NORTHWEST TURTLE BAY MARSH CREATION
PROJECT NO. BA-125

SURVEY REPORT

PREPARED FOR:

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

MAY, 2013

SUBMITTED BY:

TBS T. BAKER SMITH
PROFESSIONAL CONSULTANTS SINCE 1913

NORTHWEST TURTLE BAY MARSH CREATION
PROJECT NO. BA-125
SURVEY REPORT

Prepared for: U.S.D.A.
Natural Resources Conservation Service
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NORTHWEST TURTLE BAY
MARSH CREATION
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SURVEY REPORT

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SURVEY REPORT

NORTHWEST TURTLE BAY MARSH CREATION PROJECT (BA-125)

1.0 INTRODUCTION

The purpose of the data collection tasks summarized in this report is to provide critical support information for planning and design of the Northwest Turtle Bay Marsh Creation Project (BA-125). The Services provided under this task order involved the completion of a static GPS readjustment survey on the monuments BA27-SM-01R and BA27-SM-02, marsh creation area transects, pipeline canal spoilbank profile surveys, pipeline canal cross section surveys, proposed containment location surveys, BA-36 expansion areas surveys, marsh creation area magnetometer surveys, marsh elevation surveys, borrow area bathymetric and magnetometer surveys, pipeline investigation surveys, and geotechnical borehole location surveys. This work was outlined in *Scope of Services for Topographic, Bathymetric, and Magnetometer Survey for BA-125 Northwest Turtle Bay Marsh Creation, Jefferson Parish, Louisiana* dated August 2012.

2.0 PROJECT OVERVIEW

The Northwest Turtle Bay Marsh Creation Project is funded through Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) on Priority Project List 21. The project has been approved for engineering and design by the United States Fish and Wildlife Service (USFWS) and Natural Resources Conservation Service (NRCS), in cooperation with the Coastal Protection and Restoration Authority of Louisiana (CPRA). The primary objective of this project is to use dredged material from Turtle Bay to create and nourish marsh on the Barataria Landbridge. The project will include the creation of approximately 423 acres of marsh and the nourishment of approximately 337 acres of existing marsh.

3.0 DATA COLLECTION SUMMARY

During the period of September 2012 through March 2013, T. Baker Smith, LLC (TBS) collected field data throughout the project area. These data collection tasks consisted of topographic and bathymetric surveys throughout the marsh creation area and borrow area. Topographic and Bathymetric data was collected by a three-man survey crew aboard an Airboat or Survey vessel w/ outboard motors. Airboats were not used during the period of November 10 through December 2 and December 15 through January 20 due to an airboat suspension that was put in place by the landowner because of the duck hunting season in the area.

3.1 STATIC GPS READJUSTMENT SURVEY

Static GPS readjustment surveys were completed for secondary survey monuments "BA27-SM-01R" and "BA27-SM-02". These surveys were performed on October 3, 4 and 5, 2013 and January 21 and 23, 2013 by collecting data for approximately 5 hours on each monument. A total of four GPS sessions were collected to readjust the benchmarks.

3.2 MARSH CREATION AREA TRANSECTS

Topographic surveys were performed on October 3-24, 2012 of the marsh creation area. A total of forty-three (43) transect lines were surveyed. This data was collected using a RTK GPS unit along with hand soundings for the subaqueous portions.

3.3 PIPELINE CANAL SPOILBANK PROFILE SURVEYS

Topographic surveys along the centerline of the spoilbanks of the pipeline canals were performed on October 8-10 and 25, 2012. These data points were taken at 25' intervals or where there was a 0.5' or more change in elevation along the profile.

3.4 PIPELINE CANAL CROSS SECTION SURVEYS

Topographic surveys were performed on January 23, 28 and 31 and February 1, 2013. These cross sections were taken approximately every 200'. A total of sixty-five

(65) cross sections were surveyed within the marsh creation area. The cross sections extend beyond the spoilbanks on each side of the canal to natural ground.

3.5 PROPOSED CONTAINMENT LOCATION SURVEYS

Topographic surveys were performed on November 2, 2012. These data points were taken at intervals that show a 0.5' or less elevation change. A total of twenty (20) sections were surveyed. The sections extend a minimum of 50' into the marsh on each side of the opening.

3.6 BA-36 EXPANSION AREA SURVEYS

Topographic surveys were performed for BA-36 Expansion Areas 1, 2, and 3. The data points for all three expansion areas were recorded at 25' intervals along each transect or where elevation changes of greater than 0.5' occur. A total of eight (8) transect lines were surveyed for Expansion Area 1, five (5) for Expansion Area 2, and seven (7) for Expansion Area 3. Surveys for Expansion Area 1 were performed on October 31 and November 1, 2012. Expansion Area 2 surveys were performed on October 30-31, 2012. Surveys for Expansion Area 3 were performed on November 1, 2 and December 3, 2012.

3.7 MARSH CREATION AREA MAGNETOMETER SURVEYS

Magnetometer surveys for the marsh creation area were performed on October 12, 15, 16, 18, 19, and 22, 2012. These surveys were performed in the proposed marsh creation area to determine the location of any possible oil and gas pipelines and other metallic obstructions. A total of twenty-six (26) transect lines were surveyed. Seven (7) lines ran north and south and nineteen (19) lines ran east and west within the marsh creation area. This magnetometer survey was conducted using a proton magnetometer that was secured to a sled specifically engineered to navigate across the marsh landscape. The proton magnetometer and sled was pulled at a set distance behind a 15' airboat.

3.8 MARSH ELEVATION SURVEY

An average healthy marsh elevation survey was conducted on November 2, 2012. Elevations were taken at fourteen (14) locations with a minimum of three (3) data points from each location. A representative from NRCS and a representative from US Fish and Wildlife Service accompanied the TBS survey crew in the field for this survey.

3.9 TURTLE BAY BORROW AREA BATHYMETRIC SURVEY

The bathymetric survey for the Turtle Bay borrow area was conducted on December 13, 2012. A total of twelve (12) transect lines were surveyed. All lines were run east and west. The survey was completed using a dual frequency digital echosounder interfaced with RTK GPS.

3.10 TURTLE BAY BORROW AREA MAGNETOMETER SURVEY

The Turtle Bay magnetometer survey was conducted on November 20, 2012. A total of twenty-three (23) transect lines were surveyed. Eleven (11) lines run east and west and twelve (12) lines run north and south.

3.11 PIPELINE INVESTIGATION SURVEYS

Pipeline investigation surveys for the marsh creation area and borrow area were conducted on February 4-8, 13-15 and 27; March 7-8 and 15; April 26 and May 7-8, 2013. A gradiometer was pulled around each magnetometer target found during the magnetometer surveys. A minimum of two circles were run around each target, one with a 25’ radius and the other with a 50’ radius. Elevation of the top of pipeline and depth of cover were located at 100’ intervals on the pipelines found within the project area.

3.12 GEOTECHNICAL BORING LOCATION SURVEYS

Proposed geotechnical boring locations were staked out with cane poles and flagging in the marsh creation area and the borrow area for the geotechnical contractor. This survey was performed on April 23 and 26, 2013. A magnetometer survey was conducted at each boring location to clear the location of any pipelines or metallic

objects. A minimum of two circles were run with a gradiometer around each location, one with a 25' radius and the other with a 50' radius.

4.0 METHODOLOGY

4.1 SURVEY CONTROL AND DATUM INFORMATION

The CPRA secondary survey monument "BA27-SM-02" was used for horizontal and vertical control for the project. This monument and the monument "BA27-SM-01R" were readjusted for this project. The benchmark used was based on its proximity to the area being surveyed. The horizontal datum for all survey data collected is Louisiana State Plane, South Zone (1702), NAD 83, in U.S. Survey feet. The vertical datum for all collected data is NAVD 88, Geoid12A, in U.S. Survey feet. Revised data for the two readjusted benchmarks can be seen in Appendix 1.

4.2 STATIC GPS NETWORK PLANNING

The Static GPS Network was designed to incorporate four (4) CORS "Continuously Operating Reference Station" from the Center for GeoInformatics at LSU. The four CORS used for this survey were "LWES", "BCHS", "GRIS", and "PAUL". They are located in Luling, Belle Chasse, Grand Isle, and Galliano respectably. Since these stations are continuously collecting data, simultaneous data was collected for all four CORS during the time of the static survey of the two benchmarks. This schedule allowed the Static GPS Survey to be completed over a period of five days, which included redundant observations for each baseline. The GPS Session Schedule can be seen in Appendix 3. A map of the project area can be seen in Appendix 2.

4.3 GPS STATIC SURVEY

The GPS Static Survey was performed using a Trimble© 5700/R7 GPS receiver equipped with a Geodetic Antenna and fixed height tripod. The GPS receiver was set to collect L1 and L2 data at a 15 second epoch rate with a 10 degree elevation mask. Static GPS data was collected at each benchmark for a minimum of 5 hours per session. Data

collection sessions were performed three times for each benchmark, on different days, at different times of the day. Field personnel documented each data collection setup on GPS field log sheets. These log sheets contain the date, start time, stop time, station name, GPS receiver serial number, weather conditions, etc. A copy of the field log sheets can be seen in Appendix 4.

4.4 DATA PROCESSING AND NETWORK ADJUSTMENT

The Static GPS data was downloaded from the receiver and imported into Trimble© Business Center (TBC) for processing and QA/QC. Each setup was checked to verify that the antenna height and station name matched the corresponding field log sheet. GPS data files were also sent to OPUS to determine approximate position. These OPUS positions were checked against the log sheet to determine any setup errors.

The final (precise) ephemeris for the Static GPS data was downloaded 12 days after the last field session was completed. The precise ephemeris data was then imported into TBC for final baseline processing and adjustment. Each baseline was processed using a 15 degree elevation mask and all baselines achieved a fixed solution with no editing. Next, a 3-D minimally constrained least squares (free) adjustment was performed holding monument "PAUL" fixed in latitude, longitude, and ellipsoid height. This adjustment used GEOID12A as the basis for determining orthometric heights of adjusted ellipsoid heights. The network was found to fit existing control within acceptable limits, and all primary control was found to be consistent with respect to differences in published and computed elevation values. The Initial and Weighted Free Adjustment Report can be seen in Appendix 6. Once the Free Adjustment passed the Chi Square Test, a fully constrained least squares adjustment was performed holding all CORS fixed in latitude, longitude, and ellipsoid height. The Fully Constrained Network Adjustment report and final adjusted positions can be seen in Appendix 7. A summary of the residuals of adjusted positions versus OPUS positions can be seen in Appendix 5.

4.5 TOPOGRAPHIC SURVEYS

Topographic surveys were performed using a standard three-man survey crew, accessing the survey area by airboat or survey vessel w/ outboard motors. In areas with a clear, unobstructed view of the sky, a Trimble© model R7/R8 GPS RTK unit was used to collect the topographic field data. The manufacturer's stated accuracy of this unit is 2-3 cm horizontal, and 3-4 cm vertical. All RTK GPS Survey information was stored digitally using a Trimble TSC-3 Data Collector.

For the subaqueous portions of cross-sections, data was collected by taking hand soundings using a Standard 25' Stadia Rod with a 6" diameter bottom plate. RTK GPS was used for horizontal positioning of each sounding. The soundings were also referenced to an RTK GPS observed tide reading for elevation reduction. These observed tide readings, or top of water topographic shots, were taken right before every subaqueous portion of each cross section.

Topographic survey data was downloaded from the Trimble TSC-3 Data Collector into the Trimble Business Center software for processing. This software allows for QA/QC of GPS data, and was used to check for instrument setup errors, antenna height errors, and other blunders. Sounding data was processed by manually entering the soundings and observed tide readings into a formatted spreadsheet. The spreadsheet was configured to automatically reduce each sounding from depths to NAVD88 elevations. These points were then exported and entered into AutoCAD Civil 3D for further processing. Using this point data, 3D surface models were produced for all areas. These surface models were used to generate elevation contours and profiles for the final deliverable drawings. The processed survey data was also exported to one complete digital text file containing point numbers, X, Y, Z coordinates, and point descriptions using the DOTD survey feature code list.

4.6 BATHYMETRIC SURVEYS

Bathymetric surveys were performed using a standard three-man survey crew aboard the 24' Survey Vessel "Surveyor X." The bathymetric data was collected using a *Odom Mark III, duel-frequency* digital echosounder interfaced with the *HYPACK MAX*

survey navigation software in conjunction with the Trimble RTK GPS unit previously mentioned. All survey profiles were plotted using the high frequency beam (200 khz). Real-time position data was output from the GPS receiver to the *HYPACK* software 10 times each second. Digital water depth data was also output from the depth sounder 20 times each second. The *HYPACK* software is able to use the above information to display course corrections to help the surveyor navigate the predefined track line. The software is also able to compute a precise, centimeter level, position of each sounding.

In order to ensure accurate measurements were being recorded, equipment checks and calibrations were performed at least twice each day. The digital depthsounder was calibrated for sound velocity corrections once before the survey, once after the survey and occasionally during the survey at the surveyor's discretion. This is performed by lowering an acoustic target, with precisely measured marks, below the transducer to the desired survey depth. The depthsounder's sound velocity correction factor is then adjusted so that the depthsounder reads the precise depth of the acoustic target. The measurements of the onboard GPS system were also checked by observing navigation checkpoints, or "Nav-checks", set throughout the project area.

Bathymetric survey data was transferred from the onboard laptop computer to the office for processing. The processing was accomplished by using Hypack's Single Beam Editor. The Hypack software allowed a profile-type review of the data, where any position or sounding outliers were manually removed. Once the data had been processed and gone through an internal QA/QC review, it was exported in X,Y,Z format. These X,Y,Z point files were then imported into AutoCAD Civil 3D for grouping, management, and further QA/QC.

4.7 MAGNETOMETER SURVEYS

Geophysical instruments used during this survey consisted of a Marine Magnetics SeaSPY marine proton magnetometer. Horizontal positioning of the survey vessel was accomplished using HyPack® navigation software with a Trimble R8 GNSS (RTK) global positioning receiver. Horizontal accuracy of this positioning as stated by the manufacturer is ±2-3 centimeters. The magnetometer sensor was deployed 70 feet behind

the positioning antenna. The magnetometer sensor was attached to a buoyant PVC sled and towed behind the Airboat (see Figure 1). This method allows the operator to survey continuously through both open water and low-elevation marsh. The magnetometer sensor was set at .1sec/gamma.

All Magnetometer data was digitally recorded by an onboard laptop computer using the SeaSPY interface linked with the *HYPACK MAX* survey navigation software mentioned above. The magnetic data was processed in Hypack to obtain the exact position, signature type, and strength of each anomaly. The Hypack processing software allows the user to view the magnetic data as actual magnetic field values along a continuous line. The user is able to easily pinpoint anomalies as deflections from the normal magnetic field and note the position based on the center of the signature. Each magnetic anomaly is interpreted based on its size, signature type, and actual field observations.

Figure 1. Proton magnetometer sensor and PVC sled being towed behind Airboat.

APPENDIX 1

New Survey Benchmark Data Sheets:

BA27-SM-01R

&

BA27-SM-02

VICINITY MAP Not to Scale Reproduced from 2010 DOQQ Arial Photography

Station Name: "BA27-SM-01R"

Monument Location: Located at Little Temple Oil & Gas Field, approximately 10 easterly of Cutoff, Louisiana. From LA Highway 308 at Cutoff, Louisiana, proceed east on east 36th Street for approximately 5 miles and follow the signs for North Dock. Once at the boat landing, by boat, proceed approximately 5.5 miles easterly across Little Lake to the mouth of Bayou Perot. Continue easterly and northerly through Bayou Perot to an oilfield canal heading west. Turn left and proceed westerly in the oilfield canal to a bend south and the monument on the south spoil bank of the canal.

Monument Description: NGS style floating sleeve monument; datum point set on 9/16" stainless steel sectional rods driven 72 feet to refusal, set in sand filled 6" PVC pipe with access cover set in concrete, set with the ground.

Stamping: BA27-SM-01R

Installation Date: 2008 **Date of Survey:** January 2013

Monument Established By: John Chance Land Surveys, Inc.

Monument Re-adjusted By: T. Baker Smith, LLC (2013)

For: *Natural Resources Conservation Service*

Adjusted NAD 83 (2011) Geodetic Position
Lat. 29° 34' 23.46" N
Long. 90° 10' 02.90" W

Adjusted NAD 83 Datum LSZ (1702) Feet
N= 392,242.409
E= 3,651,413.489

Adjusted NAVD88 Height
Elevation = 1.444 feet (0.440 mtrs.) (Geoid12A)

Ellipsoid Height = -24.501 mtrs.
Geoid12A Height = -24.941 mtrs.

FOR REFERENCE ONLY
Adjusted NAVD88 Height (2006.81) (Geoid03)
Elevation = 1.40 feet (0.427 mtrs)
Ellipsoid Height = -24.536 mtrs.
Geoid03 Height = -24.963 mtrs. (2004.65)

Adjusted Position Established for Natural Resources Conservation Service, NRCS

VICINITY MAP Not to Scale Reproduced from 2010 DOQQ Arial Photography

Station Name: "BA27-SM-02"

Monument Location: Located near Little Lake Oil & Gas Field, approximately 12 easterly of Cutoff, Louisiana. From LA Highway 308 at Cutoff, Louisiana, proceed east on east 36th Street for approximately 5 miles and follow the signs for North Dock. Once at the boat landing, by boat, proceed approximately 7.5 miles easterly across Little Lake to the mouth of Bayou Perot. Proceed northeasterly in Bayou Perot for about 1 mile, then in Bayou Rigolettes for about 1 mile to Harvey Canal to the south. Proceed south in Harvey Canal to a canal heading east and the monument set approximately 300' east at east bank Harvey Cutoff and Approximately 350' west of camp with black tar paper, set 25' back from the top bank of the canal.

Monument Description: NGS style floating sleeve monument; datum point set on 9/16" stainless steel sectional rods driven 56 feet to refusal, set in sand filled 6" PVC pipe with access cover set in concrete, flush with ground.

Stamping: BA27-SM-02

Installation Date: December 2002 **Date of Survey:** January 2013

Monument Established By: John Chance Land Surveys, Inc.

Monument Re-adjusted By: T. Baker Smith, LLC (2013)

For: *Natural Resources Conservation Service*

Adjusted NAD 83 (2011) Geodetic Position
Lat. 29° 34' 04.46" N
Long. 90° 08' 01.02" W

Adjusted NAD 83 Datum LSZ (1702) Feet
N= 390,435.117
E= 3,662,195.773

Adjusted NAVD88 Height
Elevation = 0.828 feet (0.252 mtrs.) (Geoid 12A)

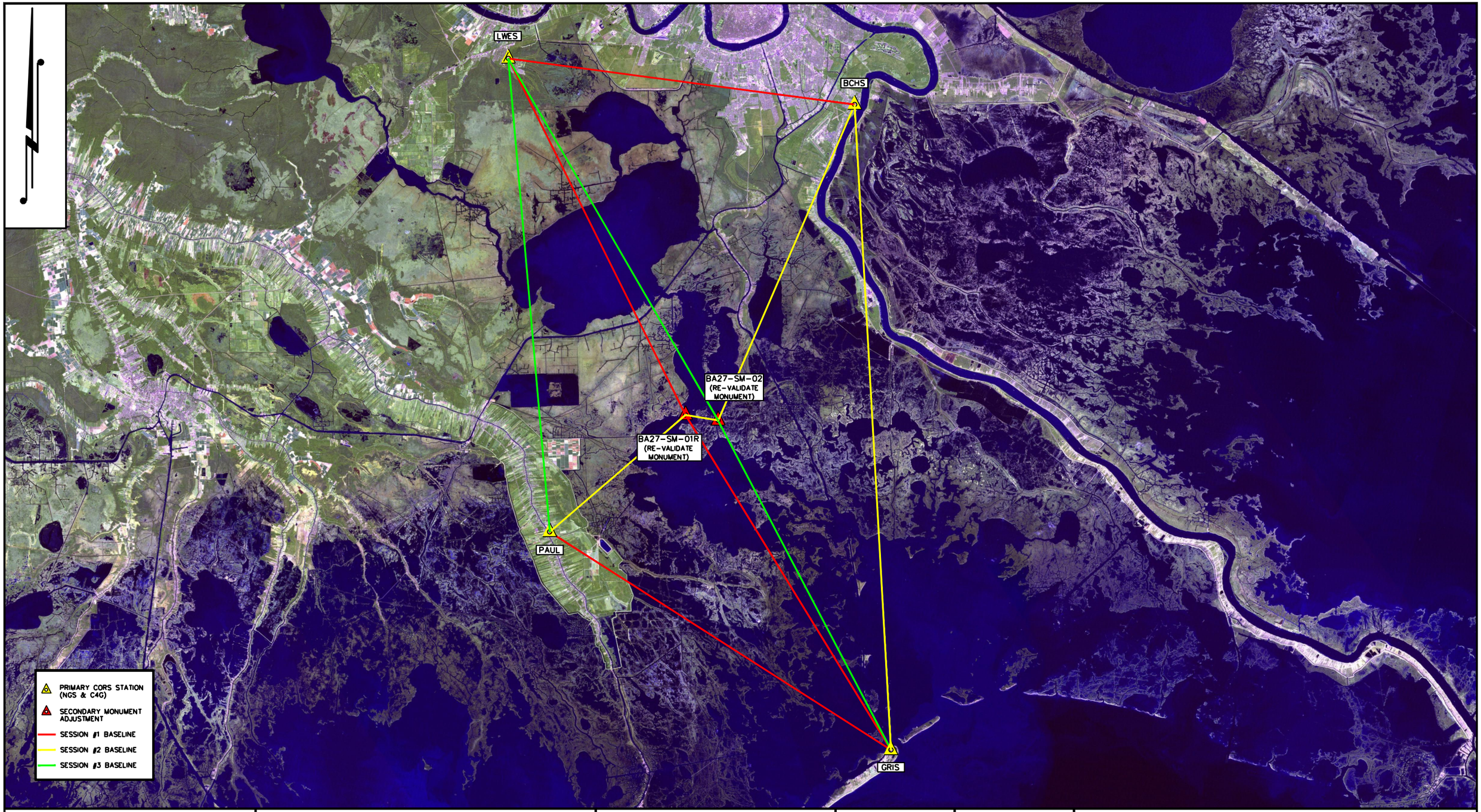
Ellipsoid Height = -24.659 mtrs.
Geoid12A Height = -24.911 mtrs.

FOR REFERENCE ONLY
Adjusted NAVD88 Height (2006.81) (Geoid03)
Elevation = 0.75 feet (0.229 mtrs)
Ellipsoid Height = -24.693 mtrs.
Geoid03 Height = -24.922 mtrs. (2004.65)

Adjusted Position Established for Natural Resources Conservation Service, NRCS

APPENDIX 2

GPS Network Map



NOTES:

T. BAKER SMITH | 1913 2013
A CENTURY OF SOLUTIONS
412 South Van Ave, Houma, LA 70363
(985)868-1050 - tbsmith.com

SCALE: 1" = 30,000'

30,000' 15,000' 0' 30,000'

REV. NO:	00	REV. DATE:	--/--/--	REV. BY:	---

REVISION DESCRIPTION:
--

DRAWN BY:	JMC	APPROVED BY:	BJK
DATE:	02/18/2013	JOB NO:	2012.0887

DRAWING NAME: GPS NETWORK.DWG

PROJECTION: LA 83-SF-MOD
GEO. DATUM: NAD83 | VERT. DATUM: NAVD88
GRID UNITS: US SURVEY FEET

SHEET NO: 1 OF 1

GPS NETWORK

SECONDARY BENCHMARK READJUSTMENT

NORTHWEST TURTLE BAY
FOR
U.S.D.A.
NATURAL RESOURCES CONSERVATION SERVICE
JEFFERSON PARISH, LOUISIANA

APPENDIX 3

Session Schedule

USDA / Natural Resources Conservation Service

Secondary Benchmark Readjustment
For
BS-125 Northwest Turtle Bay Marsh Creation Project

GPS SESSION SCHEDULE

Date	Monument	**Operator / Crew**	**Session #**	**Start Time**	**End Time**	**Length**
10/3/2012	BA27-SM-01R	Jeremy Stevens	1	09:30	14:40	5:10
10/4/2012	BA27-SM-01R	Jeremy Stevens	2	10:00	16:30	6:30
10/4/2012	BA27-SM-02	Jeremy Stevens	3	10:30	16:00	5:30
10/5/2012	BA27-SM-02	Jeremy Stevens	4	7:40	13:00	5:20
1/21/2013	BA27-SM-02	Jeremy Stevens	1	9:00	15:00	6:00
1/23/2013	BA27-SM-01R	Jeremy Stevens	2	9:00	15:00	6:00

APPENDIX 4

GPS Field Log Sheets

10-3-12

PH Chair +0.1349'

I.3. Typical GPS Log Sheet for Fixed Height Tripods

USE THIS FORM IS USING FIXED HEIGHT TRIPODS

GPS LOG SHEET

Job No. 2012 -0887 Operator TBS

Client NRCS Job Description BA-125 MARSH CREATION

Location NW TURTLE BAY

SESSION INFO

Station No. (4 Characters) Julian Date (3 Characters) Session No. (1 Character) 1

Long Name BA 27 SM 01R

Monument Description

Receiver Type R7 GNSS TRIMBLE Receiver Serial No. 4846K33659

Antenna Type ZEPHYR Geod Mod 2 Ant. Serial No. 3105273G

Antenna Height Measurement is TRUE VERTICAL to Bottom of Antenna Mount if Using Fixed Height Tripod

Reading 1 Meters Fixed Hgt 2 Meter Tripod 2.0 Meters

Reading 2 Meters Check Reading 6.562 Feet/Tenths

Reading 3 Meters Note: Record all readings on log sheet prior to entering in receiver

Start Time 0930 Stop Time 1440 Session Time 5:10

Time	Pdop	Satellites in View

Time	Note any Power Failures, Weather Conditions, etc.

USE BACK OF THIS SHEET TO MAKE STATION SKETCH, REFERENCE TIES & DESCRIPTION

10-4-12

I.3. Typical GPS Log Sheet for Fixed Height Tripods

USE THIS FORM IS USING FIXED HEIGHT TRIPODS

GPS LOG SHEET

Job No. 2012_0887 Operator TBS

Client NRCS Job Description BA-125 MARSH CREATION

Location NW TURTLE BAY

SESSION INFO

Station No. (4 Characters) Julian Date (3 Characters) Session No. (1 Character) 2

Long Name BA 27 SM OIR

Monument Description

Receiver Type TRIMBLE R7 GNSS Receiver Serial No 4846K33659

Antenna Type ZEPHYR GEOD MOD 2 Ant Serial No 31052736

Antenna Height Measurement is TRUE VERTICAL to Bottom of Antenna Mount if Using Fixed Height Tripod

Reading 1 Meters Fixed Hgt 2 Meter Tripod 2.0 Meters

Reading 2 Meters Check Reading 6.562 Feet/Tenths

Reading 3 Meters Note: Record all readings on log sheet prior to entering in receiver

Start Time 1009 Stop Time 1630 Session Time 6:30

Time	Pdop	Satellites in View

Time	Note any Power Failures, Weather Conditions, etc.

USE BACK OF THIS SHEET TO MAKE STATION SKETCH, REFERENCE TIES & DESCRIPTION

10-4-12

I.3. Typical GPS Log Sheet for Fixed Height Tripods

USE THIS FORM IS USING FIXED HEIGHT TRIPODS

GPS LOG SHEET

Job No. 2012 -0887 Operator TBS

Client NRCS Job Description BA-25 MARSH CREATION

Location NW TURTLE BAY

SESSION INFO

Station No. (4 Characters) Julian Date (3 Characters) Session No. (1 Character) 3

Long Name BA 27 SM 02

Monument Description

Receiver Type TRIMBLE R7 GNSS Receiver Serial No 4744K30915

Antenna Type ZEPHYR GEOD MOD 2 Ant. Serial No 3060581

Antenna Height Measurement is TRUE VERTICAL to Bottom of Antenna Mount if Using Fixed Height Tripod

Reading 1 Meters Fixed Hgt 2 Meter Tripod 2.0 Meters

Reading 2 Meters Check Reading 6.562 Feet/Tenths

Reading 3 Meters Note: Record all readings on log sheet prior to entering in receiver

Start Time 1030 Stop Time 1600 Session Time 5:30

Time	Pdop	Satellites in View

Time	Note any Power Failures, Weather Conditions, etc.

USE BACK OF THIS SHEET TO MAKE STATION SKETCH, REFERENCE TIES & DESCRIPTION

10-5-12

I.3. Typical GPS Log Sheet for Fixed Height Tripods

USE THIS FORM IS USING FIXED HEIGHT TRIPODS

GPS LOG SHEET

Job No. 2012 -0887 Operator TBS

Client NRCS Job Description BA-125 MARSH CREATION

Location NW TURTLE BAY

SESSION INFO

Station No. (4 Characters) 02 Julian Date (3 Characters) Session No. (1 Character) 4

Long Name BA27 SM02

Monument Description

Receiver Type TRIMBLE R7 GNSS Receiver Serial No 4744K30915

Antenna Type ZEPHYR Geod Mod 2 Ant. Serial No 30607581

Antenna Height Measurement is TRUE VERTICAL to Bottom of Antenna Mount if Using Fixed Height Tripod

Reading 1 Meters Fixed Hgt 2 Meter Tripod 2.0 Meters

Reading 2 Meters Check Reading 6.562 Feet/Tenths

Reading 3 Meters Note: Record all readings on log sheet prior to entering in receiver

Start Time 0740 Stop Time 1300 Session Time 5:20

Time	Pdop	Satellites in View

Time	Note any Power Failures, Weather Conditions, etc.

USE BACK OF THIS SHEET TO MAKE STATION SKETCH, REFERENCE TIES & DESCRIPTION

1-21-2013

I.3. Typical GPS Log Sheet for Fixed Height Tripods

USE THIS FORM IS USING FIXED HEIGHT TRIPODS

GPS LOG SHEET

Job No. 2012_0887 Operator TBS

Client NRCS Job Description BA-125 MARSH CREATION

Location NW TURTLE BAY

SESSION INFO

Station No. (4 Characters) Julian Date (3 Characters) Session No. (1 Character) /

Long Name BA27SM02

Monument Description

Receiver Type TRIMBLE R7 GNSS Receiver Serial No. 4744K30915

Antenna Type ZEPHYR GEOD MOD 2 Ant. Serial No. 30607581

Antenna Height Measurement is **TRUE VERTICAL** to Bottom of Antenna Mount if Using Fixed Height Tripod

Reading 1 Meters Fixed Hgt 2 Meter Tripod 2.0 **Meters**

Reading 2 Meters Check Reading 6.562 **Feet/Tenths**

Reading 3 Meters Note: Record all readings on log sheet prior to entering in receiver

Start Time 0900 Stop Time 0300 Session Time 5:00

Time	Pdop	Satellites in View

Time	Note any Power Failures, Weather Conditions, etc.

USE BACK OF THIS SHEET TO MAKE STATION SKETCH, REFERENCE TIES & DESCRIPTION

1-23-2013

I.3. Typical GPS Log Sheet for Fixed Height Tripods

USE THIS FORM IS USING FIXED HEIGHT TRIPODS

GPS LOG SHEET

Job No. 2012_0887 Operator TBS

Client NRCS Job Description BA-125 MARSH CREATION

Location NW TURTLE BAY

SESSION INFO

Station No. (4 Characters) Julian Date (3 Characters) Session No. (1 Character) 2

Long Name BA27 SM 01R

Monument Description

Receiver Type R7 GNSS TRIMBLE Receiver Serial No. 4744K30915

Antenna Type ZEPHYR GEOD MOD 2 Ant. Serial No. 30407581

Antenna Height Measurement is **TRUE VERTICAL** to Bottom of Antenna Mount if Using Fixed Height Tripod

Reading 1 Meters Fixed Hgt 2 Meter Tripod 2.0 **Meters**

Reading 2 Meters Check Reading 6.562 **Feet/Tenths**

Reading 3 Meters Note: Record all readings on log sheet prior to entering in receiver

Start Time 0900 Stop Time 0300 Session Time 5:00

Time	Pdop	Satellites in View

Time	Note any Power Failures, Weather Conditions, etc.

USE BACK OF THIS SHEET TO MAKE STATION SKETCH, REFERENCE TIES & DESCRIPTION

APPENDIX 5

Network Adjustment and OPUS Summary

USDA / Natural Resources Conservation Service

Contract No. AG-7217-C-09-0021 - T. Baker Smith, Inc.

Secondary Benchmark Re-adjustment

For

BA-125 NW Turtle Bay Marsh Creation Project

T. BAKER SMITH

MINIMALLY CONSTRAINED NETWORK ADJUSTMENT SUMMARY

	TBC Adjusted Values			Published Control Values			Residuals		
Station	**Northing (ft)**	**Easting (ft)**	**Ht. (ft)**	**Northing (ft)**	**Easting (ft)**	**Ht. (ft)**	**Δ Northing (ft)**	**Δ Easting (ft)**	**Δ Ht. (ft)**
LWES	510595.793	3592587.481	-51.666	510595.832	3592587.482	-51.542	0.039	0.001	0.124
BCHS	495277.590	3707529.536	-54.750	495277.586	3707529.546	-54.728	-0.004	0.010	0.022
GRIS	281033.421	3719590.169	-51.411	281033.474	3719590.183	-51.286	0.053	0.014	0.125
PAUL	Fixed	Fixed	Fixed	353430.321	3606321.437	-42.024	Fixed	Fixed	Fixed
BA27SM01R	392242.378	3651413.483	-80.472	-	-	-	-	-	-
BA27SM02	390435.086	3662195.764	-81.002	-	-	-	-	-	-

FULLY CONSTRAINED NETWORK ADJUSTMENT SUMMARY

	TBC Adjusted Values			Published Control Values			Precision (95% Confidence Level)		
Station	**Northing (ft)**	**Easting (ft)**	**El. (ft)***	**Northing (ft)**	**Easting (ft)**	**Ht. (ft)**	**Northing (ft)**	**Easting (ft)**	**El. (ft)***
LWES	Fixed	Fixed	Fixed	510595.832	3592587.482	-51.542	Fixed	Fixed	Fixed
BCHS	Fixed	Fixed	Fixed	495277.586	3707529.546	-54.728	Fixed	Fixed	Fixed
GRIS	Fixed	Fixed	Fixed	281033.474	3719590.183	-51.286	Fixed	Fixed	Fixed
PAUL	Fixed	Fixed	Fixed	353430.321	3606321.437	-42.024	Fixed	Fixed	Fixed
BA27SM01R	392242.409	3651413.489	1.444	-	-	-	0.036	0.037	0.091
BA27SM02	390435.117	3662195.773	0.828	-	-	-	0.036	0.038	0.099

OPUS ELEVATION SUMMARY

	Final OPUS Values				TBC Adjusted	
Station	**Elevation (m)**	**Elevation (ft)**	**RMS**	**Notes**	**Elevation (ft)**	**Δ Elev (ft)***
BA-27-SM01R:	0.415	1.362	0.119	high RMS	1.444	0.082
	0.418	1.371	0.058		1.444	0.073
	0.410	1.345	0.040		1.444	0.099
Average	**0.414**	**1.359**				**0.085**

	Final OPUS Values				TBC Adjusted	
Station	**Elevation (m)**	**Elevation (ft)**	**RMS**	**Notes**	**Elevation (ft)**	**Δ Elev (ft)***
BS03a-SM-02:	0.253	0.830	0.045		0.828	-0.002
	0.240	0.787	0.021		0.828	0.041
	0.222	0.728	0.016		0.828	0.100
Average	**0.238**	**0.782**				**0.046**

* - Elevations expressed in NAVD88 computed using GEOID 12A

APPENDIX 6

Initial and Weighted Free Network Adjustment Report

Project Information		Coordinate System	
Name:	P:\Y-2012\2012.0887\FieldData\Static BM Adjustment\BA27SM01_BA27SM02_adjust3.vce	Name:	US State Plane 1983 (2011)
Size:	481 KB	Datum:	NAD 1983 (2011)
Modified:	2/18/2013 9:49:56 AM (UTC:-6)	Zone:	Louisiana South 1702
Time zone:	Central Standard Time	Geoid:	GEOID12A (Conus)
Reference number:		Vertical datum:	
Description:			

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.002 ft

Centering Error: 0.005 ft

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 ft

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 ft

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2

Network Reference Factor: 1.00

Chi Square Test (95%): Passed

Precision Confidence Level: 95%

Degrees of Freedom: 18

Post Processed Vector Statistics

Reference Factor: 1.00
Redundancy Number: 18.00
A Priori Scalar: 2.31

Control Coordinate Comparisons

Values shown are control coordinates minus adjusted coordinates.

Point ID	ΔNorthing (US survey foot)	ΔEasting (US survey foot)	ΔElevation (US survey foot)	ΔHeight (US survey foot)
BCHS	-0.004	0.010	?	0.023
GRIS	0.053	0.014	?	0.125
LWES	0.039	0.002	?	0.124

Control Point Constraints

Point ID	Type	North σ (US survey foot)	East σ (US survey foot)	Height σ (US survey foot)	Elevation σ (US survey foot)
PAUL	Local	Fixed	Fixed	Fixed	
Fixed = 0.000003(US survey foot)					

Adjusted Grid Coordinates

Point ID	Northing (US survey foot)	Northing Error (US survey foot)	Easting (US survey foot)	Easting Error (US survey foot)	Elevation (US survey foot)	Elevation Error (US survey foot)
BA27SM01R	392242.378	0.024	3651413.483	0.025	1.355	0.063
BA27SM02	390435.086	0.028	3662195.764	0.028	0.728	0.074
BCHS	495277.590	0.030	3707529.536	0.031	29.677	0.081

GRIS	281033.421	0.025	3719590.169	0.025	27.250	0.063
LWES	510595.793	0.025	3592587.481	0.026	33.304	0.067
PAUL	353430.321	?	3606321.437	?	39.083	?

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (US survey foot)	Height Error (US survey foot)	Constraint
BA27SM01R	N29°34'24.23265"	W90°10'03.17272"	-80.472	0.063	
BA27SM02	N29°34'05.24029"	W90°08'01.28625"	-81.002	0.074	
BCHS	N29°51'18.09187"	W89°59'14.00478"	-54.750	0.081	
GRIS	N29°15'55.88247"	W89°57'26.26243"	-51.411	0.063	
LWES	N29°54'01.29497"	W90°20'57.83370"	-51.666	0.067	
PAUL	N29°28'04.28579"	W90°18'37.73539"	-42.024	?	LLh

Adjusted ECEF Coordinates

Point ID	X (US survey foot)	X Error (US survey foot)	Y (US survey foot)	Y Error (US survey foot)	Z (US survey foot)	Z Error (US survey foot)	3D Error (US survey foot)	Const
BA27SM01R	-53265.081	0.025	-18214207.501	0.056	10266780.319	0.037	0.072	
BA27SM02	-42504.096	0.028	-18215182.138	0.066	10265111.393	0.043	0.084	
			-		10355745.549			

BCHS	4048.545	0.031	18163540.429	0.073		0.047	0.092	
GRIS	13615.094	0.025	-18269300.447	0.057	10169271.924	0.037	0.073	
LWES	-110715.035	0.026	-18154992.902	0.060	10370042.965	0.039	0.076	
PAUL	-98805.984	?	-18232962.889	?	10233400.895	?	?	LLH

Error Ellipse Components

Point ID	Semi-major axis (US survey foot)	Semi-minor axis (US survey foot)	Azimuth
BA27SM01R	0.031	0.030	73°
BA27SM02	0.036	0.035	85°
BCHS	0.039	0.038	83°
GRIS	0.032	0.031	78°
LWES	0.032	0.031	77°

Adjusted GPS Observations

Observation ID		Observation	A-posteriori Error	Residual	Standardized Residual
LWES --> BA27SM01R (PV31)	**Az.**	154°03'48"	0.037 sec	-0.058 sec	-2.683
	ΔHt.	-28.841 ft	0.059 ft	0.011 ft	0.331
	Ellip Dist.	132174.945 ft	0.023 ft	-0.006 ft	-0.467
LWES --> PAUL (PV18)	**Az.**	175°29'53"	0.033 sec	0.036 sec	2.118
	ΔHt.	9.605 ft	0.067 ft	0.014 ft	0.355
	Ellip Dist.	157773.387 ft	0.025 ft	-0.001 ft	-0.048

GRIS --> BA27SM02 (PV4)	**Az.**	333°00'17"	0.039 sec	0.018 sec	0.781
	ΔHt.	-29.558 ft	0.063 ft	0.059 ft	1.454
	Ellip Dist.	123545.562 ft	0.023 ft	-0.023 ft	-1.680
BCHS --> GRIS (PV9)	**Az.**	177°27'04"	0.025 sec	-0.006 sec	-0.441
	ΔHt.	3.291 ft	0.068 ft	0.001 ft	0.035
	Ellip Dist.	214592.113 ft	0.025 ft	0.021 ft	1.526
PAUL --> BA27SM01R (PV19)	**Az.**	49°47'33"	0.085 sec	-0.023 sec	-0.473
	ΔHt.	-38.446 ft	0.063 ft	-0.014 ft	-0.414
	Ellip Dist.	59497.459 ft	0.025 ft	-0.020 ft	-1.399
GRIS --> BA27SM01R (PV29)	**Az.**	329°10'36"	0.037 sec	-0.030 sec	-1.328
	ΔHt.	-29.026 ft	0.059 ft	-0.016 ft	-0.470
	Ellip Dist.	130446.338 ft	0.023 ft	0.013 ft	0.919
BCHS --> LWES (PV15)	**Az.**	278°15'49"	0.045 sec	0.030 sec	1.298
	ΔHt.	3.106 ft	0.068 ft	-0.014 ft	-0.389
	Ellip Dist.	115966.650 ft	0.026 ft	-0.001 ft	-0.103
BA27SM01R --> BA27SM02 (PV1)	**Az.**	100°05'54"	0.438 sec	-0.295 sec	-1.155
	ΔHt.	-0.532 ft	0.062 ft	-0.020 ft	-0.525
	Ellip Dist.	10933.206 ft	0.024 ft	-0.013 ft	-0.929
LWES --> BA27SM02 (PV16)	**Az.**	150°24'32"	0.035 sec	0.002 sec	0.093
	ΔHt.	-29.373 ft	0.061 ft	-0.035 ft	-1.051
	Ellip Dist.	138875.169 ft	0.023 ft	0.004 ft	0.284
GRIS --> PAUL (PV21)	**Az.**	303°16'17"	0.038 sec	0.001 sec	0.055
	ΔHt.	9.421 ft	0.063 ft	-0.023 ft	-0.749
	Ellip Dist.	134430.624 ft	0.025 ft	-0.011 ft	-0.875

BCHS --> BA27SM02 (PV8)	**Az.**	204°03'23"	0.046 sec	0.023 sec	0.855
	ΔHt.	-26.267 ft	0.068 ft	0.018 ft	0.427
	Ellip Dist.	114230.851 ft	0.025 ft	0.003 ft	0.221

Covariance Terms

From Point	To Point		Components	A-posteriori Error	Horiz. Precision (Ratio)	3D Precision (Ratio)
BA27SM01R	GRIS	**Az.**	149°04'24"	0.037 sec	1 : 5652070	1 : 5652827
		ΔHt.	29.061 ft	0.059 ft		
		ΔElev.	25.895 ft	0.059 ft		
		Ellip Dist.	130446.309 ft	0.023 ft		
BA27SM01R	LWES	**Az.**	334°09'12"	0.037 sec	1 : 5727840	1 : 5729090
		ΔHt.	28.806 ft	0.059 ft		
		ΔElev.	31.948 ft	0.059 ft		
		Ellip Dist.	132174.916 ft	0.023 ft		
BA27SM01R	PAUL	**Az.**	229°51'46"	0.085 sec	1 : 2382079	1 : 2381429
		ΔHt.	38.448 ft	0.063 ft		
		ΔElev.	37.728 ft	0.063 ft		
		Ellip Dist.	59497.446 ft	0.025 ft		
BA27SM02	BA27SM01R	**Az.**	280°06'54"	0.439 sec	1 : 458566	1 : 458578
		ΔHt.	0.530 ft	0.062 ft		
		ΔElev.	0.627 ft	0.062 ft		
		Ellip Dist.	10933.204 ft	0.024 ft		
BA27SM02	BCHS	**Az.**	23°59'02"	0.046 sec	1 : 4631562	1 : 4629149
		ΔHt.	26.251 ft	0.068 ft		
		ΔElev.	28.949 ft	0.068 ft		
		Ellip Dist.	114230.826 ft	0.025 ft		
BA27SM02	GRIS	**Az.**	152°55'05"	0.039 sec	1 : 5297160	1 : 5298300

		ΔHt.	29.591 ft	0.063 ft		
		ΔElev.	26.522 ft	0.063 ft		
		Ellip Dist.	123545.535 ft	0.023 ft		
BA27SM02	LWES	**Az.**	330°30'57"	0.035 sec	1 : 5927595	1 : 5929518
		ΔHt.	29.336 ft	0.061 ft		
		ΔElev.	32.575 ft	0.061 ft		
		Ellip Dist.	138875.139 ft	0.023 ft		
GRIS	BCHS	**Az.**	357°27'57"	0.026 sec	1 : 8416795	1 : 8417319
		ΔHt.	-3.339 ft	0.068 ft		
		ΔElev.	2.427 ft	0.068 ft		
		Ellip Dist.	214592.066 ft	0.025 ft		
GRIS	PAUL	**Az.**	303°16'17"	0.038 sec	1 : 5365720	1 : 5367130
		ΔHt.	9.387 ft	0.063 ft		
		ΔElev.	11.833 ft	0.063 ft		
		Ellip Dist.	134430.594 ft	0.025 ft		
LWES	BCHS	**Az.**	98°05'00"	0.045 sec	1 : 4452342	1 : 4452790
		ΔHt.	-3.084 ft	0.068 ft		
		ΔElev.	-3.627 ft	0.068 ft		
		Ellip Dist.	115966.625 ft	0.026 ft		
LWES	PAUL	**Az.**	175°29'53"	0.033 sec	1 : 6360327	1 : 6359777
		ΔHt.	9.642 ft	0.067 ft		
		ΔElev.	5.780 ft	0.067 ft		
		Ellip Dist.	157773.352 ft	0.025 ft		

Date: 2/18/2013 11:41:41 AM	Project: P:\Y-2012\2012.0887\FieldData\Static BM Adjustment\BA27SM01_BA27SM02_adjust3.vce	Trimble Business Center

APPENDIX 7

Fully Constrained Network Adjustment Report

Project Information		Coordinate System	
Name:	P:\Y-2012\2012.0887\FieldData\Static BM Adjustment\BA27SM01_BA27SM02_adjust3.vce	Name:	US State Plane 1983 (2011)
Size:	481 KB	Datum:	NAD 1983 (2011)
Modified:	2/18/2013 9:49:56 AM (UTC:-6)	Zone:	Louisiana South 1702
Time zone:	Central Standard Time	Geoid:	GEOID12A (Conus)
Reference number:		Vertical datum:	
Description:			

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.002 ft

Centering Error: 0.005 ft

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 ft

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 ft

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2

Network Reference Factor: 1.00

Chi Square Test (95%): Passed

Precision Confidence Level: 95%

Degrees of Freedom: 23

Post Processed Vector Statistics

Reference Factor: 1.00
Redundancy Number: 23.00
A Priori Scalar: 4.50

Control Point Constraints

Point ID	Type	North σ (US survey foot)	East σ (US survey foot)	Height σ (US survey foot)	Elevation σ (US survey foot)
BCHS	Local	Fixed	Fixed	Fixed	
GRIS	Local	Fixed	Fixed	Fixed	
LWES	Local	Fixed	Fixed	Fixed	
PAUL	Local	Fixed	Fixed	Fixed	
Fixed = 0.000003(US survey foot)					

Adjusted Grid Coordinates

Point ID	Northing (US survey foot)	Northing Error (US survey foot)	Easting (US survey foot)	Easting Error (US survey foot)	Elevation (US survey foot)	Elevation Error (US survey foot)
BA27SM01R	392242.409	0.036	3651413.489	0.037	1.444	0.091
BA27SM02	390435.117	0.036	3662195.773	0.038	0.828	0.099
BCHS	495277.586	?	3707529.546	?	29.700	?
GRIS	281033.474	?	3719590.183	?	27.375	?
LWES	510595.832	?	3592587.482	?	33.428	?
PAUL	353430.321	?	3606321.437	?	39.083	?

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (US survey foot)	Height Error (US survey foot)	Constraint
BA27SM01R	N29°34'24.23297"	W90°10'03.17265"	-80.383	0.091	
BA27SM02	N29°34'05.24060"	W90°08'01.28615"	-80.902	0.099	
BCHS	N29°51'18.09183"	W89°59'14.00467"	-54.728	?	LLh
GRIS	N29°15'55.88300"	W89°57'26.26226"	-51.286	?	LLh
LWES	N29°54'01.29535"	W90°20'57.83368"	-51.542	?	LLh
PAUL	N29°28'04.28579"	W90°18'37.73539"	-42.024	?	LLh

Adjusted ECEF Coordinates

Point ID	X (US survey foot)	X Error (US survey foot)	Y (US survey foot)	Y Error (US survey foot)	Z (US survey foot)	Z Error (US survey foot)	3D Error (US survey foot)	Const
BA27SM01R	-53265.075	0.037	-18214207.562	0.082	10266780.390	0.054	0.105	
BA27SM02	-42504.087	0.038	-18215182.209	0.090	10265111.468	0.056	0.112	
BCHS	4048.554	?	-18163540.450	?	10355745.556	?	?	LLh
GRIS	13615.109	?	-18269300.529	?	10169272.032	?	?	LLh
LWES	-110715.033	?	-18154992.990	?	10370043.060	?	?	LLh
			-					

PAUL	-98805.984	?	18232962.889	?	10233400.895	?	?	LLH

Error Ellipse Components

Point ID	Semi-major axis (US survey foot)	Semi-minor axis (US survey foot)	Azimuth
BA27SM01R	0.046	0.045	78°
BA27SM02	0.047	0.045	93°

Adjusted GPS Observations

Transformation Parameters

Deflection in Latitude:	-0.022 sec **(95%)**	0.199 sec
Deflection in Longitude:	-0.008 sec **(95%)**	0.118 sec
Azimuth Rotation:	0.010 sec **(95%)**	0.034 sec
Scale Factor:	0.99999995 **(95%)**	0.00000016

Observation ID		Observation	A-posteriori Error	Residual	Standardized Residual
GRIS --> PAUL (PV21)	**Az.**	303°16'17"	0.034 sec	-0.070 sec	-1.383
	ΔHt.	9.308 ft	0.095 ft	-0.135 ft	-1.892
	Ellip Dist.	134430.614 ft	0.022 ft	-0.020 ft	-0.613
BCHS --> LWES (PV15)	**Az.**	278°15'50"	0.034 sec	0.113 sec	1.864
	ΔHt.	3.213 ft	0.106 ft	0.094 ft	1.173
	Ellip Dist.	115966.670 ft	0.019 ft	0.018 ft	0.525
LWES --> PAUL (PV18)	**Az.**	175°29'53"	0.034 sec	0.053 sec	1.208
	ΔHt.	9.464 ft	0.085 ft	-0.127 ft	-1.397
	Ellip Dist.	157773.433 ft	0.026 ft	0.047 ft	1.452
GRIS --> BA27SM02 (PV4)	**Az.**	333°00'17"	0.073 sec	0.002 sec	0.045

	ΔHt.	-29.569 ft	0.122 ft	0.047 ft	0.602
	Ellip Dist.	123545.551 ft	0.043 ft	-0.034 ft	-1.218
LWES --> BA27SM02 (PV16)	**Az.**	150°24'32"	0.063 sec	0.009 sec	0.194
	ΔHt.	-29.413 ft	0.114 ft	-0.075 ft	-1.120
	Ellip Dist.	138875.187 ft	0.041 ft	0.022 ft	0.738
LWES --> BA27SM01R (PV31)	**Az.**	154°03'48"	0.067 sec	-0.049 sec	-1.111
	ΔHt.	-28.891 ft	0.110 ft	-0.039 ft	-0.583
	Ellip Dist.	132174.960 ft	0.042 ft	0.009 ft	0.334
BCHS --> GRIS (PV9)	**Az.**	177°27'04"	0.034 sec	-0.003 sec	-0.107
	ΔHt.	3.370 ft	0.118 ft	0.080 ft	1.105
	Ellip Dist.	214592.066 ft	0.035 ft	-0.025 ft	-0.758
GRIS --> BA27SM01R (PV29)	**Az.**	329°10'36"	0.068 sec	-0.049 sec	-1.080
	ΔHt.	-29.047 ft	0.114 ft	-0.037 ft	-0.567
	Ellip Dist.	130446.330 ft	0.042 ft	0.006 ft	0.201
PAUL --> BA27SM01R (PV19)	**Az.**	49°47'33"	0.129 sec	-0.083 sec	-0.772
	ΔHt.	-38.355 ft	0.105 ft	0.077 ft	1.025
	Ellip Dist.	59497.487 ft	0.038 ft	0.008 ft	0.241
BCHS --> BA27SM02 (PV8)	**Az.**	204°03'23"	0.072 sec	0.060 sec	1.022
	ΔHt.	-26.200 ft	0.124 ft	0.086 ft	0.989
	Ellip Dist.	114230.825 ft	0.039 ft	-0.023 ft	-0.762
BA27SM01R --> BA27SM02 (PV1)	**Az.**	100°05'54"	0.831 sec	-0.280 sec	-0.553
	ΔHt.	-0.522 ft	0.120 ft	-0.009 ft	-0.130
	Ellip Dist.	10933.210 ft	0.045 ft	-0.009 ft	-0.340

Covariance Terms

From Point	To Point		Components	A-posteriori Error	Horiz. Precision (Ratio)	3D Precision (Ratio)
BA27SM01R	GRIS	**Az.**	149°04'24"	0.058 sec	1 : 3637167	1 : 3637756
		ΔHt.	29.097 ft	0.091 ft		
		ΔElev.	25.931 ft	0.091 ft		
		Ellip Dist.	130446.295 ft	0.036 ft		
BA27SM01R	LWES	**Az.**	334°09'12"	0.057 sec	1 : 3690645	1 : 3691240
		ΔHt.	28.841 ft	0.091 ft		
		ΔElev.	31.983 ft	0.091 ft		
		Ellip Dist.	132174.924 ft	0.036 ft		
BA27SM01R	PAUL	**Az.**	229°51'46"	0.125 sec	1 : 1627212	1 : 1626740
		ΔHt.	38.359 ft	0.091 ft		
		ΔElev.	37.639 ft	0.091 ft		
		Ellip Dist.	59497.471 ft	0.037 ft		
BA27SM02	BA27SM01R	**Az.**	280°06'54"	0.832 sec	1 : 241629	1 : 241642
		ΔHt.	0.519 ft	0.118 ft		
		ΔElev.	0.616 ft	0.118 ft		
		Ellip Dist.	10933.207 ft	0.045 ft		
BA27SM02	BCHS	**Az.**	23°59'02"	0.068 sec	1 : 3146339	1 : 3145613
		ΔHt.	26.174 ft	0.099 ft		
		ΔElev.	28.872 ft	0.099 ft		
		Ellip Dist.	114230.795 ft	0.036 ft		
BA27SM02	GRIS	**Az.**	152°55'05"	0.062 sec	1 : 3384961	1 : 3386043
		ΔHt.	29.616 ft	0.099 ft		
		ΔElev.	26.547 ft	0.099 ft		
		Ellip Dist.	123545.518 ft	0.036 ft		
BA27SM02	LWES	**Az.**	330°30'57"	0.055 sec	1 : 3799326	1 : 3800890

		ΔHt.	29.360 ft	0.099 ft		
		ΔElev.	32.600 ft	0.099 ft		
		Ellip Dist.	138875.149 ft	0.037 ft		
GRIS	BCHS	**Az.**	357°27'57"	0.000 sec	1 : 0	1 : 0
		ΔHt.	-3.442 ft	0.000 ft		
		ΔElev.	2.325 ft	0.000 ft		
		Ellip Dist.	214592.009 ft	0.000 ft		
GRIS	PAUL	**Az.**	303°16'17"	0.000 sec	1 : 0	1 : 0
		ΔHt.	9.262 ft	0.000 ft		
		ΔElev.	11.709 ft	0.000 ft		
		Ellip Dist.	134430.578 ft	0.000 ft		
LWES	BCHS	**Az.**	98°05'00"	0.000 sec	1 : 0	1 : 0
		ΔHt.	-3.186 ft	0.000 ft		
		ΔElev.	-3.728 ft	0.000 ft		
		Ellip Dist.	115966.639 ft	0.000 ft		
LWES	PAUL	**Az.**	175°29'53"	0.000 sec	1 : 0	1 : 0
		ΔHt.	9.518 ft	0.000 ft		
		ΔElev.	5.656 ft	0.000 ft		
		Ellip Dist.	157773.391 ft	0.000 ft		

Date: 2/18/2013 11:44:21 AM	Project: P:\Y-2012\2012.0887\FieldData\Static BM Adjustment\BA27SM01_BA27SM02_adjust3.vce	Trimble Business Center

APPENDIX 8

Loop Closures Report

Project Information		Coordinate System	
Name:	P:\Y-2012\2012.0887\FieldData\Static BM Adjustment\BA27SM01_BA27SM02_adjust3.vce	Name:	US State Plane 1983 (2011)
Size:	481 KB	Datum:	NAD 1983 (2011)
Modified:	2/18/2013 9:49:56 AM (UTC:-6)	Zone:	Louisiana South 1702
Time zone:	Central Standard Time	Geoid:	GEOID12A (Conus)
Reference number:		Vertical datum:	
Description:			

GNSS Loop Closure Results

Summary

Legs in loop: 3
Number of Loops: 6
Number Passed: 6
Number Failed: 0

	Length (US survey foot)	Δ3D (US survey foot)	ΔHoriz (US survey foot)	ΔVert (US survey foot)	PPM
Pass/Fail Criteria					1
Best		0.029	0.019	0.011	0.089
Worst		0.113	0.084	-0.094	0.428
Average Loop	340359.958	0.070	0.048	0.044	0.216
Standard Error	61652.725	0.075	0.054	0.052	0.105

Date: 2/18/2013 11:39:49 AM	Project: P:\Y-2012\2012.0887\FieldData\Static BM Adjustment\BA27SM01_BA27SM02_adjust3.vce	Trimble Business Center