150m | **BACK SITE: 0m** | **FORE SITE: 420m**

FORWARD | **REVERSED**

	FORWARD DEGREE	FORWARD MINUTE	FORWARD SECOND	REVERSED DEGREE	REVERSED MINUTE	REVERSED SECOND
SET 1:	0	0	0	180	00	04
	179	59	50	359	59	54
SET AVERAGE:	179	59	51.5			
SET 2:	0	0	0	179	59	59
	179	59	48	359	59	53
SET AVERAGE:	179	59	51			
SET 3:	0	0	0	180	00	06
	179	59	50	359	59	57
SET AVERAGE:	179	59	50.5			
SET 4:	0	0	0	180	00	05
	179	59	56	0	00	07
SET AVERAGE:	179	59	55			
4 SET AVERAGE:	179	59	52			

02

OCCUPY: 150m | **BACK SITE: 420m** | **FORE SITE :0m**

FORWARD | **REVERSED**

	FORWARD DEGREE	FORWARD MINUTE	FORWARD SECOND	REVERSED DEGREE	REVERSED MINUTE	REVERSED SECOND
SET 1:	0	0	0	180	00	03
	180	00	10	0	00	16
SET AVERAGE:	180	00	11.5			
SET 2:	0	0	0	180	00	01
	180	00	09	0	00	15
SET AVERAGE:	180	00	11.5			
SET 3:	0	0	0	180	00	10
	180	00	14	0	00	20
SET AVERAGE:	180	00	12			
SET 4:	0	0	0	180	00	02
	180	00	09	180	00	15
SET AVERAGE:	180	00	11			
4 SET AVERAGE:	180	00	11.5			

23
12

CLOSING THE CIRCLE: 360 00 03.5

MOD/SN: GTS-233W / 261012

BASELINE CALIBRATION TEST
LEAST SQUARES ANALYSIS

ACQUISITION DATE: 12/8/11

PROCESS DATE: 12/8/2011

FIELD CREW MEMBERS: Rugg, Luke, Prechtel

TOPCON
Model# GTS-233W
S/N: 261012
COT# 190263

DATA PROCESSOR: Prechtel

*** 2004 NGS PUBLISHED DATA BETWEEN 0 & 420 MONUMENTS**

OBS #	FROM STATION	TO STATION	D_{PUB}*(m)	D_{MEAS}(m)	Delta (D_{PUB}-D_{MEAS})(m)	Residual V (m)
1	0	150	150.0055	150.0070	-0.0015	0.0002
2	0	420	420.0090	420.0100	-0.0010	0.0001
3	0	1390	0.0000		0 0	
4	150	1390	0.0000		0 0	
5	150	420	270.0036	270.0070	-0.0034	-0.0020
6	150	0	150.0055	150.0060	-0.0005	0.0012
7	420	0	420.0090	420.0090	0.0000	0.0011
8	420	150	270.0036	270.0055	-0.0019	-0.0005
9	420	1390	0.0000		0 0	
10	1390	420	0.0000		0 0	
11	1390	150	0.0000		0 0	
12	1390	0	0.0000		0 0	

N= 6

S= 0.0000024 parts
or S= 2.4 ppm
C= -0.0020 meters

σ_0^2= 0.0000017
σ_S= 0.0000048
σ_C= 0.0014

t (Student) Distribution

t_S=	0.491
t_C=	1.412

STATUS= PASS

"Degrees of Freedom"
99% Confidence level

N-2	$t_{0.01}$
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169
11	3.106
12	3.055

CORRECTION FACTOR = -2.05mm + 2.363ppm
or -0.007ft + 2.363ppm

$D_{PUB}=D_{MEAS}+CF$

LEAST SQUARES ANALYSIS USING ONLY THE DISTANCES BETWEEN THE 0, 150 AND 420 METER MONUMENTS

(17)

1,458

12 2011 TOTAL STATION CALIBRATION LOG

TOPCON	MODEL#	GTS 233W	START TIME: 0800	END TIME: 10:42	DATE: 4/18/2012
	S/N:	261224			
	COT#	190454	PARTY CHIEF: STEVE SIEMANN		CHAINMAN: BRENDAN SULLIVAN
	PRISM OFFSET	-30mm			
TRIBRACH CAILBRATION		DATE:	INSTRUMENT: SCOTT WEBER		OBSERVER: SCOTT PRECHTEL
WEATHER METER		KESTREL 3500			
	S/N:	#1654072	WEATHER CONDITIONS: CLEAR - COOL TO WARM Wind 2mph		WET BULB (°C) / RELATIVE HUMIDITY (%)
PRISM	MODEL#	TOPCON TRIPLE			START / END / AVG
TRIBRACH CAILBRATION		DATE: FEB 28,2011			bulb= 11.2 / 13.7
	S/N:	TOPCON #655330			RH= 25.4 / 17.2

OBS #	FROM: STATION:	TO: STATION:	OBSERVED DISTANCE: DIRECT	REVERSED	
1	0	150	150.005	150.005	meters
2	0	420	420.009	420.009	meters
3	0	1390	1390.023	1390.023	meters
4	150	1390	1240.017	1240.019	meters
5	150	420	270.004	270.004	meters
6	150	0	150.002	150.001	meters
7	420	0	420.007	420.007	meters
8	420	150	270.003	270.002	meters
9	420	1390	970.011	970.012	meters
10	1390	420	970.011	970.010	meters
11	1390	150	1240.016	1240.015	meters
12	1390	0	1390.022	1390.019	meters

Inst. Refl.

	HI @ (0)	HR @ (150)	HR @ (420)	HR @ (1390)
	1.647	1.376	1.306	1.448
Temp (°C)		22.7	23.8	24.2
P (hPa)		922.7	922.8	922.9

	HI @ (150)	HR @ (1390)	HR @ (420)	HR @ (0)
	1.669	1.448	1.472	1.458
Temp (°C)		23.9	24.4	25.1
P (hPa)		922.9	923.0	922.8

	HI @ (420)	HR @ (0)	HR @ (150)	HR @ (1390)
	1.549	1.458	1.502	1.518
Temp (°C)		26.6	26.6	27.8
P (hPa)		923.3	923.0	923.2

	HI @ (1390)	HR @ (420)	HR @ (150)	HR @ (0)
	1.477	1.627	1.434	1.425
Temp (°C)		27.8	28.3	28.0
P (hPa)		923.2	923.6	923.5

NOTES:

RESET INSTRUMENT TO MEASURE IN ***METERS, °C & hPa*** AT THE BEGINNING OF THE CALIBRATION TEST

ALL MEASUREMENTS CONVERTED FROM FEET TO METERS ARE UNACCEPTABLE

BASELINE CALIBRATION TEST
LEAST SQUARES ANALYSIS

ACQUISITION DATE: 4/18/12

PROCESS DATE: 4/18/2012

FIELD CREW MEMBERS: Ziemann, Weber, Sullivan

TOPCON
Model# GTS-233W
S/N: 261224
COT# 190454

DATA PROCESSOR: Prechtel

*** 2004 NGS PUBLISHED DATA BETWEEN 0 & 420 MONUMENTS**

OBS #	FROM STATION	TO STATION	D_{PUB}*(m)	D_{MEAS}(m)	Delta (D_{PUB}-D_{MEAS})(m)	Residual V (m)
1	0	150	150.0055	150.0050	0.0005	-0.0013
2	0	420	420.0090	420.0090	0.0000	-0.0006
3	0	1390	0.0000		0 0	
4	150	1390	0.0000		0 0	
5	150	420	270.0036	270.0040	-0.0004	-0.0016
6	150	0	150.0055	150.0015	0.0040	0.0022
7	420	0	420.0090	420.0070	0.0020	0.0014
8	420	150	270.0036	270.0025	0.0011	-0.0001
9	420	1390	0.0000		0 0	
10	1390	420	0.0000		0 0	
11	1390	150	0.0000		0 0	
12	1390	0	0.0000		0 0	

N= 6

S= -0.0000043 parts
or S= -4.3 ppm
C= 0.0024 meters

σ_0^2= 0.0000029
σ_s= 0.0000063
σ_c= 0.0019

t (Student) Distribution

t_s=	0.676
t_c=	1.261

STATUS= PASS

"Degrees of Freedom"
99% Confidence level

N-2	$t_{0.01}$
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169
11	3.106
12	3.055

CORRECTION FACTOR = 2.39mm + -4.262ppm
or 0.008ft + -4.262ppm

$D_{PUB}=D_{MEAS}+CF$

LEAST SQUARES ANALYSIS USING ONLY THE DISTANCES BETWEEN THE 0, 150 AND 420 METER MONUMENTS

(9)

2012 ~~2009/2010~~ TOTAL STATION CALIBRATION LOG

TOPCON	MODEL#	GTS-233W	START TIME: 6:55 AM	END TIME:	DATE: 5/9/2012
	S/N:	263464			
	COT#		PARTY CHIEF: JEFF WINGSTROM		CHAINMAN:
	PRISM OFFSET	-30mm			
TRIBRACH CAILBRATION		DATE:	INSTRUMENT: Bill HENDERFAUTH		OBSERVER: Scott Prechtel
WEATHER METER		KESTREL 3500			
	S/N:	#1654072	WEATHER CONDITIONS: Cool - BREAZY - CLOUDY		WET BULB (°C) / RELATIVE HUMIDITY (%)
PRISM	MODEL#	TOPCON TRIPLE			START / END / AVG
TRIBRACH CAILBRATION		DATE: JUNE 02,2009			bulb= 13.8
	S/N:	TOPCON #655330			RH= 38.0

NOTES:

OBS #	FROM: STATION:	TO: STATION:	OBSERVED DISTANCE: DIRECT	REVERSED		HI @ (0)	HR @ (150)	HR @ (420)	HR @ (1390)
1	0	150	150.007	150.006	meters (0065)	165.7	1,660	1.673	1.708
2	0	420	420.011	420.010	meters (0105)	Temp (°C)	22.5	23.2	23.4
3	0	1390	1390.027	1390.025	meters (026)	P (hPa)	918.9	919.0	919.1
						HI @ (150)	HR @ (1390)	HR @ (420)	HR @ (0)
4	150	1390	1240.018	1240.019	meters (0185)	1.666	1.708	1.667	1.670
5	150	420	270.006	270.005	meters (0055)	Temp (°C)	23.4	24.2	24.6
6	150	0	150.003	150.004	meters (0035)	P (hPa)	919.2	919.3	919.3
						HI @ (420)	HR @ (0)	HR @ (150)	HR @ (1390)
7	420	0	420.007	420.007	meters (007)	1.635	1.670	1.708	1.663
8	420	150	270.003	270.003	meters (003)	Temp (°C)	25.5	23.9	25.3
9	420	1390	970.016	970.015	meters (0155)	P (hPa)	919.5	919.8	919.9
						HI @ (1390)	HR @ (420)	HR @ (150)	HR @ (0)
10	1390	420	970.014	970.016	meters (015)	1.592	1.680	1.656	1.525
11	1390	150	1240.014	1240.015	meters (0145)	Temp (°C)	25.9	24.4	24.6
12	1390	0	1390.018	1390.020	meters (019)	P (hPa)	920.5	920.5	920.5

RESET INSTRUMENT TO MEASURE IN ***METERS, °C & hPa*** AT THE BEGINNING OF THE CALIBRATION TEST

ALL MEASUREMENTS CONVERTED FROM FEET TO METERS ARE UNACCEPTABLE

(10)

BASELINE CALIBRATION TEST
LEAST SQUARES ANALYSIS

ACQUISITION DATE: 5/9/12

PROCESS DATE: 5/9/2012

FIELD CREW MEMBERS: Wingstrom, Henerfauth

TOPCON
Model# GTS-233W
S/N: 263464
COT#

DATA PROCESSOR: Prechtel

*** 2004 NGS PUBLISHED DATA BETWEEN 0 & 420 MONUMENTS**

OBS #	FROM STATION	TO STATION	D_{PUB}*(m)	D_{MEAS}(m)	Delta (D_{PUB}-D_{MEAS})(m)	Residual V (m)
1	0	150	150.0055	150.0065	-0.0010	-0.0011
2	0	420	420.0090	420.0105	-0.0015	-0.0014
3	0	1390	0.0000		0 0	
4	150	1390	0.0000		0	0.0019
5	150	420	270.0036	270.0055	-0.0019	-0.0019
6	150	0	150.0055	150.0035	0.0020 0	
7	420	0	420.0090	420.0070	0.0020	0.0021
8	420	150	270.0036	270.0030	0.0006	0.0006
9	420	1390	0.0000		0 0	
10	1390	420	0.0000		0 0	
11	1390	150	0.0000		0 0	
12	1390	0	0.0000		0 0	

N= 6

S= -0.0000006 parts
or S= -0.6 ppm
C= 0.0002 meters

σ_0^2= 0.0000038
σ_S= 0.0000072
σ_C= 0.0022

t (Student) Distribution

t_S=	0.089
t_C=	0.098

STATUS= PASS

"Degrees of Freedom"
99% Confidence level

N-2	$t_{0.01}$
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169
11	3.106
12	3.055

CORRECTION FACTOR = 0.21mm + -0.642ppm
or 0.001ft + -0.642ppm

$D_{PUB}=D_{MEAS}+CF$

LEAST SQUARES ANALYSIS USING ONLY THE DISTANCES BETWEEN THE 0, 150 AND 420 METER MONUMENTS

2012 TOTAL STATION CALIBRATION LOG

(11)

TOPCON MODEL#	GTS - 313	START TIME: 7:30 AM	END TIME: 10:30 AM	DATE: June 21, 2012	
S/N:	NY 1397				
COT#		PARTY CHIEF: LOFGREEN		CHAINMAN: LEHRLING	
PRISM OFFSET	-30mm				
TRIBRACH CAILBRATION	DATE:	INSTRUMENT: KALE		OBSERVER: PRECHTEL	
WEATHER METER	KESTREL 3500				
S/N:	#1654072	WEATHER CONDITIONS: ClEAR COOL TO HOT	WET BULB (°C) / RELATIVE HUMIDITY (%)		
PRISM MODEL#	TOPCON TRIPLE		START	END	AVG
TRIBRACH CAILBRATION	DATE: FEB 28,2011		bulb= 14.9	18.4	
S/N:	TOPCON #655330		RH= 21.1	15.5	

NOTES:

OBS #	FROM: STATION:	TO: STATION:	OBSERVED DISTANCE: DIRECT	REVERSED						
						HI @ (0)	HR @ (150)	HR @ (420)	HR @ (1390)
~~1~~ 12	0	150	150.009	150.009	meters ‹.009›	1.664	5.20'	5.16'	5.25'
~~2~~ 11	0	420	420.014	420.014	meters ‹.014›	Temp (°C)	35.2	35.0	36.0
~~3~~ 10	0	1390	1390.032	1390.033	meters ‹0.0325›	P (hPa)	920.0	920.0	920.0
						HI @ (150)	HR @ (1390)	HR @ (420)	HR @ (0)
~~4~~ 9	150	1390	1240.022	1240.019	meters ‹0.0205›	1.659	5.25'	5.22'	5.27'
~~5~~ 8	150	420	270.004	270.003	meters ‹.0035›	Temp (°C)	33.6	33.7	32.4
~~6~~ 7	150	0	150.004	150.004	meters ‹.004›	P (hPa)	919.9	920.5	920.5
						HI @ (420)	HR @ (0)	HR @ (150)	HR @ (1390)
~~7~~ 6	420	0	420.007	420.008	meters ‹.0075›	1.658	5.27'	5.19'	5.02'
~~8~~ 5	420	150	270.002	270.003	meters ‹.0025›	Temp (°C)	32.2	31.9	32.3
~~9~~ 4	420	1390	970.019	970.017	meters ‹.018›	P (hPa)	920.7	920.7	920.8
						HI @ (1390)	HR @ (420)	HR @ (150)	HR @ (0)
~~10~~ 3	1390	420	970.016	970.018	meters ‹.017›	1.639	5.13'		
~~11~~ 2	1390	150	1240.021	1240.023	meters ‹.022›	Temp (°C)	30.4	31.3	30.5
~~12~~ 1	1390	0	1390.027	1390.028	meters ‹.0275›	P (hPa)	921.5	921.3	921.1

X

RESET INSTRUMENT TO MEASURE IN ***METERS***, ^{0}***C & hPa*** AT THE BEGINNING OF THE CALIBRATION TEST

ALL MEASUREMENTS CONVERTED FROM FEET TO METERS ARE UNACCEPTABLE

CC.

Call MJ.

Hoof....

(12)

BASELINE CALIBRATION TEST
LEAST SQUARES ANALYSIS

ACQUISITION DATE: 6/21/12

PROCESS DATE: 6/21/2012

FIELD CREW MEMBERS: Lofgreen, Kale, Lehrling

TOPCON
Model# GTS-313
S/N: NY1397
COT#

DATA PROCESSOR: Prechtel

*** 2004 NGS PUBLISHED DATA BETWEEN 0 & 420 MONUMENTS**

OBS #	FROM STATION	TO STATION	D_{PUB}^{*}(m)	D_{MEAS}(m)	Delta (D_{PUB}-D_{MEAS})(m)	Residual V (m)
1	0	150	150.0055	150.0090	-0.0035	-0.0032
2	0	420	420.0090	420.0140	-0.0050	-0.0038
3	0	1390	0.0000		0 0	
4	150	1390	0.0000		0 0	
5	150	420	270.0036	270.0035	0.0001	0.0008
6	150	0	150.0055	150.0040	0.0015	0.0018
7	420	0	420.0090	420.0075	0.0015	0.0027
8	420	150	270.0036	270.0025	0.0011	0.0018
9	420	1390	0.0000		0 0	
10	1390	420	0.0000		0 0	
11	1390	150	0.0000		0 0	
12	1390	0	0.0000		0 0	

N= 6

S= -0.0000033 parts
or S= -3.3 ppm
C= 0.0002 meters

σ_0^2= 0.0000098
σ_s= 0.0000116
σ_c= 0.0035

t (Student) Distribution

t_s=	0.286
t_c=	0.060

STATUS= PASS

"Degrees of Freedom"
99% Confidence level

N-2	$t_{0.01}$
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169
11	3.106
12	3.055

CORRECTION FACTOR = 0.21mm + -3.306ppm
or 0.001ft + -3.306ppm

$D_{PUB}=D_{MEAS}+CF$

LEAST SQUARES ANALYSIS USING ONLY THE DISTANCES BETWEEN THE 0, 150 AND 420 METER MONUMENTS

(13)

2012 TOTAL STATION CALIBRATION LOG

TOPCON MODEL#	GTS 233W	START TIME: 700 AM	END TIME:	DATE: October 16, 2012	
S/N:	263198				
COT#		PARTY CHIEF: DAN ROBERTSON		CHAINMAN: GABE EASCON	
PRISM OFFSET	-30mm				
TRIBRACH CAILBRATION	DATE:	INSTRUMENT: "		OBSERVER: SCOTT PRECHTEL	
WEATHER METER	KESTREL 3500				
S/N:	#1654072	WEATHER CONDITIONS: COOL/CLEAR		WET BULB (°C) / RELATIVE HUMIDITY (%)	
PRISM MODEL#	TOPCON TRIPLE			START	END AVG
TRIBRACH CAILBRATION	DATE: FEB 28,2011		bulb=	7.2	12.6
S/N:	TOPCON #655330		RH=	32.3	23.1

NOTES:

OBS #	FROM: STATION:	TO: STATION:	OBSERVED DISTANCE: DIRECT	REVERSED		HI @ (0)	HR @ (150)	HR @ (420)	HR @ (1390)
1	0	150	150.004	150.003	meters <.0035>	1.659	1.544	1.538	1.613
2	0	420	420.008	420.008	meters <.008>	Temp (°C)	15.0	15.5	16.5
3	0	1390	1390.012	1390.013	meters <.0125>	P (hPa)	920.8	920.8	921.0
						HI @ (150)	HR @ (1390)	HR @ (420)	HR @ (0)
4	150	1390	1240.010	1240.011	meters <.0105>	1.660	1.613	1.478	1.485
5	150	420	270.005	270.004	meters <.0045>	Temp (°C)	18.1	20.6	22.0
6	150	0	150.003	150.004	meters <.0035>	P (hPa)	921.0	920.9	920.6
						HI @ (420)	HR @ (0)	HR @ (150)	HR @ (1390)
7	420	0	420.006	420.006	meters <.006>	1.664		1.569	1.557
8	420	150	270.003	270.003	meters <.003>	Temp (°C)	21.9	22.2	23.5
9	420	1390	970.011	970.012	meters <.0115>	P (hPa)	921.6	921.3	921.2
						HI @ (1390)	HR @ (420)	HR @ (150)	HR @ (0)
10	1390	420	970.008	970.009	meters <.0085>	1.644	1.446	1.418	1.446
11	1390	150	1240.010	1240.013	meters <.0115>	Temp (°C)	23.8	24.4	24.8
12	1390	0	1390.014	1390.015	meters <.0145>	P (hPa)	921.6	921.7	921.5

RESET INSTRUMENT TO MEASURE IN ***METERS, °C & hPa*** AT THE BEGINNING OF THE CALIBRATION TEST

ALL MEASUREMENTS CONVERTED FROM FEET TO METERS ARE UNACCEPTABLE

(14)

BASELINE CALIBRATION TEST
LEAST SQUARES ANALYSIS

ACQUISITION DATE: 10/16/12

PROCESS DATE: 10/16/2012

FIELD CREW MEMBERS: Robertson, Rascon

TOPCON
Model# GTS-233W
S/N: 263198
COT#

DATA PROCESSOR: Prechtel

*** 2004 NGS PUBLISHED DATA BETWEEN 0 & 420 MONUMENTS**

OBS #	FROM STATION	TO STATION	D_{PUB}*(m)	D_{MEAS}(m)	Delta (D_{PUB}-D_{MEAS})(m)	Residual V (m)
1	0	150	150.0055	150.0035	0.0020	0.0008
2	0	420	420.0090	420.0080	0.0010	-0.0004
3	0	1390	0.0000		0 0	
4	150	1390	0.0000		0 0	
5	150	420	270.0036	270.0045	-0.0009	-0.0022
6	150	0	150.0055	150.0035	0.0020	0.0008
7	420	0	420.0090	420.0060	0.0030	0.0016
8	420	150	270.0036	270.0030	0.0006	-0.0007
9	420	1390	0.0000		0 0	
10	1390	420	0.0000		0 0	
11	1390	150	0.0000		0 0	
12	1390	0	0.0000		0 0	

N= 6

S= 0.0000006 parts
or S= 0.6 ppm
C= 0.0011 meters

σ_0^2= 0.0000023
σ_s= 0.0000056
σ_c= 0.0017

t (Student) Distribution

t_S=	0.104
t_c=	0.661

"Degrees of Freedom"
99% Confidence level

N-2	$t_{0.01}$
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169
11	3.106
12	3.055

STATUS= PASS

CORRECTION FACTOR = 1.12mm + 0.588ppm
or 0.004ft + 0.588ppm

$D_{PUB}=D_{MEAS}+CF$

LEAST SQUARES ANALYSIS USING ONLY THE DISTANCES BETWEEN THE 0, 150 AND 420 METER MONUMENTS

15

TRIBRACH CHECK LOG **DATE:** ~~11-21-12~~ 11-21-12

CREW: 715

TRIBRACH (S/N: / COT #) 71300
OPTICAL PLUMMET:
PASS X **ADJUSTED** _____ **NOT APPLICABLE** ____
CIRCULAR VIAL:
PASS X **ADJUSTED** _____

TRIBRACH (S/N: / COT #) 25299
OPTICAL PLUMMET:
PASS X **ADJUSTED** _____ **NOT APPLICABLE** ____
CIRCULAR VIAL:
PASS X **ADJUSTED** _____

TRIBRACH (S/N: / COT #) 30801
OPTICAL PLUMMET:
PASS X **ADJUSTED** _____ **NOT APPLICABLE** ____
CIRCULAR VIAL:
PASS X **ADJUSTED** _____

TRIBRACH (S/N: / COT #) _____
OPTICAL PLUMMET:
PASS _____ **ADJUSTED** _____ **NOT APPLICABLE** ____
CIRCULAR VIAL:
PASS _____ **ADJUSTED** _____

(10)

2012 TOTAL STATION CALIBRATION LOG

TOPCON	MODEL#	GTS-605	START TIME: 9:00 AM	END TIME: 1:10 PM	DATE: 11-21-12
	S/N:	550412			
	COT#	031379	PARTY CHIEF: Schorie		CHAINMAN: Medina
	PRISM OFFSET	-30mm			
TRIBRACH CAILBRATION		DATE: 11-21-12	INSTRUMENT: Yates - Hodshon		OBSERVER:
WEATHER METER		KESTREL 3500			
	S/N:	#1654072	WEATHER CONDITIONS: Sunny, Cool		
PRISM	MODEL#	TOPCON TRIPLE			
TRIBRACH CAILBRATION		DATE: 11-21-12 FEB 28,2011			
	S/N:	TOPCON #655330			

WET BULB (°C) / RELATIVE HUMIDITY (%)

	START	END	AVG
bulb=	12.7	15.6	
RH=	38.9	30.3	

NOTES:

OBS #	FROM: STATION:	TO: STATION:	OBSERVED DISTANCE: DIRECT	REVERSED		HI @ (0)	HR @ (150)	HR @ (420)	HR @ (1390)
1	0	150	150.005	150.003	meters (.004)	1546	1404	1444	1285
2	0	420	420.009	420.008	meters (.0085)	Temp (°C)	23.0	21.8	23.2
3	0	1390	1390.018	1390.016	meters (.0017)	P (hPa)	924.6	924.6	924.8
						HI @ (150)	HR @ (1390)	HR @ (420)	HR @ (0)
4	150	1390	1240.015	1240.016	meters (.0155)	1573	1285	1355	1365
5	150	420	270.007	270.005	meters (.006)	Temp (°C)	23.5	25.3	25.6
6	150	0	150.007	150.007	meters (.007)	P (hPa)	924.8	924.6	924.4
						HI @ (420)	HR @ (0)	HR @ (150)	HR @ (1390)
7	420	0	420.007	420.008	meters (.0075)	1588	1365	1389	1228
8	420	150	270.004	270.006	meters (.005)	Temp (°C)	25.9	26.1	26.0
9	420	1390	970.012	970.012	meters (.012)	P (hPa)	924.4	924.2	923.7
						HI @ (1390)	HR @ (420)	HR @ (150)	HR @ (0)
10	1390	420	970.016	970.015	meters (.0155)	1468	1348	1331	1320
11	1390	150	1240.021	1240.021	meters (.021)	Temp (°C)	27.2	26.3	27.8
12	1390	0	1390.028	1390.023	meters (.02555)	P (hPa)	924.0	923.6	923.6

RESET INSTRUMENT TO MEASURE IN ***METERS, °C & hPa*** AT THE BEGINNING OF THE CALIBRATION TEST

ALL MEASUREMENTS CONVERTED FROM FEET TO METERS ARE UNACCEPTABLE

BASELINE CALIBRATION TEST
LEAST SQUARES ANALYSIS

ACQUISITION DATE: 11/21/12

PROCESS DATE: 11/21/2012

FIELD CREW MEMBERS: 715 Schorie Yates-Hods Medina

TOPCON
Model# GTS-605
S/N: SS-0412
COT# 031379

DATA PROCESSOR: Prechtel

*** 2004 NGS PUBLISHED DATA BETWEEN 0 & 420 MONUMENTS**

OBS #	FROM STATION	TO STATION	D_{PUB}*(m)	D_{MEAS}(m)	Delta (D_{PUB}-D_{MEAS})(m)	Residual V (m)
1	0	150	150.0055	150.0040	0.0015	0.0024
2	0	420	420.0090	420.0085	0.0005	0.0002
3	0	1390	0.0000		0 0	
4	150	1390	0.0000		0 0	
5	150	420	270.0036	270.0060	-0.0024	-0.0021
6	150	0	150.0055	150.0070	-0.0015	-0.0006
7	420	0	420.0090	420.0075	0.0015	0.0012
8	420	150	270.0036	270.0050	-0.0014	-0.0011
9	420	1390	0.0000		0 0	
10	1390	420	0.0000		0 0	
11	1390	150	0.0000		0 0	
12	1390	0	0.0000		0 0	

N= 6

S= 0.0000043 parts
or S= 4.3 ppm
C= -0.0015 meters

σ_0^2= 0.0000032
σ_S= 0.0000066
σ_C= 0.0020

t (Student) Distribution

t_S=	0.657
t_C=	0.762

STATUS= PASS

"Degrees of Freedom"
99% Confidence level

N-2	$t_{0.01}$
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169
11	3.106
12	3.055

CORRECTION FACTOR = -1.52mm + 4.344ppm
or -0.005ft + 4.344ppm

$D_{PUB}=D_{MEAS}+CF$

LEAST SQUARES ANALYSIS USING ONLY THE DISTANCES BETWEEN THE 0, 150 AND 420 METER MONUMENTS

(18)

2013 TOTAL STATION CALIBRATION LOG

TOPCON	MODEL#	GTS-233W	START TIME: 09:00	END TIME: 12:30	DATE: 10-14-2013
	S/N:	261224			
	COT#	190454	PARTY CHIEF: S Ziemann		CHAINMAN: H Medina
	PRISM OFFSET	-30mm			
TRIBRACH CAILBRATION	DATE:	10-14-2013	INSTRUMENT: S Ziemann		OBSERVER: D Luke
WEATHER METER		KESTREL 3500			
	S/N:	#1654072	WEATHER CONDITIONS: Sunny, Cloud banks visible to South and East		
PRISM	MODEL#	TOPCON TRIPLE			
TRIBRACH CAILBRATION	DATE:	FEB 28,2011			
	S/N:	TOPCON #655330			

WET BULB (°C) / RELATIVE HUMIDITY (%)

	START	END	AVG
bulb=	14.56	15.0	14.78
RH=	41.0	29.3	35.15

NOTES:

OBS #	FROM: STATION:	TO: STATION:	OBSERVED DISTANCE: DIRECT	REVERSED	
1	0	150	150.0056	150.0052	meters
2	0	420	420.0084	420.0076	meters
3	0	1390	1390.0202	1390.0206	meters
4	150	1390	1240.0152	1240.0154	meters
5	150	420	270.0038	270.0030	meters
6	150	0	150.0056	150.0048	meters
7	420	0	420.0068	420.0070	meters
8	420	150	270.0028	270.0022	meters
9	420	1390	970.0132	970.0104	meters
10	1390	420	970.0126	970.0118	meters
11	1390	150	1240.0182	1240.0178	meters
12	1390	0	1390.0204	1390.0208	meters

	HI @ (0)	HR @ (150)	HR @ (420)	HR @ (1390)
	1.607	1.550	1.522	1.290
Temp (°C)		22.0	22.9	23.1
P (hPa)		924.3	924.2	924.0

	HI @ (150)	HR @ (1390)	HR @ (420)	HR @ (0)
	1.639	1.290	1.472	1.236
Temp (°C)		24.1	23.1	27.2
P (hPa)		924.3	924.1	923.9

	HI @ (420)	HR @ (0)	HR @ (150)	HR @ (1390)
	1.639	1.236	1.401	1.336
Temp (°C)		24.1	23.9	25.7
P (hPa)		923.8	923.7	923.5

	HI @ (1390)	HR @ (420)	HR @ (150)	HR @ (0)
	1.619	1.363	1.366	1.333
Temp (°C)		25.6	27.0	26.2
P (hPa)		923.8	923.7	923.5

RESET INSTRUMENT TO MEASURE IN ***METERS, °C & hPa*** AT THE BEGINNING OF THE CALIBRATION TEST

ALL MEASUREMENTS CONVERTED FROM FEET TO METERS ARE UNACCEPTABLE

BASELINE CALIBRATION TEST
LEAST SQUARES ANALYSIS

ACQUISITION DATE: 10/14/13

PROCESS DATE: 10/14/2013

FIELD CREW MEMBERS: Ziemann, Luke, Medina

TOPCON
Model# GTS-233W
S/N: 261224
COT# 190454

DATA PROCESSOR: Prechtel

*** 2004 NGS PUBLISHED DATA BETWEEN 0 & 420 MONUMENTS**

OBS #	FROM STATION	TO STATION	D_{PUB}^{*}(m)	D_{MEAS}(m)	Delta (D_{PUB}-D_{MEAS})(m)	Residual V (m)
1	0	150	150.0055	150.0054	0.0001	0.0000
2	0	420	420.0090	420.0080	0.0010	-0.0005
3	0	1390	0.0000		0 0	
4	150	1390	0.0000		0 0	
5	150	420	270.0036	270.0034	0.0002	-0.0005
6	150	0	150.0055	150.0052	0.0003	0.0002
7	420	0	420.0090	420.0069	0.0021	0.0006
8	420	150	270.0036	270.0025	0.0011	0.0004
9	420	1390	0.0000		0 0	
10	1390	420	0.0000		0 0	
11	1390	150	0.0000		0 0	
12	1390	0	0.0000		0 0	

N= 6

S= 0.0000050 parts
or S= 5.0 ppm
C= -0.0006 meters

σ_0^2= 0.0000003
σ_S= 0.0000019
σ_C= 0.0006

t (Student) Distribution

t_S= 2.650
t_C= 1.068

STATUS= PASS

"Degrees of Freedom"
99% Confidence level

N-2	$t_{0.01}$
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169
11	3.106
12	3.055

CORRECTION FACTOR = -0.61mm + 5.041ppm
or -0.002ft + 5.041ppm

$D_{PUB}=D_{MEAS}+CF$

LEAST SQUARES ANALYSIS USING ONLY THE DISTANCES BETWEEN THE 0, 150 AND 420 METER MONUMENTS

20

2013 TOTAL STATION CALIBRATION LOG

TOPCON MODEL#	GTS-605	START TIME: 9:30 AM	END TIME: 1:00 PM	DATE: 12/3/2013	
S/N:	55-9412				
COT#	031379	PARTY CHIEF: PETE - Y-H		CHAINMAN: HERMAN MEDINA	
PRISM OFFSET	-30mm				
TRIBRACH CAILBRATION	DATE:	INSTRUMENT:		OBSERVER: SCOTT PRECHTEL	
WEATHER METER	KESTREL 3500				
S/N:	#1654072	WEATHER CONDITIONS: PARTLY CLOUDY & COOL		WET BULB (°C) / RELATIVE HUMIDITY (%)	
PRISM MODEL#	TOPCON TRIPLE			START	END	AVG
TRIBRACH CAILBRATION	DATE: FEB 28,2011		**bulb=**	9.0	10.2	
S/N:	TOPCON #655330		**RH=**	38.1	22.4	

NOTES:

OBS #	FROM: STATION:	TO: STATION:	OBSERVED DISTANCE: DIRECT	REVERSED					
						HI @ (0)	HR @ (150)	HR @ (420)	HR @ (1390)
1	0	150	150.005	150.006	meters (0055)	142.3 cm	134.7	128.0	129.4
2	0	420	420.009	420.0095	meters (0093)	Temp (°C)	16.6	17.6	18.6
3	0	1390	1390.021	1390.0205	meters (0208)	P (hPa)	918.8	919.1	919.2
						HI @ (150)	HR @ (1390)	HR @ (420)	HR @ (0)
4	150	1390	1240.011	1240.012	meters (0115)	154.10	129.4	129.9	133.5
5	150	420	270.004	270.004	meters (0040)	Temp (°C)	16.8	19.2	22.5
6	150	0	150.0055	150.0055	meters (0055)	P (hPa)	918.9	918.9	918.5
						HI @ (420)	HR @ (0)	HR @ (150)	HR @ (1390)
7	420	0	420.010	420.0095	meters (0098)	151.75	133.5	129.4	131.1
8	420	150	270.004	270.004	meters (004)	Temp (°C)	19.8	20.2	20.0
9	420	1390	1970.01 970	970.011	meters (0105)	P (hPa)	918.3	918.1	917.9
						HI @ (1390)	HR @ (420)	HR @ (150)	HR @ (0)
10	1390	420	970.014	970.0135	meters (0138)	144.15	129.3	136.7	121.0
11	1390	150	1240.017	1240.016	meters (0165)	Temp (°C)	21.8	21.1	21.5
12	1390	0	1390.022	1390.022	meters (0.22)	P (hPa)	917.7	917.2	916.9

PMS station #33

RESET INSTRUMENT TO MEASURE IN ***METERS, °C & hPa*** AT THE BEGINNING OF THE CALIBRATION TEST

ALL MEASUREMENTS CONVERTED FROM FEET TO METERS ARE UNACCEPTABLE

12837

BASELINE CALIBRATION TEST
LEAST SQUARES ANALYSIS

ACQUISITION DATE: 12/3/13

PROCESS DATE: 12/3/2013

FIELD CREW MEMBERS: 715 Yates-Hods Medina

TOPCON
Model# GTS-605
S/N: SS-0412
COT# 031379

DATA PROCESSOR: Prechtel

*** 2004 NGS PUBLISHED DATA BETWEEN 0 & 420 MONUMENTS**

OBS #	FROM STATION	TO STATION	D_{PUB}*(m)	D_{MEAS}(m)	Delta (D_{PUB}-D_{MEAS})(m)	Residual V (m)
1	0	150	150.0055	150.0055	0.0000	0.0001
2	0	420	420.0090	420.0093	-0.0003	0.0003
3	0	1390	0.0000		0 0	
4	150	1390	0.0000		0 0	
5	150	420	270.0036	270.0040	-0.0004	-0.0001
6	150	0	150.0055	150.0055	0.0000	0.0001
7	420	0	420.0090	420.0098	-0.0008	-0.0002
8	420	150	270.0036	270.0040	-0.0004	-0.0001
9	420	1390	0.0000		0 0	
10	1390	420	0.0000		0 0	
11	1390	150	0.0000		0 0	
12	1390	0	0.0000		0 0	

N= 6

S= -0.0000020 parts
or S= -2.0 ppm
C= 0.0002 meters

σ_0^2= 0.0000000
σ_S= 0.0000007
σ_C= 0.0002

t (Student) Distribution

t_S=	2.723
t_C=	1.097

STATUS= PASS

"Degrees of Freedom"
99% Confidence level

N-2	$t_{0.01}$
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169
11	3.106
12	3.055

CORRECTION FACTOR = 0.24mm + -1.994ppm
or 0.001ft + -1.994ppm

$D_{PUB}=D_{MEAS}+CF$

LEAST SQUARES ANALYSIS USING ONLY THE DISTANCES BETWEEN THE 0, 150 AND 420 METER MONUMENTS

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2014 TOTAL STATION CALIBRATION LOG

~~TOPCON~~ NIKON

MODEL#	NIVO 3.M	START TIME: 7:15 AM	END TIME: 9:45 AM	DATE: MARCH 5, 2014	
S/N:	A151805				
COT#	192844	PARTY CHIEF: TATE LOFGREEN		CHAINMAN: NICK LEHRLING	
PRISM OFFSET	-30mm				
TRIBRACH CAILBRATION	DATE: 3/4/2014	INSTRUMENT: SCOTT WEBER		OBSERVER: SCOTT PRECHTEL	
WEATHER METER	KESTREL 3500				
S/N:	#1654072	WEATHER CONDITIONS: CLEAR, COOL		WET BULB (°C) / RELATIVE HUMIDITY (%)	
PRISM MODEL#	TOPCON TRIPLE			START	END	AVG
TRIBRACH CAILBRATION	DATE: FEB 28,2011		**bulb=**	11.4	12.3	11.9
S/N:	TOPCON #655330		**RH=**	49.4	46.6	~~48.0~~

OBS #	FROM: STATION:	TO: STATION:	OBSERVED DISTANCE: DIRECT	REVERSED			HR @ (150)	HR @ (420)	HR @ (1390)
1	0	150	150.006	150.006	meters <0006>	HI @ (0) 160.3 ~~1.603~~	1.637	1.590	1.595
2	0	420	420.011	420.010	meters <0105>	Temp (°C)	12 (12.8)	13.0 (12.7)	15.0
3	0	1390	1390.016	1390.016	meters <016>	P (hPa)	923.5 (4)	923.6 (4)	924.0

OBS #	FROM: STATION:	TO: STATION:	DIRECT	REVERSED			HR @ (1390)	HR @ (420)	HR @ (0)
4	150	1390	1240.012	1240.011	meters <0115>	HI @ (150) 1.575	1.595	1.540	1.477
5	150	420	270.006	270.005	meters <0055>	Temp (°C)	15 (.1)	17 (16.6)	16 (15.6)
6	150	0	150.007	150.008	meters <0075>	P (hPa)	924 (.0)	924 (23.4)	924 (.0)

OBS #	FROM: STATION:	TO: STATION:	DIRECT	REVERSED			HR @ (0)	HR @ (150)	HR @ (1390)
7	420	0	420.012	420.012	meters <012>	HI @ (420) 1.550	1.477	1.524	1.533
8	420	150	270.005	270.004	meters <0045>	Temp (°C)	16 (16.3)	16 (.5)	17 (.3)
9	420	1390	970.010	970.011	meters <0105>	P (hPa)	924 (924.4)	924 (.3)	924 (.3)

OBS #	FROM: STATION:	TO: STATION:	DIRECT	REVERSED			HR @ (420)	HR @ (150) 1.503 ~~1.503~~	HR @ (0)
10	1390	420	970.013	970.014	meters <0135>	HI @ (1390) 1.555	1.549	~~1.503~~	1.558
11	1390	150	1240.012	1240.011	meters <0115>	Temp (°C)	19 (.2)	19 (.4)	19 (.2)
12	1390	0	1390.021	1390.023	meters <022>	P (hPa)	925 (.0)	925 (4.7)	924 (.7)

NOTES:

2.8

12.0 12.4

NIVO TS will not input Temp & Pressure in decimal precision

RESET INSTRUMENT TO MEASURE IN ***METERS, °C & hPa*** AT THE BEGINNING OF THE CALIBRATION TEST

ALL MEASUREMENTS CONVERTED FROM FEET TO METERS ARE UNACCEPTABLE

BASELINE CALIBRATION TEST
LEAST SQUARES ANALYSIS

ACQUISITION DATE: 3/5/14

PROCESS DATE: 3/5/2014

FIELD CREW MEMBERS: Lofgreen, Weber, Lehrling

NIKON
Model# NIVO 3.M
S/N: A151805
COT# 192844

DATA PROCESSOR: Prechtel

*** 2004 NGS PUBLISHED DATA BETWEEN 0 & 420 MONUMENTS**

OBS #	FROM STATION	TO STATION	D_{PUB}*(m)	D_{MEAS}(m)	Delta (D_{PUB}-D_{MEAS})(m)	Residual V (m)
1	0	150	150.0055	150.0060	-0.0005	0.0006
2	0	420	420.0090	420.0105	-0.0015	0.0007
3	0	1390	0.0000		0 0	
4	150	1390	0.0000		0 0	
5	150	420	270.0036	270.0055	-0.0019	-0.0003
6	150	0	150.0055	150.0075	-0.0020	-0.0009
7	420	0	420.0090	420.0120	-0.0030	-0.0008
8	420	150	270.0036	270.0045	-0.0009	0.0007
9	420	1390	0.0000		0 0	
10	1390	420	0.0000		0 0	
11	1390	150	0.0000		0 0	
12	1390	0	0.0000		0 0	

N= 6

S= -0.0000038 parts
or S= -3.8 ppm
C= -0.0006 meters

σ_0^2= 0.0000007
σ_S= 0.0000031
σ_C= 0.0009

t (Student) Distribution

t_S= 1.210
t_C= 0.609

STATUS= PASS

"Degrees of Freedom"
99% Confidence level

N-2	$t_{0.01}$
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169
11	3.106
12	3.055

CORRECTION FACTOR = -0.57mm + -3.784ppm
or -0.002ft + -3.784ppm

$D_{PUB}=D_{MEAS}+CF$

LEAST SQUARES ANALYSIS USING ONLY THE DISTANCES BETWEEN THE 0, 150 AND 420 METER MONUMENTS

2014 TOTAL STATION CALIBRATION LOG

TOPCON	MODEL#	GTS 304	START TIME: 8:00 AM	END TIME: 11:30 AM	DATE: APRIL 14, 2014
	S/N:	FQ1105			
	COT#		PARTY CHIEF: STEVE SCHORIE		CHAINMAN:
	PRISM OFFSET	-30mm			
TRIBRACH CAILBRATION	DATE:		INSTRUMENT: PETE YATES-HODSHON		OBSERVER: SCOTT PRECHTEL
WEATHER METER		KESTREL 3500			
	S/N:	#1654072	WEATHER CONDITIONS: CLEAR/COOL		WET BULB (°C) / RELATIVE HUMIDITY (%)
PRISM	MODEL#	TOPCON TRIPLE			START / END / AVG
TRIBRACH CAILBRATION	DATE:	FEB 28,2011			bulb= 11.6 / -2.5
	S/N:	TOPCON #655330			RH= 23.8 / 15.3

OBS #	FROM: STATION:	TO: STATION:	OBSERVED DISTANCE: DIRECT	REVERSED		HI @ (0)	HR @ (150)	HR @ (420)	HR @ (1390)
1	0	150	150.009	150.008	meters (.0085)	142.55	153.1	1.401	1294
2	0	420	420.015	420.014	meters (.0145)	Temp (°C)	19.8 (20)	21.8	21.8
3	0	1390	1390.022	1390.020	meters (.021)	P (hPa)	923.0	923.0	923.2
							692		
						HI @ (150)	HR @ (1390)	HR @ (420)	HR @ (0)
4	150	1390	1240.017	1240.011	meters (.014)	139.15	128.4	1496	149.1
5	150	420	270.007	270.008	meters (.0075)	Temp (°C)	22.8	22.9	24.1
6	150	0	150.011	150.009	meters (.010)	P (hPa)	923.5	923.6	923.8
						HI @ (420)	HR @ (0)	HR @ (150)	HR @ (1390)
7	420	0	420.013	420.013	meters (.013)	1464	149.1	1531	1357
8	420	150	270.007	270.008	meters (.0075)	Temp (°C)	24.5	23.8	25.0
9	420	1390	970.016	970.013	meters (.0145)	P (hPa)	923.9	924.1	924.0
						HI @ (1390)	HR @ (420)	HR @ (150)	HR @ (0)
10	1390	420	970.014	970.019	meters (.0165)	1511	1323	1326	1216
11	1390	150	1240.015	1240.021	meters (.018)	Temp (°C)	24.3	24.1	24.0
12	1390	0	1390.027	1390.030	meters (.0285)	P (hPa)	924.5	924.5	924.5

NOTES:

RESET INSTRUMENT TO MEASURE IN ***METERS, °C & hPa*** AT THE BEGINNING OF THE CALIBRATION TEST

ALL MEASUREMENTS CONVERTED FROM FEET TO METERS ARE UNACCEPTABLE

BASELINE CALIBRATION TEST
LEAST SQUARES ANALYSIS

ACQUISITION DATE: 4/14/14

PROCESS DATE: 4/14/2014

FIELD CREW MEMBERS: 715 Schorie Yates-Hods

TOPCON
Model# GTS-304
S/N: FQ1105
COT#

DATA PROCESSOR: Prechtel

*** 2004 NGS PUBLISHED DATA BETWEEN 0 & 420 MONUMENTS**

OBS #	FROM STATION	TO STATION	D_{PUB}*(m)	D_{MEAS}(m)	Delta (D_{PUB}-D_{MEAS})(m)	Residual V (m)
1	0	150	150.0055	150.0085	-0.0030	0.0006
2	0	420	420.0090	420.0145	-0.0055	-0.0008
3	0	1390	0.0000		0 0	
4	150	1390	0.0000		0 0	
5	150	420	270.0036	270.0075	-0.0039	0.0002
6	150	0	150.0055	150.0100	-0.0045	-0.0009
7	420	0	420.0090	420.0130	-0.0040	0.0007
8	420	150	270.0036	270.0075	-0.0039	0.0002
9	420	1390	0.0000		0 0	
10	1390	420	0.0000		0 0	
11	1390	150	0.0000		0 0	
12	1390	0	0.0000		0 0	

N= 6

S= -0.0000038 parts
or S= -3.8 ppm
C= -0.0031 meters

σ_0^2= 0.0000006
σ_S= 0.0000028
σ_C= 0.0009

t (Student) Distribution

t_S= 1.331
t_C= 3.593

STATUS= PASS

"Degrees of Freedom"
99% Confidence level

N-2	$t_{0.01}$
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169
11	3.106
12	3.055

CORRECTION FACTOR = -3.07mm + -3.784ppm
or -0.010ft + -3.784ppm

$D_{PUB}=D_{MEAS}+CF$

LEAST SQUARES ANALYSIS USING ONLY THE DISTANCES BETWEEN THE 0, 150 AND 420 METER MONUMENTS

2013 TOTAL STATION CALIBRATION LOG

TOPCON MODEL#	GTS-233W	START TIME: 08:25	END TIME: 10:14	DATE: OCT 13 2014	
S/N:	263198				
COT#		PARTY CHIEF: BUDDY ULJEKUST		CHAINMAN:	
PRISM OFFSET	-30mm				
TRIBRACH CAILBRATION	DATE:	INSTRUMENT: DANIEL ROBERTSON		OBSERVER:	
WEATHER METER	KESTREL 3500				
S/N:	#1654072	WEATHER CONDITIONS: PRETTY NICE MAN		WET BULB (°C) / RELATIVE HUMIDITY (%)	
PRISM MODEL#	TOPCON TRIPLE			START / END / AVG	
TRIBRACH CAILBRATION	DATE: FEB 28,2011			bulb= 13.2 / 14.9	
S/N:	TOPCON #655330			RH= 33.7 / 30.8	

NOTES:

OBS #	FROM: STATION:	TO: STATION:	OBSERVED DISTANCE: DIRECT	REVERSED					
						HI @ (0)	HR @ (150)	HR @ (420)	HR @ (1390)
1	0	150	150.005	150.005	meters <.005>	1.683	1.628	1.599	1.553
2	0	420	420.008	420.008	meters <.008>	Temp (°C)	22.2	24.0	23.2
3	0	1390	1390.010	1390.008	meters <.009>	P (hPa)	924.6	924.4	924.5
						HI @ (150)	HR @ (1390)	HR @ (420)	HR @ (0)
4	150	1390	1240.002	1240.003	meters <.0025>	1.576	1.553	1.563	1.595
5	150	420	270.002	270.001	meters <.0015>	Temp (°C)	23.1	24.00	25.1
6	150	0	150.004	150.003	meters <.0035>	P (hPa)	924.6	924.7	924.5
						HI @ (420)	HR @ (0)	HR @ (150)	HR @ (1390)
7	420	0	420.007	420.006	meters <.0065>	1.647	1.595	1.700	1.658
8	420	150	270.003	270.002	meters <.0025>	Temp (°C)	25.0	24.0	24.1
9	420	1390	970.000	969.999	meters <.9995>	P (hPa)	925.0	924.9	925.0
						HI @ (1390)	HR @ (420)	HR @ (150)	HR @ (0)
10	1390	420	970.002	970.001	meters <.0015>	1.630	1.595	1.590	1.543
11	1390	150	1240.004	1240.003	meters <.0035>	Temp (°C)	25.0	25.3	26.3
12	1390	0	1390.008	1390.008	meters <.008>	P (hPa)	925.6	925.7	925.6

RESET INSTRUMENT TO MEASURE IN ***METERS, °C & hPa*** AT THE BEGINNING OF THE CALIBRATION TEST

ALL MEASUREMENTS CONVERTED FROM FEET TO METERS ARE UNACCEPTABLE

BASELINE CALIBRATION TEST
LEAST SQUARES ANALYSIS

ACQUISITION DATE: 10/13/14

PROCESS DATE: 10/13/2014

FIELD CREW MEMBERS: Liljekvist, Robertson

TOPCON
Model# GTS-233W
S/N: 263198
COT#

DATA PROCESSOR: Prechtel

*** 2004 NGS PUBLISHED DATA BETWEEN 0 & 420 MONUMENTS**

OBS #	FROM STATION	TO STATION	D_{PUB}*(m)	D_{MEAS}(m)	Delta (D_{PUB}-D_{MEAS})(m)	Residual V (m)
1	0	150	150.0055	150.0050	0.0005	-0.0008
2	0	420	420.0090	420.0080	0.0010	-0.0008
3	0	1390	0.0000		0 0	
4	150	1390	0.0000		0 0	
5	150	420	270.0036	270.0015	0.0021	0.0006
6	150	0	150.0055	150.0035	0.0020	0.0007
7	420	0	420.0090	420.0065	0.0025	0.0007
8	420	150	270.0036	270.0025	0.0011	-0.0004
9	420	1390	0.0000		0 0	
10	1390	420	0.0000		0 0	
11	1390	150	0.0000		0 0	
12	1390	0	0.0000		0 0	

N= 6

S= 0.0000018 parts
or S= 1.8 ppm
C= 0.0010 meters

σ_0^2= 0.0000007
σ_S= 0.0000031
σ_C= 0.0009

t (Student) Distribution

t_S=	0.591
t_C=	1.106

STATUS= PASS

"Degrees of Freedom"
99% Confidence level

N-2	$t_{0.01}$
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169
11	3.106
12	3.055

CORRECTION FACTOR = 1.02mm + 1.817ppm
or 0.003ft + 1.817ppm

$D_{PUB}=D_{MEAS}+CF$

LEAST SQUARES ANALYSIS USING ONLY THE DISTANCES BETWEEN THE 0, 150 AND 420 METER MONUMENTS

(28)

TRIBRACH CHECK LOG **DATE:** 10/28/15

CREW: 711

TRIBRACH (S/N: / COT #) S/N: 2152-03 (Chinese Manufacture)
OPTICAL PLUMMET:
PASS _____ **ADJUSTED** ✓ **NOT APPLICABLE** ____
CIRCULAR VIAL:
PASS ✓ **ADJUSTED** _____

TRIBRACH (S/N: / COT #) Self-Serialized: #4570 ; "Sokkisha" Brand
OPTICAL PLUMMET:
PASS ✓ **ADJUSTED** _____ **NOT APPLICABLE** ____
CIRCULAR VIAL:
PASS ✓ **ADJUSTED** _____

TRIBRACH (S/N: / COT #) No Numbers ; "GPS" marking; New Chinese Manufacture
OPTICAL PLUMMET:
PASS ✓ **ADJUSTED** _____ **NOT APPLICABLE** ____
CIRCULAR VIAL:
PASS ✓ **ADJUSTED** _____

TRIBRACH (S/N: / COT #) _____
OPTICAL PLUMMET:
PASS _____ **ADJUSTED** _____ **NOT APPLICABLE** ____
CIRCULAR VIAL:
PASS _____ **ADJUSTED** _____

2015/2016 TOTAL STATION CALIBRATION LOG

711

TOPCON	MODEL#	GTS-233w	START TIME: 8:10 AM	END TIME: 12:12 PM	DATE: 10/27/15
	S/N:	26122			
	COT#	190450	PARTY CHIEF: Rugg + Ziemann		CHAINMAN:
	PRISM OFFSET	-30mm			
TRIBRACH CAILBRATION		DATE: 10/27/15	INSTRUMENT: Medina		OBSERVER: Luke
WEATHER METER		KESTREL 3500			
	S/N:	#1654072	WEATHER CONDITIONS: Clear, Light winds		
PRISM	MODEL#	TOPCON TRIPLE			
TRIBRACH CAILBRATION		DATE: OCT 27,2015			
	S/N:	TOPCON #655330			

WET BULB (°C) / RELATIVE HUMIDITY (%)

	START	END	AVG
bulb=	13.3	16.7	
RH=	58.2	35.2	

NOTES:

OBS #	FROM: STATION:	TO: STATION:	OBSERVED DISTANCE: DIRECT	REVERSED			HI @ (0)	HR @ (150)	HR @ (420)	HR @ (1390)
1	0	150	150.0054	150.0052	meters	0053	1.539	1.220	1.356	1.569
2	0	420	420.010	420.0096	meters	0098	Temp (°C)	18.4	20.3	22.5
3	0	1390	1390.0164	1390.0174	meters	0169	P (hPa)	923.6	923.7	923.8
							HI @ (150)	HR @ (1390)	HR @ (420)	HR @ (0)
4	150	1390	1240.0096	1240.0090	meters	0093	1.285	1.569	1.355	1.474
5	150	420	270.0054	270.0054	meters	0054	Temp (°C)	23.0	23.3	23.7
6	150	0	150.0054	150.0054	meters	0054	P (hPa)	923.9	924.00	923.6
							HI @ (420)	HR @ (0)	HR @ (150)	HR @ (1390)
7	420	0	420.0094	420.0088	meters	0093	1.420	1.474	1.219	1.567
8	420	150	270.0038	420.0034	meters	0036	Temp (°C)	25.3	25.4	25.8
9	420	1390	970.0040	970.0036	meters	0038	P (hPa)	923.7	923.6	923.5
							HI @ (1390)	HR @ (420)	HR @ (150)	HR @ (0)
10	1390	420	970.0040	970.0046	meters	0043	1.632	1.358	1.219	1.474
11	1390	150	1240.0084	1240.0090	meters	0087	Temp (°C)	27.2	27.3	27.2
12	1390	0	1390.0144	1390.0140	meters	0142	P (hPa)	924.0	924.0	923.6

RESET INSTRUMENT TO MEASURE IN ***METERS, °C & hPa*** AT THE BEGINNING OF THE CALIBRATION TEST

ALL MEASUREMENTS CONVERTED FROM FEET TO METERS ARE UNACCEPTABLE

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BASELINE CALIBRATION TEST
LEAST SQUARES ANALYSIS

ACQUISITION DATE: 10/27/15

PROCESS DATE: 10/28/2015

FIELD CREW MEMBERS: Ziemann, Rugg, Medina, Luke

TOPCON
Model# GTS-233W
S/N: 261224
COT# 190454

DATA PROCESSOR: Prechtel

*** 2004 NGS PUBLISHED DATA BETWEEN 0 & 420 MONUMENTS**

OBS #	FROM STATION	TO STATION	D_{PUB}*(m)	D_{MEAS}(m)	Delta (D_{PUB}-D_{MEAS})(m)	Residual V (m)
1	0	150	150.0055	150.0053	0.0002	0.0003
2	0	420	420.0090	420.0098	-0.0008	0.0000
3	0	1390	0.0000		0 0	
4	150	1390	0.0000		0 0	
5	150	420	270.0036	270.0054	-0.0018	-0.0014
6	150	0	150.0055	150.0054	0.0001	0.0002
7	420	0	420.0090	420.0093	-0.0003	0.0005
8	420	150	270.0036	270.0036	0.0000	0.0004
9	420	1390	0.0000		0 0	
10	1390	420	0.0000		0 0	
11	1390	150	0.0000		0 0	
12	1390	0	0.0000		0 0	

N= 6

S= -0.0000024 parts
or S= -2.4 ppm
C= 0.0002 meters

σ_0^2= 0.0000006
σ_S= 0.0000029
σ_C= 0.0009

t (Student) Distribution

t_S=	0.822
t_C=	0.270

STATUS= PASS

"Degrees of Freedom"
99% Confidence level

N-2	$t_{0.01}$
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169
11	3.106
12	3.055

CORRECTION FACTOR = 0.24mm + -2.391ppm
or 0.001ft + -2.391ppm

$D_{PUB}=D_{MEAS}+CF$

LEAST SQUARES ANALYSIS USING ONLY THE DISTANCES BETWEEN THE 0, 150 AND 420 METER MONUMENTS

2015/2016 TOTAL STATION CALIBRATION LOG

716

TOPCON	MODEL#	GTS-233W	START TIME: 8:00 AM	END TIME: 12:12 PM	DATE: 10/27/15
	S/N:	261012			
	COT#	190263	PARTY CHIEF: Rugg + Ziemann		CHAINMAN:
	PRISM OFFSET	-30mm			
TRIBRACH CAILBRATION		DATE: 10/27/15	INSTRUMENT: Lutz		OBSERVER: Hermann
WEATHER METER		KESTREL 3500			
	S/N:	#1654072	WEATHER CONDITIONS: Clear Winds Light to 3mph		
PRISM	MODEL#	TOPCON TRIPLE			
TRIBRACH CAILBRATION		DATE: OCT 27,2015			
	S/N:	TOPCON #655330			

WET BULB (°C) / RELATIVE HUMIDITY (%)

	START	END	AVG
bulb=	~~57~~ 13.4	16.7	
RH=	58.2	35.2	

NOTES:

OBS #	FROM: STATION:	TO: STATION:	OBSERVED DISTANCE: DIRECT	OBSERVED DISTANCE: REVERSED		
1	0	150	150.008	150.008	meters	008
2	0	420	420.011	420.011	meters	011
3	0	1390	1390.019	1390.018	meters	0185
4	150	1390	1240.011	1240.010	meters	005
5	150	420	270.006	270.006	meters	006
6	150	0	150.005	150.005	meters	005
7	420	0	420.009	420.009	meters	009
8	420	150	270.005	270.005	meters	005
9	420	1390	970.003	970.003	meters	003
10	1390	420	970.005	970.006	meters	0055
11	1390	150	1240.009	1240.009	meters	009
12	1390	0	1390.012	1390.013	meters	0125

	HI @ (0)	HR @ (150)	HR @ (420)	HR @ (1390)
	1.538	1.220	1.356	1.569
Temp (°C)		18.7	20.3	22.5
P (hPa)		923.5	923.7	923.7

	HI @ (150)	HR @ (1390)	HR @ (420)	HR @ (0)
	1.283	1.569	1.355	1.474
Temp (°C)		23.2	22.5	23.3
P (hPa)		924.0	924.0	923.8

	HI @ (420)	HR @ (0)	HR @ (150)	HR @ (1390)
	1.419	1.474	1.219	1.567
Temp (°C)		25.2	25.7	25.0
P (hPa)		923.7	923.6	923.7

	HI @ (1390)	HR @ (420)	HR @ (150)	HR @ (0)
	1.631	1.358	1.219	1.474
Temp (°C)		27.6	27.5	27.3
P (hPa)		924.1	923.8	923.6

RESET INSTRUMENT TO MEASURE IN ***METERS, °C & hPa*** AT THE BEGINNING OF THE CALIBRATION TEST

ALL MEASUREMENTS CONVERTED FROM FEET TO METERS ARE UNACCEPTABLE

BASELINE CALIBRATION TEST
LEAST SQUARES ANALYSIS

ACQUISITION DATE: 10/27/15

PROCESS DATE: 10/28/2015

FIELD CREW MEMBERS: Rugg, Ziemann, Luke, Medina

DATA PROCESSOR: Prechtel

TOPCON
Model# GTS-233W
S/N: 261012
COT# 190263

*** 2004 NGS PUBLISHED DATA BETWEEN 0 & 420 MONUMENTS**

OBS #	FROM STATION	TO STATION	D_{PUB}* (m)	D_{MEAS} (m)	Delta (D_{PUB}-D_{MEAS}) (m)	Residual V (m)
1	0	150	150.0055	150.0080	-0.0025	-0.0012
2	0	420	420.0090	420.0110	-0.0020	-0.0007
3	0	1390	0.0000		0 0	
4	150	1390	0.0000		0 0	
5	150	420	270.0036	270.0060	-0.0024	-0.0011
6	150	0	150.0055	150.0050	0.0005	0.0018
7	420	0	420.0090	420.0090	0.0000	0.0013
8	420	150	270.0036	270.0050	-0.0014	-0.0001
9	420	1390	0.0000		0 0	
10	1390	420	0.0000		0 0	
11	1390	150	0.0000		0 0	
12	1390	0	0.0000		0 0	

N= 6

S= 0.0000002 parts
or S= 0.2 ppm
C= -0.0014 meters

σ_0^2= 0.0000020
σ_S= 0.0000053
σ_C= 0.0016

t (Student) Distribution

t_S=	0.047
t_C=	0.866

STATUS= PASS

"Degrees of Freedom"
99% Confidence level

N-2	$t_{0.01}$
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169
11	3.106
12	3.055

CORRECTION FACTOR = -1.37mm + 0.246ppm
or -0.004ft + 0.246ppm

$D_{PUB}=D_{MEAS}+CF$

LEAST SQUARES ANALYSIS USING ONLY THE DISTANCES BETWEEN THE 0, 150 AND 420 METER MONUMENTS

TOTAL STATION CALIBRATION LOG

TOPCON	MODEL#	ES 102	START TIME: 11:45 AM	END TIME: 12:40	DATE: 5/5/20
	S/N:	GS 0736			
	COT#		PARTY CHIEF: S, Z,		CHAINMAN: M, M,
	PRISM OFFSET	-30mm			
TRIBRACH CAILBRATION		DATE: 5/5/20	INSTRUMENT: Topcon ES 102		OBSERVER: D, M,
WEATHER METER		KESTREL 3500			
	S/N:	#1654072	WEATHER CONDITIONS: CLEAR, HOT		
PRISM	MODEL#	TOPCON TRIPLE			
TRIBRACH CAILBRATION		DATE: 5/5/20 ~~May-29-2008~~			
	S/N:	TOPCON #655330			

WET BULB (°C) / RELATIVE HUMIDITY (%)

	START	END	AVG
W. bulb=	18.6	18.3	
RH=	16.1	14.0	

NOTES: Heat

OBS #	FROM: STATION:	TO: STATION:	OBSERVED DISTANCE:		HI @ (0)	HR @ (150)	HR @ (420)	HR @ (1390)
1	0	150	150.005	meters	1.565 m	1.492	1.525	1.557
2	0	420	420.012	meters	Temp (°C)	36.4 36	34.6 35	37.0
3	0	1390	1390.02	meters	P (hPa)	921.0	921.3	921.5
					HI @ (150)	HR @ (1390)	HR @ (420)	HR @ (0)
4	150	1390		meters				
5	150	420		meters	Temp (°C)			
6	150	0		meters	P (hPa)			
					HI @ (420)	HR @ (0)	HR (150)	HR @ (1390)
7	420	0		meters				
8	420	150		meters	Temp (°C)			
9	420	1390		meters	P (hPa)			
					HI @ (1390)	HR @ (420)	HR (150)	HR @ (0)
10	1390	420		meters				
11	1390	150		meters	Temp (°C)			
12	1390	0		meters	P (hPa)			

RESET INSTRUMENT TO MEASURE IN ***METERS*** AT THE BEGINNING OF THE CALIBRATION TEST

ALL MEASUREMENTS CONVERTED FROM FEET TO METERS ARE UNACCEPTABLE

TOTAL STATION CALIBRATION LOG

TOPCON	MODEL#	ES 102	START TIME: 6:55Am	END TIME: 9:40AM	DATE: 5/6/20
	S/N:	GX0736			
	COT#		PARTY CHIEF: S.Z.		CHAINMAN: M.M.
	PRISM OFFSET	-30mm			
TRIBRACH CAILBRATION		DATE: 5/5/20	INSTRUMENT: Gunther		OBSERVER: D.M.
WEATHER METER		KESTREL 3500			
	S/N:	#1654072	WEATHER CONDITIONS: mild, clear		WET BULB (°C) / RELATIVE HUMIDITY (%)
PRISM	MODEL#	TOPCON TRIPLE			START / END / AVG
TRIBRACH CAILBRATION		DATE: 5/5/20 ~~May 29, 2008~~	Hotter Last Set-up	bulb=	14.83 / 21.7 / 18.0
	S/N:	TOPCON #655330		RH=	~~27.7~~ 32.0 / 27.2 / 29.6

NOTES:

OBS #	FROM: STATION:	TO: STATION:	OBSERVED DISTANCE:		HI @ (0)	HR @ (150)	HR @ (420)	HR @ (1390)
1	0	150		meters				
2	0	420		meters	Temp (°C)			
3	0	1390		meters	P (hPa)			
					HI @ (150)	HR @ (1390)	HR @ (420)	HR @ (0)
4	150	1390	1240.012	meters	1.606	1.554	1.552	1.575
5	150	420	270.006	meters	Temp (°C)	22.8	28.9	29.5
6	150	0	150.004	meters	P (hPa)	922.1	921.9	921.8
					HI @ (420)	HR @ (0)	HR (150)	HR @ (1390)
7	420	0	420.009	meters	1.570	1.575	1.565	1.581
8	420	150	270.003	meters	Temp (°C)	28.#5	27.9	30.5
9	420	1390	970.010	meters	P (hPa)	921.8	922.0	922.9
					HI @ (1390)	HR @ (420)	HR (150)	HR @ (0)
10	1390	420	970.009	meters	1.56	1.602	1.588	1.548
11	1390	150	1240.013	meters	Temp (°C)	32.1	30.8	~~34~~ 33.0
12	1390	0	1390.021	meters	P (hPa)	922.2	922.2	921.9

RESET INSTRUMENT TO MEASURE IN ***METERS*** AT THE BEGINNING OF THE CALIBRATION TEST

ALL MEASUREMENTS CONVERTED FROM FEET TO METERS ARE UNACCEPTABLE

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BASELINE CALIBRATION TEST
LEAST SQUARES ANALYSIS

ACQUISITION DATE: 5/6/20

PROCESS DATE: 5/7/2020

FIELD CREW MEMBERS: Ziemann, Mullaney, Miranda

TOPCON
Model# ES-102
S/N: GX0736
COT#

DATA PROCESSOR: Prechtel

*** 2004 NGS PUBLISHED DATA BETWEEN 0 & 420 MONUMENTS**

OBS #	FROM STATION	TO STATION	D_{PUB}*(m)	D_{MEAS}(m)	Delta (D_{PUB}-D_{MEAS})(m)	Residual V (m)
1	0	150	150.0055	150.0050	0.0005	-0.0002
2	0	420	420.0090	420.0120	-0.0030	-0.0013
3	0	1390	0.0000		0 0	
4	150	1390	0.0000		0 0	
5	150	420	270.0036	270.0060	-0.0024	-0.0020
6	150	0	150.0055	150.0040	0.0015	0.0008
7	420	0	420.0090	420.0090	0.0000	0.0017
8	420	150	270.0036	270.0030	0.0006	0.0010
9	420	1390	0.0000		0 0	
10	1390	420	0.0000		0 0	
11	1390	150	0.0000		0 0	
12	1390	0	0.0000		0 0	

N= 6

S= -0.0000090 parts
or S= -9.0 ppm
C= 0.0021 meters

s_0^2= 0.0000026
s_S= 0.0000059
s_C= 0.0018

t (Student) Distribution

t_S=	1.523
t_C=	1.156

STATUS= PASS

"Degrees of Freedom"
99% Confidence level

N-2	$t_{0.01}$
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169
11	3.106
12	3.055

CORRECTION FACTOR = 2.07mm + -9.044ppm
or 0.007ft + -9.044ppm

$D_{PUB}=D_{MEAS}+CF$

LEAST SQUARES ANALYSIS USING ONLY THE DISTANCES BETWEEN THE 0, 150 AND 420 METER MONUMENTS