HYDROTERRA TECHNOLOGIES, LLC
LAND SURVEY AND HYDROGRAPHIC SOLUTIONS

SURVEY METHODOLOGY REPORT

September 10, 2015

STATE OF LOUISIANA
COASTAL PROTECTION AND RESTORATION AUTHORITY (CPRA)

NORTHWEST TURTLE BAY MARSH CREATION (BA-125) EAST CELL

JEFFERSON PARISH, LA

Prepared by: HydroTerra Technologies, LLC
202 Jacobs Run Scott, LA 70583
(337)706-8219
www.hydroterratec.com

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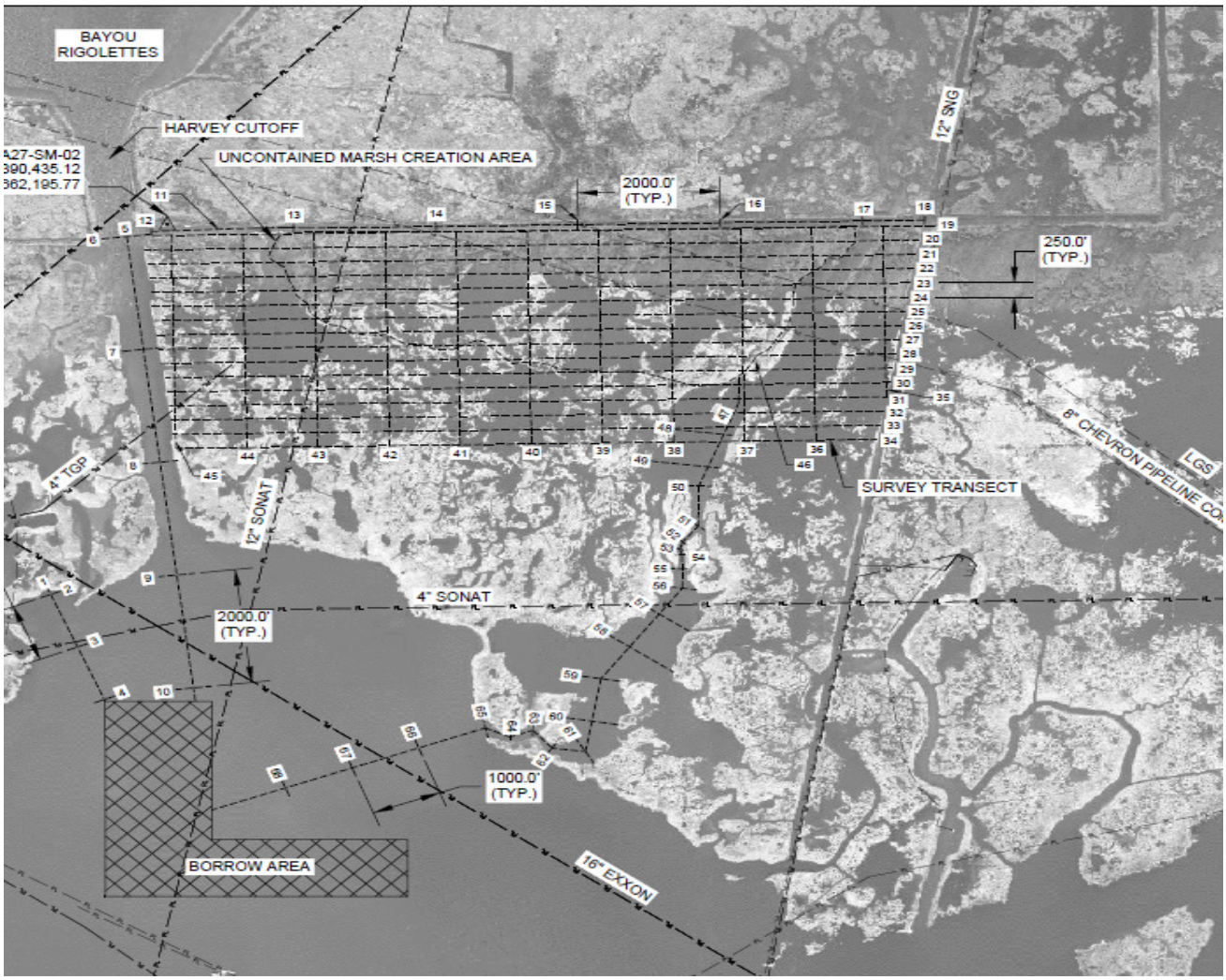
Section 1: General Project Description

Project Overview

The scope of this project was to perform topographic, bathymetric, and magnetometer surveys in the area of North Turtle Bay utilizing a combination of Real Time Kinematic GPS (RTK), electronic echo-sounding equipment and methodologies, and metal locators for the design purpose of creating and nourishing a determined amount of brackish marsh.

Vicinity Map



Section 2: Project Planning

Reference Systems and Project Control

Horizontal Datum (Epoch): NAD 83 (CORS) Louisiana South Zone (LA-1702) US feet.
Vertical Datum (Epoch): GPS derived NAVD 88 (GEOID12A – Epoch 2010.00) US feet.

All surveys performed were adjusted and calibrated to the specified secondary monument listed in the specifications as "BA27-SM-02" (See Appendix A) using industry accepted RTK GPS equipment and methodologies as outlined in this document.

Preparation of Survey Transects

All survey transects described in the "Scope" were converted using AutoCAD Civil 3D© and HYPACK© to a digital format that is compatible with the surveyor(s) task-specific data collection equipment for the use of navigation and preparation.

Section 3: East Marsh Creation Area Boundary Identification

Equipment

Equipment utilized during survey:

- Trimble GNSS R8 System (Including Receiver, Base and Data Collector).
- Airboat.
- Closed Cabin Survey Vessel.
- Fixed Height Aluminum Rod (8' or 10' in length) with a 6" diameter metal plate as the base of the rod

The manufacturer's specification sheets for each item can be found in **Appendix C** at the end of this document.

Methodology

Survey Control

The survey began with the location and verification of the project secondary monuments BA27-SM-01R and BA27-SM-02. Once the project monuments were located, visually inspected for integrity, and deemed undisturbed and suitable for use, a base receiver was then set on the monument.

Data Acquisition

The boundary of the East Marsh Creation Area (Transect #46 as shown on the plans) was delineated every 100' and marked with a stake/bamboo cane and pink flagging.

Data Processing

Topographic data was processed using Trimble Geomatics Office (TGO) software version 1.62. All processed data was then represented visually using an AutoCAD Civil 3D software version specified in the Scope for analysis.

Section 4: Marsh Creation Area Survey

Equipment

Equipment utilized during survey:

- Trimble GNSS R8 System (Including Receiver, Base and Data Collector)
- Closed Cabin Survey Vessel
- Airboat
- Fixed Height Aluminum Rod (8' or 10' in length) with a 6" diameter metal plate as the base of the rod

The manufacturer's specification sheets for each item can be found in **Appendix C** at the end of this document.

Methodology

Data Acquisition

Survey transects were provided digitally to the field surveyor for acquisition of data. Transects were spaced every 250' east-west and 1000' north-south as shown on the plans provided by the client.

Position, elevation, and water depth were recorded at a maximum point spacing of 25' along each transect or where elevation changes of greater than 0.5' occur. The use of a Fixed Height Aluminum Rod (8' or 10' in length) with a 6" diameter metal plate as the base of the rod to prevent the rod from sinking was utilized to collect topographic data where the use of bathymetric equipment is of no use.

Data Processing

Topographic data was processed using Trimble Geomatics Office (TGO) software version 1.62. All processed data was then represented visually using an AutoCAD Civil 3D software version specified in the Scope for analysis.

Section 5: Proposed Containment Location Surveys

Equipment

Equipment utilized during survey:

- Trimble GNSS R8 System (Including Receiver, Base and Data Collector)
- Closed Cabin Survey Vessel
- Airboat
- Fixed Height Aluminum Rod (8' or 10' in length) with a 6" diameter metal plate as the base of the rod.

The manufacturer's specification sheets for each item can be found in **Appendix C** at the end of this document.

Methodology

Data Acquisition

Survey transects were provided digitally to the field surveyor for acquisition of data. A profile line of existing cuts and tidal openings as shown on the plans provided by the client was surveyed. The profile line extended a minimum of 25' into the marsh on each side of the opening and shots were taken at intervals that showed a 0.5' or less change in elevation. . The use of a Fixed Height Aluminum Rod (8' or 10' in length) with a 6" diameter metal plate as the base of the rod to prevent the rod from sinking was utilized to collect topographic data where the use of bathymetric equipment is of no use.

Data Processing

Topographic data was processed using Trimble Geomatics Office (TGO) software version 1.62. All processed data was then represented visually using an AutoCAD Civil 3D software version specified in the Scope for analysis.

Section 6: Access Route and Centerline Survey

Equipment

Equipment planned to be utilized during survey:

- Trimble GNSS R8 System (Including Receiver, Base and Data Collector)
- Odom MKIII Depth Sounder with Dual Frequency Transducer (200khz/24kHz frequencies to be used during survey)
- YSI Cast Away CTD Probe (Velocimeter)
- Desktop Computer with Hypack© Navigation Software.
- Closed Cabin Survey Vessel

The manufacturer's specification sheets for each item can be found in **Appendix C** at the end of this document.

Methodology

Equipment Calibration for Bathymetric Surveys

Once the survey control was verified, the RTK system and the echo sounder transducer were hard mounted to the survey vessel using specially designed mounts welded to the hull on the bow or stern of the vessel.

The RTK antenna and transducer positional offsets were than measured and entered into the Hypack© Navigation Software for the tide and draft corrections to be applied (Fig. 1).

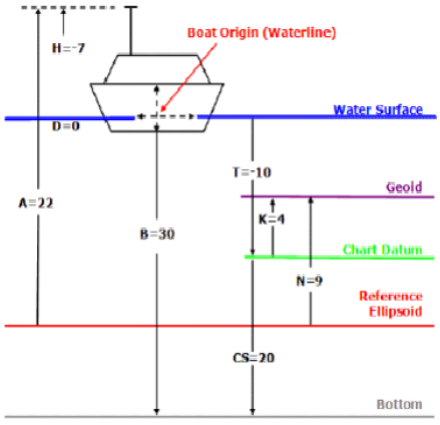


Fig. 1

A "Bar Check" of this system was then performed. First, the velocity probe will be lowered into the water within the project site down to the sea floor to obtain velocities throughout the water column and determine an average. The average water velocity will be entered into the echo sounder and set. Then, a 2' x 2' stainless steel plate will be lowered below the transducer at 5' increments down to the deepest survey depth to obtain the correct draft

and index of the transducer and to calibrate the water velocities at each five foot increment. The “Bar Check” will be recorded both on the thermal paper scroll on the echo sounder and electronically in the Odom E-chart Software.

Bar checks will be performed twice a day, prior to commencement and upon completion of each days surveys.

Data Acquisition

A bathymetric survey on the access route for the borrow area (Transects 1 and 47) was performed in the form of parallel transects and a centerline survey. Survey transects were spaced at approximately 1000’ and at points of inflection. Points, elevation and descriptions were recorded at a maximum 10’ point spacing.
In addition a bathymetric survey was performed on Transects 5 and 11 as shown on the pans. Survey transects were spaced every 2,000’ and at points of inflection and also a centerline survey was performed. Points, elevation and descriptions were recorded every 10’.

Data Processing

Bathymetric data was processed using Hypack Single Beam editor Version 2014. All processed data was then represented visually using an AutoCAD Civil 3D software version specified in the Scope for analysis.

Section 7: Magnetometer Survey

Equipment

Equipment planned to be utilized during survey:

- Trimble GNSS R8 System (Including Receiver, Base and Data Collector)
- Desktop Computer with Hypack© Navigation Software.
- Closed Cabin Survey Vessel
- Geometrics G-882 Cesium Magnetometer
- Subsurface Instruments MUL-1 (Underwater Magnetic Locator)
- Airboat
- Probe Rod

The manufacturer's specification sheets for each item can be found in **Appendix C** at the end of this document.

Methodology

Data Acquisition

The magnetometer survey utilized a Geometrics G-882 cesium magnetometer. It has an accuracy, at a minimum, of 0.1 nanotesla (gammas) and a sensitivity of 0.01 gammas. It was equipped with a digital altimeter accurate to 0.1 meters and a pressure sensor and have a sampling range of 0.1 to 4 hertz (Hz). Magnetometer readings were correlated to a position with RTK GPS and take into account speed and position of the towfish relative to the vessel using the Hypack© Navigation Software package.

HydroTerra performed a magnetometer survey in the proposed marsh creation area transects 20, 22, 26, 30, 34, 35-45 as shown on the plans.
In addition the magnetometer was run on transects 1, 5, 11 and 47 as shown on the plans. For each magnetic finding, HydroTerra run a closed loop path with the magnetometer. This path completely enclose the original finding location, while maintaining a distance of approximately 25' from that location. (A 25' radius or 25' x 25' rectangular path) HydroTerra determined the source (e.g., pipeline, well, etc.) of each finding. If a pipeline was detected, HydroTerra probed to the pipeline and determine the depth of cover and the elevation of the top of the pipeline.

Data Processing

Data was processed using Hypack Magnetometer Editor Version 2014-2015. All processed data was then represented visually using an AutoCAD Civil 3D software version specified in the Scope for analysis.

Section 8: Verification of Secondary Monument BA27-SM-02

As part of this survey, HydroTerra Technologies, LLC collected satellite data at the Base Station Receiver to verify the published coordinates of monument BA27-SM-02. (See **Appendix A** for Data Sheets as provided by the client).

Data was collected and stored on the receiver's onboard memory at a 15 second interval each day for the duration of the project. A 30 day sample of data was then processed by HydroTerra through NGS OPUS (Online Positioning User Service) to provide monument positions referenced to GEOID12A. These results (Appendix B) were than averaged together and compared to the published values (Figure 1).

After completion of the field work and when the precise emphersis was available a static survey on 3 days of data was performed to provide monument positions referenced to GEOID12A. These results (Figures 3, 4, 5) were than averaged together and compared to the published values (Figure 2).

Start	Stop	Obs Used	# Fixed Amb	Northing (Y) Meters	RMS (m)	Easting (X) Meters	RMS (m)	Ortho Height (m)	RMS (m)
6/1/2015 15:52	6/1/2015 19:44	9944 / 10360 : 96%	62 / 70 : 89%	119004.881	0.006	1116239.490	0.005	0.232	0.016
6/2/2015 13:03	6/2/2015 21:08	20652 / 21401 : 97%	96 / 108 : 89%	119004.882	0.013	1116239.493	0.008	0.209	0.026
6/3/2015 12:42	6/3/2015 17:21	11884 / 12208 : 97%	42 / 45 : 93%	119004.876	0.017	1116239.490	0.006	0.252	0.252
6/4/2015 12:28	6/4/2015 20:09	19293 / 20466 : 94%	115 / 126 : 91%	119004.883	0.010	1116239.494	0.011	0.232	0.024
6/5/2015 12:26	6/5/2015 16:18	10043 / 10296 : 98%	47 / 50 : 94%	119004.874	0.011	1116239.495	0.008	0.234	0.130
6/8/2015 19:00	6/8/2015 21:32	6734 / 7002 : 96%	28 / 33 : 85%	119004.868	0.012	1116239.502	0.044	0.238	0.093
6/10/2015 13:30	6/10/2015 20:58	17670 / 18317 : 96%	79 / 91 : 87%	119004.881	0.012	1116239.488	0.010	0.217	0.032
6/11/2015 13:06	6/11/2015 20:40	16868 / 17577 : 96%	71 / 81 : 88%	119004.873	0.021	1116239.487	0.020	0.217	0.071
6/23/2015 15:03	6/23/2015 20:47	14804 / 15415 : 96%	61 / 69 : 88%	119004.853	0.013	1116239.485	0.014	0.238	0.013
6/24/2015 16:05	6/24/2015 20:42	12405 / 12811 : 97%	54 / 65 : 83%	119004.880	0.011	1116239.498	0.032	0.221	0.041
6/25/2015 16:13	6/25/2015 20:26	10176 / 10455 : 97%	40 / 44 : 91%	119004.881	0.014	1116239.475	0.008	0.252	0.028
6/26/2015 13:18	6/26/2015 16:39	7575 / 8143 : 93%	34 / 47 : 72%	119004.878	0.024	1116239.506	0.007	0.263	0.024
6/29/2015 15:22	6/29/2015 20:53	13657 / 14933 : 91%	100 / 118 : 85%	119004.868	0.012	1116239.492	0.014	0.218	0.026
6/30/2015 13:02	6/30/2015 21:04	19424 / 20586 : 94%	107 / 114 : 94%	119004.870	0.019	1116239.490	0.005	0.182	0.035
7/1/2015 16:11	7/1/2015 19:50	9614 / 10164 : 95%	49 / 65 : 75%	119004.898	0.010	1116239.522	0.073	0.190	0.105
Average Meters				119004.876		1116239.494		0.232	
Average Feet				390435.165		3662195.739		0.761	
Published				390435.120		3662195.770		0.828	
Difference				-0.045		0.031		0.067	

Figure 1

Start	Stop	Northing (Y) USFT	Easting (X) USFT	Ortho Height (USFT)	Constrainment Point	RMS (USFT)
6/10/2015 13:30	6/10/2015 20:58	390435.149	3662195.697	0.779	ENG6	0.084
6/23/2015 15:03	6/23/2015 20:47	390435.092	3662195.688	0.857	GRIS	0.074
6/30/2015 13:02	6/30/2015 21:04	390435.140	3662195.724	0.759	HOUM	0.106
Average Feet		390435.127	3662195.703	0.798		
Published		390435.120	3662195.770	0.828		
Difference		**-0.007**	**0.067**	**0.030**		

Figure 2

Project file data		Coordinate System	
Name:	\\HYDROTERRA-NET\Hydroterra_Net\Projects\2015\2151031 - State of Louisiana (CPRA) - Northwest Turtle Bay Marsh Creation (BA-125)\OPUS\BA27-SM-02\Trimble Business Center Files\061015 Static Processing.vce	Name:	US State Plane 1983
		Datum:	NAD 1983 (Conus)
		Zone:	Louisiana South 1702
		Geoid:	GEOID12A (Conus)
		Vertical datum:	
Size:	336 KB		
Modified:	8/18/2015 7:49:27 AM (UTC:-5)		
Time zone:	Central Standard Time		
Reference number:			
Description:			

Point List

ID	Northing (US survey foot)	Easting (US survey foot)	Elevation (US survey foot)	Feature Code
BA27-SM-02	390435.149	3662195.697	0.779	
DSTR	533852.004	3581993.300	24.342	
ENG6	504231.392	3721732.391	28.841	DJ9601
GRIS	281033.485	3719590.181	27.219	DH7121
HOUM	397729.296	3474618.951	45.343	DG5315

9/8/2015 1:30:31 PM	\\HYDROTERRA-NET\Hydroterra_Net\Projects\2015\2151031 - State of Louisiana (CPRA) - Northwest Turtle Bay Marsh Creation (BA-125)\OPUS\BA27-SM-02\Trimble Business Center Files\061015 Static Processing.vce	Trimble Business Center

Figure 3

Project file data		Coordinate System	
Name:	\\HYDROTERRA-NET\Hydroterra_Net\Projects\2015\2151031 - State of Louisiana (CPRA) - Northwest Turtle Bay Marsh Creation (BA-125)\OPUS\BA27-SM-02\Trimble Business Center Files\062315 Static Processing.vce	Name:	US State Plane 1983
		Datum:	NAD 1983 (Conus)
		Zone:	Louisiana South 1702
		Geoid:	GEOID12A (Conus)
		Vertical datum:	
Size:	317 KB		
Modified:	8/18/2015 8:26:06 AM (UTC:-5)		
Time zone:	Central Standard Time		
Reference number:			
Description:			

Point List

ID	Easting (US survey foot)	Northing (US survey foot)	Elevation (US survey foot)	Feature Code
BA27-SM-02	3662195.688	390435.092	0.857	CP_MON BA27-SM-0
DSTR	3581993.307	533852.034	24.471	DH9596
ENG6	3721732.366	504231.415	28.961	DJ9601
GRIS	3719590.183	281033.474	27.375	DH7121
HOUM	3474618.962	397729.306	45.391	DG5315

Figure 4

Project file data		Coordinate System	
Name:	\\HYDROTERRA-NET\Hydroterra_Net\Projects\2015\2151031 - State of Louisiana (CPRA) - Northwest Turtle Bay Marsh Creation (BA-125)\OPUS\BA27-SM-02\Trimble Business Center Files\063015 Static Processing.vce	Name:	US State Plane 1983
		Datum:	NAD 1983 (Conus)
		Zone:	Louisiana South 1702
		Geoid:	GEOID12A (Conus)
		Vertical datum:	
Size:	338 KB		
Modified:	8/18/2015 8:43:49 AM (UTC:-5)		
Time zone:	Central Standard Time		
Reference number:			
Description:			

Point List

ID	Northing (US survey foot)	Easting (US survey foot)	Elevation (US survey foot)	Feature Code
BA27-SM-02	390435.140	3662195.724	0.759	
DSTR	533852.068	3581993.284	24.349	DH9596
ENG6	504231.423	3721732.396	28.873	DJ9601
GRIS	281033.503	3719590.169	27.324	DH7121
HOUM	397729.333	3474618.955	45.350	DG5315

9/8/2015 1:46:31 PM	\\HYDROTERRA-NET\Hydroterra_Net\Projects\2015\2151031 - State of Louisiana (CPRA) - Northwest Turtle Bay Marsh Creation (BA-125)\OPUS\BA27-SM-02\Trimble Business Center Files\063015 Static Processing.vce	Trimble Business Center

Figure 5

Section 9: Deliverables

After the preliminary deliverables were reviewed and accepted, final deliverables were created and sent to Mr. Thomas McLain CPRA, they included the following.

- Three (3) bound hard copies of the final survey report, data and drawings. Each binder included one (1) digital copy of the final survey report (Adobe PDF), data (Microsoft Excel) and drawings (AutoCad 2012 or later edition) on a compact disk.
- The Methodology report outlined the survey methodology employed in the field, survey control, calibrations, field equipment, field records and all other pertinent information.
- Survey data was provided in tables which showed the transect #, point number, northing, easting, elevation and description.
- Magnetometer survey data also included amplitude, duration and description for the probable causes of all magnetic anomalies.
- The drawing files conform to the CPRA AutoCAD Standards and are in AutoCAD *.dwg format. The plan view(s) are overlaid in conformance with Section 5.2.3. of the Scope and included the following.
    - Project name and number.
    - All elevations referenced to NAVD88.
    - All horizontal coordinates referenced to Louisiana State Plane Coordinates System South zone NAD83.
    - Survey monuments and TBM's indicated on plan view.
    - Transects shown in plan and profile and included mean high and mean low water levels.
    - Topography represented +/- 1.0 foot contours
    - Bathymetry represented +/- 2.0 foot contours.
    - Magnetometer survey track lines and readings shown in plan view.

APPENDIX A

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 B

FILE: 37261770.15o OP1438892107492

NGS OPUS SOLUTION REPORT
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All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: mike.nitska@hydroterratec.com DATE: August 06, 2015
RINEX FILE: 3726177n.15o TIME: 20:15:52 UTC

SOFTWARE: page5 1209.04 master52.pl 022814 START: 2015/06/26 13:18:00
EPHEMERIS: igs18505.eph [precise] STOP: 2015/06/26 16:39:00
NAV FILE: brdc1770.15n OBS USED: 7575 / 8143 : 93%
ANT NAME: TRMR8_GNSS NONE # FIXED AMB: 34 / 47 : 72%
ARP HEIGHT: 1.5 OVERALL RMS: 0.023(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2015.4839)

X:	-12954.732(m)	0.007(m)	-12955.515(m)	0.007(m)
Y:	-5552000.162(m)	0.014(m)	-5551998.658(m)	0.014(m)
Z:	3128812.429(m)	0.020(m)	3128812.246(m)	0.020(m)

LAT:	29 34 5.24114	0.024(m)	29 34 5.26004	0.024(m)
E LON:	269 51 58.71391	0.007(m)	269 51 58.68469	0.007(m)
W LON:	90 8 1.28609	0.007(m)	90 8 1.31531	0.007(m)
EL HGT:	-24.648(m)	0.012(m)	-26.044(m)	0.012(m)
ORTHO HGT:	0.263(m)	0.024(m) [NAVD88 (Computed using GEOID12B)]		

	UTM COORDINATES	STATE PLANE COORDINATES
	UTM (Zone 15)	SPC (1702 LA S)
Northing (Y) [meters]	3274360.839	119004.878
Easting (X) [meters]	777697.918	1116239.506
Convergence [degrees]	1.41531028	0.59983660
Point Scale	1.00055163	0.99995408
Combined Factor	1.00055550	0.99995795

US NATIONAL GRID DESIGNATOR: 15RYN7769774360(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DH7121	GRIS GRAND ISLE CORS ARP	N291555.883	W0895726.262	37656.6
DJ9603	LWES LAKEWOOD ELMENTRY CORS ARP	N295401.295	W0902057.833	42329.0
DP7419	INRI LOYOLA UNIVERSITY CORS ARP	N295613.211	W0900707.837	40914.8

NEAREST NGS PUBLISHED CONTROL POINT

AU2822	BAY 1934	N293252.806	W0900725.521	2437.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 37261531.15o OP1438891704389

NGS OPUS SOLUTION REPORT
==========

All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: mike.nitska@hydroterratec.com DATE: August 06, 2015
RINEX FILE: 3726153n.15o TIME: 20:09:21 UTC

SOFTWARE: page5 1209.04 master91.pl 022814 START: 2015/06/02 13:03:00
EPHEMERIS: igs18472.eph [precise] STOP: 2015/06/02 21:08:00
NAV FILE: brdc1530.15n OBS USED: 20652 / 21401 : 97%
ANT NAME: TRMR8_GNSS NONE # FIXED AMB: 96 / 108 : 89%
ARP HEIGHT: 1.5 OVERALL RMS: 0.021(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2015.4184)

X:	-12954.744(m)	0.008(m)	-12955.527(m)	0.008(m)
Y:	-5552000.113(m)	0.018(m)	-5551998.609(m)	0.018(m)
Z:	3128812.406(m)	0.006(m)	3128812.223(m)	0.006(m)

LAT:	29 34 5.24127	0.013(m)	29 34 5.26018	0.013(m)
E LON:	269 51 58.71346	0.008(m)	269 51 58.68424	0.008(m)
W LON:	90 8 1.28654	0.008(m)	90 8 1.31576	0.008(m)
EL HGT:	-24.702(m)	0.014(m)	-26.098(m)	0.014(m)
ORTHO HGT:	0.209(m)	0.026(m) [NAVD88 (Computed using GEOID12B)]		

	UTM COORDINATES UTM (Zone 15)	STATE PLANE COORDINATES SPC (1702 LA S)
Northing (Y) [meters]	3274360.843	119004.882
Easting (X) [meters]	777697.906	1116239.493
Convergence [degrees]	1.41531022	0.59983654
Point Scale	1.00055163	0.99995408
Combined Factor	1.00055551	0.99995796

US NATIONAL GRID DESIGNATOR: 15RYN7769774360(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DK3577	ENG5 ENGLISH TURN 5 CORS ARP	N295244.246	W0895630.197	39142.4
DJ9603	LWES LAKEWOOD ELMENTRY CORS ARP	N295401.295	W0902057.833	42329.0
DH7121	GRIS GRAND ISLE CORS ARP	N291555.883	W0895726.262	37656.6

NEAREST NGS PUBLISHED CONTROL POINT

AU2822	BAY 1934	N293252.806	W0900725.521	2437.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 37261540.15o OP1438891739866

NGS OPUS SOLUTION REPORT
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All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: mike.nitska@hydroterratec.com DATE: August 06, 2015
RINEX FILE: 3726154m.15o TIME: 20:09:43 UTC

SOFTWARE: page5 1209.04 master52.pl 022814 START: 2015/06/03 12:42:00
EPHEMERIS: igs18473.eph [precise] STOP: 2015/06/03 17:21:00
NAV FILE: brdc1540.15n OBS USED: 11884 / 12208 : 97%
ANT NAME: TRMR8_GNSS NONE # FIXED AMB: 42 / 45 : 93%
ARP HEIGHT: 1.5 OVERALL RMS: 0.018(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2015.4209)

X:	-12954.748(m)	0.006(m)	-12955.531(m)	0.006(m)
Y:	-5552000.153(m)	0.038(m)	-5551998.649(m)	0.038(m)
Z:	3128812.422(m)	0.019(m)	3128812.239(m)	0.019(m)

LAT:	29 34 5.24108	0.017(m)	29 34 5.25999	0.017(m)
E LON:	269 51 58.71332	0.006(m)	269 51 58.68410	0.006(m)
W LON:	90 8 1.28668	0.006(m)	90 8 1.31590	0.006(m)
EL HGT:	-24.659(m)	0.041(m)	-26.056(m)	0.041(m)
ORTHO HGT:	0.252(m)	0.070(m) [NAVD88 (Computed using GEOID12B)]		

	UTM COORDINATES	STATE PLANE COORDINATES
	UTM (Zone 15)	SPC (1702 LA S)
Northing (Y) [meters]	3274360.837	119004.876
Easting (X) [meters]	777697.902	1116239.490
Convergence [degrees]	1.41531020	0.59983652
Point Scale	1.00055163	0.99995408
Combined Factor	1.00055551	0.99995795

US NATIONAL GRID DESIGNATOR: 15RYN7769774360(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DK3577	ENG5 ENGLISH TURN 5 CORS ARP	N295244.246	W0895630.197	39142.4
DH7121	GRIS GRAND ISLE CORS ARP	N291555.883	W0895726.262	37656.6
DJ9603	LWES LAKEWOOD ELMENTRY CORS ARP	N295401.295	W0902057.833	42329.0

NEAREST NGS PUBLISHED CONTROL POINT

AU2822	BAY 1934	N293252.806	W0900725.521	2437.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 37261550.15o OP1438891826449

NGS OPUS SOLUTION REPORT
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All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: mike.nitska@hydroterratec.com DATE: August 06, 2015
RINEX FILE: 3726155m.15o TIME: 20:11:40 UTC

SOFTWARE: page5 1209.04 master91.pl 022814 START: 2015/06/04 12:28:00
EPHEMERIS: igs18474.eph [precise] STOP: 2015/06/04 20:09:00
NAV FILE: brdc1550.15n OBS USED: 19293 / 20466 : 94%
ANT NAME: TRMR8_GNSS NONE # FIXED AMB: 115 / 126 : 91%
ARP HEIGHT: 1.5 OVERALL RMS: 0.024(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2015.4238)

X:	-12954.743(m)	0.011(m)	-12955.526(m)	0.011(m)
Y:	-5552000.132(m)	0.007(m)	-5551998.628(m)	0.007(m)
Z:	3128812.418(m)	0.014(m)	3128812.235(m)	0.014(m)

LAT:	29 34 5.24131	0.010(m)	29 34 5.26021	0.010(m)
E LON:	269 51 58.71350	0.011(m)	269 51 58.68428	0.011(m)
W LON:	90 8 1.28650	0.011(m)	90 8 1.31572	0.011(m)
EL HGT:	-24.679(m)	0.012(m)	-26.076(m)	0.012(m)
ORTHO HGT:	0.232(m)	0.024(m) [NAVD88 (Computed using GEOID12B)]		

	UTM COORDINATES	STATE PLANE COORDINATES
	UTM (Zone 15)	SPC (1702 LA S)
Northing (Y) [meters]	3274360.844	119004.883
Easting (X) [meters]	777697.907	1116239.494
Convergence [degrees]	1.41531023	0.59983654
Point Scale	1.00055163	0.99995408
Combined Factor	1.00055551	0.99995796

US NATIONAL GRID DESIGNATOR: 15RYN7769774360(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DH7121	GRIS GRAND ISLE CORS ARP	N291555.883	W0895726.262	37656.6
DP7419	INRI LOYOLA UNIVERSITY CORS ARP	N295613.211	W0900707.837	40914.8
DK3577	ENG5 ENGLISH TURN 5 CORS ARP	N295244.246	W0895630.197	39142.4

NEAREST NGS PUBLISHED CONTROL POINT

AU2822	BAY 1934	N293252.806	W0900725.521	2437.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 37261560.15o OP1438891869117

NGS OPUS SOLUTION REPORT
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All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: mike.nitska@hydroterratec.com DATE: August 06, 2015
RINEX FILE: 3726156m.15o TIME: 20:11:42 UTC

SOFTWARE: page5 1209.04 master52.pl 022814 START: 2015/06/05 12:26:00
EPHEMERIS: igs18475.eph [precise] STOP: 2015/06/05 16:18:00
NAV FILE: brdc1560.15n OBS USED: 10043 / 10296 : 98%
ANT NAME: TRMR8_GNSS NONE # FIXED AMB: 47 / 50 : 94%
ARP HEIGHT: 1.5 OVERALL RMS: 0.019(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2015.4263)

X:	-12954.743(m)	0.008(m)	-12955.526(m)	0.008(m)
Y:	-5552000.138(m)	0.007(m)	-5551998.634(m)	0.007(m)
Z:	3128812.411(m)	0.009(m)	3128812.228(m)	0.009(m)

LAT:	29 34 5.24101	0.011(m)	29 34 5.25992	0.011(m)
E LON:	269 51 58.71350	0.008(m)	269 51 58.68428	0.008(m)
W LON:	90 8 1.28650	0.008(m)	90 8 1.31572	0.008(m)
EL HGT:	-24.677(m)	0.004(m)	-26.074(m)	0.004(m)
ORTHO HGT:	0.234(m)	0.013(m) [NAVD88 (Computed using GEOID12B)]		

	UTM COORDINATES	STATE PLANE COORDINATES
	UTM (Zone 15)	SPC (1702 LA S)
Northing (Y) [meters]	3274360.835	119004.874
Easting (X) [meters]	777697.907	1116239.495
Convergence [degrees]	1.41531022	0.59983654
Point Scale	1.00055163	0.99995408
Combined Factor	1.00055551	0.99995796

US NATIONAL GRID DESIGNATOR: 15RYN7769774360(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DK3577	ENG5 ENGLISH TURN 5 CORS ARP	N295244.246	W0895630.197	39142.4
DH7121	GRIS GRAND ISLE CORS ARP	N291555.883	W0895726.262	37656.6
DH9596	DSTR DESTREHAN H.S. CORS ARP	N295752.395	W0902256.006	50087.5

NEAREST NGS PUBLISHED CONTROL POINT

AU2822	BAY 1934	N293252.806	W0900725.521	2437.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 37261591.15o OP1438891910418

NGS OPUS SOLUTION REPORT
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All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: mike.nitska@hydroterratec.com DATE: August 06, 2015
RINEX FILE: 3726159t.15o TIME: 20:12:30 UTC

SOFTWARE: page5 1209.04 master93.pl 022814 START: 2015/06/08 19:00:00
EPHEMERIS: igs18481.eph [precise] STOP: 2015/06/08 21:32:00
NAV FILE: brdc1590.15n OBS USED: 6734 / 7002 : 96%
ANT NAME: TRMR8_GNSS NONE # FIXED AMB: 28 / 33 : 85%
ARP HEIGHT: 1.5 OVERALL RMS: 0.019(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2015.4352)

X:	-12954.736(m)	0.044(m)	-12955.519(m)	0.044(m)
Y:	-5552000.145(m)	0.052(m)	-5551998.641(m)	0.052(m)
Z:	3128812.407(m)	0.026(m)	3128812.224(m)	0.026(m)

LAT:	29 34 5.24079	0.012(m)	29 34 5.25969	0.012(m)
E LON:	269 51 58.71376	0.044(m)	269 51 58.68454	0.044(m)
W LON:	90 8 1.28624	0.044(m)	90 8 1.31546	0.044(m)
EL HGT:	-24.673(m)	0.054(m)	-26.070(m)	0.054(m)
ORTHO HGT:	0.238(m)	0.093(m) [NAVD88 (Computed using GEOID12B)]		

	UTM COORDINATES	STATE PLANE COORDINATES
	UTM (Zone 15)	SPC (1702 LA S)
Northing (Y) [meters]	3274360.828	119004.868
Easting (X) [meters]	777697.914	1116239.502
Convergence [degrees]	1.41531026	0.59983658
Point Scale	1.00055163	0.99995408
Combined Factor	1.00055551	0.99995795

US NATIONAL GRID DESIGNATOR: 15RYN7769774360(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DP7419	INRI LOYOLA UNIVERSITY CORS ARP	N295613.211	W0900707.837	40914.8
DH7121	GRIS GRAND ISLE CORS ARP	N291555.883	W0895726.262	37656.6
DK3577	ENG5 ENGLISH TURN 5 CORS ARP	N295244.246	W0895630.197	39142.4

NEAREST NGS PUBLISHED CONTROL POINT

AU2822	BAY 1934	N293252.806	W0900725.521	2437.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 37261610.15o OP1438891953483

NGS OPUS SOLUTION REPORT
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All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: mike.nitska@hydroterratec.com DATE: August 06, 2015
RINEX FILE: 3726161n.15o TIME: 20:13:10 UTC

SOFTWARE: page5 1209.04 master51.pl 022814 START: 2015/06/10 13:30:00
EPHEMERIS: igs18483.eph [precise] STOP: 2015/06/10 20:58:00
NAV FILE: brdc1610.15n OBS USED: 17670 / 18317 : 96%
ANT NAME: TRMR8_GNSS NONE # FIXED AMB: 79 / 91 : 87%
ARP HEIGHT: 1.5 OVERALL RMS: 0.019(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2015.4404)

X:	-12954.749(m)	0.010(m)	-12955.532(m)	0.010(m)
Y:	-5552000.120(m)	0.018(m)	-5551998.616(m)	0.018(m)
Z:	3128812.409(m)	0.008(m)	3128812.226(m)	0.008(m)

LAT:	29 34 5.24124	0.012(m)	29 34 5.26015	0.012(m)
E LON:	269 51 58.71328	0.010(m)	269 51 58.68406	0.010(m)
W LON:	90 8 1.28672	0.010(m)	90 8 1.31594	0.010(m)
EL HGT:	-24.694(m)	0.017(m)	-26.091(m)	0.017(m)
ORTHO HGT:	0.217(m)	0.032(m) [NAVD88 (Computed using GEOID12B)]		

	UTM COORDINATES	STATE PLANE COORDINATES
	UTM (Zone 15)	SPC (1702 LA S)
Northing (Y) [meters]	3274360.842	119004.881
Easting (X) [meters]	777697.901	1116239.488
Convergence [degrees]	1.41531020	0.59983651
Point Scale	1.00055163	0.99995408
Combined Factor	1.00055551	0.99995796

US NATIONAL GRID DESIGNATOR: 15RYN7769774360(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DP7419	INRI LOYOLA UNIVERSITY CORS ARP	N295613.211	W0900707.837	40914.8
DJ9603	LWES LAKEWOOD ELMENTRY CORS ARP	N295401.295	W0902057.833	42329.0
DH9596	DSTR DESTREHAN H.S. CORS ARP	N295752.395	W0902256.006	50087.5

NEAREST NGS PUBLISHED CONTROL POINT

AU2822	BAY 1934	N293252.806	W0900725.521	2437.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 37261620.15o OP1438891980549

NGS OPUS SOLUTION REPORT
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All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: mike.nitska@hydroterratec.com DATE: August 06, 2015
RINEX FILE: 3726162n.15o TIME: 20:13:37 UTC

SOFTWARE: page5 1209.04 master52.pl 022814 START: 2015/06/11 13:06:00
EPHEMERIS: igs18484.eph [precise] STOP: 2015/06/11 20:40:00
NAV FILE: brdc1620.15n OBS USED: 16868 / 17577 : 96%
ANT NAME: TRMR8_GNSS NONE # FIXED AMB: 71 / 81 : 88%
ARP HEIGHT: 1.5 OVERALL RMS: 0.021(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2015.4430)

X:	-12954.750(m)	0.020(m)	-12955.533(m)	0.020(m)
Y:	-5552000.124(m)	0.030(m)	-5551998.620(m)	0.030(m)
Z:	3128812.402(m)	0.030(m)	3128812.219(m)	0.030(m)

LAT:	29 34 5.24098	0.021(m)	29 34 5.25989	0.021(m)
E LON:	269 51 58.71324	0.020(m)	269 51 58.68402	0.020(m)
W LON:	90 8 1.28676	0.020(m)	90 8 1.31598	0.020(m)
EL HGT:	-24.694(m)	0.041(m)	-26.091(m)	0.041(m)
ORTHO HGT:	0.217(m)	0.071(m) [NAVD88 (Computed using GEOID12B)]		

	UTM COORDINATES	STATE PLANE COORDINATES
	UTM (Zone 15)	SPC (1702 LA S)
Northing (Y) [meters]	3274360.834	119004.873
Easting (X) [meters]	777697.900	1116239.487
Convergence [degrees]	1.41531019	0.59983651
Point Scale	1.00055163	0.99995408
Combined Factor	1.00055551	0.99995796

US NATIONAL GRID DESIGNATOR: 15RYN7769774360(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DH7121	GRIS GRAND ISLE CORS ARP	N291555.883	W0895726.262	37656.6
DK3577	ENG5 ENGLISH TURN 5 CORS ARP	N295244.246	W0895630.197	39142.5
DH9596	DSTR DESTREHAN H.S. CORS ARP	N295752.395	W0902256.006	50087.5

NEAREST NGS PUBLISHED CONTROL POINT

AU2822	BAY 1934	N293252.806	W0900725.521	2437.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 37261740.15o OP1438892022226

NGS OPUS SOLUTION REPORT
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All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: mike.nitska@hydroterratec.com DATE: August 06, 2015
RINEX FILE: 3726174p.15o TIME: 20:14:20 UTC

SOFTWARE: page5 1209.04 master93.pl 022814 START: 2015/06/23 15:03:00
EPHEMERIS: igs18502.eph [precise] STOP: 2015/06/23 20:47:00
NAV FILE: brdc1740.15n OBS USED: 14804 / 15415 : 96%
ANT NAME: TRMR8_GNSS NONE # FIXED AMB: 61 / 69 : 88%
ARP HEIGHT: 1.5 OVERALL RMS: 0.027(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2015.4760)

X:	-12954.753(m)	0.014(m)	-12955.536(m)	0.014(m)
Y:	-5552000.152(m)	0.007(m)	-5551998.648(m)	0.007(m)
Z:	3128812.395(m)	0.011(m)	3128812.212(m)	0.011(m)

LAT:	29 34 5.24034	0.013(m)	29 34 5.25924	0.013(m)
E LON:	269 51 58.71313	0.014(m)	269 51 58.68391	0.014(m)
W LON:	90 8 1.28687	0.014(m)	90 8 1.31609	0.014(m)
EL HGT:	-24.673(m)	0.004(m)	-26.070(m)	0.004(m)
ORTHO HGT:	0.238(m)	0.013(m) [NAVD88 (Computed using GEOID12B)]		

	UTM COORDINATES	STATE PLANE COORDINATES
	UTM (Zone 15)	SPC (1702 LA S)
Northing (Y) [meters]	3274360.814	119004.853
Easting (X) [meters]	777697.897	1116239.485
Convergence [degrees]	1.41531016	0.59983649
Point Scale	1.00055163	0.99995408
Combined Factor	1.00055551	0.99995795

US NATIONAL GRID DESIGNATOR: 15RYN7769774360(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DJ9603	LWES LAKEWOOD ELMENTRY CORS ARP	N295401.295	W0902057.833	42329.0
DH7121	GRIS GRAND ISLE CORS ARP	N291555.883	W0895726.262	37656.6
DK3577	ENG5 ENGLISH TURN 5 CORS ARP	N295244.246	W0895630.197	39142.5

NEAREST NGS PUBLISHED CONTROL POINT

AU2822	BAY 1934	N293252.806	W0900725.521	2437.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 37261750.15o OP1438892053988

NGS OPUS SOLUTION REPORT
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All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: mike.nitska@hydroterratec.com DATE: August 06, 2015
RINEX FILE: 3726175q.15o TIME: 20:14:51 UTC

SOFTWARE: page5 1209.04 master92.pl 022814 START: 2015/06/24 16:05:00
EPHEMERIS: igs18503.eph [precise] STOP: 2015/06/24 20:42:30
NAV FILE: brdc1750.15n OBS USED: 12405 / 12811 : 97%
ANT NAME: TRMR8_GNSS NONE # FIXED AMB: 54 / 65 : 83%
ARP HEIGHT: 1.5 OVERALL RMS: 0.023(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2015.4788)

X:	-12954.739(m)	0.032(m)	-12955.522(m)	0.032(m)
Y:	-5552000.124(m)	0.021(m)	-5551998.620(m)	0.021(m)
Z:	3128812.410(m)	0.017(m)	3128812.227(m)	0.017(m)

LAT:	29 34 5.24121	0.011(m)	29 34 5.26011	0.011(m)
E LON:	269 51 58.71365	0.032(m)	269 51 58.68443	0.032(m)
W LON:	90 8 1.28635	0.032(m)	90 8 1.31557	0.032(m)
EL HGT:	-24.690(m)	0.023(m)	-26.087(m)	0.023(m)
ORTHO HGT:	0.221(m)	0.041(m)	[NAVD88 (Computed using GEOID12B)]	

	UTM COORDINATES UTM (Zone 15)	STATE PLANE COORDINATES SPC (1702 LA S)
Northing (Y) [meters]	3274360.841	119004.880
Easting (X) [meters]	777697.911	1116239.498
Convergence [degrees]	1.41531025	0.59983656
Point Scale	1.00055163	0.99995408
Combined Factor	1.00055551	0.99995796

US NATIONAL GRID DESIGNATOR: 15RYN7769774360(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DJ9603	LWES LAKEWOOD ELMENTRY CORS ARP	N295401.295	W0902057.833	42329.0
DH7121	GRIS GRAND ISLE CORS ARP	N291555.883	W0895726.262	37656.6
DP7419	INRI LOYOLA UNIVERSITY CORS ARP	N295613.211	W0900707.837	40914.8

NEAREST NGS PUBLISHED CONTROL POINT

AU2822	BAY 1934	N293252.806	W0900725.521	2437.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 37261760.15o OP1438892080093

NGS OPUS SOLUTION REPORT
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All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: mike.nitska@hydroterratec.com DATE: August 06, 2015
RINEX FILE: 3726176q.15o TIME: 20:15:21 UTC

SOFTWARE: page5 1209.04 master93.pl 022814 START: 2015/06/25 16:13:00
EPHEMERIS: igs18504.eph [precise] STOP: 2015/06/25 20:26:00
NAV FILE: brdc1760.15n OBS USED: 10176 / 10455 : 97%
ANT NAME: TRMR8_GNSS NONE # FIXED AMB: 40 / 44 : 91%
ARP HEIGHT: 1.5 OVERALL RMS: 0.025(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2015.4815)

X:	-12954.762(m)	0.008(m)	-12955.545(m)	0.008(m)
Y:	-5552000.151(m)	0.019(m)	-5551998.647(m)	0.019(m)
Z:	3128812.426(m)	0.005(m)	3128812.243(m)	0.005(m)

LAT:	29 34 5.24123	0.014(m)	29 34 5.26013	0.014(m)
E LON:	269 51 58.71280	0.008(m)	269 51 58.68358	0.008(m)
W LON:	90 8 1.28720	0.008(m)	90 8 1.31642	0.008(m)
EL HGT:	-24.659(m)	0.015(m)	-26.055(m)	0.015(m)
ORTHO HGT:	0.252(m)	0.028(m) [NAVD88 (Computed using GEOID12B)]		

	UTM COORDINATES	STATE PLANE COORDINATES
	UTM (Zone 15)	SPC (1702 LA S)
Northing (Y) [meters]	3274360.841	119004.881
Easting (X) [meters]	777697.888	1116239.475
Convergence [degrees]	1.41531013	0.59983644
Point Scale	1.00055163	0.99995408
Combined Factor	1.00055550	0.99995795

US NATIONAL GRID DESIGNATOR: 15RYN7769774360(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DH9596	DSTR DESTREHAN H.S. CORS ARP	N295752.395	W0902256.006	50087.5
DK3577	ENG5 ENGLISH TURN 5 CORS ARP	N295244.246	W0895630.197	39142.4
DJ9603	LWES LAKEWOOD ELMENTRY CORS ARP	N295401.295	W0902057.833	42329.0

NEAREST NGS PUBLISHED CONTROL POINT

AU2822	BAY 1934	N293252.806	W0900725.521	2437.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 37261770.15o OP1438892107492

NGS OPUS SOLUTION REPORT
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All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: mike.nitska@hydroterratec.com DATE: August 06, 2015
RINEX FILE: 3726177n.15o TIME: 20:15:52 UTC

SOFTWARE: page5 1209.04 master52.pl 022814 START: 2015/06/26 13:18:00
EPHEMERIS: igs18505.eph [precise] STOP: 2015/06/26 16:39:00
NAV FILE: brdc1770.15n OBS USED: 7575 / 8143 : 93%
ANT NAME: TRMR8_GNSS NONE # FIXED AMB: 34 / 47 : 72%
ARP HEIGHT: 1.5 OVERALL RMS: 0.023(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2015.4839)

X:	-12954.732(m)	0.007(m)	-12955.515(m)	0.007(m)
Y:	-5552000.162(m)	0.014(m)	-5551998.658(m)	0.014(m)
Z:	3128812.429(m)	0.020(m)	3128812.246(m)	0.020(m)

LAT:	29 34 5.24114	0.024(m)	29 34 5.26004	0.024(m)
E LON:	269 51 58.71391	0.007(m)	269 51 58.68469	0.007(m)
W LON:	90 8 1.28609	0.007(m)	90 8 1.31531	0.007(m)
EL HGT:	-24.648(m)	0.012(m)	-26.044(m)	0.012(m)
ORTHO HGT:	0.263(m)	0.024(m) [NAVD88 (Computed using GEOID12B)]		

	UTM COORDINATES	STATE PLANE COORDINATES
	UTM (Zone 15)	SPC (1702 LA S)
Northing (Y) [meters]	3274360.839	119004.878
Easting (X) [meters]	777697.918	1116239.506
Convergence [degrees]	1.41531028	0.59983660
Point Scale	1.00055163	0.99995408
Combined Factor	1.00055550	0.99995795

US NATIONAL GRID DESIGNATOR: 15RYN7769774360(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DH7121	GRIS GRAND ISLE CORS ARP	N291555.883	W0895726.262	37656.6
DJ9603	LWES LAKEWOOD ELMENTRY CORS ARP	N295401.295	W0902057.833	42329.0
DP7419	INRI LOYOLA UNIVERSITY CORS ARP	N295613.211	W0900707.837	40914.8

NEAREST NGS PUBLISHED CONTROL POINT

AU2822	BAY 1934	N293252.806	W0900725.521	2437.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 37261801.15o OP1438892139117

NGS OPUS SOLUTION REPORT
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All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: mike.nitska@hydroterratec.com DATE: August 06, 2015
RINEX FILE: 3726180p.15o TIME: 20:16:24 UTC

SOFTWARE: page5 1209.04 master93.pl 022814 START: 2015/06/29 15:22:00
EPHEMERIS: igs18511.eph [precise] STOP: 2015/06/29 20:53:00
NAV FILE: brdc1800.15n OBS USED: 13657 / 14933 : 91%
ANT NAME: TRMR8_GNSS NONE # FIXED AMB: 100 / 118 : 85%
ARP HEIGHT: 1.5 OVERALL RMS: 0.023(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2015.4925)

X:	-12954.746(m)	0.014(m)	-12955.529(m)	0.014(m)
Y:	-5552000.127(m)	0.018(m)	-5551998.623(m)	0.018(m)
Z:	3128812.398(m)	0.004(m)	3128812.215(m)	0.004(m)

LAT:	29 34 5.24082	0.012(m)	29 34 5.25973	0.012(m)
E LON:	269 51 58.71339	0.014(m)	269 51 58.68417	0.014(m)
W LON:	90 8 1.28661	0.014(m)	90 8 1.31583	0.014(m)
EL HGT:	-24.693(m)	0.014(m)	-26.090(m)	0.014(m)
ORTHO HGT:	0.218(m)	0.026(m) [NAVD88 (Computed using GEOID12B)]		

	UTM COORDINATES	STATE PLANE COORDINATES
	UTM (Zone 15)	SPC (1702 LA S)
Northing (Y) [meters]	3274360.829	119004.868
Easting (X) [meters]	777697.904	1116239.492
Convergence [degrees]	1.41531021	0.59983653
Point Scale	1.00055163	0.99995408
Combined Factor	1.00055551	0.99995796

US NATIONAL GRID DESIGNATOR: 15RYN7769774360(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DH7121	GRIS GRAND ISLE CORS ARP	N291555.883	W0895726.262	37656.6
DH9596	DSTR DESTREHAN H.S. CORS ARP	N295752.395	W0902256.006	50087.5
DK3577	ENG5 ENGLISH TURN 5 CORS ARP	N295244.246	W0895630.197	39142.4

NEAREST NGS PUBLISHED CONTROL POINT

AU2822	BAY 1934	N293252.806	W0900725.521	2437.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 37261810.15o OP1438892190083

NGS OPUS SOLUTION REPORT
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All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: mike.nitska@hydroterratec.com DATE: August 06, 2015
RINEX FILE: 3726181n.15o TIME: 20:17:16 UTC

SOFTWARE: page5 1209.04 master51.pl 022814 START: 2015/06/30 13:02:00
EPHEMERIS: igs18512.eph [precise] STOP: 2015/06/30 21:04:00
NAV FILE: brdc1810.15n OBS USED: 19424 / 20586 : 94%
ANT NAME: TRMR8_GNSS NONE # FIXED AMB: 107 / 114 : 94%
ARP HEIGHT: 1.5 OVERALL RMS: 0.025(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2015.4951)

X:	-12954.747(m)	0.005(m)	-12955.531(m)	0.005(m)
Y:	-5552000.095(m)	0.022(m)	-5551998.591(m)	0.022(m)
Z:	3128812.382(m)	0.013(m)	3128812.199(m)	0.013(m)

LAT:	29 34 5.24088	0.019(m)	29 34 5.25979	0.019(m)
E LON:	269 51 58.71335	0.005(m)	269 51 58.68409	0.005(m)
W LON:	90 8 1.28665	0.005(m)	90 8 1.31591	0.005(m)
EL HGT:	-24.729(m)	0.020(m)	-26.126(m)	0.020(m)
ORTHO HGT:	0.182(m)	0.035(m) [NAVD88 (Computed using GEOID12B)]		

	UTM COORDINATES	STATE PLANE COORDINATES
	UTM (Zone 15)	SPC (1702 LA S)
Northing (Y) [meters]	3274360.831	119004.870
Easting (X) [meters]	777697.903	1116239.490
Convergence [degrees]	1.41531020	0.59983652
Point Scale	1.00055163	0.99995408
Combined Factor	1.00055552	0.99995796

US NATIONAL GRID DESIGNATOR: 15RYN7769774360(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DJ9603	LWES LAKEWOOD ELMENTRY CORS ARP	N295401.295	W0902057.833	42329.0
DH7121	GRIS GRAND ISLE CORS ARP	N291555.883	W0895726.262	37656.6
DH9596	DSTR DESTREHAN H.S. CORS ARP	N295752.395	W0902256.006	50087.5

NEAREST NGS PUBLISHED CONTROL POINT

AU2822	BAY 1934	N293252.806	W0900725.521	2437.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 37261820.15o OP1438892215699

NGS OPUS SOLUTION REPORT
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All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: mike.nitska@hydroterratec.com DATE: August 06, 2015
RINEX FILE: 3726182q.15o TIME: 20:17:34 UTC

SOFTWARE: page5 1209.04 master91.pl 022814 START: 2015/07/01 16:11:00
EPHEMERIS: igs18513.eph [precise] STOP: 2015/07/01 19:50:30
NAV FILE: brdc1820.15n OBS USED: 9614 / 10164 : 95%
ANT NAME: TRMR8_GNSS NONE # FIXED AMB: 49 / 65 : 75%
ARP HEIGHT: 1.5 OVERALL RMS: 0.024(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2015.4979)

X:	-12954.715(m)	0.074(m)	-12955.499(m)	0.074(m)
Y:	-5552000.088(m)	0.057(m)	-5551998.584(m)	0.057(m)
Z:	3128812.410(m)	0.025(m)	3128812.227(m)	0.025(m)

LAT:	29 34 5.24179	0.010(m)	29 34 5.26069	0.010(m)
E LON:	269 51 58.71454	0.073(m)	269 51 58.68528	0.073(m)
W LON:	90 8 1.28546	0.073(m)	90 8 1.31472	0.073(m)
EL HGT:	-24.721(m)	0.062(m)	-26.118(m)	0.062(m)
ORTHO HGT:	0.190(m)	0.105(m) [NAVD88 (Computed using GEOID12B)]		

	UTM COORDINATES (UTM (Zone 15))	STATE PLANE COORDINATES (SPC (1702 LA S))
Northing (Y) [meters]	3274360.860	119004.898
Easting (X) [meters]	777697.934	1116239.522
Convergence [degrees]	1.41531038	0.59983669
Point Scale	1.00055163	0.99995408
Combined Factor	1.00055551	0.99995796

US NATIONAL GRID DESIGNATOR: 15RYN7769774360(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DP7419	INRI LOYOLA UNIVERSITY CORS ARP	N295613.211	W0900707.837	40914.8
DH7121	GRIS GRAND ISLE CORS ARP	N291555.883	W0895726.262	37656.6
DH9596	DSTR DESTREHAN H.S. CORS ARP	N295752.395	W0902256.006	50087.5

NEAREST NGS PUBLISHED CONTROL POINT

AU2822	BAY 1934	N293252.806	W0900725.521	2437.7

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

APPENDIX C

NEW

The CastAway™-CTD

with profiling and analysis software

The YSI CastAway-CTD is a lightweight, easy to use hydrographic instrument designed for quick and accurate conductivity, temperature, and depth profiles. Starting with a unique six-electrode array and a flow-through cell, the CastAway makes use of commercial Bluetooth and GPS technology to make an instrument that is as usable as it is accurate.

The CastAway is a multi-functional tool that incorporates the most modern technology available - yet is simple to use. It is designed for CTD profiling down to 100 m and is easy to deploy.

The palm-sized CastAway-CTD can easily be deployed by hand. Each cast is referenced with both time and location using its built-in GPS receiver. Latitude and longitude are acquired both before and after each profile. Plots of conductivity, temperature, salinity and sound speed versus depth can be viewed immediately on the CastAway's integrated color LCD screen in the field.

Raw data can be easily downloaded via Bluetooth to a Windows computer for detailed analysis and/or export at any time. Rugged, non-corrosive housing, AA battery power and tool-free operation reflect the technician-friendly pedigree of the CastAway-CTD. So do the simple, intuitive features – everything an operator needs to know about deploying the CastAway-CTD, viewing data and downloading the files fits in the lunchbox-sized carrying case.

The CastAway-CTD
Instant, reliable data in the palm of your hand!

Best used in:

- Coastal Oceanography
- Hydrology
- Aquaculture/Fisheries

When needed for:

- Saltwater Intrusion
- Surveying/Hydrography
- Sound Velocity Profiles
- Field Sensor Verification
- Estuarine Research

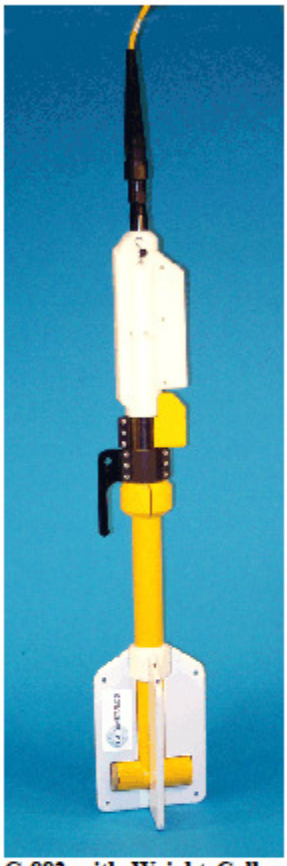
- *GPS position, date and time*
- *Fast sampling and sensor response*
- *Waterproof interface works in and out of the water*
- *Bluetooth wireless communication*
- *No user calibration required*
- *No tools, computers or cables required!*

Pure Data for a Healthy Planet.®

www.ysi.com/castaway

G-882 MARINE MAGNETOMETER

- ***CESIUM VAPOR HIGH PERFORMANCE – Highest detection range and probability of detecting all sized ferrous targets***
- ***NEW STREAMLINED DESIGN FOR TOW SAFETY – Low probability of fouling in lines or rocks***
- ***NEW QUICK CONVERSION FROM NOSE TOW TO CG TOW – Simply remove an aluminum locking pin, move tow point and reinsert. New built in easy carry handle!***
- ***NEW INTERNAL CM-221 COUNTER MODULE – Provides Flash Memory for storage of default parameters set by user***
- ***NEW ECHOSOUNDER / ALTIMETER OPTION***
- ***NEW DEPTH RATING – 4,000 psi !***
- ***HIGHEST SENSITIVITY IN THE INDUSTRY – 0.004 nT/√Hz RMS with the internal CM-221 Mini-Counter***
- ***EASY PORTABILITY & HANDLING – no winch required, single man operation, only 44 lbs with 200 ft cable (without weights)***
- ***COMBINE TWO SYSTEMS FOR INCREASED COVERAGE – Internal CM-221 Mini-Counter provides multi-sensor data concatenation allowing side by side coverage which maximizes detection of small targets and reduces noise***



G-882 with Weight Collar Depth Option & Altimeter

Very high resolution Cesium Vapor performance is now available in a low cost, small size system for professional surveys in shallow or deep water. High sensitivity and sample rates are maintained for all applications. The well proven Cesium sensor is combined with a unique and new CM-221 Larmor counter and ruggedly packaged for small or large boat operation. Use your computer and standard printer with our MagLogLite™ software to log, display and print GPS position and magnetic field data. The G–882 is the lowest priced high performance full range marine magnetometer system ever offered.

The G-882 offers flexibility for operation from small boat, shallow water surveys as well as deep tow applications (4,000 psi rating, telemetry over steel coax available to 10Km). The G-882 also directly interfaces to all major Side Scan manufacturers for tandem tow configurations. Being small and lightweight (44 lbs net, without weights) it is easily deployed and operated by one person. But add several streamlined weight collars and the system can quickly weigh more than 100 lbs. for deep tow applications. Power may be supplied from a 24 to 30 VDC battery power or the included 110/220 VAC power supply. The tow cable employs high strength Kevlar strain member with a standard length of 200 ft (61 m) and optional cable length up to 500m with no telemetry required.

A rugged fiber-wound fiberglass housing is designed for operation is all parts of the world allowing sensor rotation for work in equatorial regions. The shipboard end of the tow cable is attached to an included junction box or optional on-board cable for quick and simple hookup to power and output of data into any Windows 98, ME, NT, 2000 or XP computer equipped with RS-232 serial ports.

The G-882 Cesium magnetometer provides the same operating sensitivity and sample rates as the larger deep tow model G-880. MagLogLite™ Logging Software is offered with each magnetometer and allows recording and display of data and position with Automatic Anomaly Detection and automatic anomaly printing on Windows™ printer! Additional options include: MagMap2000 plotting and contouring software and post acquisition processing software MagPick™ (free from our website.)

ECHOTRAC™ MKIII

MODEL DF3200

- Interchangeable paper chart or color LCD
- Frequency agile (both channels)
- Internal data storage and playback with color LCD
- Four serial ports and Ethernet interface
- Optional built-in DGPS
- AC/DC power input

TELEDYNE
ODOM HYDROGRAPHIC
A Teledyne Technologies Company

TRIMBLE R8 GNSS SYSTEM

KEY FEATURES

Advanced satellite tracking with Trimble 360 receiver technology

Includes Trimble Maxwell 6 chips with 440 channels

Unmatched GNSS tracking performance

Web user interface and remote configuration

Base and rover communications options to suit any application

THE INDUSTRY LEADING TOTAL GNSS SOLUTION

The Trimble® R8 GNSS system has long set the bar for advanced GNSS surveying systems. Through advanced Trimble 360 tracking technology and a comprehensive set of communication options integrated into a flexible system design, this integrated GNSS system delivers industry-leading performance. For surveyors facing demanding RTK applications, the Trimble R8 is an invaluable GNSS partner.

TRIMBLE 360 RECEIVER TECHNOLOGY

Future-proof your investment

Powerful Trimble 360 receiver technology integrated in the Trimble R8 supports signals from all existing and planned GNSS constellations and augmentation systems providing unmatched GNSS tracking performance. With this leading-edge technology, it is now possible for surveyors to expand the reach of their GNSS rovers into areas that were previously too obscured, such as under trees and in dense urban areas.

With two integrated Trimble Maxwell™ 6 chips, the Trimble R8 offers an unparalleled 440 GNSS channels. Also capable of tracking carrier signals from a wide range of satellite systems, including GPS, GLONASS, Galileo, BeiDou (COMPASS), and QZSS, the Trimble R8 provides a robust solution for surveyors.

The CMRx communications protocol in the Trimble R8 provides unprecedented correction compression for optimized bandwidth and full utilization all of the satellites in view, giving you the most reliable positioning performance.

Designed with the future in mind, Trimble 360 technology is optimized to receive future planned signals as the number of available satellites continues to grow. With Trimble 360 technology, the Trimble R8 delivers business confidence with a sound GNSS investment for today and long into the future.

FLEXIBLE SYSTEM DESIGN

The Trimble R8 combines the most comprehensive feature set into an integrated and flexible system design for demanding surveying applications. Connect directly to the controller, receive RTK network corrections, and connect to the Internet via comprehensive communication options. With a built-in transmit/receive UHF radio, the Trimble R8 enables ultimate flexibility for rover or base operation. As a base station, the internal NTRIP caster provides you customized access[1] to base station corrections via the Internet.

Trimble's exclusive Web UI™ eliminates travel requirements for routine monitoring of base station receivers. Now you can assess the health and status of base receivers and perform remote configurations from the office. Likewise, you can download post-processing data through Web UI and save additional trips out to the field.

AN INDUSTRY LEADING FIELD SOLUTION

If you're seeking the industry leading field solution, pair the Trimble R8 GNSS receiver with one of our powerful Trimble controllers, such as the Trimble TSC3, Trimble CU or Trimble Tablet Rugged PC featuring Trimble Access™ field software. These rugged controllers bring the power of the office to the field through an intuitive Windows-based interface.

Trimble Access field software offers numerous features and capabilities to streamline the flow of everyday surveying work. Streamlined workflows such as Roads, Monitoring, Mines, and Tunnels—guide crews through common project types and allows crews to get the job done faster with less distractions. Survey companies can also implement their unique workflows by taking advantage of the customization capabilities available in the Trimble Access Software Development Kit (SDK).

Need to get data back to the office immediately? Benefit from real-time data sharing via Trimble Access Services, now available with any valid Trimble Access maintenance agreement.

Back in the office, seamlessly transfer your field data using Trimble Business Center. Edit, process, and adjust collected data with confidence.

The Trimble R8 GNSS system—the industry leader for GNSS surveying applications.

1 Cellular modem required.

Trimble

DATASHEET

TRIMBLE R8 GNSS VRS ROVER

KEY FEATURES

Proven GNSS technology from Trimble

Internal GSM/GPRS modem for fast Internet connection and data transfer

Lightweight, ergonomic, and cable free

Designed to optimally support the Trimble GNSS infrastructure solution

The Trimble® R8 GNSS VRS™ Rover is a multi-channel, multi-frequency GNSS (Global Navigation Satellite System) receiver, antenna, and data-link radio combined in one compact unit. The VRS rover combines advanced receiver technology with a proven system design to provide maximum accuracy and productivity.

TRIMBLE R-TRACK TECHNOLOGY FOR COMPREHENSIVE GNSS SUPPORT

Powered by an enhanced RTK engine, Trimble R-Track™ technology in the Trimble R8 GNSS VRS Rover supports the modernized GPS L2C and L5 signals as well as GLONASS L1/L2 signals. This extensive GNSS support is capable of providing surveying professionals with real field benefits.

With the world's GNSS' in constant development, surveying businesses small and large can be confident that investment in a Trimble GNSS system is protected. Trimble, already proven in GPS technology, will continue to lead the industry in GNSS support.

PROVEN SYSTEM DESIGN

From its powerful Trimble field software and controller to the receiver itself, the Trimble R8 GNSS VRS Rover's overall design has been tried, tested, and proven. It's rugged, lightweight and cable free for unsurpassed ergonomics and productivity in the field. Additionally, the Trimble R8 GNSS VRS rover consumes very little power and includes internal memory. These features also assist you in the field, enabling you to work longer without changing batteries or transferring data.

The Trimble R8 GNSS VRS Rover works optimally with Trimble controllers such as the Trimble CU or Trimble® TSC2® controller. Both controllers run industry-standard Microsoft® Windows™ operating systems, which are familiar and easy to use. They are also flexible for running both Trimble field software and other specialized applications.

The VRS rover includes an internal GSM/GPRS cell modem for wireless connection to the Internet via NTRIP (Networked Transport of RTCM via Internet Protocol). Quickly and easily access GNSS data from a Trimble GNSS infrastructure solution over the Internet. No additional cellphone or external modem is required.

AN IMPORTANT COMPONENT OF A TRIMBLE GNSS INFRASTRUCTURE SOLUTION

Trimble® GNSS Infrastructure is the most established and widely used GNSS infrastructure solution available. Additionally, all components of Trimble GNSS infrastructure—including the Trimble R8 GNSS VRS Rover—are designed to work together. This means the solution is scalable; that is, it will grow with you as your business needs change. And the solution is part of Trimble's Connected Site model, where products, techniques, services, and relationships combine to take your business to all-new levels of achievement.

With numerous fully modeled networks all over the world and dedicated GNSS infrastructure engineers on hand to support your unique needs, Trimble GNSS infrastructure solutions are always a wise investment. Surveying professionals like you can rely on Trimble's experience and expertise in this field, and be confident that choosing a Trimble GNSS infrastructure solution is the right decision.

Trimble