FL PANHANDLE QL2 LIDAR PROJECT
ACQUISITION GROUND CONTROL POINTS

CONTRACT NO. G16PC00020

Reference:

Client: USGS
Contract #: G16PC00020
Task Order No.: 140G0218F0145
Task Name: FL_Panhandle_2018_B18_v1.3

Prepared For:

Dewberry Consultants LLC

Prepared By:

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APPENDICES:

1. INTRODUCTION

1.1 *Project Summary*

Dewberry|Preble-Rish is under subcontract to Dewberry Consultants, LLC, to provide 50 Acquisition Ground Control Points that will be used to calibrate newly collected LiDAR and Imagery for the FL Panhandle QL2 LiDAR Project. Field survey was conducted from April 10 through 25, 2018.

Existing NGS Control Points were recovered and surveyed to verify the accuracy of the RTK/GPS survey equipment with the results shown in Section 2.4 and Appendix 1 of this report.

As an internal QA/QC procedure, and to verify that the LiDAR check points meet the 95% confidence level, all of the GCP survey points were re-surveyed and the differences between observations are shown in Appendix 4 of this report. An average of the two observations was computed to generate final coordinates and elevations.

Final horizontal coordinates are referenced to the Florida State Plane Coordinate System, NAD83, North Zone, Meters. Final vertical elevations are referenced to NAVD88 in Meters using Geoid model 2012B (Geoid12B).

1.2 *Points of Contact*

Questions regarding the technical aspects of this report should be addressed to:

Dewberry|Preble-Rish

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1.3 *Project Area*

FL PANHANDLE QL2 LIDAR PROJECT – GCP LOCATIONS

2. PROJECT DETAILS

2.1 *Survey Equipment*

In performing the GPS observations, Spectra Precision Epoch 80 GNSS RTK GPS receiver/antenna attached to a 6.56 foot (2 meter) fixed height pole was used, together with a Spectra Precision Ranger Data Collector equipped with SurveyPro Software (version 5.5.2), to collect GPS raw data for the field surveys.

2.2 *Survey Point Detail*

50 LiDAR calibration points were distributed throughout the project area. Approximate locations were provided to Dewberry|Preble-Rish prior to field survey.

A sketch was made for each location and a nail was set at the point where possible, unless said point was already located at a photo identifiable point. The LiDAR calibration point locations are detailed on the "Ground Control Point Documentation Report", which is delivered via electronic transfer, see appendix 5a on sheet 2.

2.3 *Network Design*

The GPS survey performed by Dewberry|Preble-Rish was tied to the Trimble VRS Now Permanent Reference Network, a Real Time Network (RTN) managed by the Trimble Company. The Trimble VRS Now Network provides instant access to real-time kinematic (RTK) corrections utilizing a network of continuously operating permanent reference stations located throughout the United States, Europe, and Australia. Each site provides Global Positioning System (GPS) carrier phase and code range measurements in support of 3-dimensional positioning activities through Florida and surrounding states. All of the reference stations have been linked together, creating a Virtual Reference Station System (VRS).

2.4 *Field Survey Procedures and Analysis*

Dewberry|Preble-Rish field surveyors used Spectra Precision Epoch 80 GNSS RTK GPS systems, which is a geodetic quality dual frequency GPS receiver, to collect data at each check point location.

A total of eleven (11) existing NGS monuments were located as an additional QA/QC procedure, for the purpose of verifying the accuracy of the VRS network. All NGS monuments used are published in the NSRS database, and represent the primary project control for this survey. Field GPS observations are detailed in the "Project Network Control Monument Report", see appendix 1 on sheets 8-9.

All of the GCP check point locations were occupied twice. If re-observations matched the initially derived station positions within the allowable tolerance of ± 5cm or within the 95% confidence level, then no further occupations were performed. If re-observations did not match the initially derived positions, a static GPS session was collected and processed through NOAA's Online Positioning User Service (OPUS). Each VRS occupation utilized the Trimble VRS Now Network, was occupied for approximately 3 to 6 minutes in duration, and measured to 180 - 360 epochs. All static sessions were occupied for a minimum of 45 minutes, and up to 100 minutes. Field GPS observations are detailed in the "Ground Control Point Documentation Report", and delivered via electronic transfer, see appendix 5a on sheet 2.

2.5 *Adjustment*

Most survey data was collected using Virtual Reference Stations (VRS) methodology within a Virtual Reference System (VRS). The system is designed to provide a true Network RTK performance. The RTK software enables high-accuracy positioning in real time across a geographic region. The RTK software package uses real-time data streams from the GPS system user and generates correction models for high-accuracy RTK GPS corrections throughout the network. Therefore, corrections were applied to the points as they were being collected, thus negating the need for a post process adjustment.

Some survey data was collected using Rapid Static GPS Surveying methodology. Rapid Static methodology is similar to conventional static GPS, except for the benefit of needing shorter occupation times due to shorter baselines, favorable satellite geometry, and minimal signal disturbances. Once data was collected, static sessions were processed through NOAA's Online Positioning User Service (OPUS). This service provides simplified access to high-accuracy National Spatial Reference System (NSRS) coordinates and elevations. OPUS uses software which computes coordinates and elevations for NGS' Continuously Operating Reference Station (CORS) network. The resulting positions are accurate and consistent with other National Spatial Reference System users.

2.6 *Data Processing Procedures*

After field data is collected (and processed through OPUS for static observations) the information is downloaded into the office software. Text files are created that show the point number, northing, easting, elevation, and description (PNEZD format) for each point surveyed. Points are then entered into a Microsoft Excell spreadsheet, which contains formulas for calculating differences between published and field survey data, as well as, comparing differences between points surveyed multiple times. This data is used to confirm point accuracy and precision.

After review of the point data, an “ASCII” or “txt” file (PNEZD format) is created, which is the industry standard. Point files are loaded into our CADD program (AutoCAD Civil 3D) to make a visual check of the point data (Pt. #, Coordinates, Elev. and Description). For check points that were surveyed twice, an average of the two observations was computed to generate final northings, eastings, and elevations. The data can now be imported into the final product.

Appendix 1:

Project Network Control Monument Report

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Date	Field Survey Data (M)			Published Data (M)			Differences (M)			RMSE	
	Northing	Easting	Elevation	Northing	Easting	Elevation	Delta N	Delta E	Delta Z		
4/11/2018	147941.369	478632.321	4.374	147941.369	478632.315	4.367	0.000	-0.006	-0.007	$rmse_N$	0.017
4/11/2018	147941.397	478632.323	4.353	147941.369	478632.315	4.367	-0.028	-0.008	0.014	$rmse_E$	0.007
4/12/2018	147941.369	478632.321	4.351	147941.369	478632.315	4.367	0.000	-0.006	0.016	**$Hrmse_r$**	**0.018**
4/12/2018	147941.380	478632.309	4.357	147941.369	478632.315	4.367	-0.011	0.006	0.010	**Vrmse**	0.021
4/13/2018	147941.373	478632.307	4.354	147941.369	478632.315	4.367	-0.004	0.008	0.013		
4/13/2018	147941.386	478632.319	4.354	147941.369	478632.315	4.367	-0.017	-0.004	0.013		
4/17/2018	147941.386	478632.317	4.346	147941.369	478632.315	4.367	-0.017	-0.002	0.021		
4/17/2018	147941.375	478632.320	4.347	147941.369	478632.315	4.367	-0.006	-0.005	0.020		
4/18/2018	147941.375	478632.308	4.354	147941.369	478632.315	4.367	-0.006	0.007	0.013		
4/18/2018	147941.399	478632.326	4.393	147941.369	478632.315	4.367	-0.030	-0.011	-0.026		
4/23/2018	147941.392	478632.313	4.319	147941.369	478632.315	4.367	-0.023	0.002	0.048		

BAY 1054 - HORIZONTAL ONLY

Date	Field Survey Data (M)			Published Data (M)			Differences (M)			RMSE	
	Northing	Easting	Elevation	Northing	Easting	Elevation	Delta N	Delta E	Delta Z		
4/11/2018	159424.722	513986.496	41.009	159424.710	513986.475	N.A.	-0.012	-0.021	N.A.	$rmse_N$	0.025
4/12/2018	159424.738	513986.492	41.006	159424.710	513986.475	N.A.	-0.028	-0.017	N.A.	$rmse_E$	0.011
4/13/2018	159424.737	513986.492	40.986	159424.710	513986.475	N.A.	-0.027	-0.017	N.A.	**$Hrmse_r$**	**0.027**
4/16/2018	159424.741	513986.472	40.991	159424.710	513986.475	N.A.	-0.031	0.003	N.A.	**Vrmse**	N.A.
4/19/2018	159424.730	513986.478	41.001	159424.710	513986.475	N.A.	-0.020	-0.003	N.A.		
4/19/2018	159424.736	513986.485	40.981	159424.710	513986.475	N.A.	-0.026	-0.010	N.A.		
4/20/2018	159424.734	513986.473	41.000	159424.710	513986.475	N.A.	-0.024	0.002	N.A.		
4/20/2018	159424.724	513986.473	41.016	159424.710	513986.475	N.A.	-0.014	0.002	N.A.		
4/23/2018	159424.725	513986.474	40.986	159424.710	513986.475	N.A.	-0.015	0.001	N.A.		
4/23/2018	159424.742	513986.463	41.028	159424.710	513986.475	N.A.	-0.032	0.012	N.A.		
4/24/2018	159424.746	513986.471	41.014	159424.710	513986.475	N.A.	-0.036	0.004	N.A.		
4/25/2018	159424.733	513986.486	41.011	159424.710	513986.475	N.A.	-0.023	-0.011	N.A.		

BAY 2 FLDNR - VERTICAL ONLY

Date	Field Survey Data (M)			Published Data (M)			Differences (M)			RMSE	
	Northing	Easting	Elevation	Northing	Easting	Elevation	Delta N	Delta E	Delta Z		
4/11/2018	159556.213	508548.372	39.949	N.A.	N.A.	39.969	N.A.	N.A.	0.020	$rmse_N$	N.A.
4/12/2018	159556.196	508548.375	39.947	N.A.	N.A.	39.969	N.A.	N.A.	0.022	$rmse_E$	N.A.
4/13/2018	159556.222	508548.391	39.937	N.A.	N.A.	39.969	N.A.	N.A.	0.032	**$Hrmse_r$**	**N.A.**
4/16/2018	159556.219	508548.376	39.937	N.A.	N.A.	39.969	N.A.	N.A.	0.032	**Vrmse**	0.032
4/19/2018	159556.197	508548.389	39.924	N.A.	N.A.	39.969	N.A.	N.A.	0.045		
4/19/2018	159556.202	508548.391	39.979	N.A.	N.A.	39.969	N.A.	N.A.	-0.010		
4/20/2018	159556.214	508548.379	39.924	N.A.	N.A.	39.969	N.A.	N.A.	0.045		
4/20/2018	159556.202	508548.375	39.980	N.A.	N.A.	39.969	N.A.	N.A.	-0.011		
4/23/2018	159556.213	508548.380	39.936	N.A.	N.A.	39.969	N.A.	N.A.	0.033		
4/24/2018	159556.225	508548.380	39.942	N.A.	N.A.	39.969	N.A.	N.A.	0.027		
4/25/2018	159556.220	508548.391	39.923	N.A.	N.A.	39.969	N.A.	N.A.	0.046		

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Date	Field Survey Data (M)			Published Data (M)			Differences (M)			RMSE	
	Northing	Easting	Elevation	Northing	Easting	Elevation	Delta N	Delta E	Delta Z		
4/11/2018	113562.912	501051.802	5.870	113562.923	501051.780	5.887	0.011	-0.022	0.017	$rmse_N$	0.011
4/12/2018	113562.913	501051.803	5.861	113562.923	501051.780	5.887	0.010	-0.023	0.026	$rmse_E$	0.022
										$Hrmse_r$	**0.025**
										Vrmse	0.022

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Date	Field Survey Data (M)			Published Data (M)			Differences (M)			RMSE	
	Northing	Easting	Elevation	Northing	Easting	Elevation	Delta N	Delta E	Delta Z		
4/10/2018	194250.698	424496.361	76.004	194250.695	424496.364	76.053	-0.003	0.003	0.049	$rmse_N$	0.009
4/10/2018	194250.697	424496.340	76.025	194250.695	424496.364	76.053	-0.002	0.024	0.028	$rmse_E$	0.012
4/10/2018	194250.700	424496.351	76.030	194250.695	424496.364	76.053	-0.005	0.013	0.023	**$Hrmse_r$**	**0.015**
4/16/2018	194250.702	424496.362	76.051	194250.695	424496.364	76.053	-0.007	0.002	0.002	**Vrmse**	0.034
4/16/2018	194250.693	424496.357	76.047	194250.695	424496.364	76.053	0.002	0.007	0.006		
4/24/2018	194250.707	424496.355	76.016	194250.695	424496.364	76.053	-0.012	0.009	0.037		
4/24/2018	194250.715	424496.382	76.010	194250.695	424496.364	76.053	-0.020	-0.018	0.043		
4/25/2018	194250.700	424496.373	76.018	194250.695	424496.364	76.053	-0.005	-0.009	0.035		
4/25/2018	194250.696	424496.363	76.015	194250.695	424496.364	76.053	-0.001	0.001	0.038		
4/25/2018	194250.702	424496.384	76.003	194250.695	424496.364	76.053	-0.007	-0.020	0.050		
4/25/2018	194250.706	424496.360	76.029	194250.695	424496.364	76.053	-0.011	0.004	0.024		

Appendix 1:

Project Network Control Monument Report (Cont.)

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Date	Field Survey Data (M)			Published Data (M)			Differences (M)			RMSE	
	Northing	Easting	Elevation	Northing	Easting	Elevation	Delta N	Delta E	Delta Z		
4/12/2018	80519.654	553000.708	4.584	80519.643	553000.696	4.635	-0.011	-0.012	0.051	$rmse_N$	0.011
										$rmse_E$	0.012
										$Hrmse_r$	**0.016**
										Vrmse	0.051

J 45											
Date	Field Survey Data (M)			Published Data (M)			Differences (M)			RMSE	
	Northing	Easting	Elevation	Northing	Easting	Elevation	Delta N	Delta E	Delta Z		
4/12/2018	80540.022	553245.877	4.497	80540.029	553245.893	4.537	0.007	0.016	0.040	$rmse_N$	0.005
4/17/2018	80540.026	553245.912	4.522	80540.029	553245.893	4.537	0.003	-0.019	0.015	$rmse_E$	0.017
										$Hrmse_r$	**0.018**
										Vrmse	0.030

Y 295											
Date	Field Survey Data (M)			Published Data (M)			Differences (M)			RMSE	
	Northing	Easting	Elevation	Northing	Easting	Elevation	Delta N	Delta E	Delta Z		
4/13/2018	80003.704	541196.757	4.129	80003.701	541196.748	4.156	-0.003	-0.009	0.027	$rmse_N$	0.003
										$rmse_E$	0.009
										$Hrmse_r$	**0.010**
										Vrmse	0.027

S 293											
Date	Field Survey Data (M)			Published Data (M)			Differences (M)			RMSE	
	Northing	Easting	Elevation	Northing	Easting	Elevation	Delta N	Delta E	Delta Z		
4/16/2018	88744.564	576595.192	7.167	88744.566	576595.207	7.215	0.002	0.015	0.048	$rmse_N$	0.002
										$rmse_E$	0.015
										$Hrmse_r$	**0.015**
										Vrmse	0.048

FLGPS 20											
Date	Field Survey Data (M)			Published Data (M)			Differences (M)			RMSE	
	Northing	Easting	Elevation	Northing	Easting	Elevation	Delta N	Delta E	Delta Z		
4/17/2018	87594.205	713132.835	7.588	87594.188	713132.815	7.627	-0.017	-0.020	0.039	$rmse_N$	0.012
4/17/2018	87594.195	713132.833	7.596	87594.188	713132.815	7.627	-0.007	-0.018	0.031	$rmse_E$	0.016
4/19/2018	87594.192	713132.825	7.595	87594.188	713132.815	7.627	-0.004	-0.010	0.032	**$Hrmse_r$**	**0.020**
4/23/2018	87594.201	713132.830	7.593	87594.188	713132.815	7.627	-0.013	-0.015	0.034	**Vrmse**	0.034

TLC 1023											
Date	Field Survey Data (M)			Published Data (M)			Differences (M)			RMSE	
	Northing	Easting	Elevation	Northing	Easting	Elevation	Delta N	Delta E	Delta Z		
4/19/2018	166529.538	640388.611	26.398	166529.553	640388.624	26.408	0.015	0.013	0.010	$rmse_N$	0.013
4/23/2018	166529.558	640388.640	26.434	166529.553	640388.624	26.408	-0.005	-0.016	-0.026	$rmse_E$	0.015
4/24/2018	166529.532	640388.641	26.381	166529.553	640388.624	26.408	0.021	-0.017	0.027	**$Hrmse_r$**	**0.020**
4/25/2018	166529.550	640388.614	26.362	166529.553	640388.624	26.408	0.003	0.010	0.046	**Vrmse**	0.030

Appendix 2:

Final Calibration Ground Control Point Coordinates

FL Panhandle QL2 LiDAR Project 2018			
POINT #	NORTHING (M)	EASTING (M)	ELEV. (M)
GCP-101	224306.547	364671.988	81.484
GCP-102	221438.198	382096.412	73.740
GCP-103	215171.870	403929.767	31.181
GCP-104	219550.392	421118.099	70.540
GCP-105	219595.299	443756.681	63.781
GCP-106	208305.342	373062.808	63.906
GCP-107	207594.851	391984.920	71.502
GCP-108	203709.112	417480.331	56.850
GCP-109	206154.210	440311.037	76.165
GCP-110	188496.907	372295.404	44.294
GCP-111	191944.228	398105.067	44.243
GCP-112	193868.388	422094.684	74.042
GCP-113	190329.584	440105.120	63.049
GCP-114	162392.009	372658.308	7.601
GCP-115	161404.968	401813.600	8.724
GCP-116	164883.758	423739.383	2.978
GCP-117	161060.435	444485.283	5.868
GCP-118	221877.094	513309.906	48.539
GCP-119	219162.863	549796.568	34.383
GCP-120	197766.524	516241.045	46.755
GCP-121	204264.825	536299.398	35.621
GCP-122	196775.391	550309.737	33.532
GCP-123	182011.170	513761.109	91.048
GCP-124	179501.453	543160.989	67.290
GCP-125	182131.997	577325.820	89.953
GCP-126	181429.627	607931.078	79.285
GCP-127	159486.326	530593.857	42.200
GCP-128	159662.034	554540.578	50.176
GCP-129	159930.284	586028.668	49.801
GCP-130	162906.050	609340.868	31.647
GCP-131	140484.764	528599.779	20.951
GCP-132	138001.359	551197.998	13.522
GCP-133	137219.086	576898.085	21.294
GCP-134	135652.028	613258.735	5.427
GCP-135	184743.662	659483.066	38.786
GCP-136	168972.692	645635.378	48.977
GCP-137	177202.537	676519.138	34.727
GCP-138	152880.218	666062.854	19.956
GCP-139	132008.393	643361.907	4.920
GCP-140	113995.171	553406.837	7.447
GCP-141	111105.805	599606.382	3.894
GCP-142	96475.816	554119.078	3.697
GCP-143	94553.325	583109.831	4.262
GCP-144	78168.472	533155.183	2.507
GCP-145	73918.323	564696.133	2.120
GCP-146	97053.509	715212.095	10.428
GCP-147	90840.071	711472.833	9.423
GCP-148	81885.564	714636.466	9.152
GCP-149	75147.726	707201.318	1.480
GCP-150	74169.156	711206.201	2.882

Appendix 3:

GPS Observation & Re-Observation Schedule

FL Panhandle QL2 LiDAR Project 2018					
POINT #	SURVEY DATE	JULIAN DATE	TIME	RE-SURVEY DATE	RE-SURVEY TIME
GCP-101	4/24/2018	124	12:56	4/25/2018	13:50
GCP-102	4/10/2018	100	11:30	4/11/2018	12:30
GCP-103	4/11/2018	101	15:50	4/12/2018	11:10
GCP-104	4/17/2018	117	10:22	4/18/2018	9:57
GCP-105	4/17/2018	117	11:05	4/18/2018	10:51
GCP-106	4/10/2018	100	13:55	4/11/2018	13:57
GCP-107	4/10/2018	100	14:40	4/11/2018	15:19
GCP-108	4/17/2018	117	9:39	4/18/2018	9:35
GCP-109	4/16/2018	116	13:28	4/17/2018	8:52
GCP-110	4/12/2018	112	12:33	4/16/2018	9:47
GCP-111	4/12/2018	112	10:05	4/16/2018	9:12
GCP-112	4/12/2018	112	9:07	4/16/2018	8:42
GCP-113	4/16/2018	116	12:41	4/17/2018	8:18
GCP-114	4/12/2018	112	13:35	4/13/2018	14:10
GCP-115	4/12/2018	112	14:40	4/13/2018	13:03
GCP-116	4/12/2018	112	15:44	4/13/2018	12:21
GCP-117	4/13/2018	113	11:40	4/16/2018	11:20
GCP-118	4/17/2018	117	14:51	4/18/2018	13:35
GCP-119	4/19/2018	119	9:00	4/20/2018	11:25
GCP-120	4/17/2018	117	13:27	4/18/2018	12:28
GCP-121	4/18/2018	118	14:32	4/19/2018	8:30
GCP-122	4/19/2018	119	9:46	4/20/2018	10:43
GCP-123	4/17/2018	117	14:05	4/18/2018	12:51
GCP-124	4/19/2018	119	10:25	4/20/2018	10:10
GCP-125	4/19/2018	119	11:20	4/20/2018	9:00
GCP-126	4/20/2018	120	12:35	4/23/2018	10:05
GCP-127	4/19/2018	119	13:30	4/20/2018	7:45
GCP-128	4/19/2018	119	12:20	4/20/2018	8:14
GCP-129	4/23/2018	123	8:35	4/23/2018	14:05
GCP-130	4/20/2018	120	14:00	4/23/2018	9:12
GCP-131	4/11/2018	111	10:40	4/16/2018	7:57
GCP-132	4/11/2018	111	12:20	4/24/2018	13:13
GCP-133	4/12/2018	112	15:30	4/13/2018	15:42
GCP-134	4/16/2018	116	12:02	4/17/2018	10:28
GCP-135	4/23/2018	123	11:30	4/25/2018	11:02
GCP-136	4/19/2018	119	14:43	4/24/2018	11:15
GCP-137	4/23/2018	123	12:25	4/25/2018	10:20
GCP-138	4/16/2018	116	14:20	4/17/2018	11:56
GCP-139	4/16/2018	116	13:01	4/17/2018	11:06
GCP-140	4/11/2018	101	12:57	4/12/2018	12:50
GCP-141	4/16/2018	116	15:50	4/17/2018	9:43
GCP-142	4/12/2018	112	13:05	4/13/2018	13:49
GCP-143	4/16/2018	116	16:31	4/17/2018	9:03
GCP-144	4/12/2018	112	10:58	4/13/2018	11:30
GCP-145	4/11/2018	101	14:36	4/12/2018	10:01
GCP-146	4/19/2018	119	12:21	4/23/2018	12:26
GCP-147	4/17/2018	117	13:45	4/18/2018	11:52
GCP-148	4/17/2018	117	14:12	4/19/2018	11:37
GCP-149	4/19/2018	119	10:49	4/23/2018	11:30
GCP-150	4/19/2018	119	11:10	4/23/2018	11:44

Appendix 4:

Point Comparison Report

FL Panhandle QL2 LiDAR Project 2018				
POINT ID	POINT CHK	DELTA N (M)	DELTA E (M)	VERT DIFF (M)
GCP-101	GCP-1CHK	-0.005	0.003	-0.040
GCP-102	GCP-2CHK	0.010	-0.001	-0.008
GCP-103	GCP-3CHK	0.022	0.016	0.003
GCP-104	GCP-4CHK	-0.009	0.002	-0.013
GCP-105	GCP-5CHK	-0.004	-0.003	-0.027
GCP-106	GCP-6CHK	0.004	-0.005	0.009
GCP-107	GCP-7CHK	0.003	-0.003	0.033
GCP-108	GCP-8CHK	0.002	-0.014	-0.018
GCP-109	GCP-9CHK	0.002	0.000	0.012
GCP-110	GCP-10CHK	0.002	-0.003	0.030
GCP-111	GCP-11CHK	0.007	-0.004	0.016
GCP-112	GCP-12CHK	0.003	0.007	0.018
GCP-113	GCP-13CHK	-0.004	-0.002	0.007
GCP-114	GCP-14CHK	0.005	0.007	0.013
GCP-115	GCP-15CHK	0.003	0.012	0.023
GCP-116	GCP-16CHK	-0.009	-0.004	-0.027
GCP-117	GCP-17CHK	0.000	-0.011	0.014
GCP-118	GCP-18CHK	0.002	-0.014	0.002
GCP-119	GCP-19CHK	-0.001	0.006	-0.007
GCP-120	GCP-20CHK	-0.009	-0.009	0.008
GCP-121	GCP-21CHK	0.027	0.003	-0.001
GCP-122	GCP-22CHK	0.021	-0.002	-0.009
GCP-123	GCP-23CHK	-0.004	-0.010	0.044
GCP-124	GCP-24CHK	0.012	-0.003	-0.024
GCP-125	GCP-25CHK	0.005	-0.002	0.017
GCP-126	GCP-26CHK	-0.004	0.012	-0.001
GCP-127	GCP-27CHK	0.005	-0.004	0.034
GCP-128	GCP-28CHK	-0.005	0.008	0.013
GCP-129	GCP-29CHK	0.018	-0.019	0.004
GCP-130	GCP-30CHK	0.003	-0.016	0.020
GCP-131	GCP-31CHK	0.003	-0.002	-0.007
GCP-132	GCP-32CHK	0.002	0.000	-0.034
GCP-133	GCP-33CHK	-0.002	0.000	-0.004
GCP-134	GCP-34CHK	0.005	-0.002	0.011
GCP-135	GCP-35CHK	-0.005	0.008	0.039
GCP-136	GCP-36CHK	-0.018	0.000	-0.008
GCP-137	GCP-37CHK	0.019	0.000	-0.013
GCP-138	GCP-38CHK	0.006	-0.007	-0.011
GCP-139	GCP-39CHK	-0.009	0.014	-0.018
GCP-140	GCP-40CHK	0.014	0.007	0.027
GCP-141	GCP-41CHK	0.014	-0.001	0.008
GCP-142	GCP-42CHK	0.008	-0.015	0.015
GCP-143	GCP-43CHK	-0.007	-0.009	-0.008
GCP-144	GCP-44CHK	0.013	0.025	0.036
GCP-145	GCP-45CHK	-0.019	-0.031	0.036
GCP-146	GCP-46CHK	-0.001	0.002	0.049
GCP-147	GCP-47CHK	0.007	-0.003	-0.017
GCP-148	GCP-48CHK	-0.008	0.006	-0.026
GCP-149	GCP-49CHK	-0.001	-0.002	-0.004
GCP-150	GCP-50CHK	-0.008	0.012	-0.023