HMTAP Task Order 18

Mississippi Coastal Analysis Project

Geospatial Technology Task Report (Task 3)

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FEMA

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Task Order 18

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URS Group, Inc. (URS) has an Indefinite Delivery/Indefinite Quantity (IDIQ) contract with the Federal Emergency Management Agency (FEMA) to support the Hazard Mitigation Technical Assistance Program (HMTAP). Task Order 18 under that contract is to provide coastal analyses and floodplain mapping along the Gulf Coasts of Hancock, Harrison, and Jackson counties in Mississippi; this report details the work performed under the Geospatial Technology subtask.

Topographic and bathymetric data are required for the storm surge modeling, wave height analysis, and flood hazard mapping activities being performed under Task Order 18. Acquisition, processing, and quality control for topography and bathymetry were managed under a single subtask. Team leads for bathymetry, topography and field survey were engaged to ensure accurate and efficient integration of these datasets into a single, seamless 3-dimensional surface model representing the coastal area of interest to this project.

All of the topographic and bathymetric data used to develop the seamless surface model were obtained from pre-existing, publicly available sources; no new datasets were created. Documentation furnished by the owner agencies is included as a series of appendices to this report. URS reviewed this documentation and determined that the elevation datasets were acquired, processed and tested in alignment with FEMA Guidelines and Specifications for Flood Hazard Mapping Partners. URS performed visual inspections for completeness and consistency as part of the process of creating one seamless surface model from a number of independently created input datasets. The results of this visual inspection and the methodology used to merge the datasets are described in detail in this report.

2.1 INTRODUCTION

All of the topographic data for this project was originally provided with elevations referenced to the North American Vertical Datum of 1988 (NAVD88). The bathymetric data was originally provided as depth referenced to Mean Sea Level (MSL), which is standard for hydrographic surveying. NAVD88 is an orthometric height datum; MSL is a tidal datum. Providing rigorous definitions and a detailed explanation of the differences between orthometric and tidal datums is beyond the scope of this report; if interested, the reader should refer to a textbook on surveying or geodesy. The National Oceanic and Atmospheric Administration (NOAA) and the National Geodetic Survey (NGS) also provide a wealth of information on their websites. A graphic illustration of tidal vs. geodetic datums is shown in Figure 1.

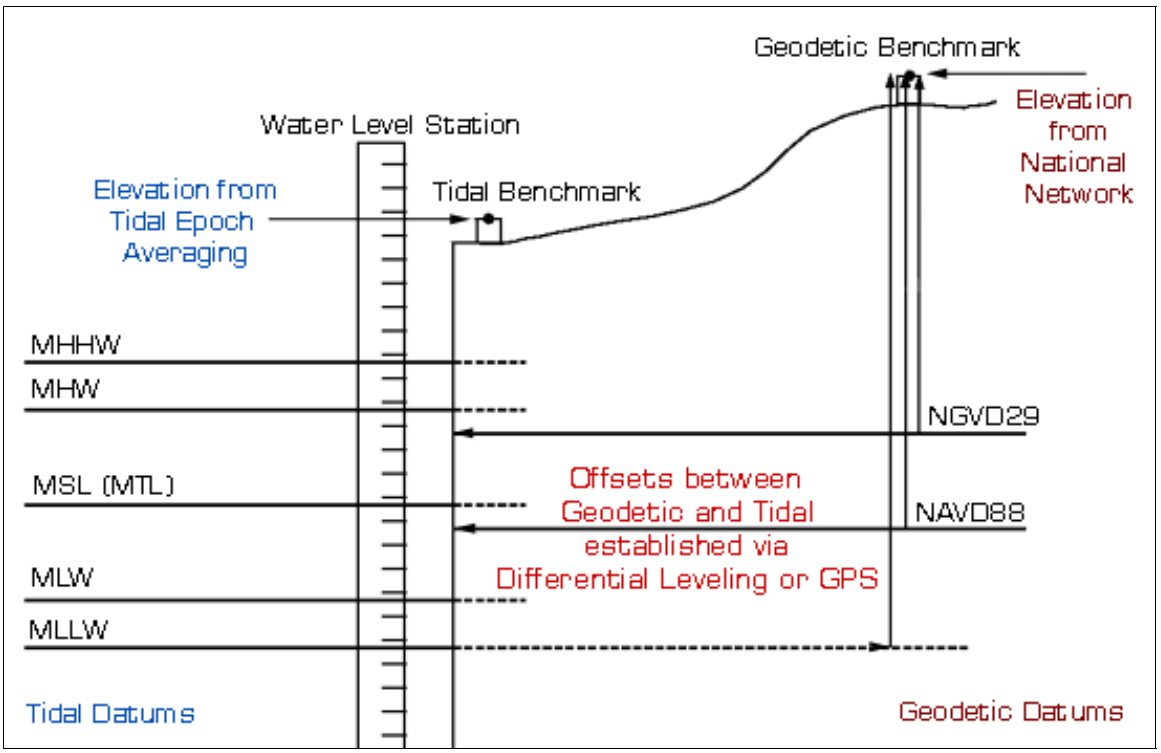

Figure 1: An illustration of the differences between tidal datums and geodetic datums. MSL is the mean sea level reference used to measure water levels at tidal benchmarks. NAVD88 is the geodetic reference used to measure orthometric height, or elevation, at a geodetic benchmark. Image taken from the NOAA Center for Operational Oceanographic Products and Services (CO-OPS).

For this project, the URS team had to resolve the datum differences between the topographic and the bathymetric datasets along the land/sea boundary in coastal Mississippi in order to create the surface model required for the engineering tasks. The domain experts determined that the most effective course of action would be to use NAVD88 as the reference datum for all storm surge modeling, wave height analysis and flood hazard mapping tasks. The topographic data could be used as provided, already referenced to NAVD88; the bathymetry data provided in MSL had to be converted to NAVD88.

2.2 TRANSFORMATION METHOD

Ideally, the conversion from MSL to NAVD88 would be performed using the NGS VDatum transformation tool (NOAA, 2006). However, at the time this project was undertaken, VDatum did not exist for the Mississippi gulf coast and could not be developed in the timeframe required for project completion. The domain experts determined that the most effective and accurate way to perform the vertical datum transformation for the bathymetry data was to apply observed datum differences at coastal tide stations in a systematic manner across the entire project area.

Using the NOAA Tides and Currents website (NOAA, 2005a), as well NGS published bench marks, the difference between MSL and NAVD88 was determined at 11 tidal stations along the Louisiana, Mississippi, and Alabama coastlines, as shown in Figure 2 below.

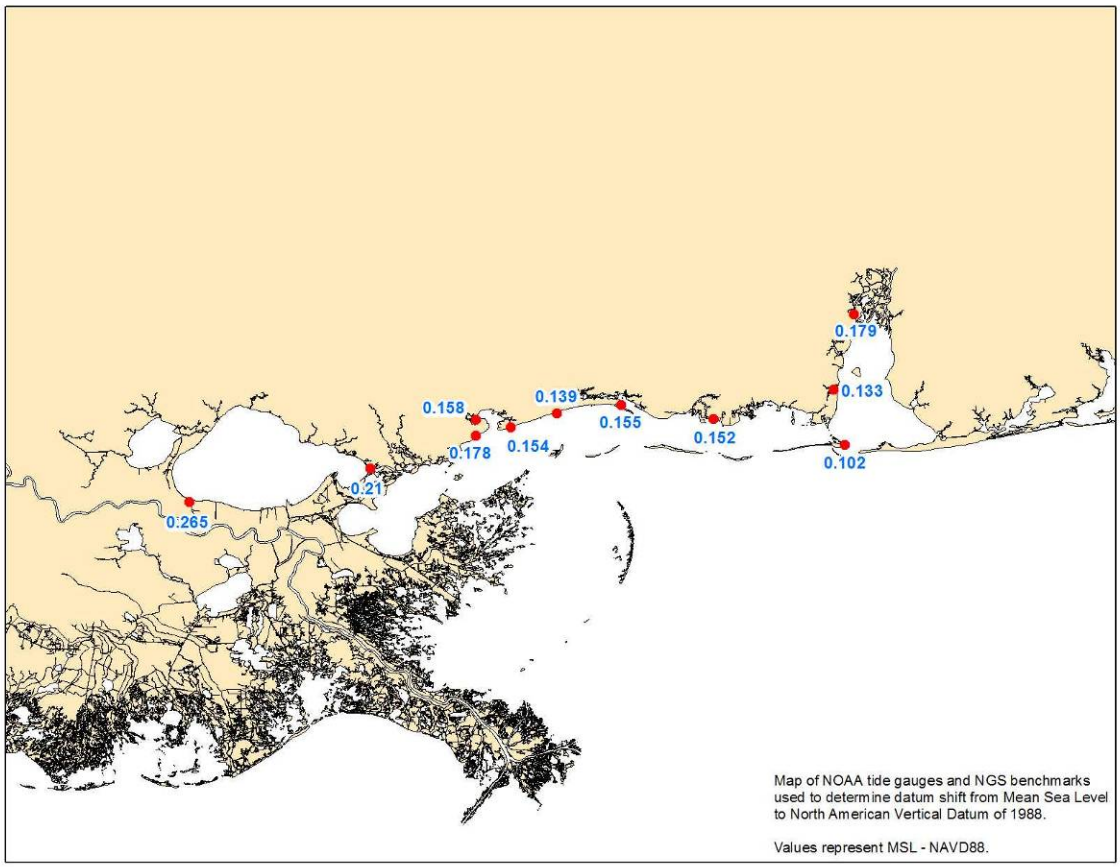

Figure 2: Map representing the 11 locations used in determining the difference between MSL and NAVD88

Table 1 lists the datum differences at the tidal stations. Based on the estimated error budget for the surface model and the associated analytical modeling tolls, the domain experts determined that a simple average of the datum differences, calculated as 0.16 meters (0.5 feet), could be applied to all of the bathymetric data to transform it from MSL to NAVD88 for the purposes of this project.

Table 1: Differences of MLLW and project vertical datums at each location.

Station Name	MSL – MLLW* (m)	NAVD88 – MLLW (m)	MSL – NAVD88
Waveland, MS	0.244	0.066	0.178
Jourdan River, MS	0.278	0.11	0.158
Bay Saint Louis, MS	0.267	0.13	0.154
Gulfport Harbor, MS	0.269	0.13	0.139
Cadet Point, MS	0.27	0.115	0.155
Pascagoula, MS	0.268	0.116	0.152
Fowl River, AL	0.217	0.084	0.133
Mobile State Docks, AL	0.241	0.062	0.179
Dauphin Island, AL	0.172	0.07	0.102
East Bank, LA	0.079	-0.186	0.265
Rigolets, LA	1.052	0.842	0.21

* MLLW = mean lower low water

Once the topography and bathymetry data have been brought to a common datum, it is also important to establish a zero-elevation shoreline to define the transition from water to land. The topographic data used in the project was captured using airborne Light Detection and Ranging (LIDAR), which does not inherently detect a distinct "edge" at the land/water interface. Furthermore, the airborne topographic LIDAR data was captured without regard to tidal conditions; it would be inappropriate to use it to delineate a zero-elevation contour, which may or may not have been covered by water at the moment the LIDAR was collected.

The bathymetric data used for this project was collected using hydrographic survey ships, which cannot operate in the shallow water along the shoreline. The most useful technical approach today for delineating shoreline is a concurrent topographic/bathymetric LIDAR mission accompanied by optical imagery. This type of data can be acquired using the CHARTS system operated by the U.S. Army Corps of Engineers Joint LIDAR Bathymetry Technical Center of Expertise (JALBTCX). However, a complete CHARTS dataset was not available at the time this project was undertaken. An alternative method had to be used to establish the shoreline for this task order.

The NOAA Coastal Services Center (CSC) provides historical shoreline data compiled from a variety of sources, including nautical charts and aerial photography (NOAA, 2005b). The NOAA shoreline for the Mississippi coast was downloaded in ESRI shapefile format (SHP) from http://www.csc.noaa.gov/shoreline/data.html. NOAA's metadata for this shoreline file is reproduced in Appendix A. The shoreline is a two-dimensional line feature referenced to the North American Datum of 1983 (NAD83).

URS performed a visual review of the NOAA shoreline data, overlaying the SHP file on digital orthophotography of 1-meter and 3-meter ground sample distance (GSD). The orthophotos were obtained from the United States Department of Agriculture National Agriculture Imagery Program (USDA NAIP); the imagery was acquired from August – October 2004. Further information on the NAIP imagery can be found at http://www.apfo.usda.gov/NAIP.html.

In rare instances, there were slight discrepancies between the imagery and the shoreline vector. These horizontal displacements were generally on the order of 10 meters or less and were deemed insignificant by the domain expert for the purposes of this project. The noted inconsistencies between the two data sources can be attributed to the level of the tide at the time of acquisition of the aerial photography. The NOAA shoreline vector was adopted as the official delineation of the zero-elevation contour and was not changed or edited by the project team.

4.1 INTRODUCTION

FEMA contracted URS to study and improve the current Advance Circulation model (ADCIRC), producing more accurate storm surge probabilities for the coast of Mississippi. The initial data gathering phase of this project was to procure and assemble the best available bathymetric data set for the coast, sounds, and rivers of Mississippi and the surrounding states. In addition, these data sets were reviewed, and proper quality assurance/quality control (QA/QC) procedures were put into place to ensure the integrity of the data.

4.2 DATA ACQUISITION AND DESCRIPTION

The initial phase of the bathymetric data gathering involved research on the internet to find the most complete and up-to-date data sets.

4.2.1 Northern Gulf Littoral Initiative

The most prominent and complete data set obtained was from the Northern Gulf Littoral Initiative (NGLI). The NGLI dataset is an initiative by Federal Agencies (U.S. Navy, NOAA, U.S. Coast Guard), state Agencies (Mississippi Department of Environmental Quality, Mississippi Department of Marine Resources), universities, and private contractors to produce a regional scale modeling system for the northern Gulf of Mexico. A variety of data sources were included in the merged bathymetric grid downloaded from NGLI, including Naval Oceanographic Office (NAVO) multibeam and singlebeam bathymetry, NOAA bathymetric surveys, and NOAA navigational charts (see Figure 3).

NGLI data was provided in 3-second arc grids (90 meter) in six tiled data sets. The horizontal datum is Latitude/Longitude NAD83. Soundings are in meters referenced to MSL.

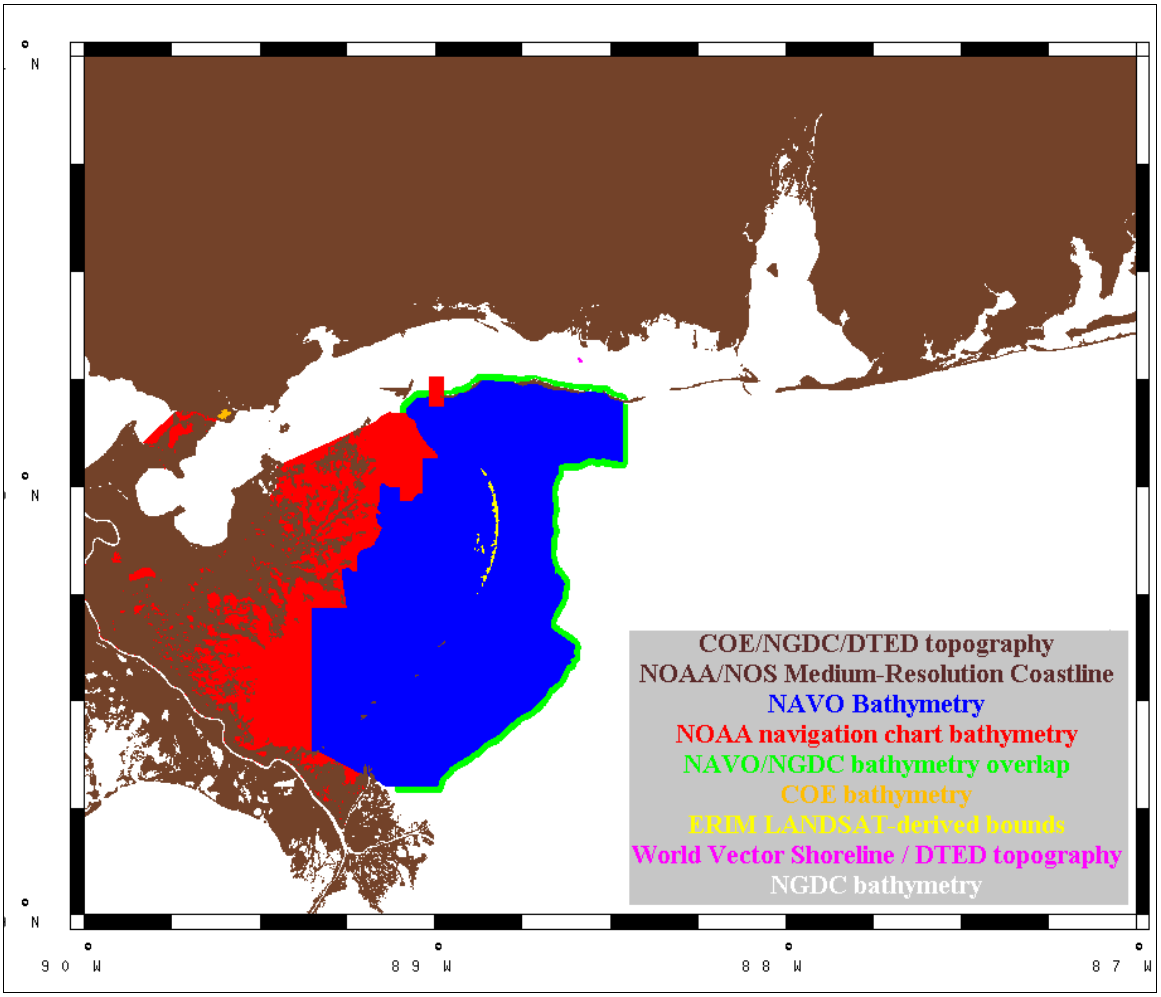

Figure 3: NGLI map showing bathymetric data sets used in compilation of data set.

4.2.2 NOAA Navigational Charts

NOAA Navigational Charts were also downloaded from the NOAA National Ocean Service's website to be used for verification of the NGLI data set. These rasters could be used to provide more detailed information in the event that the NGLI data was scarce or did not provide full coverage of the Mississippi waters. NOAA's Raster Navigational Charts (RNCs) are scanned and georeferenced images of navigational charts, and are intended to be used in electronic navigational systems. The horizontal reference of the downloaded charts is Latitude/Longitude North American Datum of 1927 (NAD27) or Latitude/Longitude NAD83. The vertical datums are chart-dependent. In general, navigational charts are soundings in feet referenced to Mean Lower Low Water. In cases of deeper water, the vertical units are changed to fathoms (6 feet).

4.2.3 Riverine Depths

Rivers and streams play a key role in accurate modeling of storm surge inundation. They allow for the further propagation of the coastal surge by providing an area of less friction. In addition, erosion caused by the flow of rivers and streams have lowered the surrounding elevations, providing a channel-like area for the surge to follow. For these reasons, the depths of the rivers

and streams were needed as input into the ADCIRC model. Two methods were used to find the depths.

1. During the production of Flood Insurance Rate Maps (FIRMs), selected rivers and streams are studied in detail. Surveyors will use various methods to determine depths in pre-defined locations, after which hydrologists will "connect-the-dots" of these depths to create a river profile. The results of these studies are presented in the Flood Insurance Studies (FIS) text. These depths were extracted from the flood profiles, and entered as features into an ESRI ArcGIS database. Extracted depths were positioned using aerial photography, vector road files, and rectified digital topographic maps, cross-referencing labels present on the flood profiles to determine the location where studied streams crossed prominent features. In addition, significant changes in bottom slope were extracted and entered into the database.
2. For rivers and streams that were not studied in detail, Strahler's stream order system was implemented to determine depths (see Figure 4). This stream order system uses a simple method of classifying stream segments base on the number of tributaries upstream. For example, a stream with no tributaries is considered a first order stream. A segment downstream of the confluence of two first order streams is a second order stream. Once the stream order was determined for all rivers and streams in the study area, and using the depths extracted from the FIS profiles as a guide, nominal depths were applied to the entire stream length, as listed in Table 2.

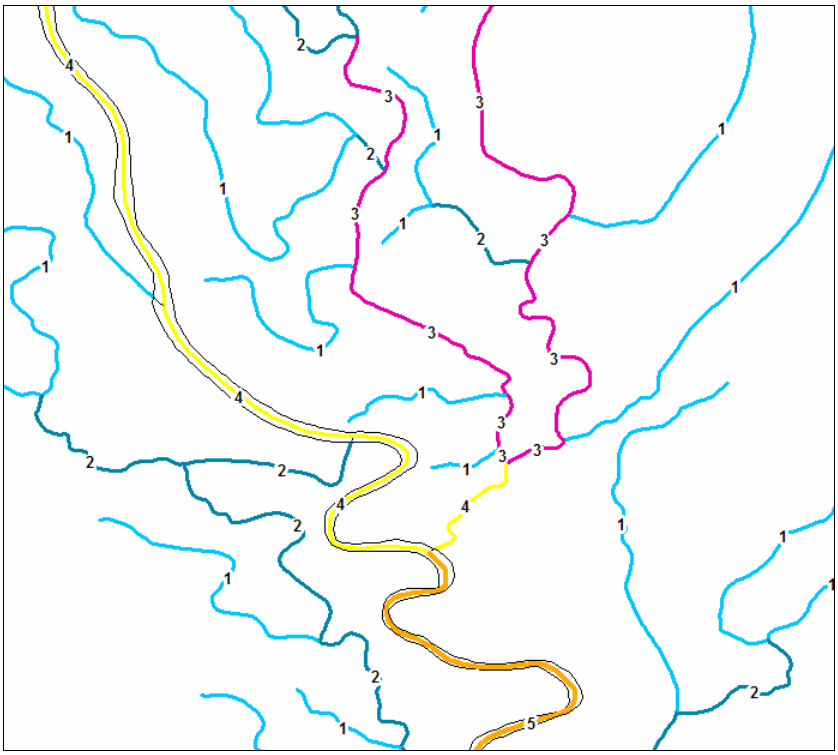

Figure 4: Example of Strahler's stream order system in Hancock County

Table 2: Stream order and assigned depths

Stream Order	Depth (m)
1st	2
2nd	3
3rd	5
4th	6
5th	8
6th	10

4.3 QA/QC METHODOLOGY

Quality assurance and quality control were conducted on two of the downloaded data sets. The NGLI data set was compared to the downloaded RNCs to ensure that no significant changes to the depths were affected by the 3-arc gridding process. The shoreline vector files were compared with 3-meter and 1-meter resolution aerial photography to ensure that significant changes in shoreline have not occurred since the digitization of the shoreline. The methodologies are described in the following paragraphs.

4.3.1 NGLI

The NGLI was contained in six separate files that were downloaded from the NGLI website. The files downloaded were in xyz ASCII format. This allowed for ease of import into a standard GIS program, in this case, MapInfo. The data was imported in tabular format, and points were created based on the x (longitude) and y (latitude) contained within the file. The horizontal projected was set at NAD83 at the time of point creation.

Once points were created, a query was performed to remove any topographic features within the data set. The query was set to remove any z components of the file greater then -1.0 meters, resulting in a pure bathymetric data set, with a small area of topography. After the query was performed, a conversion of +0.24 meters (+0.8 feet) was applied in the vertical to convert the points from MLLW to MSL. The conversion of 0.8 feet was supplied from information provided on the NGLI website.

In order to examine the data with the provided RNCs, the z data was converted from meters to feet using a factor of 1 meter = 3.2808 feet, and rounding the results to the nearest tenth of a foot.

An examination of the data was performed by overlaying the RNCs with the created hydrographic point data. Random areas along the coast of Mississippi were selected to perform this evaluation. Results were found to be satisfactory, with differences in depths between NGLI data and charted soundings being less then 1 foot (0.3 meters).

In areas where the NGLI data set did not adequately model the coastline as depicted in the charts and the vector shoreline file, points were added to ensure a smooth and accurate transition between the bathymetry and topographic data sets.

A problem was found to exist in areas south of the barrier islands. During compilation of the dataset by NAVO, digital survey data was not available for this area, and was supplemented by using digitized contours. Depths between contour lines were interpolated through the use of GIS software. However, the interpolation technique used assigned constant depths between contours, which produced “stair-stepping” within the data. These stair steps are evident when observing a sun-illuminated digital terrain model of the offshore bathymetry (see Figure 5).

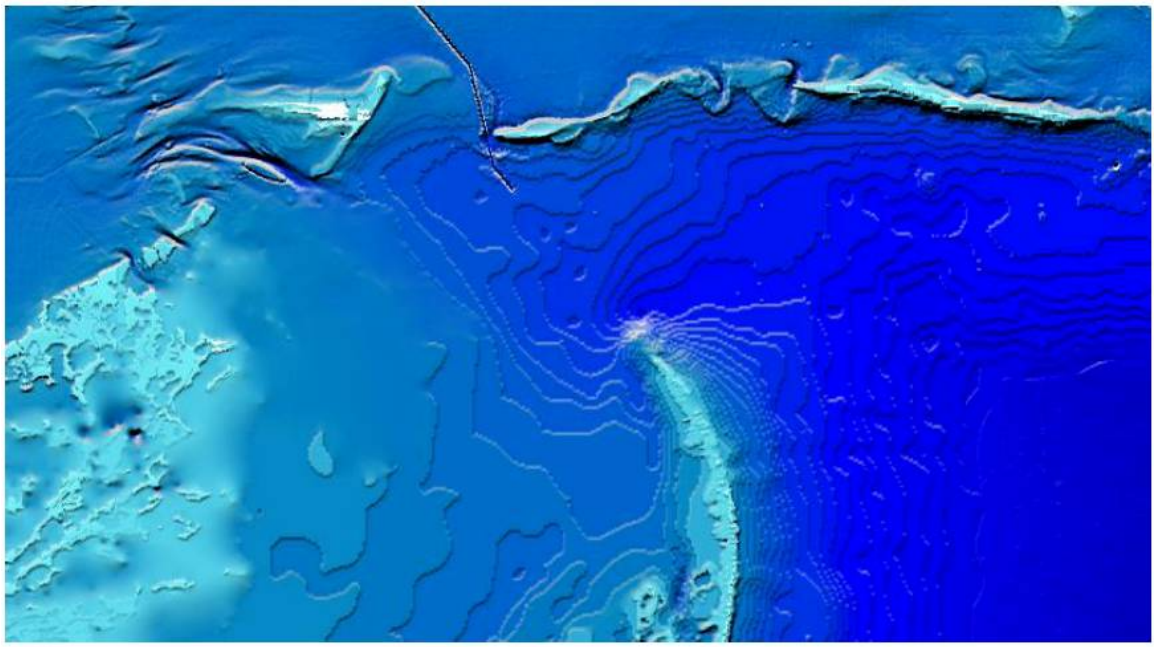

Figure 5: Sun illuminated digital terrain model showing "stair-stepping" in the NGLI data.

To resolve this issue, whole numbered contours (i.e., 1, 2, 3, etc.) were computed using ArcGIS spatial analyst. The contour vertices were then export to a xyz scatter set, and imported into the Surface-Water Modeling System (SMS) software. An unbiased linear interpolation was used to obtain water depths between existing contours, and assigned to grid nodes by SMS.

The NGLI data set is deemed to be accurate and acceptable to be used as a data source in this project.

The input LIDAR data sets included both pre-Katrina and post-Katrina data, which were acquired and processed by a number of sources (Table 3).

Table 3: LIDAR data sources deemed to be the "best-available" elevation data were used to create seamless topographic coverage over the project area

Pre-Katrina LIDAR Data for Mississippi				
Data Source	**Coverage Area**	**Acquisition Date**	**Post Spacing**	**Data Format**
EarthData International	Harrison County	3/1/03 – 3/30/03	5-meter	EEBN[1]
EarthData International	Jackson County	2/25/05 – 3/26/05	5-meter	LAS[2]
EarthData International	Hancock County	2/25/05 – 3/26/05	5-meter	LAS
Post-Katrina LIDAR Data for Mississippi				
Data Source	**Coverage Area**	**Acquisition Date**	**Post Spacing**	**Data Format**
Woolpert	Coastal Mississippi	9/19/05 – 10/09/05	1-meter	LAS
USACE	MS Barrier Islands	report requested	1-meter	ASCII
LIDAR Data for Adjoining States				
Data Source	**Coverage Area**	**Acquisition Date**	**Post Spacing**	**Data Format**
Louisiana Statewide GIS web site	Project area border area between Louisiana and Mississippi	01/01/2002 – 03/31/02	5-meter	ASCII
Mobile County, Alabama	Project border area between Alabama and Mississippi	report requested	report requested	LAS

These datasets were merged into a seamless coverage for the study area using procedures and methods described in this section. The resulting terrain model, color coded by data source, covers the area of southern Mississippi shown in Figure 6.

[1] EEBN is a proprietary binary format developed by EarthData prior to development and adoption of an industry standard format for LIDAR data

[2] The LAS file format is a public file format for the interchange of LIDAR data between vendors and customers. This binary file format is an alternative to proprietary systems or a generic ASCII file interchange system used by many companies. See www.lasformat.org for further information.

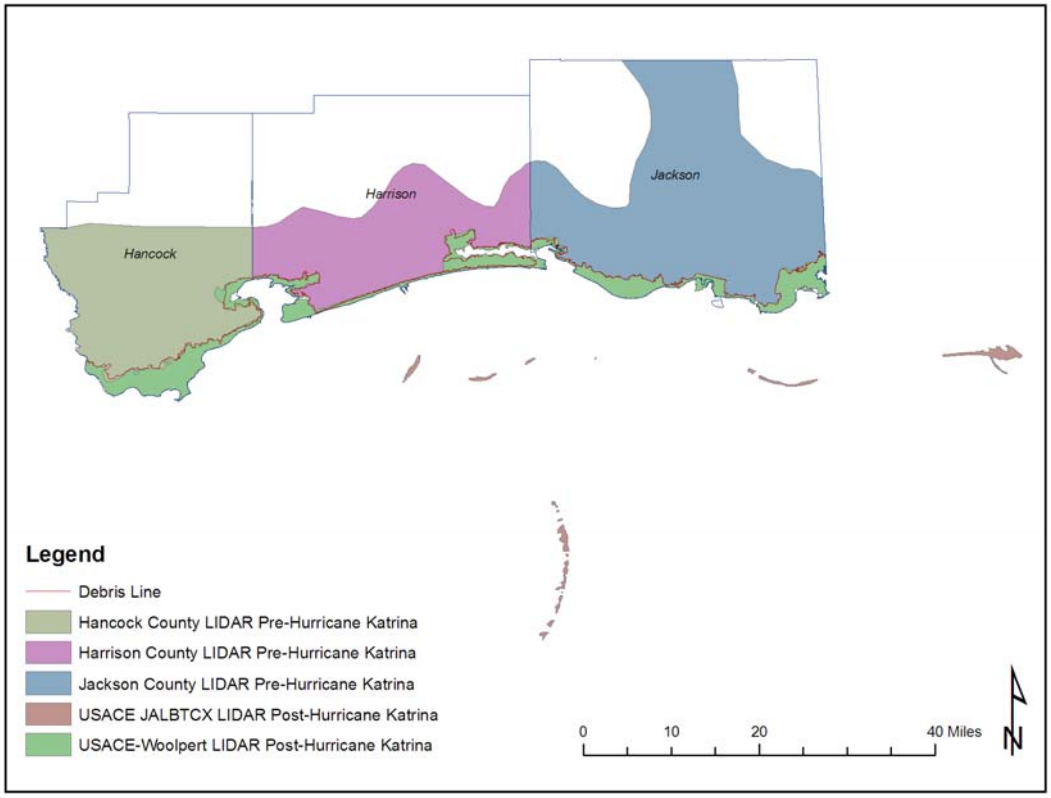

Figure 6: Composition of seamless topographic data from best-available LIDAR sources

5.1 PRE-KATRINA LIDAR DATA PREPARATION

Step 1 – Recover and distribute the existing data to the LIDAR team:

The LIDAR data and original water body breaklines for Jackson, Harrison, and Hancock counties were recovered from the EarthData archive and placed into a working folder on the network. The Harrison County LIDAR data was converted from EarthData's EEBN format to LAS format. The LIDAR data converted to the LAS format was distributed to the LIDAR team and each sheet was reviewed to ensure all attribute information was successfully converted. Note the EEBN format does not contain enough information to populate all fields (such as timestamp) in the LAS format completely.

Step 2 – Clip LIDAR data to the project mapping limits:

Treating the three counties as individual data sets, each one was clipped to the reduced area defined by URS. This was accomplished by omitting sheets that were outside of the URS project limit and using TerraSolid[3] to trim the LIDAR data sets to the project area limits.

[3] TerraSolid refers to LIDAR processing software tools, TerraScan and TerraModeler, produced by TerraSolid, LTD. TerraScan is used for LIDAR point classification and point file generation. TerraModeler is used for analysis and visualization

Step 3 – Check overlap and create butt joins between the three county data sets:

Using TerraSolid, surfaces were created from the three LIDAR data sets and subtracted from each other along the overlap areas between counties. Differences of up to ±30 cm were observed at varying locations along the overlap areas. The minor discrepancies are mainly due to the fact that each county was processed independently using different ground control. As a solution, a butt-match clip line was established and the data feathered to within 15 to 20 cm using EarthData proprietary software. Note the option to reprocess all three counties as a single data set was dismissed due to the fact that the feathering solution, which achieved acceptable accuracy levels for the project, was much more time efficient and cost effective. Further, this solution maintained the integrity of the original processed data for each county.

Step 4 – Create project sheet layout:

A TerraSolid project was created using a sheet layout designed to maximize efficiency taking into consideration EarthData and URS hardware/software configurations. The Jackson, Harrison, and Hancock LIDAR data sets were then imported into the TerraSolid project, which from this point forward will be referred to as the pre-Katrina seamless Mississippi LIDAR data set (Figure 7).

Figure 7: Sheet layout for topographic LIDAR project.

Step 5 – Perform final review of coverage, limits, and data seams:

The pre-Katrina seamless Mississippi LIDAR data set was then distributed to the LIDAR team in order to validate coverage giving special attention to the sheets that contain seam/feather areas (Figure 8).

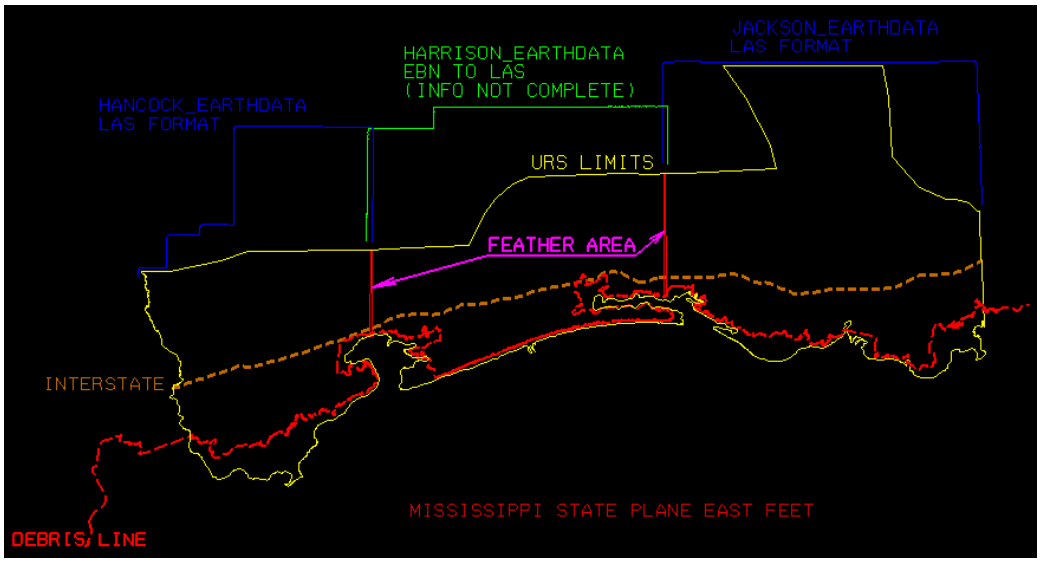

Figure 8: Merging of pre-Katrina LIDAR source dataset

5.2 POST-KATRINA LIDAR DATA PREPARATION

Step 1 – Establish a clip line between the pre Katrina and post-Katrina LIDAR data sets:

Using TerraSolid software, surfaces were created from both the seamless Mississippi LIDAR data set and Woolpert's post-Katrina LIDAR data. The surfaces were subtracted from each other resulting in a difference surface. The difference surface along with the debris line was used in creating the clip line. The debris line served as a rough guide however agreement between surfaces was the overriding factor in the determination of the clip line placement. The screenshots in Figure 9 and Figure 10 below depict approximate placement of the clip line.

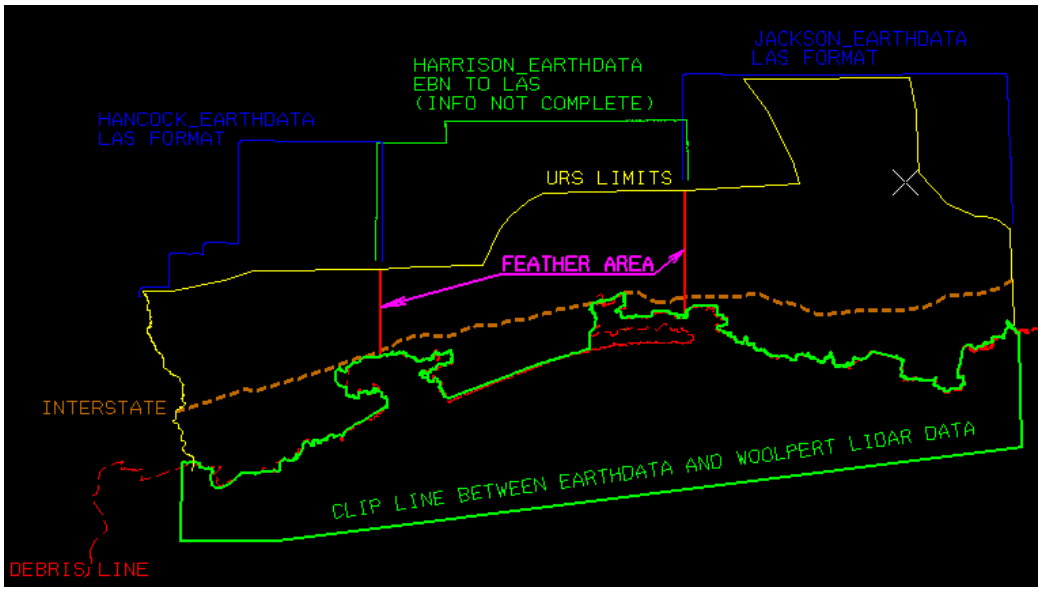

Figure 9: Merging of pre- and post-Katrina LIDAR data (overview)

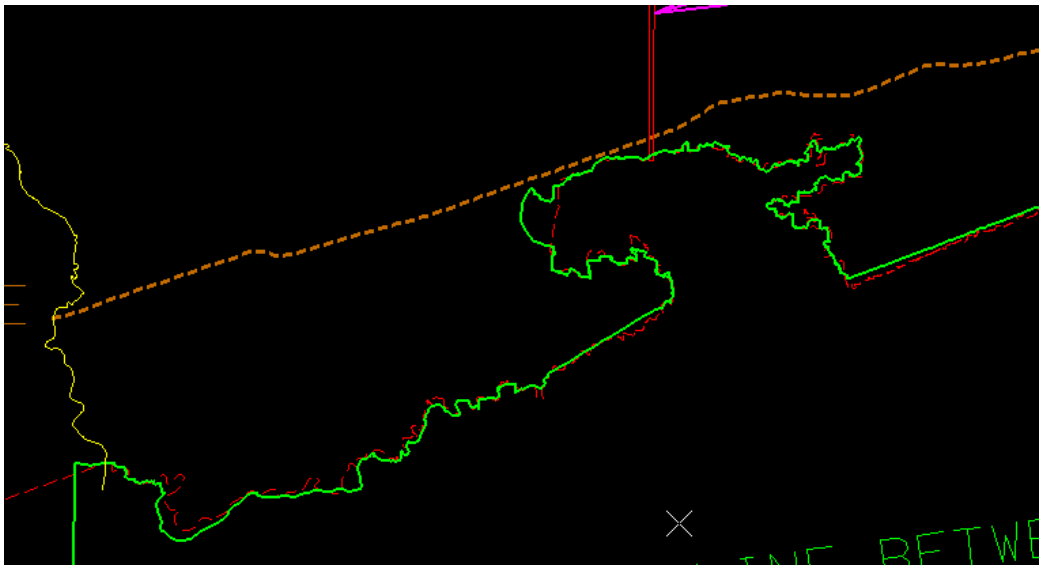

Figure 10: Merging of pre- and post-Katrina LIDAR data (Hancock County)

Step 2 – Clean and filter post-Katrina LIDAR data along clip line:

During the clip line generation phase, large discrepancies of up to 1 m were encountered in various areas. After close examination of those areas, it was determined that vegetation and or man-made features were not filtered out of the post-Katrina LIDAR data. EarthData cleaned and filtered the post-Katrina LIDAR data along the clip line to bring the overall agreement to within ±20 cm, and both data sets were clipped back to butt match each other along the clip line. Data south of the clip line was removed from the seamless Mississippi LIDAR data set. Data north of the clip line was removed from the post-Katrina LIDAR data set. The post-Katrina LIDAR data set was then imported into the seamless Mississippi LIDAR data set creating a merged single data set.

Step 3 – Perform final QC for coverage and data gaps:

The seamless Mississippi LIDAR data set was distributed to the LIDAR team in order to validate coverage of the lower portion of the data set, giving special attention to the sheets that contain butt match areas along the clip line between the pre-Katrina and post-Katrina LIDAR data sets. This round of checks revealed missing data in a couple of locations. The gaps were filled in using pre-Katrina data. See screenshot in Figure 11 below for locations of re-filtered and filled areas.

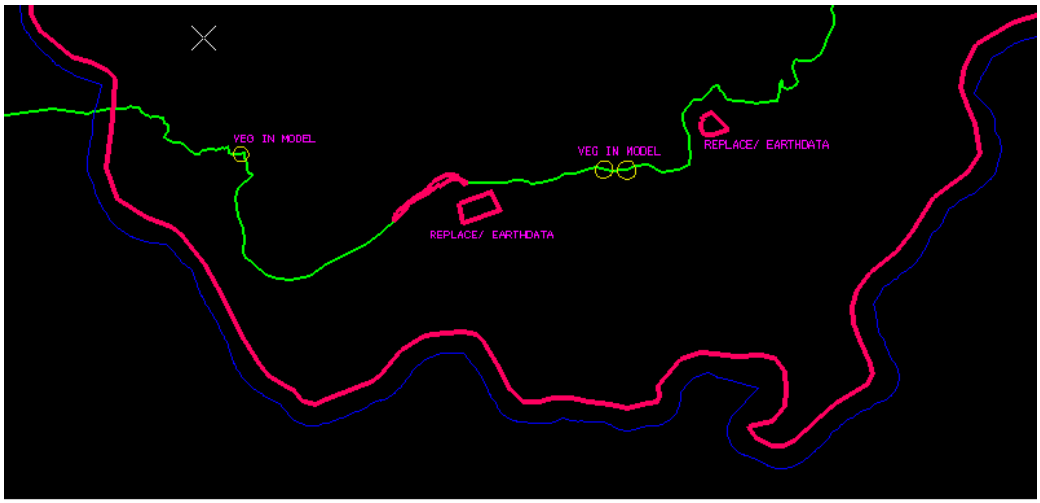

Figure 11: Gaps in post-Katrina LIDAR data were filled using pre-Katrina data sources]

During the QC phase of the post-Katrina LIDAR data, many areas were found not to be filtered to a bare earth; anomalies included vegetation and man-made structures classified as bare earth. Further, the classification of water data along the shoreline is incorrect in many areas.

The data for the barrier islands were delivered in the JALBTCX custom XYZTT format. The last return files were stripped of the last two columns and converted to XYZ state plane feet using proprietary software. This data set consists of raw last returns only, and is not classified to bare earth. The elevations were compared to the seamless Mississippi LIDAR data set along the shoreline and found to be within an acceptable tolerance.

5.3 ELEVATION GRIDS

Elevation grids with 66-foot post-spacing were derived from the seamless Mississippi LIDAR data set using TerraSolid and converted to XYZ format. The XYZ files were delivered via FTP in NAD83 Geographic Coordinates (decimal degrees) and NAVD88 elevations in meters.

5.4 ELEVATED LINEAR FEATURE BREAKLINES

A GeoCue[4] project was created using the LIDAR sheets layout as working segment footprints. The seamless Mississippi LIDAR data set was imported into this project. Stereo pair parameters were adjusted to achieve an optimum stereo environment for collection purposes using ZI software (SSK). Multiple stereo pairs were generated and submitted to the compilation department for approval until the desired results were obtained. The final parameters were then applied to all tiles and (export) stereo pairs generated for the entire project except the barrier islands. Since the barrier islands were not delivered in XYZTT and not LAS, it was not possible to generate stereo pairs because intensity values did not exist.

[4] GeoCue is a geospatial data/process management system produced by GeoCue Corporation especially suited to managing large LIDAR data sets.

Stereo pairs, created from the LIDAR intensity returns, were set up on Intergraph SSK stereo compilation systems to collect specific elevated features in 3-D throughout the project area. These features included roads, railroads, water bodies, berms, and levees.

Continuous 3D breaklines were collected for all streams having a drainage area of greater than one square mile (approximately). Stream breaklines were digitized with a consistent orientation from upstream to downstream, and were neither broken nor differentiated by attribution at culverts or bridges. The stream breaklines agree in lateral placement with the LIDAR intensity stereo pairs.

For small streams (nominal distance from channel bank to channel bank less than 50 feet) a single breakline was collected for the stream centerline. For large streams (distance from channel bank to channel bank greater than 50 feet) breaklines at the edge of the stream as well as in the centerline of the channel were collected.

For all other elevated, linear features (roads, berms, railroads and levees) 3D polygons and centerlines were collected for all elevated linear features 24 feet and wider; only centerlines were collected for features less than 24 feet in width.

For urban areas within the project area, only major elevated linear features that spanned the width of the area and/or extend outward from the urban area were collected. These features included major highways, railroads, rivers, etc. City blocks and subdivision streets were not collected within the urban area polygons, shown as tan shaded areas in Figure 12 below.

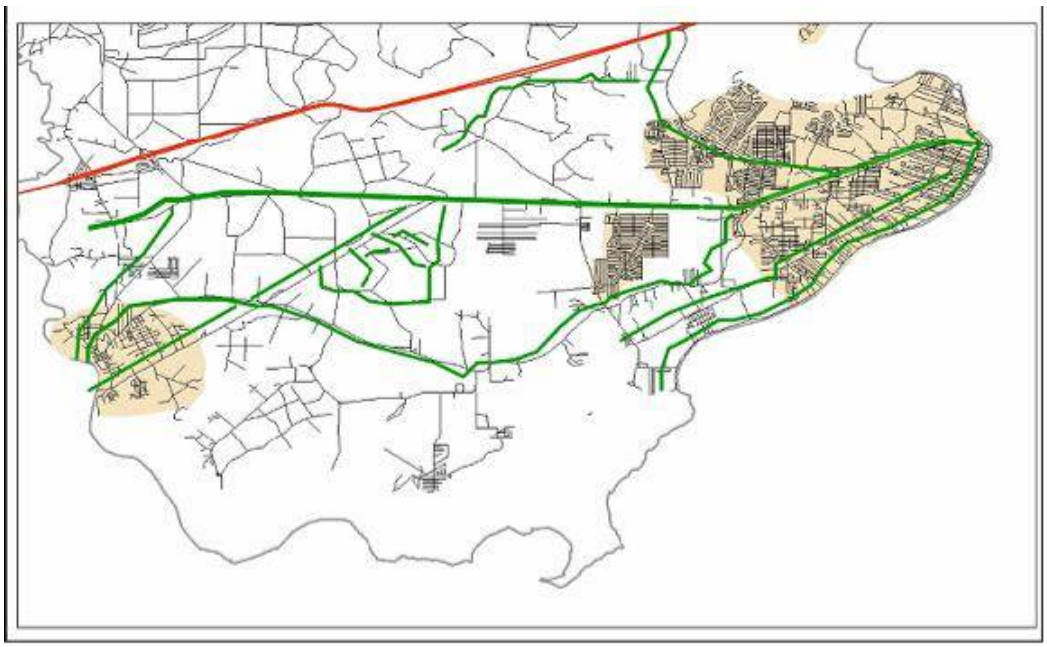

Figure 12: Criteria for collection of elevated feature breaklines in urban areas. All roads were collected in the unshaded areas. Only major connecting roadways, shown in red and green above, were collected as breaklines within the shaded areas.

For roads 24 feet or greater that were collected with center and road edges, the line work was collected using the offset parallel feature in MicroStation so that the road edges were at the same elevation as the centerline. At feature intersections, centerlines intersected at the same z-

elevation. Double-line roads were closed off as polygons at sheet boundaries or if the road ends, as shown in Figure 13. Road lines also continued beneath features such as bridges.

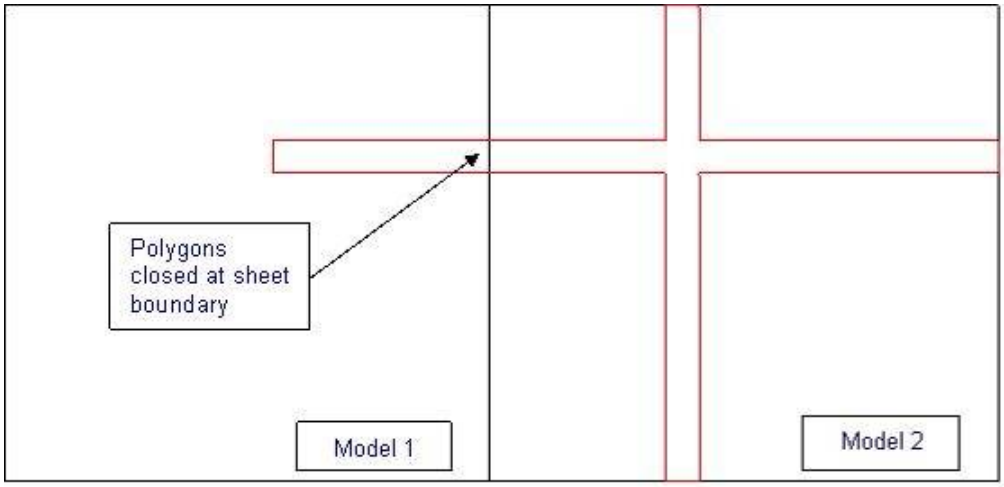

Figure 13: Road intersection topology

Stereo pairs and hill shades were provided to the subcontractor, to facilitate compilation of road and railroad features. EarthData performed QC checks on all of the completed vector data, against the Triangulated Irregular Network (TIN) of the seamless Mississippi LIDAR data set, and any anomalies detected were corrected in stereo. Once all of the vector data passed final QC checks, the MicroStation break line files were converted to a XYZ point format and delivered in both NAD83 Geographic Coordinates (decimal degrees) and NAVD88 elevations in meters.

5.5 SHORELINE

The Woolpert LIDAR data set water classification does not match the URS-supplied shoreline (see Section, Shoreline Determination above). In some areas, the bare earth was classified as water. The URS-supplied shoreline is very intricate and detailed; in fact, so detailed that it is not practical to use to reclassify. The shoreline was simplified in order to reclassify certain areas from water to bare earth.

Upon completion of the shoreline reclassification, the seamless Mississippi LIDAR data set was delivered to URS and Watershed Concepts in LAS format, except the barrier islands, which were delivered in ASCII XYZ format. The LAS files were delivered in two sets, one set consisting of the point cloud and the other consisting of bare earth only.

5.6 ASSESSMENT OF ELEVATION MATCH TO ADJOINING STATES

5.6.1 Alabama

The adjoining Alabama LIDAR data set was subtracted from the seamless Mississippi LIDAR data set along the overlap area, which revealed elevation differences of up to about 1.0 foot in a positive and negative direction (Figure 14). This is comparable to the elevation differences

between the three individual Mississippi counties, prior to applying the feathering routine along the overlap seams (see Section 5.1, Pre-Katrina LIDAR Data Preparation, Step 3).

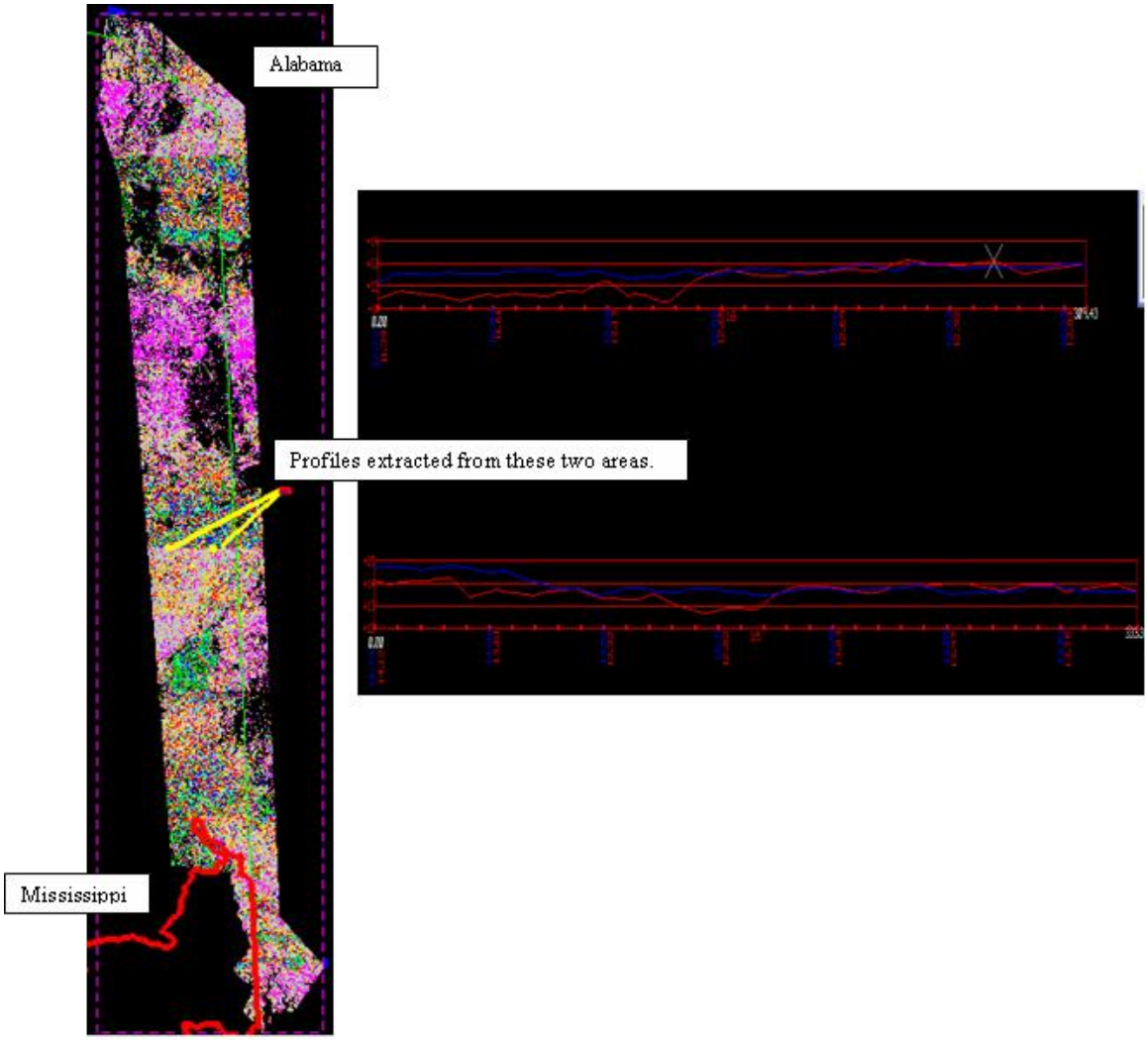

Figure 14: Assessment of elevation match between Mississippi (profiles shown in blue) and Alabama (profiles shown in red).

5.6.2 Louisiana

The adjoining Louisiana LIDAR data set was subtracted from the seamless Mississippi LIDAR data set along the overlap area. A series of profiles were run in three separate areas (see LIDAR Subtraction Raster graphic below left). The profile difference revealed an approximately 1.0 foot elevation bias between the two sets of data (see sample profile graphics in Figure 15 below). As a test, the Louisiana LIDAR data set was adjusted by a constant -30 cm Z shift and subtracted again. This difference revealed a 30 cm float in a positive and negative direction, similar comparison of the Mississippi and Alabama data. Differences in the procedures and parameters

utilized to pre-process the flight lines of the two data sets could be one possible explanation for the vertical bias.

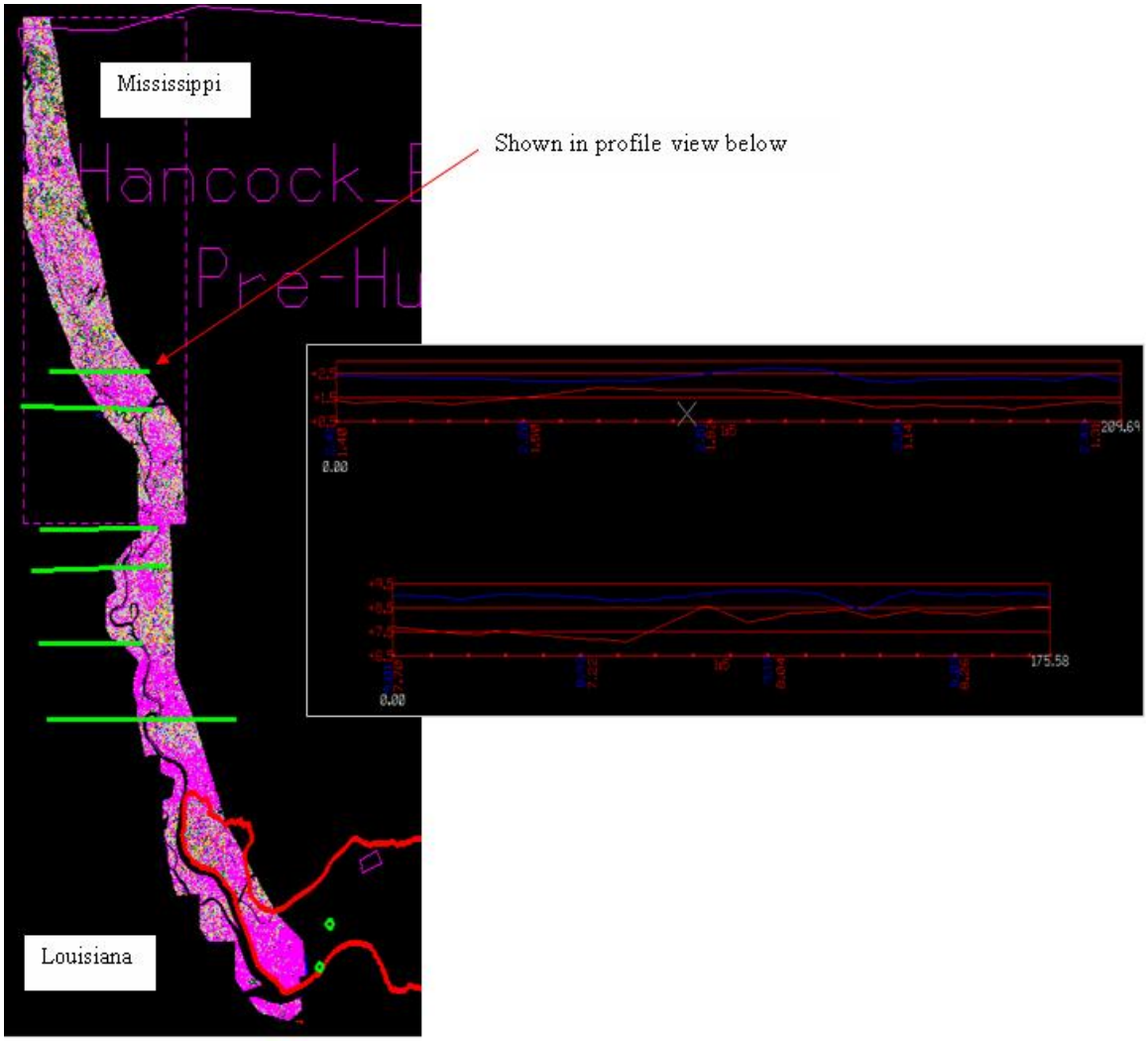

Figure 15: Assessment of elevation match between Mississippi (profiles shown in blue) and Louisiana (profiles shown in red).

6.1 INTRODUCTION

This phase of the project required compiling data pertaining to water conveyance structures that intersect with elevated roads as indicated by the LIDAR dataset. Identification of these structures was vital as they function as preferential flow paths during storm surge inundation. Types of structures identified included bridges, culverts, elevated roads, and overpasses.

6.2 METHOD

Initially, an internet search was conducted to identify potential data sources within the state of Mississippi; however, no information was available for download. The next step was to contact the Mississippi Department of Transportation (MDOT) and request information in a digital format. It was determined that MDOT only retains information on state roads and obtaining detailed data would require training by MDOT employees followed by several weeks of URS staff working on site at MDOT. URS obtained information on some larger facilities from the MDOT Division of Bridges, but no smaller structures. As these data were incomplete, and time constraints did not allow for an onsite review of electronic records, a decision was made to conduct a field survey to complete the structure database.

Two URS employees were designated to drive Mississippi roads identified from the LIDAR dataset. They were instructed to identify the following types of structures:

- Road overpasses at intersections
- Stream and or drainage crossings with culverts or other structures
- Roads that are elevated above grade with pilings – allowing free flow across the road
- Other features that may influence across-land flow during storm surge – railroad embankments, etc.

In addition to verifying the structure type, proper dimensions and location of the feature are key inputs into the ADCIRC model. The survey team recorded the following attributes of identified features on field data sheets:

- A GPS latitude/longitude
- Length of the structure
- Height of the structure opening
- Distance from the road crest to the top of structure
- Distance from top of structure to bottom of invert (when possible)
- Type of structure
- Photograph of the structure
- Feature intersected by the structure (creek, road, etc.)
- Any additional notes that might be helpful

The survey took approximately five days to complete. Data from the field sheets were entered into a spreadsheet. The spreadsheet was imported into ESRI's GIS ArcView program and converted to a point feature file. Locations were checked for spatial accuracy by verifying their alignment with hydrologic features.

The next stage of the process involved assigning elevation values to the point features and calculating the elevation of the bottom of the invert for each structure. The LIDAR dataset was brought into ArcView as a xyz scatter file; z elevation values of the road crest were transferred from the LIDAR dataset to the structure point file. The bottom elevation of the structure invert was calculated using the following equation:

Bottom Elevation = (crest of road elevation) – (distance from the road crest to the top of structure) – (height of the structure as shown in Figure 16)

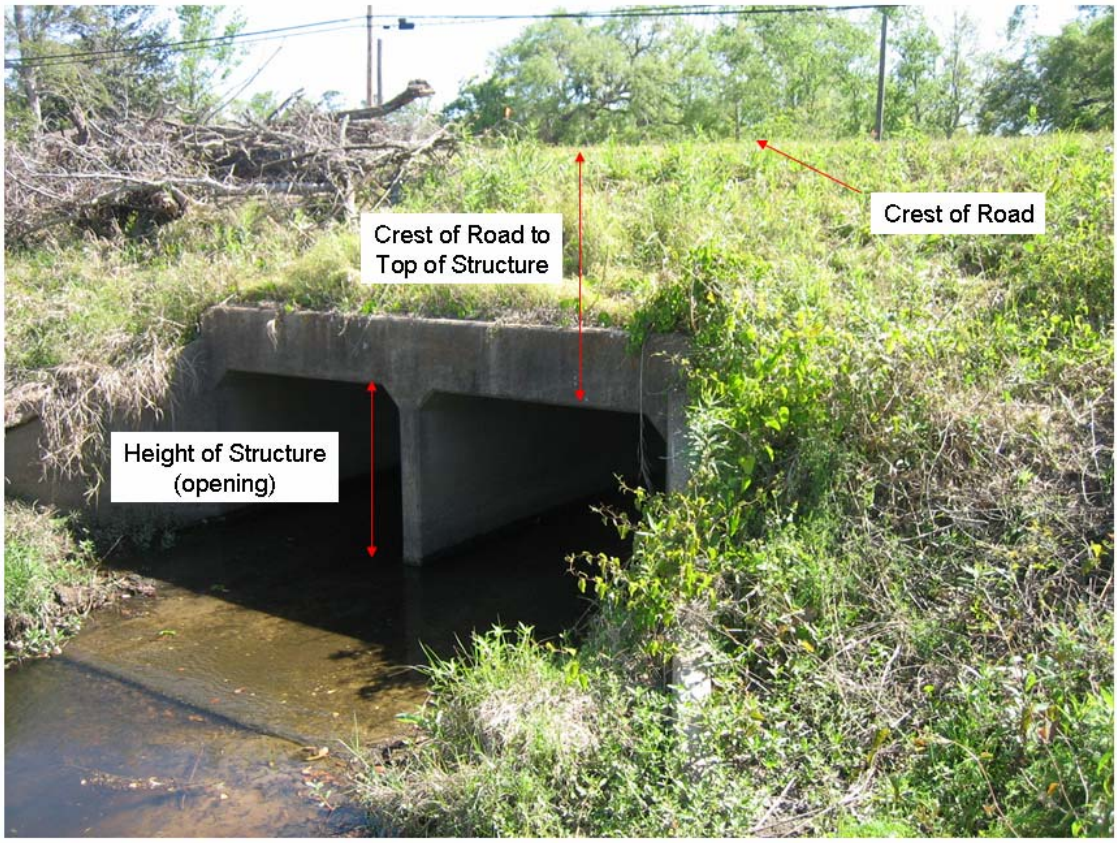

Figure 16: Structure Invert

Finally, the cross sectional area (for flow volume purposes) was calculated by multiplying the length of the structure by the height of the opening. The points were then exported to an xyz scatter file for application to the model.

7.1 INTRODUCTION

Data received from the various sources required an extensive amount of analysis and manipulation before incorporation into the ADCIRC grid though the SMS software. The simplest data format to incorporate into SMS is a simple xyz (longitude, latitude, depth/height) text file. However, these text files must include a variety of elevation data including: ground surface, river and stream bottom, road, and the zero land/sea boundary (as designated by the zero elevation contour), while still adhering to file size limitations of SMS.

This section will discuss the steps and techniques used to create, calculate, and merge these data sets into an SMS compatible ASCII file.

7.2 DATA DELIVERY

A list of the data received by the modeling group follows:

1. LIDAR → xyz text file (in decimal degrees, with positive z values representing elevations).
2. Elevated Linear Features (ELF) Shape → ESRI PolyLineZ (ESRI polyline shape file containing elevations as Z values embedded within the Shapefile. See ESRI technical paper on Shapefile formats for a more detailed description).
3. ELF Text → xyz text file representing tops of elevated roads or other features (in decimal degrees, with positive z values representing elevations).
4. Hydrographic Breaklines → ESRI Shapefile representing river and stream banks.
5. NOAA High Resolution Shoreline File → ESRI Shapefile representing 0 elevation contour along Mississippi Coast.
6. Northern Gulf Littoral Initiative Bathymetric Data Set → xyz text file (in decimal degrees, with positive z values representing depth).

7.3 DATA MANIPULATION

Data received were not considered to be complete, as river and stream bottom elevations had not been integrated into the LIDAR elevation data set. In order to ensure a consistent matching between the bathymetry and topographic data set, the zero elevation contour was added to both the bathymetric data and topographic data sets. The following procedures were implemented to generate a complete and integrated data set.

7.3.1 Shoreline file

Using the ESRI ArcGIS ArcTools function Feature Vertices to Points, the shoreline vertices were converted to points, and assigned a depth of 0 feet (NAVD88). The points were then exported to a xyz data set.

7.3.2 Hydrographic Breaklines

The hydrographic breaklines shapefiles were imported into SMS by the modelers and converted to feature objects using the Shapefile → Feature Objects tool in SMS. Using aerial photography, the modelers chose select streams to be included in the final grid (see Figure 17). The excess bathymetric feature objects were deleted from the SMS project. When the arcs were considered finalized in SMS, they were exported to shapefiles and brought back into ArcGIS.

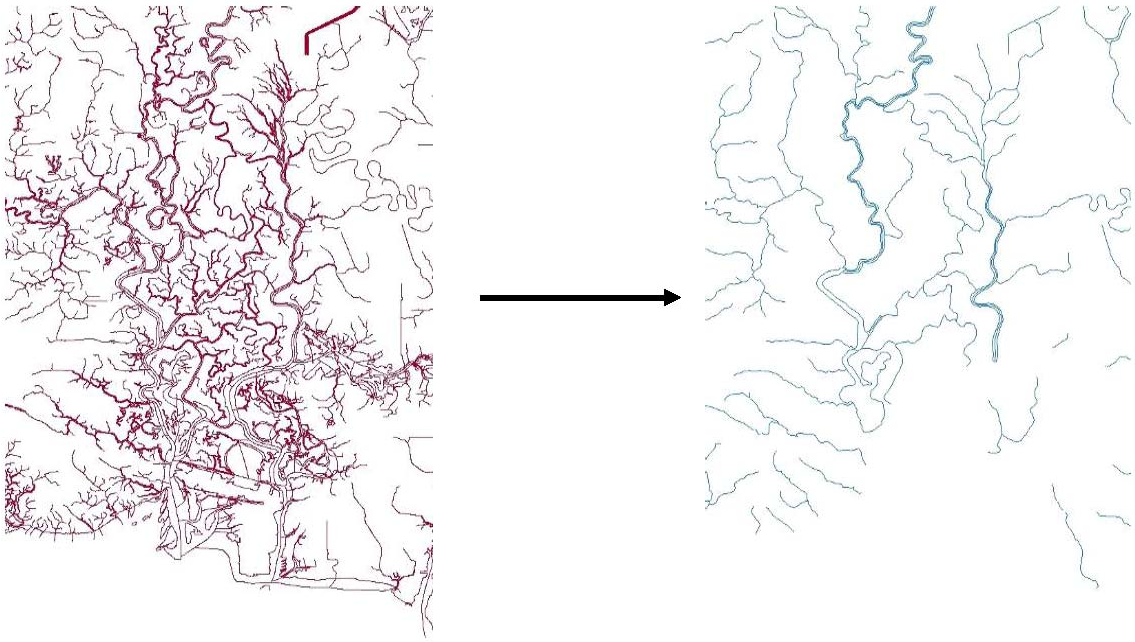

Figure 17: Example of edited hydrographic breaklines. The image on the left shows the complete data set as imported into SMS. The image on the right shows the edits made by the modelers.

As described in Section 4, Bathymetric Data Sources and Processing, stream orders were assigned to the original hydrographic breaklines, followed by appropriate depths. The arcs exported from SMS were assigned stream orders corresponding to the original hydrographic breakline.

7.3.3 Elevated Linear Features

ELFs created from the raw LIDAR data represent linear features that appear to be elevated above the surrounding terrain (i.e. elevated roads, railroads, levees, berms, etc.) as shown in Figure 18. Because the LIDAR data was delivered in 20-meter gridded tiles, these features were necessary to ensure the most significant elevation (highest elevation of the feature) was not lost during the gridding process. The ELFs were imported into SMS as shapefiles, and arcs were created using the Shapefile → Feature Objects tool.

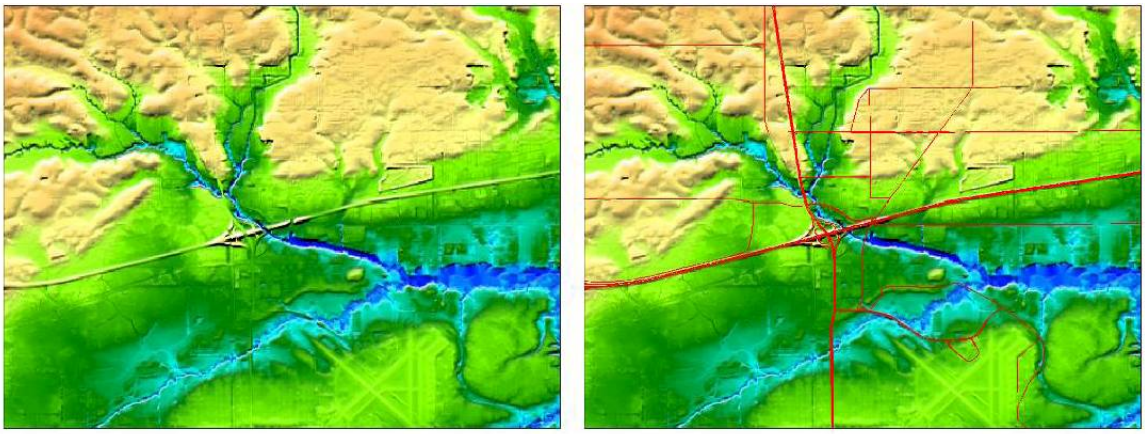

Figure 18: Shaded relief model of 20m gridded LIDAR data. The image on the right demonstrates the location of the ELFs (in red).

Once the arcs were created and inspected for accuracy, they were imported into SMS and designated as weirs. A Fortran script was written to search for common latitude and longitude values between the SMS .grd file and the ELF text file. The .grd height would be replaced with the ELF height values at these common points.

7.3.4 Northern Gulf Littoral Initiative Bathymetric Data

The Northern Gulf Littoral Initiative data set was downloaded from the NGLI website (http://128.160.23.41/) in a series of six tiled xyz data sets. Because the NGLI data is an integrated bathymetric/topographic data set, the first step in preparing the data was to remove ground surface (or positive) elevations. This was accomplished by first importing the data into MapInfo, querying all elevations greater then zero, and deleting the results of the query.

The next step involved ensuring the bathymetric data did not overlap the predetermined location of the shoreline (i.e. no depths inside what is supposed to be land). For this step, the data were exported from MapInfo into a shapefile, and brought into ArcGIS, where a spatial query was performed. The query was coded to select NGLI data whose center was contained by the shoreline polygon file. The results of this query were deleted. After the edits were saved, the data were exported to a xyz text file.

The final step to create the ADCIRC bathymetric data set was to incorporate the zero elevation contour as defined by the shoreline file into the edited NGLI data. The two data sets were combined using a Perl script because of large file sizes. The Perl script also divided the data into 1° x 1° tiles because of SMS file size limitations.

7.3.5 Pre- and Post-Katrina LIDAR Data

The most complex portion of the data integration task involved creating a complete LIDAR data set that included topographic elevations and river bottom elevations. The effort and time involved in performing this task were exponentially increased as a result of the file sizes associated with the gridded LIDAR data.

The first step of this process was to delete any data points contained within the LIDAR data set that were located over the bathymetric data. As utilized in the NGLI data preparation, a spatial query was performed to select all point's centroids that were contained by the shoreline polygon file. The selected results were "switched," resulting in the selection of points not within the shoreline polygon (i.e., points over water), and deleted.

The next step involved deleting LIDAR topographic points that overlapped with the breaklines created in ADCIRC. This ensured that river bottom elevations, not topographic elevations, would be assigned to the grid nodes in the ADCIRC model. This was accomplished using the ArcGIS spatial query function (or Select by Location). The query was formatted by selecting LIDAR data points that were within 20 meters of the modeler's hydrographic breaklines. The selected LIDAR points were deleted from the data set.

The last calculation for creating the final LIDAR data set was finding the elevation of the river bottom. Several inputs were required to accomplish this task. First, the vertices from the hydrographic breaklines were exported to a point file, retaining the assigned depth attribute. These points were then exported as a xyz text file. Second, the LIDAR data set, as created in the previous discussion, was exported to a xyz text file.

A Perl script was written to perform a spatial query, calculate the average elevations of the selected data, and subtract the depth of the river at that point from the average elevation. The logic within the Perl script is presented in Figure 19 below.

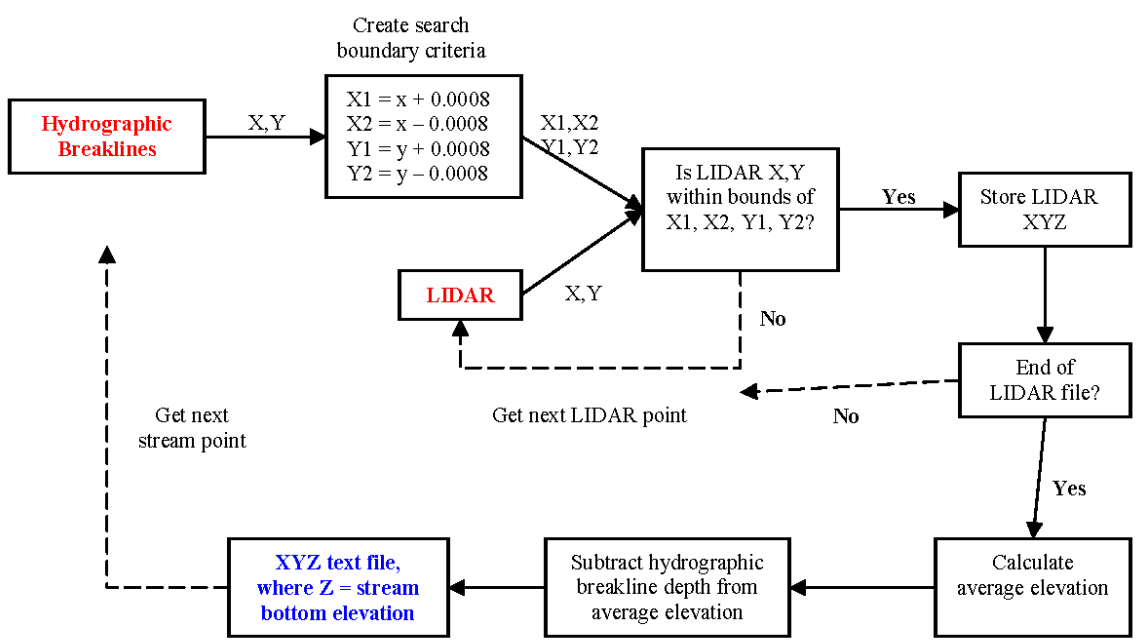

Figure 19: Flow diagram representing computation of stream bottom elevation. Red text represents input files and blue text represents output file.

8.1 OVERVIEW

The following discussion reviews the processes implemented to develop terrain coverages for the three coastal Mississippi counties, and their contributing watersheds. The subject of this report is on the coastal regions; however, the specific processes described below offer a comprehensive look at the terrain project development for Hancock, Harrison, and Jackson Counties. These processes ensure consistency between the coastal analyses/mapping being performed for this project, and the riverine re-delineations and restudies that are also being updated by Watershed Concepts under a separate contract with the state of Mississippi.

The Watershed Information SystEm (WISE) Terrain module allowed for the import of Digital Terrain Model (DTM) data from a variety of sources into project files for each of the coastal Mississippi counties (Jackson, Hancock, and Harrison). Each county's DTM data consisted of LIDAR point data within the county boundaries, new breakline data along the coast, and/or 10-meter, 30-meter and 1 arc-second resolution U.S. Geological Survey (USGS) Digital Elevation Models (DEM). The USGS DEM data was used only to supplement the LIDAR DTM for a comprehensive terrain build which will include all drainage areas that flow into the study streams. The comprehensive elevation information will be used for riverine hydrologic analyses, while the terrain built from solely the LIDAR data will be used for hydraulic and coastal analyses.

Initially, the stored data were organized for further analysis. The list below depicts the levels of prioritization for DTM data used in the projects. Item 1 represents the highest/most accurate level whereas item 4 represents the lowest/least accurate level of prioritization.

1. LIDAR bare earth points (pre- and post-Katrina)
2. 10 meter USGS DEM data
3. 30 meter USGS DEM data
4. 1 arc-second USGS DEM data

The DTM data were used to produce digital models of the topography. The two types of models produced in WISE were a model based on a TIN and a DEM. The DEM is a raster representation of the TIN having a uniform posting of elevations. These postings are typically referred to as the DEM cell size and generally range from 5 feet to 100 feet.

8.2 HYDROLOGICALLY CORRECTING DEMS

For the purposes of the riverine studies being performed, once the DEM was created, WISE Terrain module functions were used to compute the flow vectors and checks for accuracy. The principal process used to calculate flow vectors was Watershed Concepts' proprietary program FAUCET (Flow Analysis Utilizing Cell Elevation Topology). The FAUCET tool assigned flow vector values to minor cells in the DEM while also identifying flow problems such as sumps, peaks, and flat areas. After adjusting the maximum depth depression for the automated correction of sumps, cutlines were digitized to breach fill thereby restricting flow from a sump. The digitized cutlines use an interpolation method to modify the cells in the DEM that intersect the cutline. Cell elevation values are modified based on the interpolated elevations from the sump to the lower elevation downstream. After all flow problems were corrected with the

automated or manual method, FAUCET was rerun. This process ultimately led to calculations which resulted in a hydrologically correct DEM with concurrent binary flow vector values in an array of 0 through 8 (FEMA Guidelines and Specifications for Flood Hazard Mapping Partners, Appendix N: Data Capture Standards page N-18). This information, in conjunction with defining incoming neighbors and calculating the flow accumulation for all points within a watershed, completed the production of a hydrologically correct DEM for the project area. Again, note that this DEM processing was for the purposes of facilitating riverine analyses being performed concurrently with the coastal studies.

8.3 REVISIONS TO COASTAL TIN

With the onset of Hurricane Katrina, a post-event topographic LIDAR dataset was derived and implemented into the model as a second version. This versioning step preserved the old terrain dataset and concurrent hydrology files. As a result, the versioned terrain model created a seamless “patchwork” of DTM data without the need to rebuild a separate model. The final products of the Mississippi coastal terrain projects in WISE, after the compilation and processing of LIDAR and DEM DTM data types and versions, were a TIN model and a hydrologically-correct DEM, flow vectors, and drainage area calculations for Pre- and Post-Katrina topographic data.

Quality assurance performed on the data included the search for anomalous points in the LIDAR raw data, automated basin delineation, the use of the WISE raindrop flow tool for visual display of flow within the watershed, and the creation of contours from TINs. These were all performed for visual comparison against the DEMs and created from the model and accompanying aerial imagery.

The geospatial technology subtask of the Mississippi Coastal Analysis project provided a seamless terrain and bathymetry dataset as a foundation for all subsequent engineering activities. No new topographic or bathymetric datasets were created for this project; all of the topographic and bathymetric datasets were acquired from existing "best-available" sources. URS has relied upon quality control and accuracy assessments performed by the agency owners of the input datasets. Every effort was made to merge these datasets accurately without modifying any of the original measurements.

Creation of a seamless topographic and bathymetric dataset required resolution of geodetic and tidal elevation datum differences. In the interest of the project schedule, it was not possible to follow rigorous methods incorporating field observations and survey profiles. An assumption was made that the differences between NAVD88, MSL, and MLLW are constant across the Mississippi Gulf Coast. While this may oversimplify the situation from the point of view of a surveyor or geodesist, it was deemed acceptable for this project because small, localized variations in the datum differences are insignificant relative to other assumptions and sources of error inherent in coastal analysis.

While the analysis performed in this task order is limited to the state of Mississippi, many will be interested in the consistency of the results compared to other analyses performed in the neighboring states of Louisiana and Alabama. Topographic datasets for St. Tammany Parish, LA and Mobile County, AL were also acquired; the elevation differences between these and the Mississippi data were analyzed and reported.

For the purposes of the ADCIRC modeling, the URS team supplemented the topographic data with additional breaklines to define elevated features that would impede surge. These breaklines were collected from the existing LIDAR data sources described above.

The resulting seamless topographic dataset, created from pre- and post-Katrina sources is, in and of itself, a useful and unique product that could be used for many other engineering and mapping applications. Per their request and FEMA's approval, a copy of this dataset was sent to the USACE Mobile District. An additional request from the Mississippi Department of Marine Resources has been forwarded to FEMA for consideration.

NOAA (2005a), Tides and Currents, http://tidesandcurrents.noaa.gov, Nov 2005.

NOAA (2005b), Coastal Services Center, Historical Shoreline Data, http://www.csc.noaa.gov/shoreline/data.html, March 2005.

NOAA (2006), Office of Coast Survey and National Geodetic Survey, VDatum Transformation Tool, http://nauticalcharts.noaa.gov/csdl/Vdatum.htm, April 2006

Appendix A.1
Hancock And Jackson County LIDAR Acquisition Report

EARTHDATA

Turning Spatial Data into Knowledge

ELEVATION MAPPING

Jackson and Hancock Counties, MS
Lidar

Final Project Report

21 December 2005

Prepared for

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INTRODUCTION

The NOAA Coastal Services Center (CSC) and Mississippi Department of Environmental Quality contracted EarthData International, LLC (EarthData) to collect and deliver high quality topographic elevation point data derived from multiple return light detection and ranging (Lidar) measurements for an area of approximately 477 square miles encompassing Hancock County and 727 square miles encompassing Jackson County in Mississippi.

1.1 Project Area

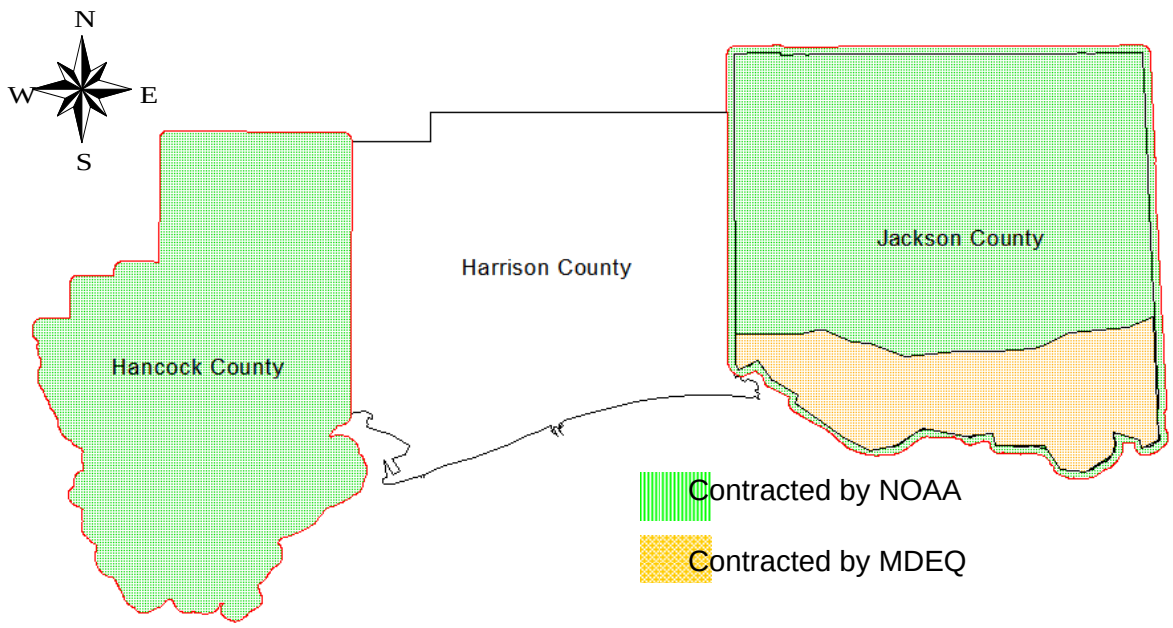


Figure 1 - Project Area

1.2 Purpose

The mission of the Center is to support the environmental, social, and economic well being of the coast by linking people, information, and technology. The data produced from this SOW are intended to support the local Coastal Zone Managers in their decision-making processes. This data will be used for flood plain mapping and other coastal management applications. Information from this project is also being used in response to data requirements for post-hurricane Katrina mapping efforts.

The information provided in this report summarizes the project, from project planning through final deliverable generation, and provides a final quality control evaluation of the project deliverables.

2 PROJECT OVERVIEW

This project includes the collection and processing of lidar data covering approximately 1,204 square miles over Jackson and Hancock counties, MS. Data was collected at a nominal meter (5) meter post spacing between points. Hydro-enforced breaklines were produced for this project as well as lidar intensity images.

2.1 Project Plan

EarthData developed a project plan designed to provide MDEQ and NOAA with comprehensive support and assurance of the successful completion of the project's requirements through a combination of program management, data management, and resource management as well as through the strengths of the EarthData team who contributed:

- Experienced technical staff.
- Proven experience integrating new technology and commercial off-the-shelf (COTS) solutions in the production environment.
- Experienced program management capabilities.
- Proven ability to meet production/schedule requirements while functioning in crises.
- Excellent working relationship with MDEQ/NOAA contracting staff.

3 PROJECT DELIVERABLES/ACCURACY

The project deliverables listed below will provide NOAA and MDEQ data to assist in their decision-making processes.

3.1 Products

Products developed for NOAA
LAS file of lidar data of point cloud with classifications in accordance with the American Society of Photogrammetry and Remote Sensing (ASPRS) LAS format classification table.
Lidar intensity images in .TIF/.TFW format
Ground survey report

Products developed for MDEQ
ASCII, xyz files with point cloud of lidar data.
ASCII, xyz files with bare-earth lidar points only
Lidar intensity images in .TIF/.TFW format
Hydro-breaklines derived from imagery and lidar surface
Ground survey report

3.2 Data Accuracy Requirements

Data Accuracy
Lidar data collected at a nominal five (5) meter spacing between points
For **NOAA**, all data was referenced to the North American Datum of 1983 (NAD83) and the Geodetic Reference System of 1980 (GRS80). Horizontal units were in decimal degrees and vertical units were in meters above the GRS80 ellipsoidal surface.
For **MDEQ** , all data was referenced to Mississippi State Plane East, U.S. survey Feet, NAD83, NAVD88.
Lidar has been collected and processed in accordance with FEMA guidance as published in Appendix A,

February 2002.
Lidar points have been processed to meet National Standard for Spatial Accuracy (NSSDA). When compared to GPS survey grade points in generally flat, open, non-vegetated areas, at least 95% of the positions have an error less than or equal to 36.3 cm (equivalent to root mean square error of 18.5 cm if errors were normally distributed)

4 PROJECT PLANNING

EarthData's program management process has been documented and is conducted in accordance with ISO9001 requirements. Mr. Rempel monitored progress against schedule through internal production meetings which facilitate communications between project managers and key project personnel. He prepared monthly written reports that were submitted to NOAA and to MDEQ to track the status of the program and to note milestones and/or issues that required resolution.

5 LIDAR AND AIRBORNE GPS/IMU DATA ACQUISITION

All lidar data collected for this project was acquired using the Leica ALS-50 lidar system. The ALS-50 instrument has an operating ceiling of 15,000' AMT and is equipped with a with a 50 kHz thermal infrared laser that delivers a ground point spacing between 1 and 8 meters.

The ALS-50 system has the ability to detect and record up to 3 return signals for each transmit pulse. The system is also equipped with two intensity cards that record the reflective energy of each returning pulse.

All data is written to 9.1 GB removable hard disk drives through a SCSI connection for post-mission processing. Data from both the laser subsystem and the positioning subsystem are tagged with the GPS 1 PPS clock, and the laser data stream also contains the GPS time word for subsequent time matching and processing.

To support this project EarthData Aviation, Inc contracted an EarthData Company, Horizons Inc. to acquire ALS-50 Lidar data over Jackson and Hancock counties in MS. Data was acquired between February 25th and March 12th, 2005 using its aircraft with tail number N2636P. Lidar data was captured using an ALS-50 Lidar system, including an inertial measuring unit (IMU) and a dual frequency GPS receiver.

5.1 Lidar Data Acquisition

The area of interest was flown at an altitude of 3,657 meters (12,000 feet) above mean terrain. Data was collected at a nominal five-meter point spacing. The ALS-50 collection specifications follow:

Sensor Collection Parameters	
Flying Height	3,657 m AMT
Target Airspeed	150 knots
Laser Pulse Rate	29,900 Hz
Field of View	45 Degrees
Scan Rate	17 Hz
Average Swath Width	3,100 meters

5.2 Airborne GPS Data Acquisition

The concept of airborne GPS is to precisely locate the lidar sensor in space at a defined moment in time. Airborne GPS control is accomplished through the simultaneous observation of five or more satellites in the GPS constellation using a receiver that is permanently mounted in the aircraft and multiple ground receivers that are located over known control points that are in the vicinity of the project area. As the aircraft traverses the flight lines, the GPS system logs observations in 1-second epochs. After the flight is completed, the data logged from the roving receiver, the stationary receiver(s), and the time pulses are post-processed and the position of the camera is defined to an accuracy of 3-10 cm.

EarthData's airborne GPS system is designed to allow on-the-fly initialization, which means that the aircraft does not have to start and end each mission over a known survey point. More importantly, the aircraft receiver can re-initialize during flight should satellite reception be lost. During the lidar collection mission, the stationary receiver and roving receiver acquire GPS observations in 1-second intervals or epochs, which are then merged during post mission processing and quality control.

During airborne data collection, an additional GPS receiver was in constant operation over a published National Geodetic Survey (NGS) control point at Stennis International Airport. During the data acquisition, the receiver collected phase data at an epoch rate of 1 Hz.

5.3 GPS Data Processing

All GPS phase data was post processed with continuous kinematic survey techniques using "On the Fly" (OTF) integer ambiguity resolution. The GPS data was processed with forward and reverse processing algorithms. The results from each process, using the data collected at the airport, were combined to yield a single fixed integer phase differential solution of the aircraft trajectory.

5.4 Project Acquisition Areas

The bounding coordinates provided below represent rectangles covering the total area in which the project is located.

- **Jackson County Bounding coordinates:**
  West Bounding Coordinate: +088.907348
  East Bounding Coordinate: +088.379323
  North Bounding Coordinate: +30.752416
  South Bounding Coordinate: +30.303901

- **Hancock County Bounding coordinates:**
  West Bounding Coordinate: +089.719289
  East Bounding Coordinate: +089.295856
  North Bounding Coordinate: +30.667090
  South Bounding Coordinate: +30.159431

6 CONTROL

6.1 Ground Control and GPS Base Stations

TerraSurv, Inc. of Pittsburgh, PA was contracted by EarthData International to perform a geodetic control survey in support of LIDAR mapping of Hancock and Jackson Counties, Mississippi. The survey was completed in two phases; the first phase consisted of 8 LIDAR control points in southern Jackson County (indicated by yellow squares in the map below). The second phase consisted of 12 additional LIDAR control points in Jackson County and 20 new LIDAR control points in Hancock County (indicated by blue circles in the map below). The map below in figure 1 shows the location of the project area.

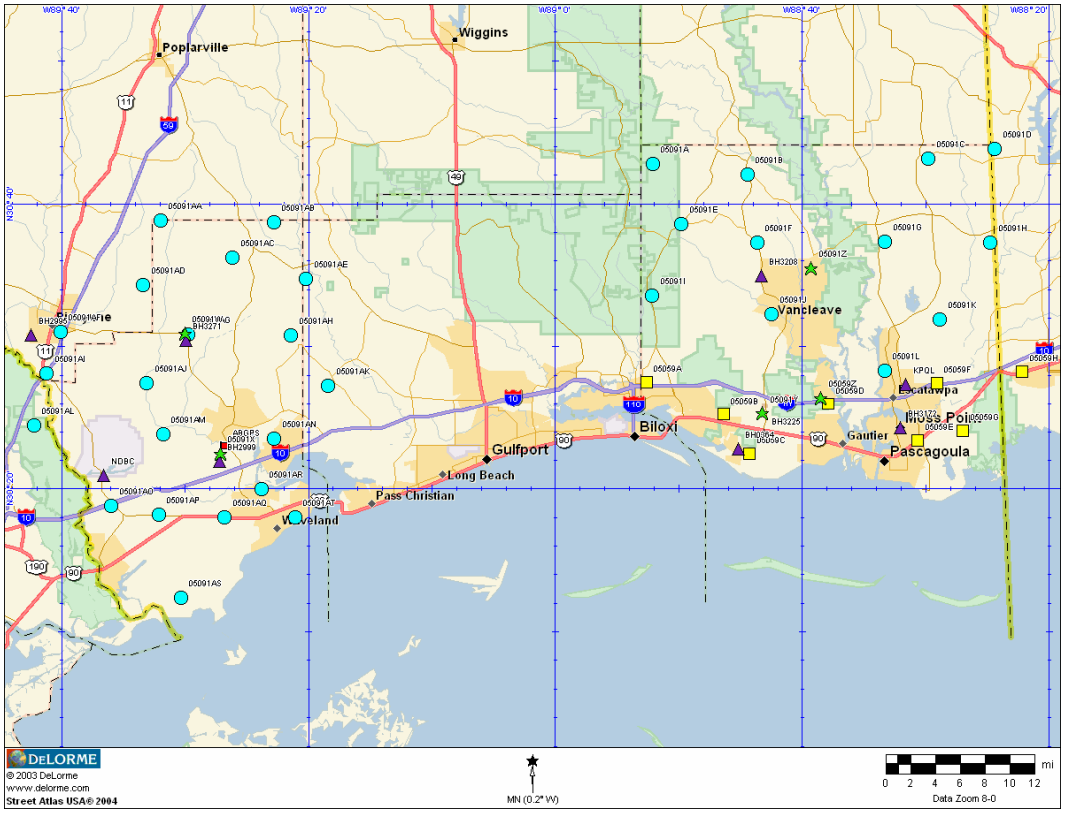


Figure 2 - Project Area Survey

The purple triangles represent existing NSRS control and the green stars represent temporary base locations. The red flag indicates the location of the Airborne GPS base station used by the flight crew. This station was also tied to the LIDAR ground control network. This station was located at the Stennis International Airport.

STATIONS SURVEYED

Station Name	GPSID	Description
ABGPS	ABGPS	Airborne GPS base
BASE	05059Z	temp GPS base
BASE	05091W	temp GPS base
BASE	05091X	temp GPS base
BASE	05091Y	temp GPS base
BASE	05091Z	temp GPS base
CAREY AZ MK	BH2995	control
FONTAINE AZ MK	BH0364	control
H1	05091AA	sand road berm
H10	05091AJ	edge of dirt road
H11	05091AK	edge of asphalt
H12	05091AL	grass area
H13	05091AM	sand/grass field drive
H14	05091AN	asphalt berm
H15	05091AO	brick/concrete walk
H16	05091AP	asphalt berm
H17	05091AQ	asphalt berm
H18	05091AR	concrete patch on old drive
H19	05091AS	end of asphalt road
H2	05091AB	grass field drive
H20	05091AT	sand/grass area
H3	05091AC	sand/gravel road berm
H4	05091AD	grass trail
H5	05091AE	edge of asphalt
H6	05091AF	grass area
H7	05091AG	gravel/grass berm
H8	05091AH	grass/sand berm
H9	05091AI	asphalt lot
J1	05091A	edge of gravel road
J10	05091J	edge of asphalt
J11	05091K	edge of asphalt
J12	05091L	gravel/sand lot
J2	05091B	gravel berm
J3	05091C	edge of asphalt

Station Name	GPSID	Description
J4	05091D	asphalt pad
J5	05091E	edge of gravel drive
J6	05091F	edge of asphalt
J7	05091G	edge of asphalt
J8	05091H	asphalt pad
J9	05091I	edge of asphalt
K 364	BH3225	control
KPQL	KPQL	Temporary station
LJ1	05059A	ground
LJ2	05059B	edge of asphalt
LJ3	05059C	edge of asphalt
LJ4	05059D	grass/gravel area
LJ5	05059E	concrete pad
LJ6	05059F	asphalt berm
LJ7	05059G	edge of asphalt
LJ8	05059H	grass area
MOB1	MOB1	CORS
MOSS POINT RESET	BH3172	control
N 365	BH3271	control
NDBC	NDBC	CORS
STENNIS	BH2999	control
VAN RM 1	BH3208	control

The following table lists the horizontal and vertical control utilized for the primary network. The horizontal datum was the North American Datum of 1983, 1993 adjustment (NAD 1983 1993). The vertical datum was the North American Vertical Datum of 1988 (NAVD 1988).

Station Name	PID	H order	V order
CAREY AZ MK	BH2995	3	1
FONTAINE AZ MK	BH0364	1	1
K 364	BH3225	B	1
MOBILE POINT 1 CORS ARP	AF9559	CORS	GPS
MOSS POINT RESET	BH3172	B	GPS
N 365	BH3271	-	1
STENNIS	BH2999	B	1

STENNIS CORS ARP	AF9574	CORS	GPS
VAN RM 1	BH3208	B	1

All of these stations are part of the National Spatial Reference System (NSRS).

7 GPS OBSERVATIONS

The primary control network was observed utilizing GPS. Trimble 4000 and 5000 series receivers were used in a static differential mode to observe the baselines comprising the network. The network was observed on days 102, 152, 153, and 154 of 2005. Data from the Airborne GPS base station and nearby CORS station MOB1 was also included in the network. The table below summarizes the GPS occupations for phase 1 (southern Jackson county) of the project. The HI's (uncorrected) are in meters, and the durations are in minutes.

GPSID	UTC start	UTC stop	dur	HI	Filename
05059D	4/12/2005 16:06:30	4/12/2005 16:26:30	20	2.5	36651020.dat
BH3172	4/12/2005 16:45:30	4/12/2005 17:01:00	16	2	36651021.dat
05059E	4/12/2005 17:27:00	4/12/2005 17:43:15	16	2	36651022.dat
05059G	4/12/2005 18:02:30	4/12/2005 18:25:15	23	2.5	36651023.dat
05059H	4/12/2005 18:42:30	4/12/2005 19:15:30	33	2.5	36651024.dat
05059F	4/12/2005 19:28:00	4/12/2005 19:46:00	18	2.5	36651025.dat
BH3225	4/12/2005 20:12:15	4/12/2005 20:46:00	34	2.5	36651026.dat
05059C	4/12/2005 20:58:30	4/12/2005 21:15:15	17	2.5	36651027.dat
05059B	4/12/2005 21:31:15	4/12/2005 21:47:15	16	2.5	36651028.dat
05059A	4/12/2005 22:08:45	4/12/2005 22:35:30	27	2.5	36651029.dat
05059Z	4/12/2005 15:51:30	4/12/2005 22:58:15	427	0	99811020.DAT
MOB1	4/12/2005 15:51:30	4/12/2005 22:58:15	427	0	MOB1102.05O
KPQL	3/1/2005 12:48:00	3/1/2005 23:24:00	636	0.0001	KPQL060.05O
MOB1	3/1/2005 12:48:00	3/1/2005 23:24:00	636	0	MOB1060.05O

8 LIDAR PROCESSING

8.1 Lidar Data Processing Production Steps

EarthData has developed a unique method for processing Lidar data. The algorithms for filtering data were utilized within EarthData's proprietary software and commercial software written by TerraSolid and Leica. This software suite of tools provides efficient processing for small to large-scale projects and has been incorporated into ISO 9001 compliant production work flows.

8.1.1 Point Cloud

The following is a step-by-step breakdown of the process utilized to produce variably-spaced point cloud data sets.

Step 1 Processing of the Lidar data begins with refinement of the initial boresight alignment parameters provided in the ALS processor by Leica. The technician also verifies that there are no voids, and that the data covers the entire project area. Calibration is accomplished using the tri-directional flight lines over the project airport, which is generally flat and free of major obstructions, trees or brush. Two overlapping bi-directional lines are flown along the length of the runway, and the cross flight line is perpendicular to both. All three lines are examined to ensure that they agree, within expected system tolerances, in the overlapping areas. The technician will review flight lines and locate the areas that contained systematic errors or distortions that were introduced by the Lidar sensor.

Step 2 Systematic distortions highlighted in step 1 were removed and the data was re-inspected. Corrections and adjustments can involve the application of angular deflection or compensation for curvature of the ground surface that can be introduced by crossing from on type of land cover to another.

Step 3 All flight lines are processed with the refined calibration parameters obtained thru steps 1 and 2. All flight line are examined to ensure that they agree, within expected system tolerances, in the overlapping areas (side lap).

Step 4 The Lidar data for each flight line was trimmed in batch for the removal of the overlap areas between flight lines. The data was checked against a control network to ensure that vertical requirements were maintained. Conversion to the client-specified datum and projections were then completed. The Lidar flight line data sets were then segmented into adjoining tiles for batch processing and data management.

Step 5 The data was then edited for Blunder removal.

Step 6 The data was separated into a variably-spaced point cloud in .LAS file format, and EarthData .EBN (binary) format for bare earth production of ASCII deliverables and left in .LAS format for bare earth production of .LAS deliverables. The files were written to PC readable CD-ROM for archiving.

UNAUTHORIZED USE NOT PERMITTED WITHOUT WRITTEN CONSENT.

8.1.2 Bare-Earth

The following is a step-by-step breakdown of the process utilized to produce variably-spaced bare-earth data sets.

Step 1 Processing of the Lidar data begins with refinement of the initial boresight alignment parameters provided by EarthData Aviation in the LITES configuration file delivered with the raw data. The technician also verifies that there are no voids, and that the data covers the entire project area. Calibration is accomplished using the tri-directional flight lines over the project airport, which is generally flat and free of major obstructions, trees or brush. Two overlapping bi-directional lines are flown along the length of the runway, and the cross flight line is perpendicular to both. All three lines are examined to ensure that they agree, within expected system tolerances, in the overlapping areas. The technician will review flight lines and locate the areas that contained systematic errors or distortions that were introduced by the Lidar sensor.

Step 2 Systematic distortions highlighted in step 1 were removed and the data was re-inspected. Corrections and adjustments can involve the application of angular deflection or compensation for curvature of the ground surface that can be introduced by crossing from on type of land cover to another.

Step 3 All flight lines are processed with the refined calibration parameters obtained thru steps 1 and 2. All flight lines are examined to ensure that they agree, within expected system tolerances, in the overlapping areas (side lap).

Step 4 The Lidar data for each flight line was trimmed in batch for the removal of the overlap areas between flight lines. The data was checked against a control network to ensure that vertical requirements were maintained. Conversion to the client-specified datum and projections were then completed. The Lidar flight line data sets were then segmented into adjoining tiles for batch processing and data management.
4a. Sins and Fins (first and only and last of many) points are extracted from the point cloud and are used for bare earth classification.

Step 5 The initial batch-processing run removed 75% to 95% of points falling on vegetation. The algorithm also removed points that fell on the edge of hard features such as structures, elevated roadways and bridges. In addition, points not classified as ground are coded as above ground. Thus the Lidar data was classified into two thematic layers that can be analyzed separately or together. Sub-classification of the above ground layer to intermediate canopy, top of canopy, building, etc was not required for this project.

Step 6 The data was processed interactively by the operator using Lidar editing tools. During this final phase the operator generated a TIN based on a desired thematic layers to evaluate the automated classification performed in step 5. This allowed the operator to quickly re-classify points from one layer to another and recreate the TIN surface to see the effects of edits. The use of geo-referenced images was toggled on or off to aid the operator in identifying problem areas. The data was also examined with an automated profiling tool to aid the operator in the reclassification.

Step 7 The final bare earth products were written to LAS and ASCII formats for delivery. The files were written to PC readable DVD-ROM.

8.1.3 Generation of Lidar Intensity Images

Lidar intensity images were produced for the corresponding tiles of lidar points. Intensity images are generated through the use of a DOS-driven proprietary program called "eebnstif.exe". The program allows a user to select the desired pixel size of the resultant intensity image and will both extract the intensity value from each lidar and resample the data to the selected pixel size. Eebntif outputs the intensity images in .TIF format with associated .TFW files for the tiles.

Several samples at different pixel resolutions are generated and the lead technician selects the sample that is the most aesthetically pleasing and yields the most interpretability. From past experience on other projects, EarthData has found that the pixel resolution usually selected is one that closely mirrors the post spacing of the source lidar. In some cases, however, re-sampling to a tighter pixel resolution has yielded better results. For this project, the best resolution was a 16' (foot) pixel which is close to the nominal post spacing of the lidar data.

Once all of the intensity images were generated, the lead technician examined all of the images with the zoom and dynamic pan tools for normalcy, continuity, and coverage.

8.1.4 Generation of Hydro-Breaklines

*****Technical Note on NCFPM Breaklines:*** It should be noted that the breaklines developed for use in the H&H modeling should not be confused with traditional stereo-graphic or field survey derived breaklines. The elevation component of the 3D streamlines (breaklines) is derived from the lowest adjacent bare earth lidar point and adjusted to ensure that the streams flow downstream. The best elevation that can be derived for the 3D streamlines will be the water surface elevation on the date that the lidar data was acquired. The elevations in the 3D streamlines will not represent the underwater elevations for streams due to the fact that lidar data cannot collect bathymetry information.

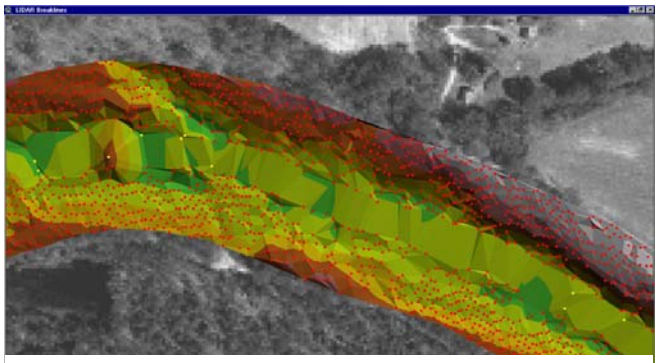


Figure 3: lidar TIN without breaklines

Watershed Concepts and EarthData have done considerable research generating breaklines from lidar data. Current H&H modeling practices rely heavily on mass points and breaklines to create a realistic TIN surface for hydrologic and hydraulic modeling. lidar data consists only of points, which are not suited to defining sharp breaks on terrain. The problem is most pronounced across stream channels, where lidar is not able to define the stream banks clearly. Furthermore lidar does not reflect off water, therefore no reliable elevation points will exist within the stream channel itself. The TIN surface generated from lidar data alone is unsuitable for H&H modeling, as can be seen in

Watershed Concepts engineers have studied the sensitivity of the 100-year flood boundary to the definition of stream channel geometry. The surface created with both lidar points and breaklines improves channel definitions for hydraulic cross section takeoffs and better defines the stream invert. It is not necessary to create breaklines on the top and bottom of stream banks; minor modifications to the cross sections and stream inverts can be made based on field survey data as necessary. In the 100-year flood, most of the

flooded cross sectional area occurs in the overbank; therefore creating a more refined channel definition from the lidar data is not cost effective. The lidar TIN is used simply as the basis for the overbank definition.

Our research indicates that breaklines are required at the stream centerline for smaller streams with widths less than 50 feet. For larger streams (widths greater than 50 feet, breaklines are needed on the left and right water edge lines. Collection of photography and stereo compilation of the breaklines is not cost-effective for this purpose. Watershed Concepts and EarthData have developed techniques to synthesize 3D break lines using digital orthophotos and lidar data. These breaklines can be digitized in 2D from orthophotos, approximating the stream bank in areas of significant tree overhang. A bounding polygon, created from the edge of bank lines, is used to remove all points within the channel. Automatic processes assign elevations to the vertices of the centerline based on surrounding lidar points. The lines are then smoothed to ensure a continuous downhill flow. Edge-of-bank vertices are adjusted vertically to match the stream centerline vertices. A new TIN can then be created from the remaining lidar points and newly created breaklines. The new TIN clearly defines the stream channel, as shown in Figure 4.

For this project, breaklines were generated in the matter described above for all streams draining greater than approximately one square mile. 2D lines defining the centerline and banks of those streams were manually digitized into ArcView shape file format from the USGS DOQQ imagery. The streamlines were then processed against the bare-earth lidar as described above. The new 3D lines were then viewed in profile to correct any anomalous vertices or remove errant points from the lidar DTM, which cause unrealistic "spikes" or "dips" in the breakline.

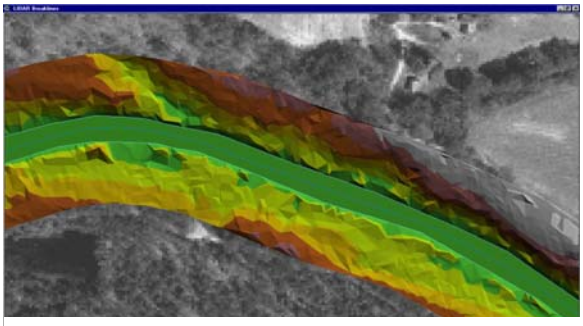


Figure 4: lidar TIN with breaklines

9 QUALITY ASSURANCE/QUALITY CONTROL PLAN

EarthData is committed to achieving an error-free production environment so that NOAA/NGA can have full confidence in EarthData's ability to provide products and services on time and first time right. To achieve this goal, EarthData has implemented an ISO9001-certified quality management system (QMS) that encompasses, enhances, controls, and standardizes production processes and quality control (QC) activities to ensure that products and services meet or exceed the client's requirements and expectations.

As a result, both manual and automated QC activities have been integrated throughout the production process as an effective method for identifying errors early in the production process, instead of reviewing only the final deliverable. These QC techniques detect failures in the system and then, through corrective action reviews and routines, link QC and quality assurance (QA) practices.

EarthData's approach to quality for the NOAA/NGA project includes detailed quality procedures and plans based on project specifications and industry standards. This approach is designed to:

- Ensure that all data products meet or exceed the client's expectations for quality and accuracy

- Ensure high first-time acceptance rates – on time – by incorporating quality assurance (QA) and quality control (QC) throughout the production lifecycle, not just final deliverables
- Minimize client 's responsibility and administrative burden for ensuring that all data products meet their expectations and the expectations of their users'

EarthData has developed an excellent reputation for providing our clients with high quality products and services that meet their specific needs. ISO9001 certified since 15 April 2000, EarthData has used its comprehensive QMS to improve performance to 97% on-time delivery, first-time-right.

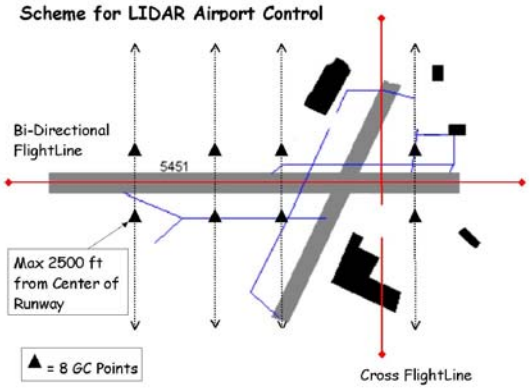
EarthData has very detailed processes and production workflows that govern each phase of production, from data acquisition through to processing and product finishing.

9.1 Quality Control of the Airborne GPS and IMU Data for Lidar

The performance and accuracy of the lidar/IMU system is tested and validated for each data capture sortie through a process called *boresight determination*. EarthData uses a permanent control field at the Hagerstown airport or establishes a control field in the vicinity of the project site and lidar data is obtained, processed and inspected to verify that all components (GPS, IMU and the lidar instrument) are operating correctly. The boresight determination is based on lidar data collected over a local airport located in the proximity of the project area.

- IMU Boresight Determination

EarthData conducts a boresight determination prior to each data collection sortie to model and synchronize the outputs of the inertial measurement unit (IMU) and the lidar instrument. The goal of the boresight is to determine the level of compensation that must be applied to the dataset to remove systematic distortion during lidar post-processing. The following are the steps included in a boresight determination:



Step 1 At the start of each acquisition mission, lidar data is acquired over the local airfield where the crew establishes its base station at the altitude, swath width, and post spacing to be used for the project. The test area is covered by three overlapping flight lines. Two parallel lines cover the area in opposing directions with 100% overlap; the third line crosses perpendicular to the two principal lines.

Step 2 The vertical data from the 2 lines overlapping by 100% are processed using ArcView to color code differences in the elevation values of identical points in each of the lines to determine if there is any yaw or pitch in the lidar/IMU system. The perpendicular line is used to detect bowing or warping in the lidar sensor that occurs within each swath.

Step 3 The technician records the measurements of the boresight determination and calculates any offsets that must be applied to the IMU data during the initial processing.

- Field Quality Control of Lidar Data

Raw lidar data consists of time events and mirror scan angles which must be transformed into georeferenced elevation points. The following list describes the step-by-step process used to ensure that the lidar, GPS and IMU data is compliant with project specifications:

Step 1 At the earliest opportunity post-mission, the airborne GPS is processed and passed through quality control. The GPS phase data is processed using continuous kinematic survey techniques, which yields a positional accuracy of 10 centimeters.

Step 2 The IMU data is then processed to integrate the inertial measurements and the precise phase differential GPS positions. This data is combined with the measurements of the angle of the scanning mirror in relationship to the IMU. Now the geodetic position and the orientation (omega, phi, and kappa) of the scan mirror can be calculated for at any point in the mission.

Step 3 The time and ranging data collected by the lidar instrument is then processed in conjunction with the known sensor position and orientation to calculate a three-dimensional ground coordinate for each pulse using GPS time as the common link between the two data sets. Processing of the lidar data is performed using EarthData's proprietary software, LITES.

Several transformations of the data are needed to complete this process. These transformations are performed between several different Cartesian coordinate systems called frames. The initial processing acts as a comprehensive quality control review of the lidar and associated positional data to ensure that the resulting elevation model will be compliant with the requirements of NOAA.

Step 4 Using the LITES software, the operator specifies which portions of the lidar and/or intensity data are extracted for subsequent vegetation classification and processing. Lidar data has been checked for georeferencing and is output in a binary format designed by EarthData to increase the efficiency of processing.

9.2 QC Process for Lidar Data

EarthData has incorporated quality control processes into each component of the lidar acquisition and processing workflow. Some of the key components are described below:

The correct operation of the lidar instrument as well as the GPS/IMU subsystems are validated prior to each data collection sortie through the IMU boresight process. Calibration data for the boresight is acquired at the local airport where the aircrew is based. Lidar data for the boresight is acquired in several overlapping directions, normally over the airport runways, which is processed and measured. The results of this

processing provide the technician with important information to model the combined GPS/IMU information, which determines the accuracy of the location of the lidar point data.

During data acquisition, the on-board GPS flight management system eliminates the need for re-flights due to insufficient or improper coverage. EarthData incorporates one or more crossing lines that are acquired perpendicular to the main flight acquisition plan. The data from the crossing line provides the technician with the ability to review selected points on the ground from two different vantage points. The use of crossing lines identifies systematic distortion in the lidar elevation data caused by the lidar sensor. Further, the crossing line provides the means to model any distortion and to apply a correction factor to ensure that the elevation data meets NSSDA requirements.

Once post-processing commences, existing ground control and elevation data are used to verify the accuracy of the lidar data. Coverage and edge-match of the data is confirmed a second time using cross flight lines. Finally, the bare-ground DEM is checked against the intensity data and/or digital orthophotography to verify that no artifacts are introduced during post-processing.

EarthData has developed proprietary processes to identify and to remove systematic distortion in the lidar data that may be introduced by the lidar sensor. Data processing routines for distortion removal are fully documented in accordance with ISO9001 requirements.

EarthData received ISO9001 certification in April 2000. All production process development complies with ISO standards for quality that require all production processes be documented and address all aspects of quality control and that all of the required steps be implemented for the project. All processes go through management review for process improvement and certification on an on-going basis.

Every phase of production has a quality assurance plan that includes checklists, independent review, automated quality routines for data validation, reports, and interactive quality steps.

10 POSITIONAL ACCURACY EVALUATION

10.1 Positional Accuracy

10.1.1 Vertical Positional Accuracy Report

Compliance with the accuracy requirements was ensured by comparing GPS ground control points against the processed dataset. Tests consisted of visual checks and the use of EarthData proprietary software (Check DEM).

- CheckDEM is a program designed to compare a list of controls against DEM file(s) and therefore to check the accuracy of the DEM file(s). For each control point, first, the program selects all the DEM points that fall into a given radius from the position of the control point. Second, the program calculates a weighted average of the DEM points to interpolate an elevation at the position of the control point. And last, the program computes the difference between the elevation of the control point and the interpolated elevation. After all the control points have been checked, the program computes several statistics on the differences between controls and interpolated DEM elevations. The statistics include RMSE, Standard Deviation, Minimum Difference, Maximum Difference, and Mean Difference. In the output report, the program prints out elevation differences for every control points and the statistics.

10.1.1.1 Accuracy Report of Jackson County, Mississippi

Date: Sun Sep 11 23:02:31 2005
Check Points in ASCII File: 13029_utm.txt
Coordinate Unit: m
Interpolation Range: 3.000m
DEM File(s) Processed:
all_edb.ebn

ID	X	Y	Z	Interpolated Z	Difference
LJ1	319829.938	3371021.676	-19.991	-19.880	-0.111
LJ2	329761.355	3366698.159	-21.452	-21.474	0.022
LJ3	333021.238	3361456.922	-24.473	-24.573	0.100
LJ4	343338.676	3367883.750	-19.607	-19.639	0.032
LJ5	354857.204	3362839.378	-23.288	-23.397	0.109
LJ6	357514.108	3370359.836	-23.476	-23.492	0.016
LJ7	360773.110	3364059.114	-26.749	-26.786	0.037
LJ8	368578.751	3371763.097	-13.318	-13.234	-0.084

Root Mean Square Error = 0.075 m
Standard Deviation = 0.078 m
Minimum Difference = 0.016 m
Maximum Difference = 0.111 m
Mean Difference = 0.015 m

# of Points Checked = 8

10.1.1.2 Accuracy Report of Hancock County, Mississippi

Date: Wed Sep 21 20:52:32 2005
Check Points in ASCII File: hancock_mod.txt
Coordinate Unit: m
Interpolation Range: 3.000m
DEM File(s) Processed:
all_cont.ebn

ID	X	Y	Z	Interpolated Z	Difference
H15	250033.310	3356376.620	-20.559	-20.581	0.022
H16	256281.493	3355058.075	-21.668	-21.696	0.028
H17	264766.046	3354568.579	-24.236	-24.248	0.012
H18	269664.482	3358106.583	-26.313	-26.262	-0.051
H19	258917.852	3344215.311	-26.070	-26.145	0.075

Root Mean Square Error = 0.044 m
Standard Deviation = 0.045 m
Minimum Difference = 0.012 m
Maximum Difference = 0.075 m

Mean Difference = 0.017 m

# of Points Checked = 5

11 METADATA

Project level metadata was produced to FGDC compliant standards and contain sufficient detail to ensure the data or data product can be fully understood for future use and for posterity.

12 DISSEMINATION AND ARCHIVING

Data was delivered to both NOAA and MDEQ on DVD media. In addition, copies of the data were made for the following organizations to facilitate archiving and post-hurricane Katrina mapping efforts:

- USGS – EROS
- USGS – St. Petersburg, FL
- Harris Corporation (working for FEMA)
- URS Corporation (working for FEMA)
- Baker and Associates (working for FEMA)

An extra copy of all deliverables has been created until notice is received from MDEQ/NOAA that the data has been accepted. A copy of the final digital version will be stored on a file server using the data organization schema developed for this project. All data can be quickly accessed and retrieved should the need arise.

All data produced under this project has been supplied to MDEQ/NOAA without restriction.

13 CONCLUSION

This program has been a success through a partnership that connotes end-to-end collaboration in achieving the end project objectives. EarthData worked closely with personnel from NOAA and MDEQ to ensure that the data produced through this project will support the local Coastal Zone Managers in their decision-making processes now and in the future.

Appendix A.2
Hancock and Jackson County LIDAR Quality Control Report

DELIVERABLE 5.3

2005 Mississippi Lidar Data Validation Report

IMSG/PSGS Project Lead
Andrew Meredith

IMSG/PSGS Project Team
Jamie Carter
Christiana Pollack

February 15, 2006

I. M. Systems Group, Inc.

perotsystems®
Government Services

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2005 Mississippi Lidar Data Validation Report

Introduction

The National Oceanic Atmospheric Administration (NOAA) Coastal Service Center Topographic Change Mapping (TCM) project seeks to aid coastal managers with their topographic needs. This can include issues ranging from beach geomorphologic change to storm surge inundation to determination of invasive species habitat. Additionally, the TCM project creates derived information products and analysis tools to facilitate the coastal resource manager's decision-making process. The TCM project received Light Detection and Ranging (Lidar) data collected along the coast of Mississippi in May 2005 and will distribute the data from its web-based Lidar Data Retrieval Tool (LDART).

EarthData International collected elevation point data derived from multiple return (first through fourth) lidar measurements from Jackson and Hancock coastal counties in Mississippi on February 25 and March 1, 10, 11, and 12, 2005. Final data were delivered in the LAS format with several embedded attributes: return number, number of returns, intensity, and classification ("bare ground" or "not bare ground"). Average ground sample distance was 5.0 meters. The survey area covered approximately 3,538 square kilometers (*Figure 1*). The survey was conducted under tidally controlled conditions to ensure maximum shoreline exposure during the data collection. The contract with EarthData International specified a vertical accuracy requirement of ±0.185-meter root mean square error ($RMSE_{(z)}$).

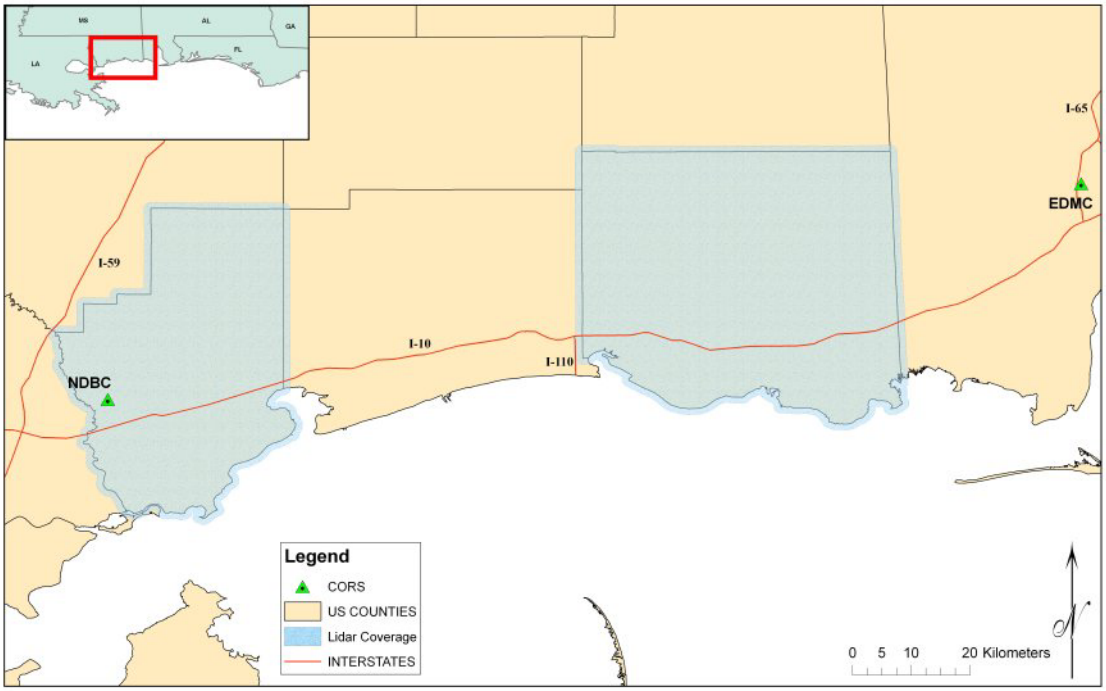


Figure 1. Extent of the Mississippi lidar survey.

This report presents the results of a quantitative error assessment conducted to verify the vertical accuracy of the lidar data in open terrain using independent ground check points as validation points. This assessment followed procedures and recommendations presented in the *Guidelines for Digital Elevation Data* prepared by the National Digital Elevation Program (NDEP) and the *ASPRS Guidelines for Vertical Accuracy Reporting for Lidar Data* prepared by the ASPRS Lidar Committee.

Methods

The Center conducted a survey to collect ground check points on October 17-20, 2005. A survey network was established and tied to the North American Datum 1983 (NAD83) Continuous Operating Reference Station (CORS) network. Points in flat, open terrain distributed throughout the study area were selected for occupation. Three Thales Z-Max dual frequency GPS receivers were operated in static differential mode to collect vector information. The vector data was post-processed and adjusted using *Thales Navigation's* GNSS Studio software. The final independent ground control data set consisted of thirty-two check points that were believed to have a vertical accuracy of 0.065 meters at 95 % confidence.

The post edited bare earth lidar data were used by the Center to perform this data validation. The nature of topographic lidar data collection limits the ability to survey precise horizontal (xy) locations; therefore, a form of interpolation of lidar data is required to accurately compare check points and lidar derived elevation models. The Guidelines for Digital

Elevation Data by NDEP recommends interpolation from a surface generated from a triangulated irregular network (TIN) derived from the lidar point data for assessing the accuracy of mass points. This method was employed in this evaluation. Elevation values at the location of each of the 32 check points were interpolated from the triangulated bare earth point data. The vertical error at each check point location was calculated by subtracting the interpolated lidar elevation value from the check point elevation value. After calculating the error at each check point, the overall root mean square error ($RMSE_{(z)}$) for the survey was calculated. The overall vertical accuracy at the 95th percentile was then calculated with the following equation:

Vertical Accuracy at 95% confidence level = 1.9600 * $RMSE_{(z)}$
(assuming errors were normally distributed)

Results

The overall $RMSE_{(z)}$ error was ±0.1197 meters which is based on 32 samples (i.e., n = 32). A Shapiro-Wilk statistical test performed on the errors for the quantitative assessment indicated the errors were normally distributed (W = 0.9814; p = 0.83). The Shapiro-Wilk test was chosen because it works well with a small sample size as long as there are no identical values.

shows the elevation difference calculated at each of the ground control stations. A mean error of 0.004 meters and a standard deviation of 0.12 meters were reported. The greatest elevation difference was 0.287 meters at station 2001 (see *Appendix A*).

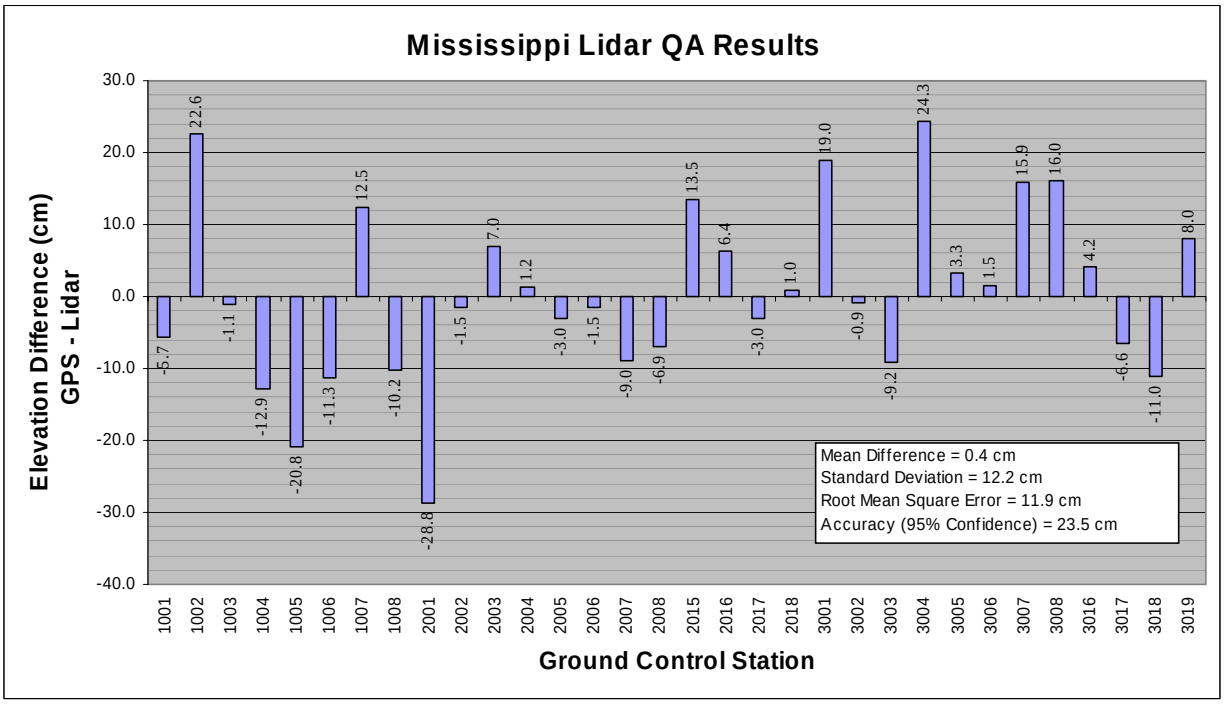


Figure 2. Elevation differences at each control station (check point elevation – Lidar elevation).

The spatial distribution of the elevation differences is presented in *Figure 3* and the actual values are presented in a table in *Appendix A.* Each check point is colored according to the magnitude of the error identified for the lidar elevation calculated at the station's horizontal (xy) location.

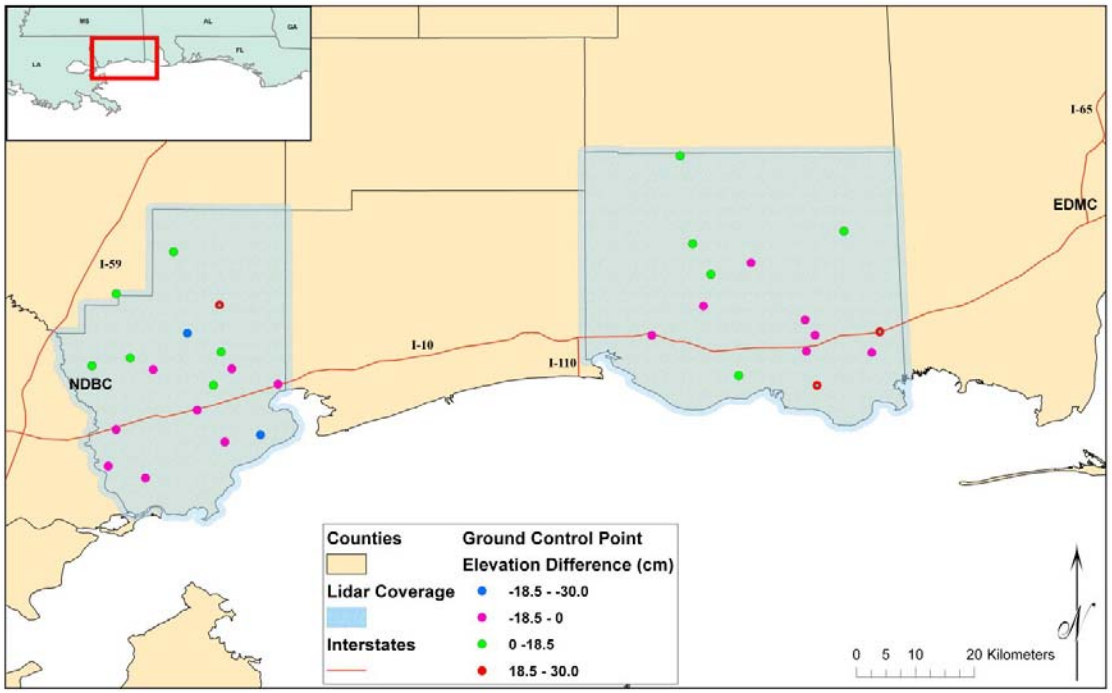


Figure 3: Map showing the spatial distribution of elevation differences between check point elevations and interpolated lidar elevations (Check point elevation – Lidar elevation).

Discussion

The overall vertical error calculated from the collection of check points is within the prescribed accuracy limits. Given that the control stations were located in flat and open terrain, these errors are generally believed to be random errors in the lidar sensor system as opposed to systematic errors generated from vegetated areas.

The horizontal accuracy of this lidar data was not assessed. The high vertical accuracy is indicative of good horizontal accuracy, though slight horizontal inaccuracies are difficult to detect using these check points because they were located in relatively flat terrain.

Based on this assessment, the 2005 Mississippi lidar survey data meet the prescribed vertical accuracy level since more than 95% of the measured positions have an error less than or equal to 36.3 cm (equivalent to root mean square error of 18.5 cm for normally distributed data). In accordance with the National Standard for Spatial Data Accuracy (NSSDA), the vertical accuracy is reported as:

> **"Tested 0.24 meter fundamental vertical accuracy at 95 percent confidence level in open terrain using $RMSE_{(z)}$ x 1.9600."**

Appendix A

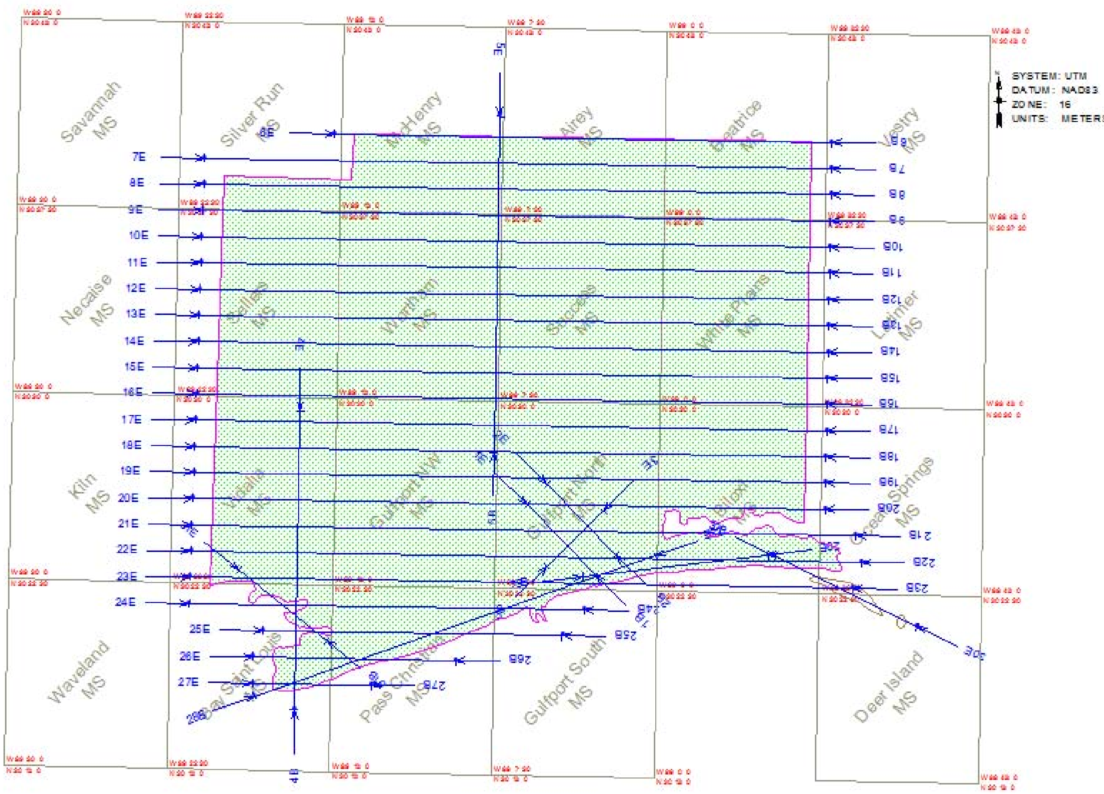
The following table shows the elevation difference calculated at each of the ground control stations. The differences (Delta Z) were calculated by subtracting the interpolated (via tinning) orthometric lidar heights (meters) from the coincident check point heights.

Station	Longitude (dd)	Latitude (dd)	Delta z (m)	Delta z2 (m)
1001	-88.446772	30.429952	-0.057	0.003
1002	-88.434727	30.461605	0.226	0.051
1003	-88.533413	30.456486	-0.011	0.000
1004	-89.352515	30.381723	-0.129	0.017
1005	-89.379247	30.304560	-0.208	0.043
1006	-89.433649	30.293645	-0.113	0.013
1007	-89.451044	30.380148	0.125	0.016
1008	-89.423031	30.405077	-0.102	0.010
2001	-89.490905	30.459455	-0.288	0.083
2002	-89.542972	30.403910	-0.015	0.000
2003	-89.577915	30.421583	0.070	0.005
2004	-89.636297	30.409333	0.012	0.000
2005	-89.599511	30.312536	-0.030	0.001
2006	-89.611659	30.256505	-0.015	0.000
2007	-89.554823	30.238650	-0.090	0.008
2008	-89.475805	30.341938	-0.069	0.005
2015	-88.739272	30.730061	0.135	0.018
2016	-88.720103	30.595886	0.064	0.004
2017	-88.631071	30.566623	-0.030	0.001
2018	-88.489474	30.614970	0.010	0.000
3001	-88.530382	30.379767	0.190	0.036
3002	-88.546501	30.432245	-0.009	0.000
3003	-88.548478	30.479518	-0.092	0.008
3004	-89.441852	30.502515	0.243	0.059
3005	-89.439371	30.430878	0.033	0.001
3006	-89.636304	30.409332	0.015	0.000
3007	-89.599401	30.519715	0.159	0.025
3008	-89.511931	30.583765	0.160	0.026
3016	-88.692234	30.548831	0.042	0.002
3017	-88.703719	30.500993	-0.066	0.004
3018	-88.782373	30.456107	-0.110	0.012
3019	-88.649864	30.394566	0.080	0.006
			Mean dz (m)	0.004
			Standard Dev. (m)	0.12
			$RMSE_{(z)}$ (m)	0.12
			$Accuracy_{(z)}$ (m)	**0.23**

Appendix B.1
Harrison County LIDAR Acquisition Report

HARRISON COUNTY, MISSISSIPPI

LIDAR ACQUISITION REPORT



Prepared By: EarthData International for Mississippi Geographic Information
7/28/05

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LiDAR Acquisition/Processing
Quality Assurance/Quality Control

Harrison County, Mississippi

1 LIDAR ACQUISITION 3

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1.2 IMU Data Processing 3

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1.3.1 Flight Line Data Acquisition Quality Control Check 4

2 APPENDICES 4

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- Coordinate Listing of Flight Lines 4
- LiDAR Collection Logsheets 4
- GPS Base Station Logs 4
- NGS Data Sheet 4
- Forward & Reverse Solutions Residuals 4
- Aircraft Height Plot 4
- Aircraft Trajectory Plot 4
- Diagram – LiDAR Coverage Check for Project Lines 4
- Diagram – LiDAR Intensity Check for Project Lines 4

PROPRIETARY INFORMATION 6/26/2006, EARTHDATA.
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1 LIDAR ACQUISITION

LiDAR acquisition for the Harrison County, Mississippi project was performed by Horizons Inc at the request of EarthData Aviation in a Cessna 310 (tail number N97HC) equipped with an LH System ALS40 LiDAR system including an inertial measuring unit (IMU) and a dual frequency GPS receiver. Acquisition was accomplished on March 8th & 9th, 2004 in three lifts. Maps identifying the flight lines and LiDAR collection log sheets containing information regarding flights, times, conditions, etc are included in the Appendix. The LiDAR flight specifications follow:

Field of View	45 Degrees
Altitude	11,100 feet AMT
Scan Rate	11.0 Hz
Pulse Rate	20 kHz
Ground Speed	120 knots
Post Spacing	5 meters
Swath Width	9112.7 feet
Line Spacing	6283.2 feet
Side Lap	30 %
Range Gate	5,500 feet
Intensity Mode	3+3
Total Flight Lines	22

1.1 GPS Data Collection

A GPS receiver was in constant operation over a National Geodetic Survey control point during flight acquisition. The control point "AD9935" is located at the Gulfport airport in Mississippi. The NGS data sheet for this point is included in the Appendix. In addition, 46 GPS control points were established throughout the airport.

Flight	NGS PID
Harrison County, Mississippi	AD9935

1.1.1 GPS Data Processing

The airborne GPS data was processed as a kinematic survey, using both forward and reverse processing techniques. Both processes produced a fixed integer solution. The results of each process were combined into a single fixed integer solution. The results of the individual solutions were compared to yield an indicator of the quality of the combined solution. The RMS and the standard deviation were also checked to confirm the accuracy of the solution. The accuracy was determined to be <10cm horizontally and vertically.

1.2 IMU Data Processing

The IMU data was processed using the POSProc software provided by Applanix Corporation. The log files were checked for recorded errors. Also, graphs of the output were used to insure consistency of the instrument. The GPS data was used as an input to the IMU processing, resulting in an x,y,z, omega, phi, kappa position for the LiDAR at 200Hz (*_SBET.out).

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1.3 LiDAR Data Processing

1.3.1 Flight Line Data Acquisition Quality Control Check

AeroScan LiDAR timed reflection data and the IMU SBET files were processed together using LIDAR processing software. The data set for each flight line was checked for data gaps between overlapping flight lines, and tension/compression areas (areas where data points are more or less dense than the average project specified post spacing). Diagram of LIDAR Coverage Check for Project Lines is included in Appendix.

2 APPENDICES

- **Flight Map**
- **Coordinate Listing of Flight Lines**
- **LiDAR Collection Logsheets**
- **GPS Base Station Logs**
- **NGS Data Sheet**
- **Forward & Reverse Solutions Residuals**
- **Aircraft Height Plot**
- **Aircraft Trajectory Plot**
- **Diagram – LiDAR Coverage Check for Project Lines**
- **Diagram – LiDAR Intensity Check for Project Lines**

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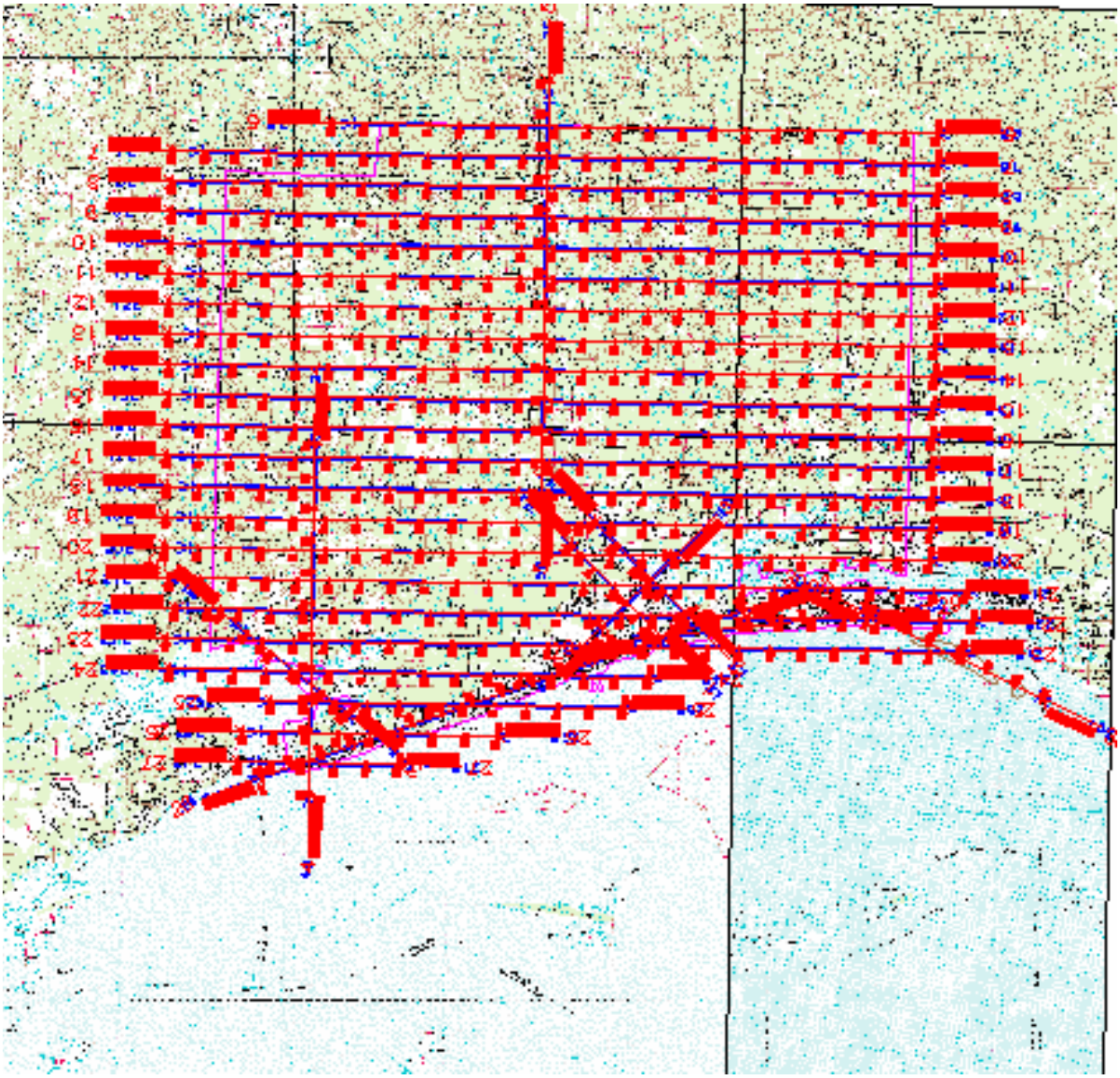
Appendix A:

Harrison County, Mississippi
Flight Map



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Appendix B:

Harrison County, Mississippi
Coordinate Listing of Flight Lines

1B 30 23 07.544436 089 02 50.711688
1E 30 25 53.543385 089 06 06.146446
2B 30 23 56.719341 089 01 55.089268
2E 30 26 42.741062 089 05 10.527942
3B 30 23 25.714378 089 05 07.524390
3E 30 25 42.488621 089 02 32.858771
4B 30 17 29.188097 089 16 38.329075
4E 30 29 27.118475 089 16 41.241920
5B 30 27 58.572763 089 07 39.545405
5E 30 41 27.419547 089 07 41.693813
6B 30 40 38.920416 088 52 15.723917
6E 30 40 36.791716 089 15 20.850322
7B 30 39 35.794081 088 52 15.755399
7E 30 39 32.454756 089 21 20.635939
8B 30 38 32.667553 088 52 15.787497
8E 30 38 29.338591 089 21 21.615959
9B 30 37 29.540897 088 52 15.820250
9E 30 37 26.222319 089 21 22.596379
10B 30 36 26.414080 088 52 15.853581
10E 30 36 23.105874 089 21 23.577272
11B 30 35 23.287102 088 52 15.887527
11E 30 35 19.989291 089 21 24.558563
12B 30 34 20.159932 088 52 15.922088
12E 30 34 16.872568 089 21 25.540329
13B 30 33 17.032632 088 52 15.957303
13E 30 33 13.755705 089 21 26.522532
14B 30 32 13.905173 088 52 15.993096
14E 30 32 10.638704 089 21 27.505134
15B 30 31 10.777521 088 52 16.029502
15E 30 31 07.521596 089 21 28.488212
16B 30 30 07.649773 088 52 16.738266
16E 30 30 04.404316 089 21 29.471688
17B 30 29 04.521809 088 52 16.775518
17E 30 29 01.286897 089 21 30.455640
18B 30 28 01.393717 088 52 16.790740
18E 30 27 58.169339 089 21 31.440030
19B 30 26 58.265432 088 52 16.806584
19E 30 26 55.051642 089 21 32.424820
20B 30 25 55.137019 088 52 16.823051
20E 30 25 51.933807 089 21 33.410086
21B 30 24 51.995710 088 50 50.212128
21E 30 24 48.815865 089 21 34.395753
22B 30 23 48.862401 088 50 35.230218
22E 30 23 45.697752 089 21 35.381896
23B 30 22 45.738360 088 50 56.610381
23E 30 22 42.579500 089 21 36.368477

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24B 30 21 42.203819 089 03 20.958713
24E 30 21 39.461110 089 21 37.355460
25B 30 20 38.996297 089 04 20.917103
25E 30 20 37.057361 089 18 10.567232
26B 30 19 35.354496 089 09 15.283059
26E 30 19 33.854798 089 18 37.022940
27B 30 18 31.692824 089 13 08.853142
27E 30 18 30.737960 089 18 37.041983
28B 30 18 00.083479 089 18 30.920656
28E 30 23 55.535994 089 00 05.972399
29B 30 23 02.053187 089 03 27.092811
29E 30 24 02.403049 088 54 55.050189
30B 30 23 58.494632 088 54 32.719328
30E 30 21 16.312946 088 47 55.767918
31B 30 20 16.977275 089 15 14.293363
31E 30 23 02.947036 089 19 22.446908

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Appendix C:
Harrison County, Mississippi
LIDAR Collection Log sheet (Lift 1)

1

18/2

HORIZONS, INC.

3600 Jet Drive, Rapid City, South Dakota 57703

LIDAR COLLECTION LOGSHEET

Date 03-08-04 GPS Day 04-068 Time Zone GPS Job # ~~12362~~ 12326

Pilot Chuck Plane 974C FMS CCNS Mission GULFPORT_040308_A

Mode 343 Pulse Rate 20kHz Range Gate 5,500' AGC: #1 3 #2 1 Attenuator: [1.5] [0.7] None

Operator TJ AMT 11,000' Comment Lift # 01

Session A HD #6 START: Time 15:48 Temp 5°C Pressure 30.36

Airborne GPS NovAtel STOP: Time 20:56 Temp 3°C Pressure 30.24

BASE: Receiver Mad Dog Station ID KGPT HI 1.863 Start 15:19 Stop 02:03

Line	Dir	Start Way	Start Time	End Way	End Time	Scan Angle/Rate	Ground Speed	Comments
			040308_					
TEST			155434		1554			
1	314	1	161959	5	1622	45°/11.0	120	Airport Lines
1	134	5	162542	1	1627	"	145	" "
2	314	1	163221	5	1634	"	115	" "
3	224	4	163917	1	1640	"	135	" "
6	270	1	165620	20	1706	45°/11.0	125	Clear w/
7	090	25	171313	1	1726	"	123	Low Haze
8	270	1	173016	25	1743	"	124	Mod. Humidity
9	090	25	174639	1	1800	"	121	Good Visability
10	270	1	180421	25	1817	"	125	Smooth Ride
11	090	25	182054	1	1834	"	122	Aprox. 10° Drift &
12	270	1	183814	25	1851	"	123	Strong NW Wind
13	090	25	185433	1	1907	"	124	
14	270	1	191134	25	1924	"	121	
15	090	25	192752	1	1940	"	125	
5	360	1	194930	14	1956	"	123	"X" Line
7	090	8	200033	4	2002	"	127	RF w/p 8-4 Smoke
3	224	4	201027	1	2012	45°/11.0	120	Airport Lines
1	314	1	201703	5	2019	"	110	" "
1	134	5	202315	1	2025	"	145	" "
2	314	1	202904	5	2031	"	108	" "

\HORIZONS\FLT_DEPT\FLTCRDL.CDR 5/13/2002 \FLM

Page 1

Harrison County, Mississippi
LIDAR Collection Log sheet (Lift 2)

2

17/1

HORIZONS, INC.

3600 Jet Drive, Rapid City, South Dakota 57703

LIDAR COLLECTION LOGSHEET

Date 03-08-04 GPS Day 04-068 Time Zone GPS Job # ~~12362~~ 12326

Pilot Chuck Plane 97HC FMS CCNS Mission GULFPORT-040308-B

Mode 3+3 Pulse Rate 20kHz Range Gate 5500' AGC: #1 3 #2 1 Attenuator: [1.5] [0.75] (None)

Operator TJ AMT 11,000' Comment Lift # 02

Session "B" HD #6 START: Time 21:47 Temp 2°C Pressure 30.20

Airborne GPS NovAtel STOP: Time 01:49 Temp 2°C Pressure 30.19

BASE: Receiver MadDog Station ID KGPT HI 1.863 Start 15:19 Stop 02:03

Line	Dir	Start Way	Start Time	End Way	End Time	Scan Angle/Rate	Ground Speed	Comments
			040308					
TEST			215333		2153			
1	314	1	221735	5	2220	45°/11.0	115	Airport Lines
1	134	5	222320	1	2225	"	135	Very Large Fire
2	314	1	223015	5	2233	"	100	(W) of Airport
3	044	1	223911	4	2241	"	125	Strong (NW) Wind
20	270	1	224838	25	2302	45°/11.0	120	(OK)
21	090	26	230519	1	2319	"	123	Smoke w/p 16-14
30	295	7	232453	1	2329	"	110	(OK)
29	262	8	233443	1	2339	"	115	(OK)
22	270	1	234735	26	0001	"	120	Smoke w/p 13-17
27	090	6	000620	1	0009	"	133	Strong (W) Wind
26	270	1	001345	9	0018	"	115	(OK)
31	308	1	002534	6	0028	"	115	(OK)
25	090	12	003255	1	0038	"	128	(OK)
24	270	1	004313	16	0052	"	120	Smoke w/p 3-6
3	044	1	010032	4	0102	45°/11.0	125	Airport Lines
1	134	5	010947	1	0111	"	135	" "
1	314	1	011621	5	0119	"	101	
2	134	5	012208	1	0124	"	143	

Unable to See Smoke Plumes After Dark - End Mission

Several Fires in Project Area

Clear w/ Mod.-Heavy Haze

Mod. Humidity, Good Visability

Strong Winds - Smooth Ride

\HORIZONS\FLT_DEPT\FIZCRDL.CDR 5/13/2002 BJH

Page 1

Harrison County, Mississippi
LIDAR Collection Log sheet (Lift 3)

3
17/1

HORIZONS, INC.

3600 Jet Drive, Rapid City, South Dakota 57703

LIDAR COLLECTION LOGSHEET

Date 03-09-04 GPS Day 04-069 Time Zone GPS Job # 12326
Pilot Chuck Plane 97HC FMS CCNS Mission GULFPORT-040309
Mode 3+3 Pulse Rate 20kHz Range Gate 5,500' AGC: #1 3 #2 1 Attenuator: [1.5] [0.7] (None)
Operator TJ AMT 11,000' Comment Lift #03
Session A HD #6 START: Time 15:08 Temp -4°C Pressure 30.10
Airborne GPS Nov Atel STOP: Time 20:05 Temp -2°C Pressure 30.00
BASE: Receiver Mad Dog Station ID KGPT HI 1.863 Start 14:45 Stop 20:47

Line	Dir	Start Way	Start Time	End Way	End Time	Scan Angle/Rate	Ground Speed	Comments
TEST			151346		1514			
1	314	1	154023	5	1542	45°/11.0	115	Airport Lines
1	134	5	154642	1	1548	"	160	Strong (NW) Winds
2	314	1	155236	5	1555	"	110	
3	224	4	160002	1	1601	"	125	
28	250	17	160958	1	1619	45°/11.0	120	
23	270	1	163145	26	1645	"	120	Smoke @ w/p 15 ?
16	270	1	165734	25	1710	"	120	Strong (W) Wind
17	270	1	172232	25	1735	"	120	Must "One Way"
18	090	25	173847	1	1747	"	180	All Lines
18	270	1	175225	25	1805	"	120	
19	270	1	181638	25	1829	"	123	
4	360	1	183602	12	1842	"	123	
24	270	1	185019	6	1853	"	120	RF w/p 1-6 (Smoke)
23	270	14	185836	16	1859	"	123	RF w/p 14-16 (Smoke)
22	270	12	190551	18	1909	"	121	RF w/p 12-18 (Smoke)
21	270	13	191546	17	1918	"	120	RF w/p 13-17 (Smoke)
1	134	5	192057	1	1922	45°/11.0	185	
2	314	1	192618	5	1929	"	115	
3	224	4	193238	1	1934	"	135	Cloud ?
1	314	1	193810	5	1940	"	115	

\HORIZONS\FLT_DEPT\FLPCRDL.CDR 5/13/2002 SJLM

Page 1

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Appendix D:
Harrison County, Mississippi
LIDAR Base Station Log sheet (Lift 1 & 2)

GPS BASE STATION LOG

HORIZONS, INC.
Aerial Mapping Professionals

JOB#	~~E2362~~ 12326
JOB NAME	GULFPORT
OPERATOR	TJ
DATE	03-08-04
GPS DAY	04-068
STATE	MS
COUNTY	HARRISON
START	15:19
STOP ☐ LOCAL ☒ UTC	02:03
ANT. HI ☒ V ☐ S	1.863 m
POINT ID	KGPT

DESCRIPTION

Lifts #01 & 02

SKETCH ☐ NEW ☐ EXISTING ☐ KNOWN NGS PID AD 9935

GPT ARP

Harrison County, Mississippi
LIDAR Base Station Log sheet (Lift 3)

GPS BASE STATION LOG

HORIZONS, INC.
Aerial Mapping Professionals

JOB #	12326
JOB NAME	GULFPORT
OPERATOR	TJ
DATE	03-09-04
GPS DAY	04-069
STATE	MS
COUNTY	HARRISON
START	14:45
STOP ☒ LOCAL ☐ UTC	20:47
ANT. HI ☒ V ☐ S	1.863 m
POINT ID	KGPT

DESCRIPTION

Lift # 03

SKETCH ☐ NEW ☐ EXISTING ☐ KNOWN NGS PID AD 9935

GPT ARP

Appendix E:

Harrison County, Mississippi
NGS Data Sheet 1

```
National Geodetic Survey,   Retrieval Date = FEBRUARY 27, 2004
AD9935 ***********************************************************************
AD9935  PACS       -  This is a Primary Airport Control Station.
AD9935  DESIGNATION -  GPT ARP
AD9935  PID        -  AD9935
AD9935  STATE/COUNTY-  MS/HARRISON
AD9935  USGS QUAD   -  GULFPORT NORTH (1994)
AD9935
AD9935                    *CURRENT SURVEY CONTROL
AD9935 ___________________________________________________________________
AD9935* NAD 83(1993)-  30 24 28.18952(N)    089 04 05.11255(W)     ADJUSTED
AD9935* NAVD 88     -        7.44   (meters)     24.4    (feet)  GPS OBS
AD9935 ___________________________________________________________________
AD9935  X          -     89,542.662 (meters)                  COMP
AD9935  Y          -  -5,504,766.191 (meters)                  COMP
AD9935  Z          -   3,209,435.823 (meters)                  COMP
AD9935  LAPLACE CORR-         -0.90  (seconds)                DEFLEC99
AD9935  ELLIP HEIGHT-        -20.72  (meters)        (05/29/02) GPS OBS
AD9935  GEOID HEIGHT-        -28.19  (meters)                GEOID03
AD9935
AD9935  HORZ ORDER  -  B
AD9935  ELLP ORDER  -  FIRST     CLASS I
AD9935
AD9935.This mark is at Gulfport-Biloxi Rgnl Airport (GPT)
AD9935
AD9935.The horizontal coordinates were established by GPS observations
AD9935.and adjusted by the National Geodetic Survey in December 1999.
AD9935
AD9935.The orthometric height was determined by GPS observations and a
AD9935.high-resolution geoid model.
AD9935
AD9935.GPS derived orthometric heights for airport stations designated as
AD9935.PACS or SACS are published to 2 decimal places.  This maintains
AD9935.centimeter relative accuracy between the PACS and SACS.  It does
AD9935.not indicate centimeter accuracy relative to other marks which are
AD9935.part of the NAVD 88 network.
AD9935
AD9935.The X, Y, and Z were computed from the position and the ellipsoidal ht.
AD9935
AD9935.The Laplace correction was computed from DEFLEC99 derived deflections.
AD9935
AD9935.The ellipsoidal height was determined by GPS observations
AD9935.and is referenced to NAD 83.
AD9935
AD9935.The geoid height was determined by GEOID03.
AD9935
AD9935;                 North        East     Units Scale Factor Converg.
AD9935;SPC MS E     -   100,652.883   277,443.795   MT  0.99995627   -0 07 07.8
AD9935;UTM  16      - 3,365,792.903   301,337.248   MT  1.00008691   -1 02 49.6
AD9935
AD9935!            -  Elev Factor  x  Scale Factor =   Combined Factor
AD9935!SPC MS E     -   1.00000325  x   0.99995627  =   0.99995952
AD9935!UTM  16      -   1.00000325  x   1.00008691  =   1.00009016
AD9935
AD9935:              Primary Azimuth Mark                  Grid Az
AD9935:SPC MS E     -  GPT A                              296 23 31.3
```

```
AD9935:UTM  16      -  GPT A                          297 19 13.1
AD9935
AD9935|-----------------------------------------------------------------------|
AD9935| PID    Reference Object                  Distance      Geod. Az  |
AD9935|                                        dddmmss.s |
AD9935| AI2711 GPT A                          APPROX. 1.0 KM 2961623.5 |
AD9935|-----------------------------------------------------------------------|
AD9935
AD9935                    SUPERSEDED SURVEY CONTROL
AD9935
AD9935  ELLIP H (12/02/99)  -20.74   (m)                    GP(      ) 1 1
AD9935
AD9935.Superseded values are not recommended for survey control.
AD9935.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AD9935.See file dsdata.txt to determine how the superseded data were derived.
AD9935
AD9935_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RCU0133765793(NAD 83)
AD9935_MARKER: DD = SURVEY DISK
AD9935_SETTING: 4 = OBJECT SURROUNDED BY MASS OF CONCRETE
AD9935_STAMPING: ARP 1956
AD9935_MARK LOGO: CGS
AD9935_MAGNETIC: N = NO MAGNETIC MATERIAL
AD9935_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AD9935+STABILITY: SURFACE MOTION
AD9935_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AD9935+SATELLITE: SATELLITE OBSERVATIONS - January 12, 2001
AD9935
AD9935  HISTORY    - Date     Condition       Report By
AD9935  HISTORY    - 1956     MONUMENTED      CGS
AD9935  HISTORY    - 19920630 GOOD            NGS
AD9935  HISTORY    - 19990316 GOOD            NGS
AD9935  HISTORY    - 20010112 GOOD            NGS
AD9935
AD9935                    STATION DESCRIPTION
AD9935
AD9935'DESCRIBED BY NATIONAL GEODETIC SURVEY 1992
AD9935'THE STATION IS LOCATED ABOUT 1500 FEET (457.2 M) WEST OF THE TERMINAL
AD9935'BUILDING, IN THE GRASS AREA BETWEEN RUNWAYS 4-22 AND 17-35 AND NORTH
AD9935'OF THE CENTER TAXIWAY.  THE MARK IS 500 FEET (152.4 M) WEST OF THE
AD9935'WEST EDGE OF RUNWAY 17-35 AND 300 FEET (91.4 M) NORTH OF THE NORTH
AD9935'EDGE OF THE CENTER TAXIWAY.  A TOPOGRAPHIC STATION DISK STAMPED ARP
AD9935'1956 IN THE TOP OF A CONCRETE MONUMENT ABOUT FLUSH WITH THE GROUND.
AD9935
AD9935                    STATION RECOVERY (1999)
AD9935
AD9935'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1999 (AJL)
AD9935'THE STATION IS LOCATED ABOUT 11.3 KM (7.00 MI) WEST OF BILOXI AND NEAR
AD9935'THE NORTH SIDE OF GULFPORT, AT THE GULFPORT-BILOXI REGINAL AIRPORT.
AD9935'NEAR THE SOUTH SECTION OF A LARGE TRIANGULAR SHAPED GRASS AREA NORTH
AD9935'OF TAXIWAY B, WEST OF RUNWAY 18-36 AND SOUTHEAST OF THE CLOSED RUNWAY
AD9935'4-22.  OWNERSHIP--HARRISON COUNTY AND THE CITIES OF GULFPORT AND
AD9935'BILOXI.  AIRPORT ADDRESS IS, GULFPORT-BILOXI REGIONAL AIRPORT 14035-L
AD9935'AIRPORT ROAD GULFPORT, MS.  39503.  AIRPORT MANAGER BRUCE FRALLIC.
AD9935'OPERATIONS AND MAINTENANCE MANAGER KEN SPIRITO, A.A.E.  PHONE
AD9935'228-863-5951 OR FAX 228-863-5953.  --NOTE--CONTACT OPERATIONS MANAGER
AD9935'(24-HOURS IN ADVANCE) WITH INTENTIONS AND FOR ESCORT.  TO REACH THE
AD9935'STATION FROM THE JUNCTION OF INTERSTATE HIGHWAY 10 AND U.S.  HIGHWAY
AD9935'49 (EXIT 34) NEAR THE NORTH SIDE OF GULFPORT, GO SOUTH, FOR 0.97 KM
AD9935'(0.60 MI) ON HIGHWAY 49 TO AIRPORT ROAD ON THE LEFT.  TURN LEFT,
AD9935'EASTERLY, FOR 1.77 KM (1.10 MI) ON AIRPORT ROAD TO A PAVED ROAD RIGHT.
AD9935'TURN RIGHT, SOUTH, THEN SOUTHEAST, FOR 0.32 KM (0.20 MI) TO THE
AD9935'AIRPORT TERMINAL ON THE RIGHT.  CONTACT OPERATIONS MANAGER ON THE 3RD
```

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AD9935'FLOOR OF THE TERMINAL BUILDING FOR INSTRUCTIONS AND ESCORT
AD9935'(MAINTENANCE KNOWS WHERE ALL THE STATIONS ARE LOCATED) . STATION IS
AD9935'152.4 M (500.0 FT) WEST OF THE WEST EDGE OF RUNWAY 18-36, 102.8 M
AD9935'(337.3 FT) NORTH OF THE TAXIWAY B CENTER, AND THE MONUMENT IS ABOUT
AD9935'LEVEL WITH TAXIWAY B AND FLUSH WITH THE GROUND SURFACE. THIS STATION
AD9935'IS DESIGNATED A PRIMARY AIRPORT CONTROL STATION.

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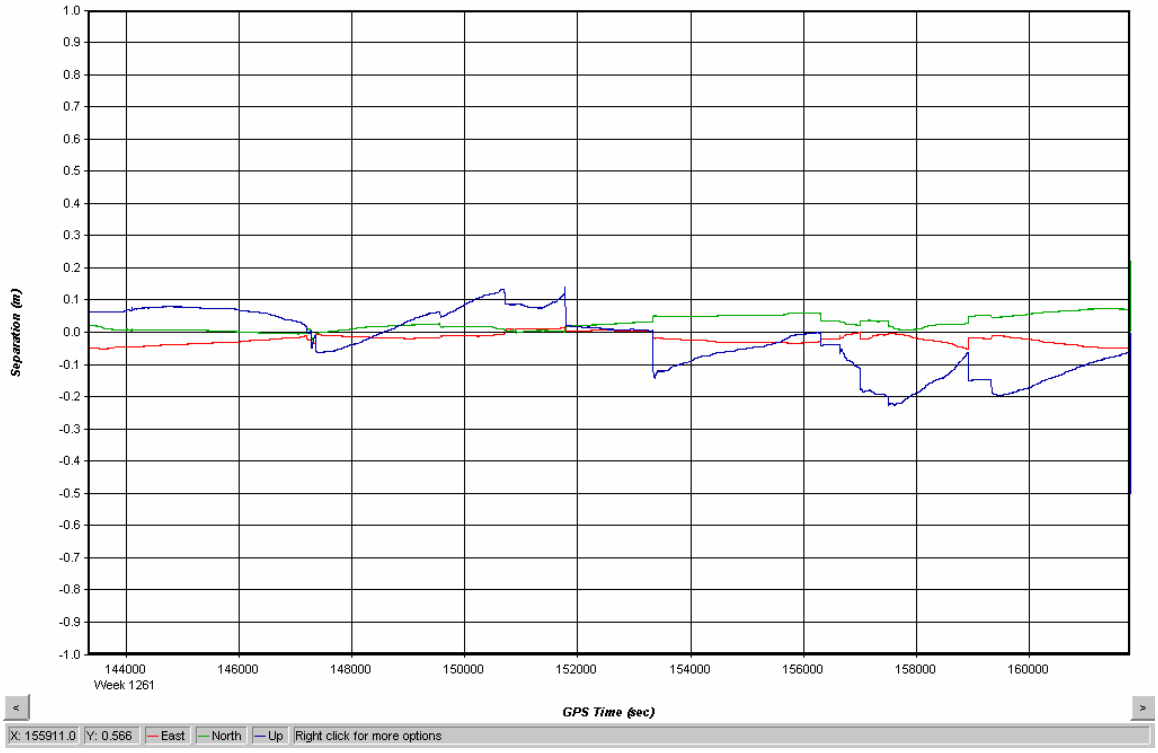
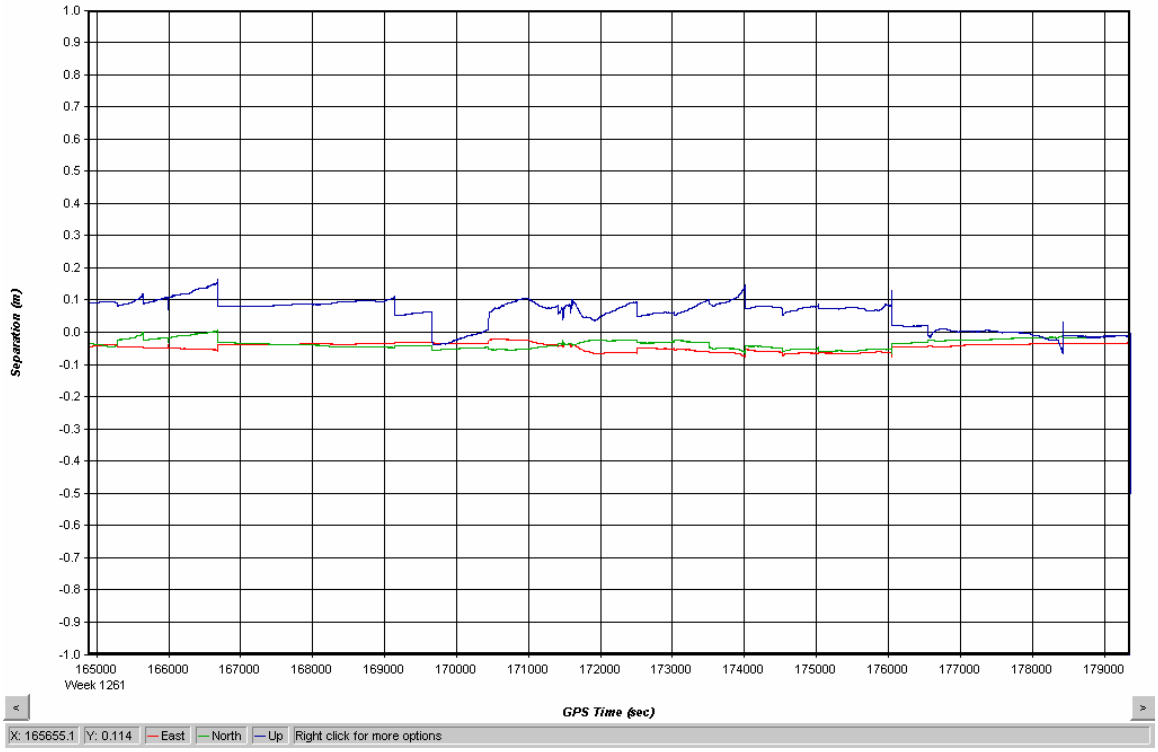
Appendix F:

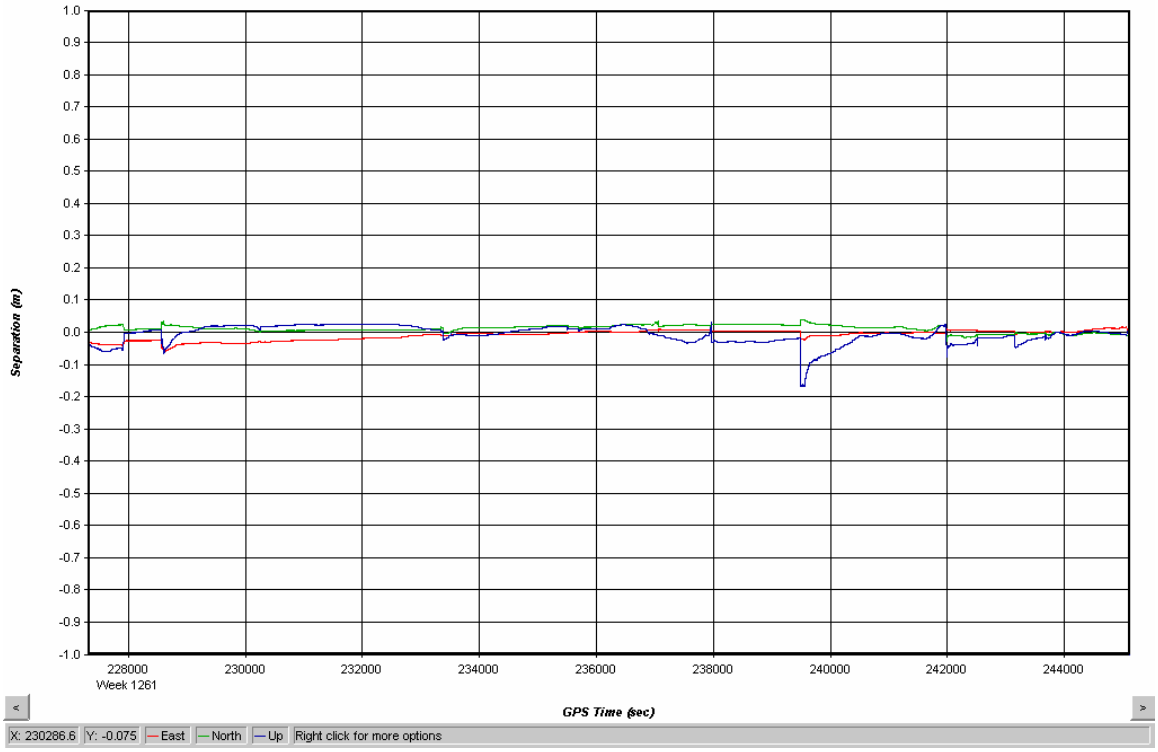
Harrison County, Mississippi
Diagram – Fwd-Rev Solutions Residuals Lift 1



Harrison County, Mississippi
Diagram – Fwd-Rev Solutions Residuals Lift 2

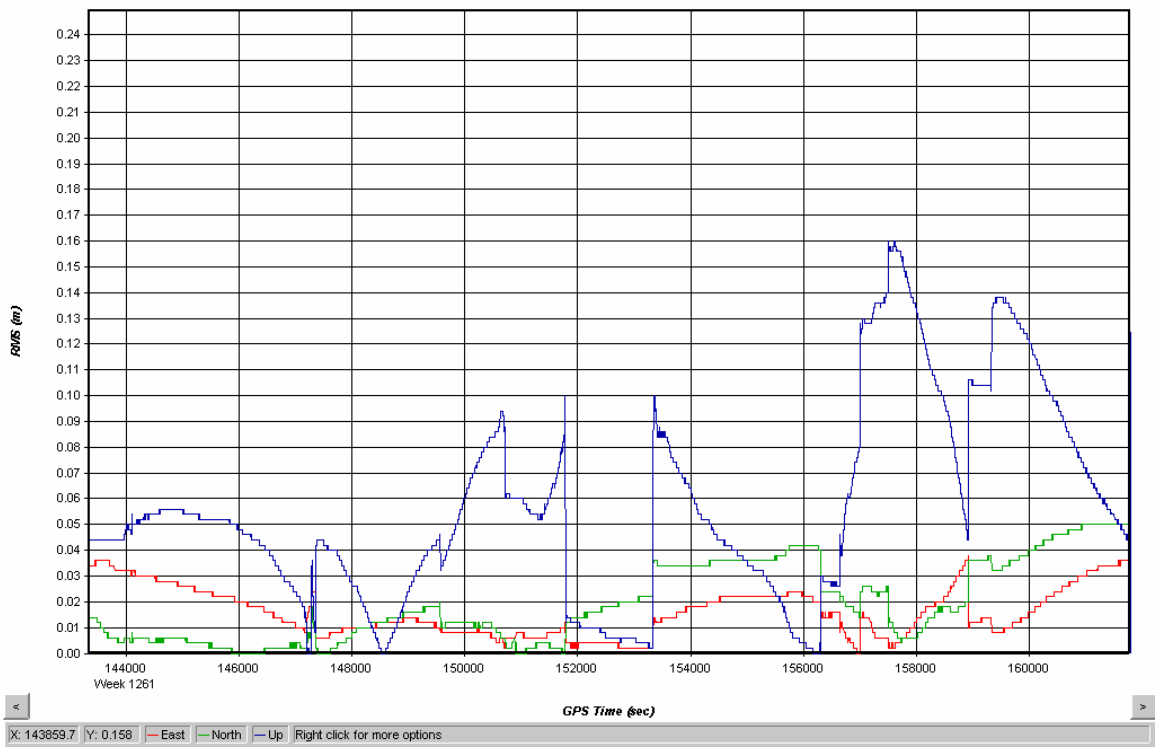


Harrison County, Mississippi
Diagram – Fwd-Rev Solutions Residuals Lift 3

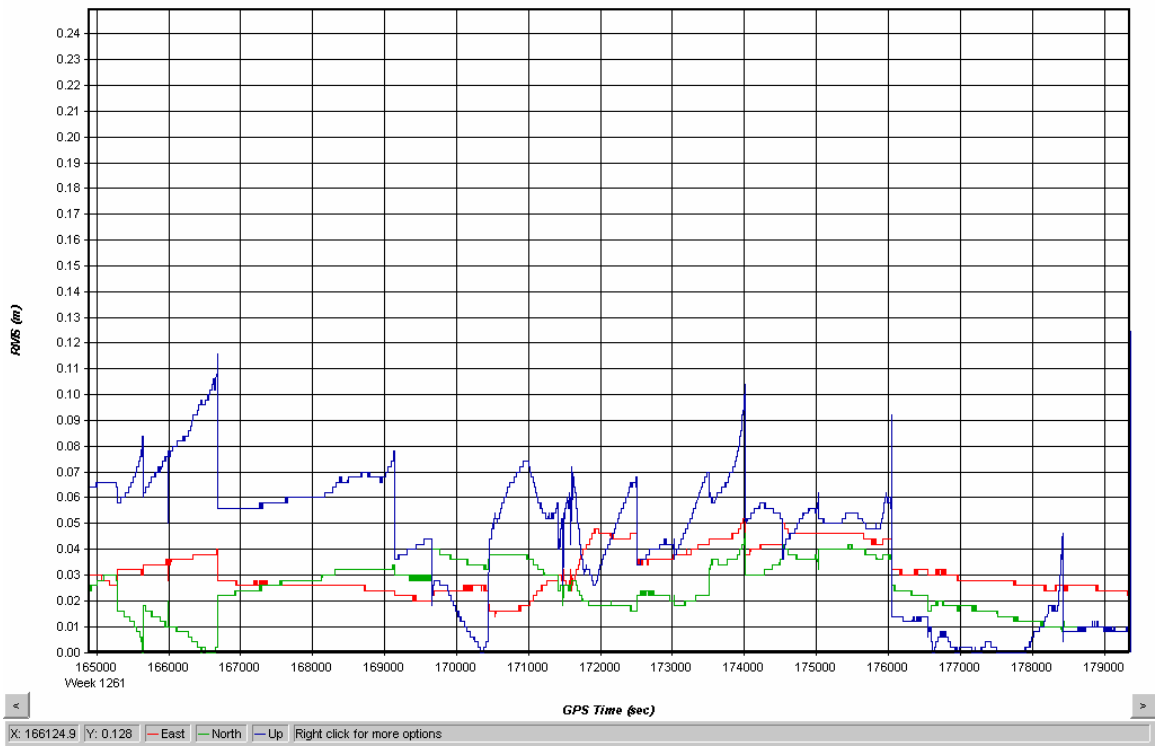


Appendix G:

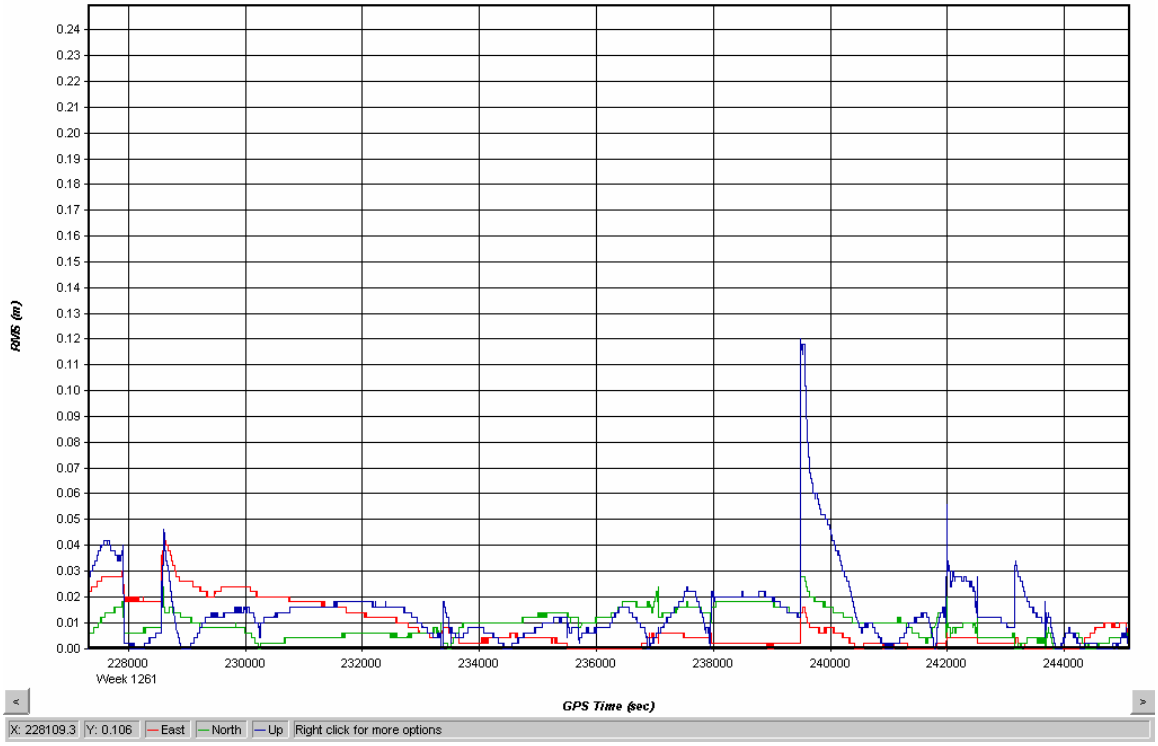
Harrison County, Mississippi
Diagram – RMS Plot Lift 1



Harrison County, Mississippi
Diagram – RMS Plot Lift 2

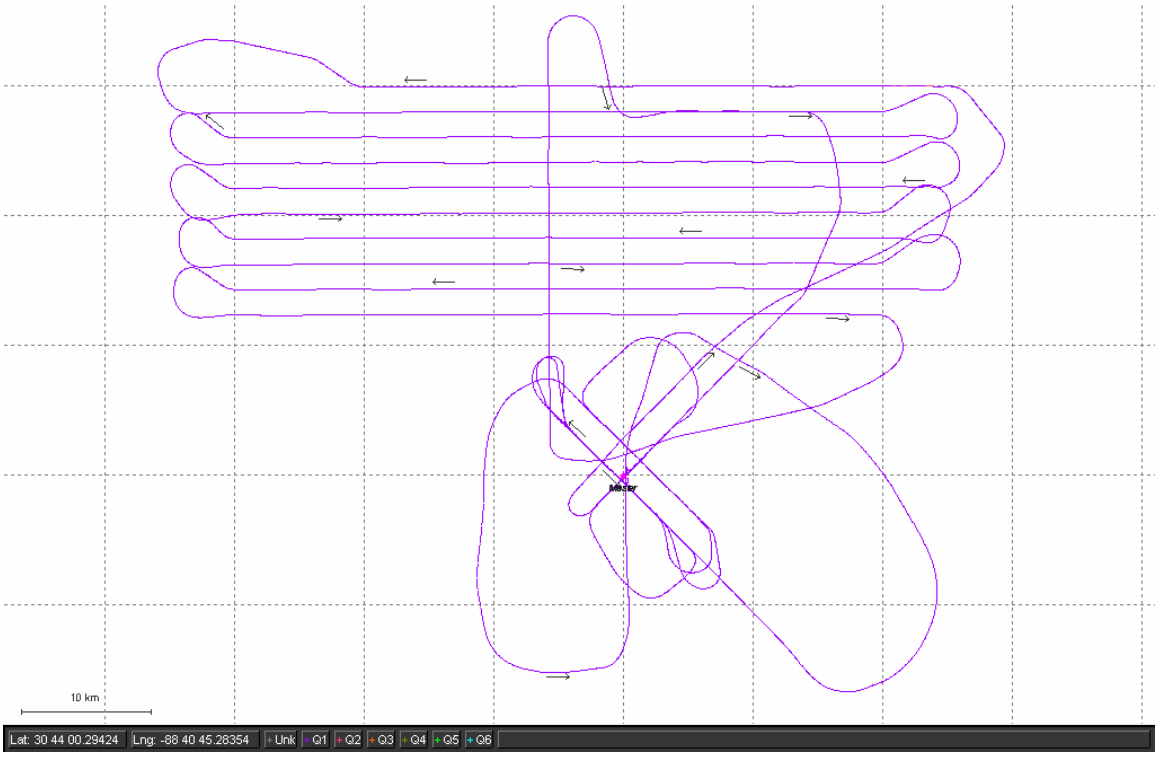


Harrison County, Mississippi
Diagram – RMS Plot Lift 3

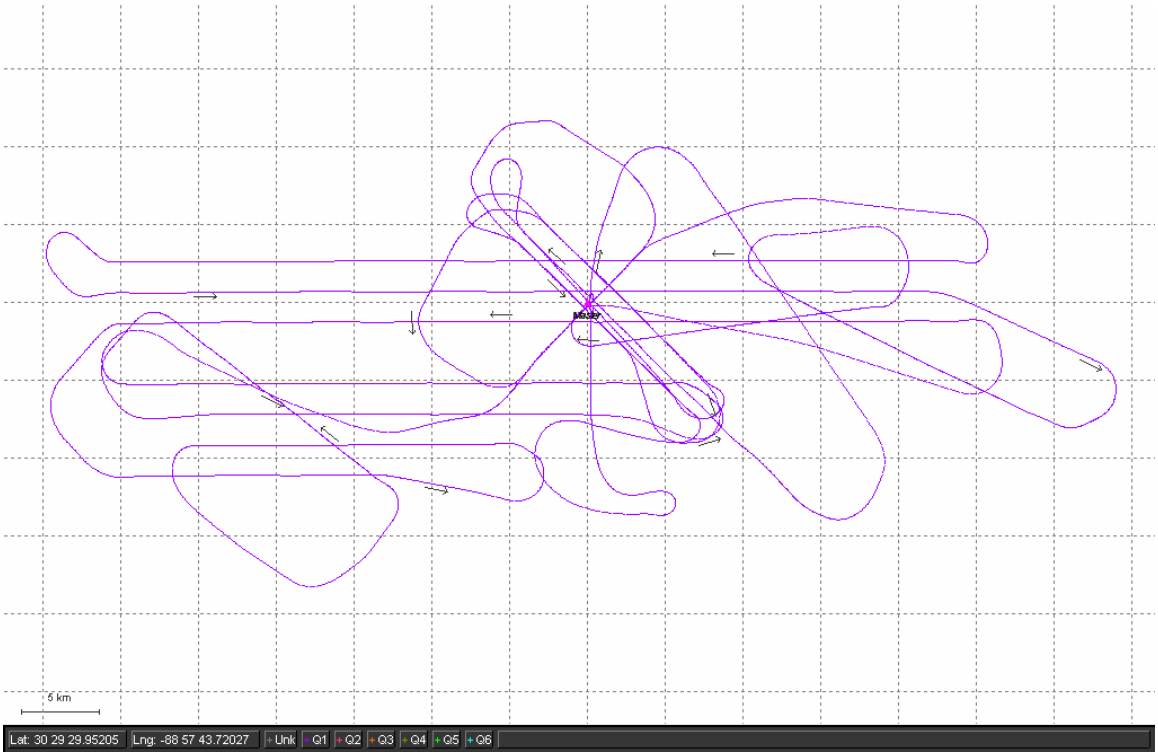


Appendix H:

Harrison County, Mississippi
Diagram – Aircraft Trajectory plot Lift 1



Harrison County, Mississippi
Diagram – Aircraft Trajectory plot Lift 2



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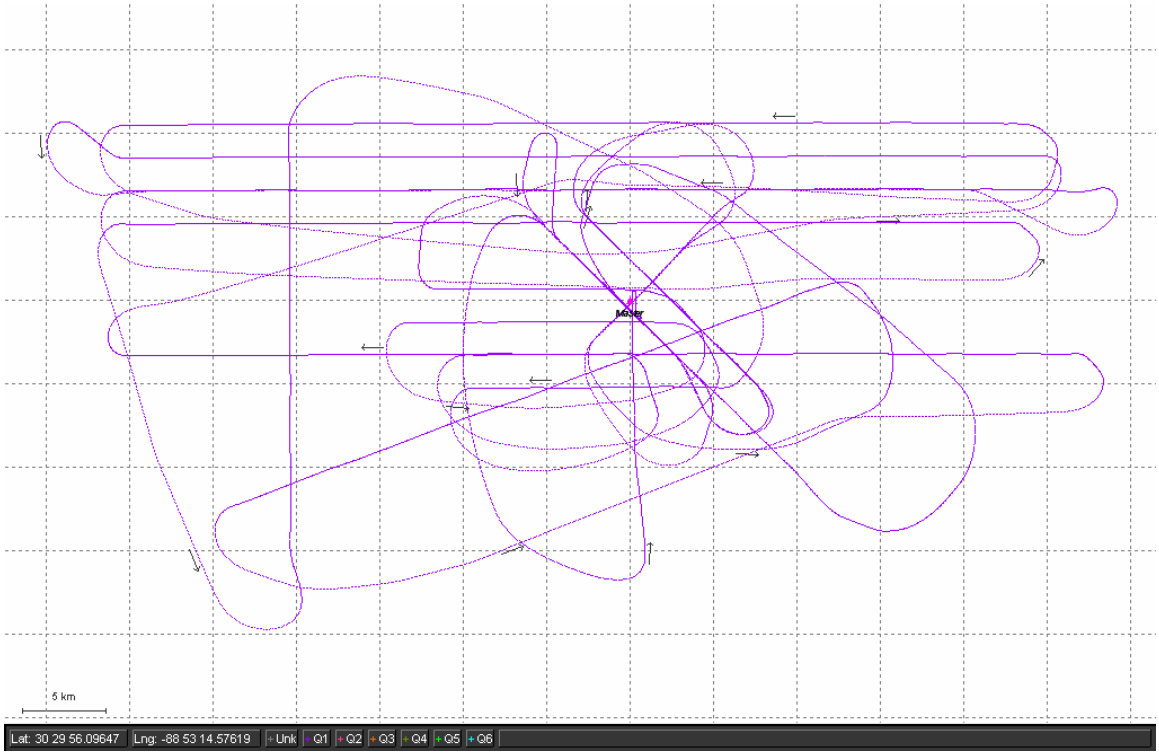
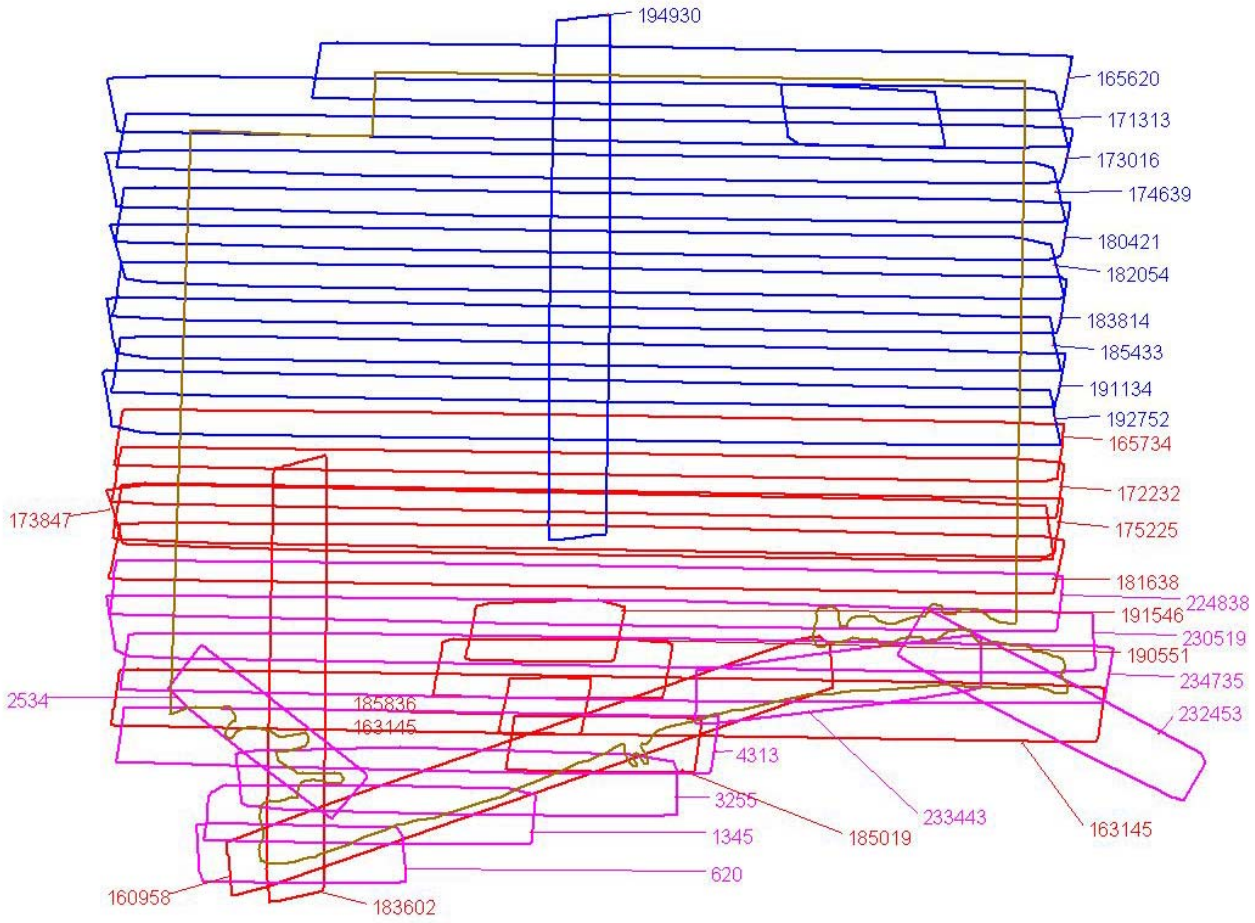
Harrison County, Mississippi
Diagram – Aircraft Trajectory plot Lift3



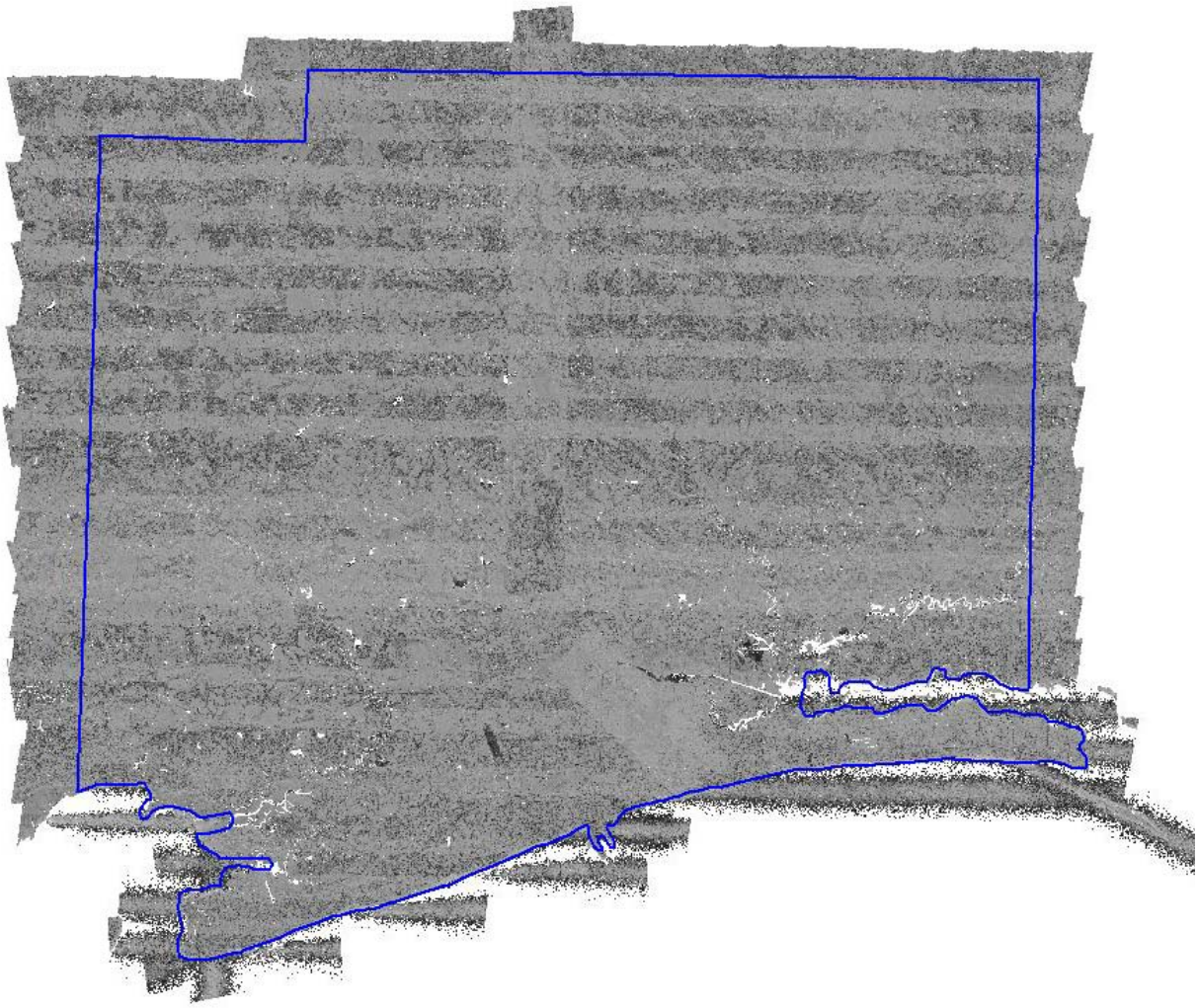
Appendix I:

Harrison County, Mississippi
Diagram – LIDAR Coverage Check for Project Lines



Appendix J:

Harrison County, Mississippi
LIDAR Intensity Check for Project Lines



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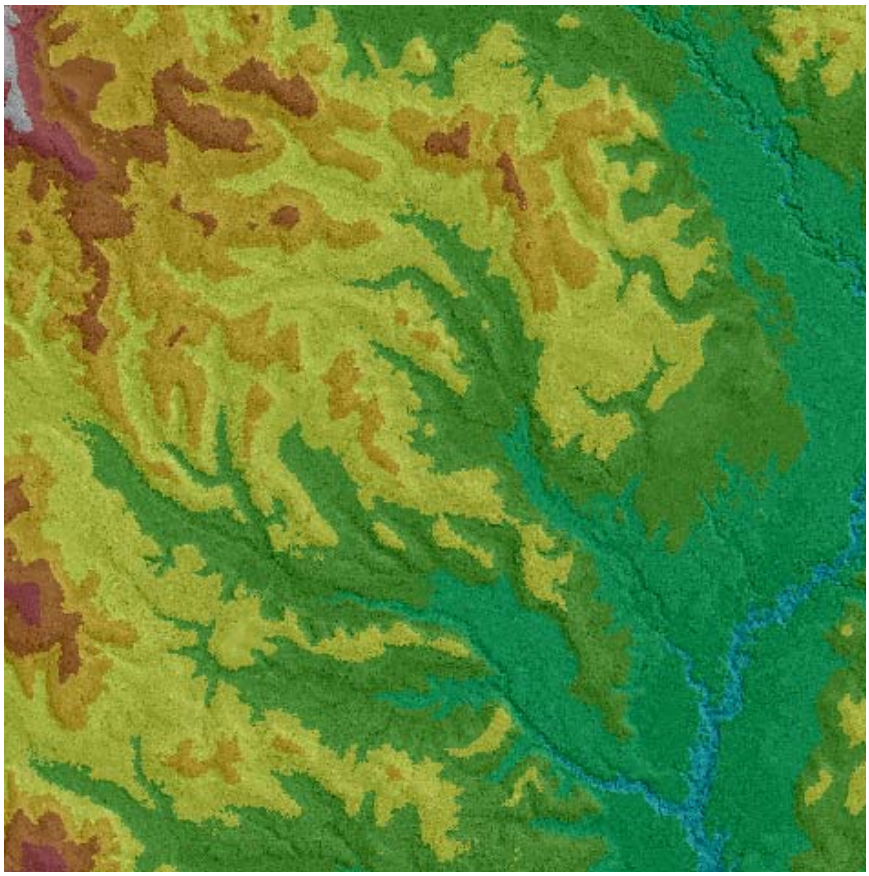
Appendix B.2
Harrison County LIDAR Processing Report

HARRISON COUNTY, MISSISSIPPI

LIDAR PROCESSING REPORT



Prepared By: EarthData International for Mississippi Geographic Information
7/28/05

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1 LIDAR BORESIGHT/PRE-PROCESSING 3
1.1 Process 3
2 FILTERING PROCEDURES 4
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2.2.1 Use of Supplemental Imagery 5
2.3 Quality Control 5
2.3.1 Processing Quality Control 6
2.4 Processing Flow Chart 8

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Lidar processing for this project began under a separate task order from the data acquisition. The following outlines the data processing methodology for this project.

1 LIDAR BORESIGHT/PRE-PROCESSING

All LIDAR pre processing utilises geographic curvilinear coordinates (latitude/longitude) and ellipsoid heights. Conversion to the projects target horizontal and vertical system occurred prior to Vegetation/Feature removal in LIDAR postprocessing. Horizontal and vertical conversions from ETRS 89 (WGS84\UTM) to Mississippi East State Plane, NAD83, NAVD88, U.S. Survey Feet was carried out using proprietary software.

1.1 Process

Unique methods for processing LIDAR data have been developed to identify and re-classify into separate data layers elevation points falling on vegetation, building and other "above ground" structures. The algorithm for filtering of the data points was developed by EarthData and has been designed specifically to automate the filtering process. The algorithm has the ability to process large amounts of elevation point data in batch mode. The following is a step-by-step description of the vegetation removal process:

- Step 1 Technicians perform visual inspections of the data to verify that the flight lines overlap correctly and that there are no gaps and that the data covers the project limits. The technician selects a series of areas in the data set to be inspected where adjacent flight lines overlap. These overlapping areas are merged and a routine is run to detect and color code differences in elevation values. The technicians review the display on-screen and locate areas that contain systematic errors or distortions that are introduced by the LIDAR sensor.

- Step 2 Systematic distortions highlighted in step 1 are removed and the data is re-checked. Correction and adjustment can involve application of angular deflection or compensation for systematic effects in the data sets.

- Step 3 The LIDAR data for each flight line was processed in batch mode through the vegetation removal algorithm. This initial processing run re-classifies 90-95% of points falling on vegetation. The algorithm also re-classifies the points falling on the edges of hard features including structures, elevated roadways and bridges.

- Step 4 The data was re-processed interactively to re-classify the remaining points falling on vegetation and points falling on other above ground structures. In our experience and professional judgment we believe that the RMSE values that are realistically achievable using LIDAR technology after processing are:

  - Trees and tall vegetation - 40 cm
  - Weeds and crops - 30 cm
  - Paved surfaces, soil, sand, rock and short grass - 15-20 cm

  The above RMSE Values allowed the vertical accuracy specifications to be met.

- Step 5 Flight lines were merged together and the data set was clipped to the final extents. Excess points falling in the overlap areas between flight lines were clipped from the data set, but retained in a different classification layer.

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- Step 6 The data was re-displayed using a viewer package (ArcView or GeoMedia) and colors were assigned to different ranges of elevation. The clipped data sets were re-inspected to verify the accuracy of the edge match. Once approved, the data was converted to the Mississippi East State Plane, NAD83, NAVD88, U.S. Survey Feet

Further description of the processing can be found in the attached flowchart (Appendix 4)

2 FILTERING PROCEDURES

It is generally accepted that automated filtering alone cannot process lidar data down to a true bare earth surface. During the initial filtering of the lidar dataset to a bare earth product, automated filters are used to remove as much of the above-ground features as possible without negatively impacting the terrain model. Approximately 90-95% of the artifacts in lidar can be removed by the automated filtering (depending upon factors such as the terrain, man-made features, and type of vegetation). The remaining 5-10% of the artifacts are removed via manual filtering which uses up to 80% of the processing budget.

2.1 Automated Filtering

During automatic classification of the lidar points some major routines were used:

1. Points having a First of Many or Intermediate return classifications are automatically removed.

2. Downswing points for the the first 34% of the downswing of the sensor mirror, are removed to prevent stepping or "corn rows" in the data.

3. Low points (filter algorithm) - this routine classifies points, which are lower than other points in the vicinity. It is often used to search for possible error points, which are clearly below the ground. This routine will basically compare the elevation of each point (=center) with every other point within a given xy distance. If the center point is clearly lower than any other point, it will be classified. Sometimes there is a higher density of error points. If there are several error points close to each other, those will not be detected if searching for single low points. However, the routine can also search for groups of low points where the whole group is lower than other points in the vicinity.

4. Ground (filter algorithm) - this routine classifies ground points by iteratively building a triangulated surface model. The routine starts by selecting some local low points as sure hits on the ground. Initial point selection is controlled with the Max building size parameter. If maximum building size is 60.0 m, the application can assume that any 60 by 60 m area will have at least one hit on the ground (provided there are points around different parts of the area) and that the lowest point is a ground hit. The routine builds an initial model from selected low points. Triangles in this initial model are mostly below the ground with only the vertices touching ground. The routine then starts molding the model upwards by iteratively adding new laser points to it. Each added point makes the model follow ground surface more closely. Iteration parameters determine how close a point must be to a triangle plane so that the point can be accepted to the model. Iteration angle is the maximum angle between point, its projection on triangle plane and closest triangle vertex. Iteration distance parameter makes sure that the iteration does not make big jumps upwards when triangles are large. This helps to keep low buildings out of the model. The smaller the Iteration angle, the less eager the routine is to follow changes in the point cloud (small undulations in terrain or hits on low vegetation). A small angle is used (close to 4.0) in flat terrain and a bigger angle (close to 10.0) in hilly terrain.

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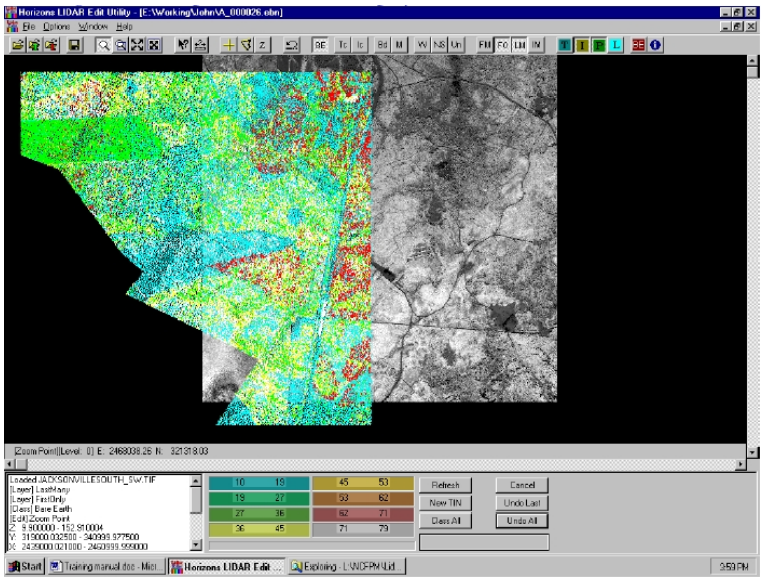
5. Subsurface noise points are filtered from the bare earth dataset primarily with the use of the automatic filtering routine. However, some noise points may still remain in the dataset; if this is the case, the points are removed during manual filtering at the technician's discretion.

2.2 Interactive Filtering

Vegetation and artifacts remaining after automatic data post-processing were removed manually through interactive filtering. The data was re-processed interactively to re-classify the remaining points falling on vegetation and points falling on other above ground structures. Lone lidar points may be difficult to interpret based only on a TIN or shaded relief view of the lidar data. For example, a lone high point in the TIN could either be a tree or a rock outcrop in rugged terrain. For this reason, it is considered "best practice" to reference aerial photography to identify and edit as may be necessary and remaining artifacts in the post-processed terrain model.



Monoscopic viewing of aerial imagery was used to ensure the most accurate interpretation and editing of the lidar data. This step also afforded the opportunity to visually check the final DTM quality before delivery.

Software visualization tools enabled the analysts to quickly scan through a deliverable sector, identify areas where additional points or artifacts need to be removed and reclassify them in the database. The surface was then redrawn allowing the analyst to immediately see the result of the edit and make further corrections, including 'undoing' previous steps if necessary. Removed points were stored in the database where they may be retrieved at a later date, if required. The final result of interactive data post-processing was the bare earth digital elevation model (DEM) deliverable covering the project area.

2.2.1 Use of Supplemental Imagery

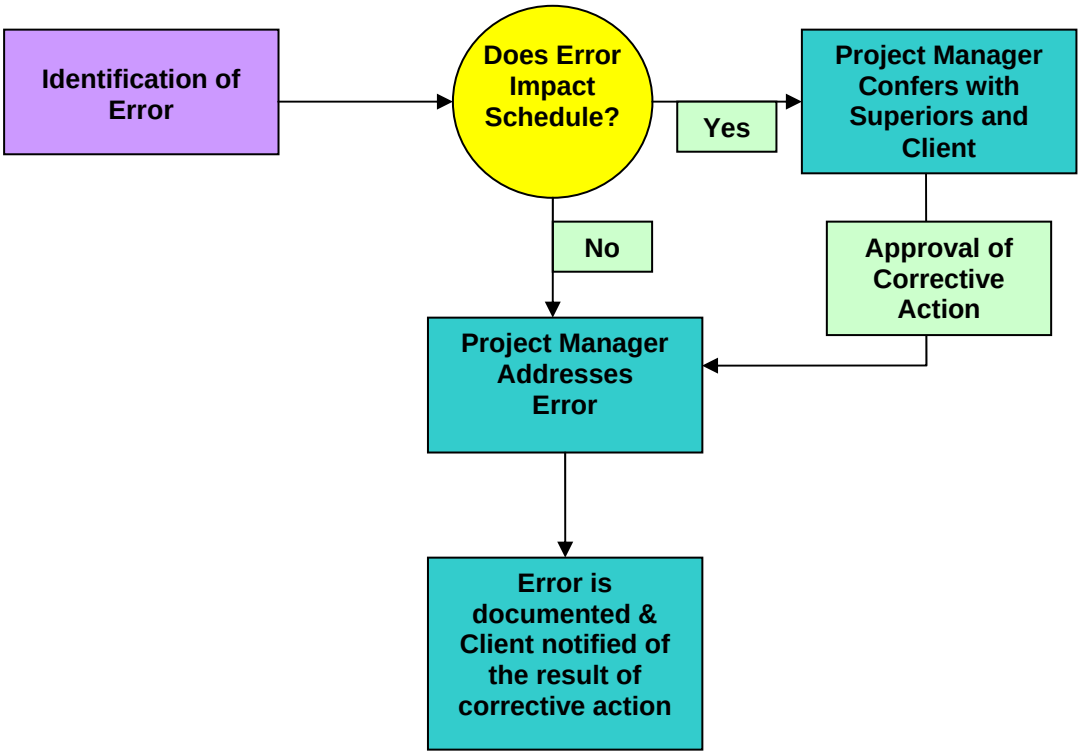
This project involved the use of supplemental imagery for quality control, breakline processing and interactive filtering of the lidar data as earlier described. The imagery was also used to support breakline development along stream channels and water bodies to ensure the proper identification of water features. This project utilized orthophotography made available by Harrison County.

2.3 Quality Control

During the life of a project, attention to quality control is of the utmost importance to the project partners. EarthData International has implemented stringent quality measures designed to eliminate human error and identify systematic errors immediately upon their occurrence. Another important measure of quality control is the correction culture that EarthData works by. Correction culture is defined by procedures in each process, project management, and project requirements. From the level of the technicians, to the Project Managers, and upward to the prime contractor, procedures in each process dictate the action to be taken when errors are

encountered. This includes actions and decisions made to correct minor errors at the technician level, to larger errors that may impact project schedule or quality.

A simplified error correction flow chart is provided in the diagram below:



Each member of the team, from the technician up to the project manager, is expected to know and understand the specifications of the project, schedule, and quality steps. Before each project is begun, kick-off meetings are held during which every team member assigned to the project is involved in discussing the scope of work for the project and the scheduling requirements. Progress on projects is monitored in a formal manner during weekly production meetings, and informally during the course of the week by constant monitoring by the project mangers. Detailed quality control steps in the processing follow in Section 2.3.1.

2.3.1 Processing Quality Control

2.3.1.1 Data Evaluation

In the data evaluation step, a project or block of strips was examined for collection errors (excessive noise), preprocessing errors (gaps, slivers, missing data and steps) and AVR (Automated Veg Removal) errors (misclassified banks) and any other anomalies that are unique to the dataset. During the data evaluation step, the general terrain (flat, hilly, steep, swampy) and land cover (forested, agricultural, urban) were also assessed. This allowed the technicians to set up classification parameters during the manual filtering that closely match the terrain type. In order to ensure that the manual filtering process is effective and that no rework occurs, the output from the automated processing was checked thoroughly, utilizing a visual check of the data.

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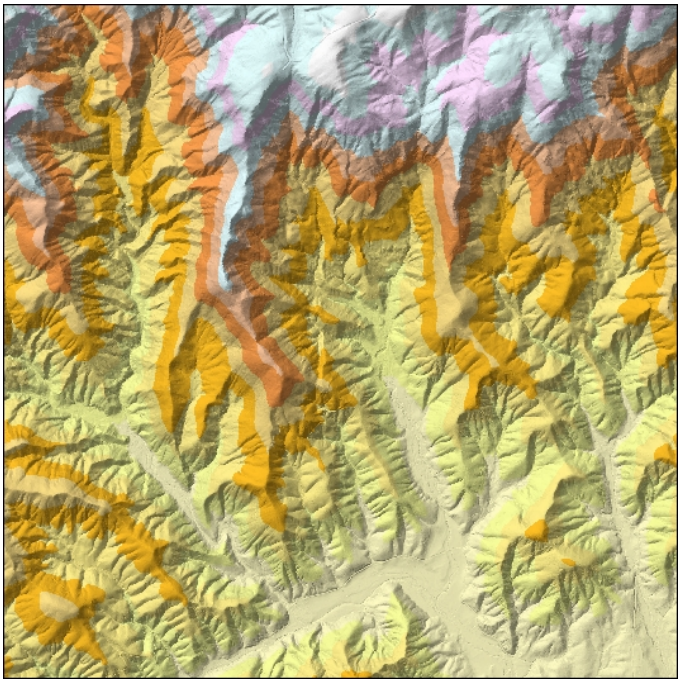
2.3.1.2 Manual Filtering

2.3.1.2.1 Hillshade Checks



Hillshade images simulate the appearance of terrain surface, combining shading and coloration to indicate the elevation, slope and aspect (direction of slope) of the terrain in an artificial view of the landscape. Creating a hill shade image from points that have been classified as bare earth provides a view of the data that is useful in detecting errors in the bare earth product. Hill shades are especially useful in detecting points that would actually have been returns from vegetation that protrude above the surface of the surrounding terrain. Hill shades were used both during the manual filtering process, and by the technician at the end of filtering a strip for a personal QC check. The strip was then submitted for a peer review. Hillshades are generated using ESRI ArcView software.

2.3.1.2.2 Peer Review

Because there are so many steps involved in the filtering process and due to the subjective nature of the task, the peer review offers the opportunity for yet another review of not only the data, but also of the editors' skills and editing abilities. Thus, the peer review becomes part of a process that promotes conformity among the filtering technicians and in the final product and ensures that the editing process produces a dataset that is edited completely and correctly. Every tile of data was subject to review by peers during the qc process.

2.3.1.2.3 QC and Tile/Sheet Edge Matching

Another step of the QC process is for the final product to be consistent in quality across the breadth of the project. Each group or number of tiles in a project was assigned to a lead technician who is responsible for the quality of the block. The lead technician spent time on the front end exploring the tiles in the block and making recommendations to the manual filtering technicians based on the content (terrain types). Once tiles in the block completed the peer review process, they were checked over by the lead technician and were either approved or sent back to the technician for further edits. Once all tiles in a given block were QC'ed, The lead technician then edge matched all the strips to ensure that there was conformity across the block between strips and between completed, adjoining blocks of tiles.

2.3.1.2.4 Final Delivery QC

The Project Manager for the project was responsible for conducting a final overview QC of all deliverables leaving the department. A review of the lead technician's QC, file management procedures, and delivery format and coverage were all checked a final time before each deliverable was sent out. Reporting on deliveries and submitting any project reports was the direct responsibility of the Project Manager.

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Some of the additional quality control routines that are incorporated into each phase of lidar processing are:

- ✓ Existing ground control and elevation data can be used to verify the accuracy of the lidar data.
- ✓ The coverage and edge matching of the data is re-checked during the vegetation re-classification process to ensure that the data meets the required accuracy specifications. See process Flow Charts below.
- ✓ Peer reviews are conducted by the technicians during the entire process
- ✓ Project managers consistently check on quality during production

2.4 Processing Flow Chart

For reference, the following flow chart illustrates the lidar processing flow for this project.

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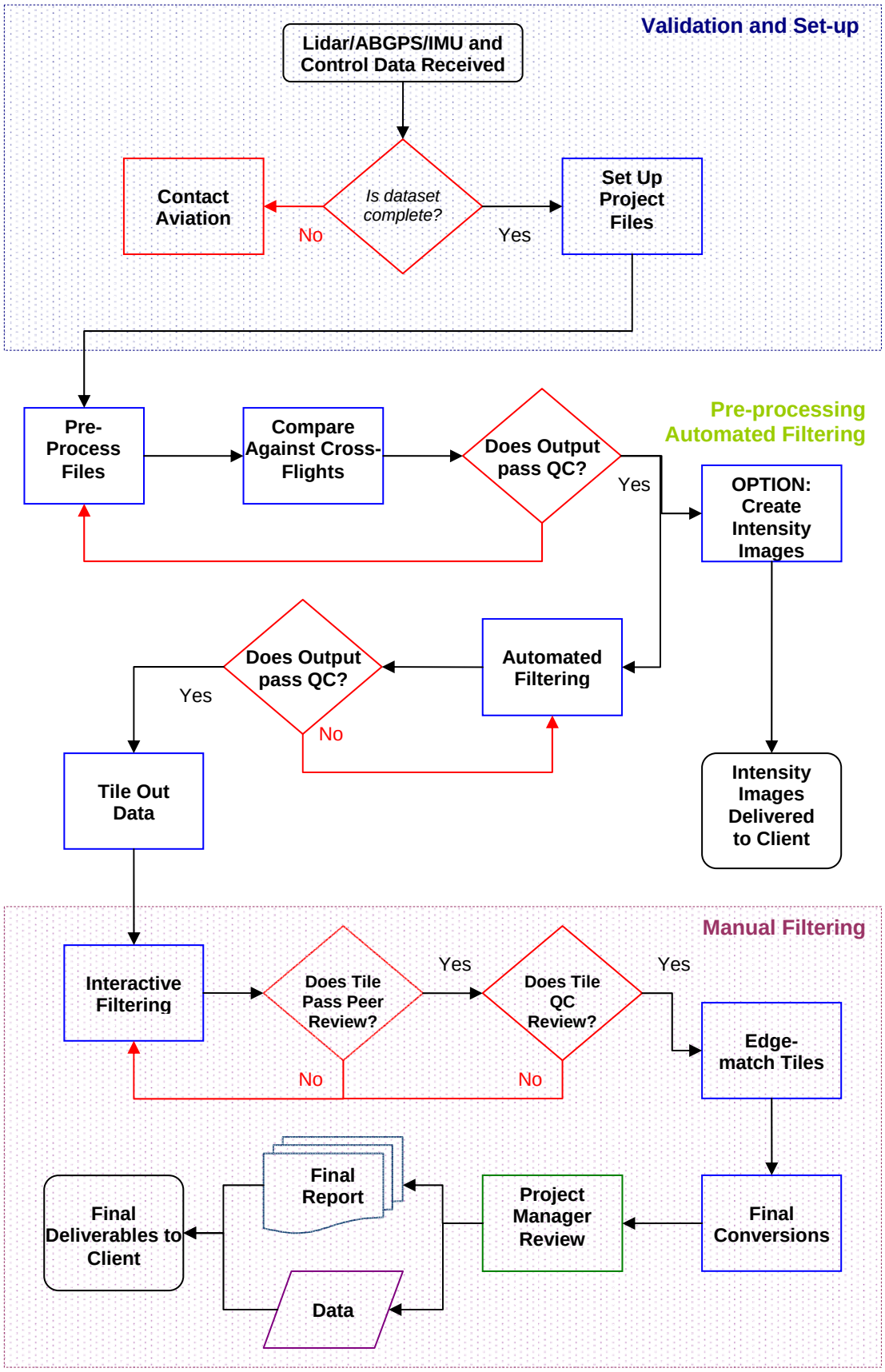

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Appendix B.3
Harrison County LIDAR Quality Control Report

Harrison County Watershed Project RMSE Calculations

Harrison	With Outliers	
	100 points	RMSE
		21.28

Harrison	Outliers Removed	
	95 Points	RMSE
		19.21

	Number Points	RMSE CM
Open Terrain	20	20.06
High Grass	20	21.01
Low Trees	20	25.51
Forested	20	26.13
Urban	20	18.37

Harrison County RMSE

Terrain Delivery Order By: J. Hendricks

Harrison County QC Points (100 Points) Comm # 60485 Date: 8/10/2005

Bm_id	Category	Northing_ft (Y)	Easting_ft (X)	Survey Elevation_ft (Z)	Lidar Elevation_ft (Z)	Error	Error^2
HD01A	CAT1	312323.340	863254.330	21.4500	22.3310	-0.8810	**0.776161**
HD02A	CAT1	305534.570	863027.520	10.9500	11.3600	-0.4100	**0.1681**
HD03C	CAT3	305511.760	862748.200	11.3500	11.9740	-0.6240	**0.389376**
HD04D	CAT4	305379.260	863018.260	10.7900	11.4250	-0.6350	**0.403225**
HD05D	CAT4	305432.460	863329.660	10.4400	11.8450	-1.4050	**1.974025**
HD06B	CAT2	305638.330	860747.190	8.5400	9.0610	-0.5210	**0.271441**
HD07A	CAT1	306932.050	865405.370	26.6400	27.2540	-0.6140	**0.376996**
HD08B	CAT2	311775.700	869411.190	28.1600	29.1330	-0.9730	**0.946729**
HD09E	CAT5	309695.520	869818.980	27.2000	28.4900	-1.2900	**1.6641**
HD10A	CAT1	309634.470	867506.250	26.5800	27.7570	-1.1770	**1.385329**
HD11E	CAT5	310105.260	867502.590	28.2900	29.2700	-0.9800	**0.9604**
HD12D	CAT4	310021.060	867986.360	26.3100	27.3810	-1.0710	**1.147041**
HD13D	CAT4	309446.210	868117.650	25.5500	26.9420	-1.3920	**1.937664**
HD14C	CAT3	318148.350	867443.450	22.4600	23.4550	-0.9950	**0.990025**
HD15C	CAT3	315911.330	865315.060	19.1100	20.3170	-1.2070	**1.456849**
HD16B	CAT2	315502.840	864649.000	20.2600	21.1450	-0.8850	**0.783225**
HD17B	CAT2	314440.220	860534.990	12.1400	12.8740	-0.7340	**0.538756**
HD18A	CAT1	314511.350	857000.050	11.2300	12.0430	-0.8130	**0.660969**
HD19C	CAT3	314466.740	858370.720	9.7700	10.8270	-1.0570	**1.117249**
HD20B	CAT2	310663.470	858311.720	6.7800	7.8080	-1.0280	**1.056784**
HD21E	CAT5	329248.640	853703.970	77.3600	77.8700	-0.5100	**0.2601**
HD22C	CAT3	332086.810	853152.810	102.7600	104.7090	-1.9490	**3.798601**
HD23E	CAT5	327930.580	853466.190	66.6100	67.0330	-0.4230	**0.178929**
HD24E	CAT5	327473.660	853477.820	60.5600	61.0740	-0.5140	**0.264196**
HD25E	CAT5	322131.270	855995.340	20.6600	20.8320	-0.1720	**0.029584**
HA01A	CAT1	385295.580	863885.770	134.1200	134.3640	-0.2440	**0.059536**
HA02C	CAT3	395056.030	866041.800	138.2200	138.6410	-0.4210	**0.177241**
HA03E	CAT5	395178.130	866232.060	143.3600	143.2880	0.0720	**0.005184**
HA04B	CAT2	394759.720	865251.370	144.9800	145.4490	-0.4690	**0.219961**
HA05B	CAT2	394576.510	865392.650	144.6700	144.8980	-0.2280	**0.051984**
HA06D	CAT4	394883.410	865189.080	141.5300	142.0740	-0.5440	**0.295936**
HA07D	CAT4	394623.130	865159.050	134.2700	134.6570	-0.3870	**0.149769**
HA08A	CAT1	384293.480	866663.890	92.0100	92.2800	-0.2700	**0.0729**
HA09A	CAT1	384384.200	866280.520	90.6700	90.7070	-0.0370	**0.001369**
HA10D	CAT4	384167.150	866603.380	90.3300	90.4120	-0.0820	**0.006724**
HA11D	CAT4	384370.910	866628.670	89.4100	89.4680	-0.0580	**0.003364**
HA12C	CAT3	385496.980	873312.470	91.3500	92.3080	-0.9580	**0.917764**
HA13E	CAT5	388714.790	874152.290	121.4600	121.6350	-0.1750	**0.030625**
HA14A	CAT1	388379.770	874825.580	127.4500	127.7570	-0.3070	**0.094249**
HA15B	CAT2	388044.580	875170.350	119.8400	119.7440	0.0960	**0.009216**
HA16D	CAT4	387954.920	875255.930	112.2700	111.7530	0.5170	**0.267289**
HA17C	CAT3	380690.970	878010.520	63.1800	63.7460	-0.5660	**0.320356**
HA18E	CAT5	369432.190	877746.710	156.6900	156.3790	0.3110	**0.096721**
HA19E	CAT5	373990.340	863085.850	133.5100	133.1310	0.3790	**0.143641**
HA20A	CAT1	374720.610	860505.100	133.8400	134.1560	-0.3160	**0.099856**
HA21E	CAT5	376292.330	857630.950	138.0000	137.8110	0.1890	**0.035721**
HA22B	CAT2	376775.890	856776.070	123.5200	123.9200	-0.4000	**0.16**
HA23C	CAT3	379057.530	853849.810	154.1400	154.5460	-0.4060	**0.164836**
HA24C	CAT3	387284.050	847009.500	189.3400	189.4940	-0.1540	**0.023716**
HA25B	CAT2	393528.110	858919.700	104.9200	105.3570	-0.4370	**0.190969**
HB01B	CAT2	383411.930	923909.430	156.8100	157.4530	-0.6430	**0.413449**
HB02B	CAT2	396672.610	931899.940	146.8600	147.2530	-0.3930	**0.154449**
HB03A	CAT1	395351.420	932712.850	131.3500	131.5510	-0.2010	**0.040401**

Harrison County RMSE

Terrain Delivery Order | By: J. Hendricks

Harrison County QC Points (100 Points) | Comm # 60485 | Date: 8/10/2005

Bm_id	Category	Northing_ft (Y)	Easting_ft (X)	Survey Elevation_ft (Z)	Lidar Elevation_ft (Z)	Error	Error^2	
HB04E	CAT5	390817.650	938787.250	101.2500	101.1720	0.0780	**0.006084**	
HB05C	CAT3	391126.190	938473.430	107.5900	107.7410	-0.1510	**0.022801**	
HB06D	CAT4	390974.580	938227.210	104.3200	104.8960	-0.5760	**0.331776**	
HB07D	CAT4	390538.280	938470.610	86.7400	87.9930	-1.2530	**1.570009**	
HB08D	CAT4	390551.730	939019.980	102.0900	102.7670	-0.6770	**0.458329**	
HB09C	CAT3	385628.050	934893.760	80.1600	80.7290	-0.5690	**0.323761**	
HB10B	CAT2	385579.440	935346.740	82.2600	82.4520	-0.1920	**0.036864**	
HB11C	CAT3	376441.510	925801.390	105.2100	105.3510	-0.1410	**0.019881**	
HB12A	CAT1	374044.500	918858.480	55.3800	54.9990	0.3810	**0.145161**	
HB13B	CAT2	373645.010	918533.370	45.7100	45.3780	0.3320	**0.110224**	
HB14D	CAT4	374583.130	919113.480	54.8700	54.9500	-0.0800	**0.0064**	
HB15A	CAT1	374486.820	915130.430	41.9700	42.1560	-0.1860	**0.034596**	
HB16C	CAT3	374366.950	914970.470	36.5700	36.6610	-0.0910	**0.008281**	
HB17D	CAT4	374592.680	915516.320	43.2900	43.5090	-0.2190	**0.047961**	
HB18D	CAT4	374852.610	915251.280	45.8800	45.5170	0.3630	**0.131769**	
HB19C	CAT3	381419.190	916613.210	96.2600	96.6730	-0.4130	**0.170569**	
HB20B	CAT2	387926.680	917894.020	162.4400	162.9770	-0.5370	**0.288369**	
HB21E	CAT5	390031.440	909834.990	142.4300	142.3560	0.0740	**0.005476**	
HB22E	CAT5	396190.670	916267.350	192.3900	192.6320	-0.2420	**0.058564**	
HB23A	CAT1	390090.220	916509.650	162.0900	162.3340	-0.2440	**0.059536**	
HB24E	CAT5	382100.250	929362.120	105.8200	105.9360	-0.1160	**0.013456**	
HB25A	CAT1	380529.480	926491.870	155.7400	155.6660	0.0740	**0.005476**	
HC01B	CAT2	337400.530	922862.950	21.7100	22.8530	-1.1430	**1.306449**	
HC02A	CAT1	346783.010	927662.760	2.9600	3.3510	-0.3910	**0.152881**	
HC03C	CAT3	345940.530	920630.390	27.0300	27.5620	-0.5320	**0.283024**	
HC04E	CAT5	345547.190	919541.020	23.5400	23.6930	-0.1530	**0.023409**	
HC05B	CAT2	345382.100	916049.840	24.5800	24.9320	-0.3520	**0.123904**	
HC06C	CAT3	345455.260	911439.510	42.3700	43.2510	-0.8810	**0.776161**	
HC07E	CAT5	345494.780	911634.170	41.8200	41.9390	-0.1190	**0.014161**	
HC08D	CAT4	345508.400	911431.390	42.3900	43.1580	-0.7680	**0.589824**	
HC09D	CAT4	345323.600	911368.920	41.4800	41.3260	0.1540	**0.023716**	
HC10A	CAT1	340482.250	908423.030	23.2100	24.0870	-0.8770	**0.769129**	
HC11C	CAT3	340097.260	908283.480	19.5800	20.7730	-1.1930	**1.423249**	
HC12D	CAT4	340449.000	908532.030	23.5300	24.2340	-0.7040	**0.495616**	
HC13D	CAT4	340327.220	907773.530	21.3600	22.2050	-0.8450	**0.714025**	
HC14E	CAT5	339737.890	919396.580	17.6400	18.5130	-0.8730	**0.762129**	
HC15B	CAT2	339751.390	919212.350	15.2400	16.3990	-1.1590	**1.343281**	
HC16D	CAT4	339539.970	919172.370	15.5700	16.3180	-0.7480	**0.559504**	
HC17B	CAT2	327380.970	924708.830	27.8800	28.8600	-0.9800	**0.9604**	
HC18C	CAT3	327304.660	925271.060	28.4700	29.4410	-0.9710	**0.942841**	
HC19B	CAT2	326389.020	921621.090	30.1500	30.8830	-0.7330	**0.537289**	
HC20C	CAT3	329723.600	925369.780	11.1600	11.9880	-0.8280	**0.685584**	
HC21E	CAT5	339493.830	922026.630	21.4000	22.0350	-0.6350	**0.403225**	
HC22E	CAT5	340989.920	918230.500	14.9900	15.6980	-0.7080	**0.501264**	
HC23A	CAT1	339746.470	920404.360	16.5000	17.3740	-0.8740	**0.763876**	
HC24A	CAT1	337412.970	921628.670	19.7700	21.0430	-1.2730	**1.620529**	
HC25A	CAT1	337403.030	924171.990	22.3400	23.5130	-1.1730	**1.375929**	
						Average=	**0.5**	
						RMSE=	**0.698210728**	feet
							21.28146297	centimeter

Harrison County RMSE

Terrain Delivery Order By: J. Hendricks

Harrison County QC Points (95 Points) Comm # 60485 Date: 8/10/2005

Bm_id	Category	Northing_ft (Y)	Easting_ft (X)	Survey Elevation_ft (Z)	Lidar Elevation_ft (Z)	Error	Error^2
HD01A	CAT1	312323.340	863254.330	21.4500	22.3310	-0.8810	**0.776161**
HD02A	CAT1	305534.570	863027.520	10.9500	11.3600	-0.4100	**0.1681**
HD03C	CAT3	305511.760	862748.200	11.3500	11.9740	-0.6240	**0.389376**
HD04D	CAT4	305379.260	863018.260	10.7900	11.4250	-0.6350	**0.403225**
HD06B	CAT2	305638.330	860747.190	8.5400	9.0610	-0.5210	**0.271441**
HD07A	CAT1	306932.050	865405.370	26.6400	27.2540	-0.6140	**0.376996**
HD08B	CAT2	311775.700	869411.190	28.1600	29.1330	-0.9730	**0.946729**
HD10A	CAT1	309634.470	867506.250	26.5800	27.7570	-1.1770	**1.385329**
HD11E	CAT5	310105.260	867502.590	28.2900	29.2700	-0.9800	**0.9604**
HD12D	CAT4	310021.060	867986.360	26.3100	27.3810	-1.0710	**1.147041**
HD14C	CAT3	318148.350	867443.450	22.4600	23.4550	-0.9950	**0.990025**
HD15C	CAT3	315911.330	865315.060	19.1100	20.3170	-1.2070	**1.456849**
HD16B	CAT2	315502.840	864649.000	20.2600	21.1450	-0.8850	**0.783225**
HD17B	CAT2	314440.220	860534.990	12.1400	12.8740	-0.7340	**0.538756**
HD18A	CAT1	314511.350	857000.050	11.2300	12.0430	-0.8130	**0.660969**
HD19C	CAT3	314466.740	858370.720	9.7700	10.8270	-1.0570	**1.117249**
HD20B	CAT2	310663.470	858311.720	6.7800	7.8080	-1.0280	**1.056784**
HD21E	CAT5	329248.640	853703.970	77.3600	77.8700	-0.5100	**0.2601**
HD23E	CAT5	327930.580	853466.190	66.6100	67.0330	-0.4230	**0.178929**
HD24E	CAT5	327473.660	853477.820	60.5600	61.0740	-0.5140	**0.264196**
HD25E	CAT5	322131.270	855995.340	20.6600	20.8320	-0.1720	**0.029584**
HA01A	CAT1	385295.580	863885.770	134.1200	134.3640	-0.2440	**0.059536**
HA02C	CAT3	395056.030	866041.800	138.2200	138.6410	-0.4210	**0.177241**
HA03E	CAT5	395178.130	866232.060	143.3600	143.2880	0.0720	**0.005184**
HA04B	CAT2	394759.720	865251.370	144.9800	145.4490	-0.4690	**0.219961**
HA05B	CAT2	394576.510	865392.650	144.6700	144.8980	-0.2280	**0.051984**
HA06D	CAT4	394883.410	865189.080	141.5300	142.0740	-0.5440	**0.295936**
HA07D	CAT4	394623.130	865159.050	134.2700	134.6570	-0.3870	**0.149769**
HA08A	CAT1	384293.480	866663.890	92.0100	92.2800	-0.2700	**0.0729**
HA09A	CAT1	384384.200	866280.520	90.6700	90.7070	-0.0370	**0.001369**

HA10D	CAT4	384167.150	866603.380	90.3300	90.4120	-0.0820	**0.006724**
HA11D	CAT4	384370.910	866628.670	89.4100	89.4680	-0.0580	**0.003364**
HA12C	CAT3	385496.980	873312.470	91.3500	92.3080	-0.9580	**0.917764**
HA13E	CAT5	388714.790	874152.290	121.4600	121.6350	-0.1750	**0.030625**
HA14A	CAT1	388379.770	874825.580	127.4500	127.7570	-0.3070	**0.094249**
HA15B	CAT2	388044.580	875170.350	119.8400	119.7440	0.0960	**0.009216**
HA16D	CAT4	387954.920	875255.930	112.2700	111.7530	0.5170	**0.267289**
HA17C	CAT3	380690.970	878010.520	63.1800	63.7460	-0.5660	**0.320356**
HA18E	CAT5	369432.190	877746.710	156.6900	156.3790	0.3110	**0.096721**
HA19E	CAT5	373990.340	863085.850	133.5100	133.1310	0.3790	**0.143641**
HA20A	CAT1	374720.610	860505.100	133.8400	134.1560	-0.3160	**0.099856**
HA21E	CAT5	376292.330	857630.950	138.0000	137.8110	0.1890	**0.035721**
HA22B	CAT2	376775.890	856776.070	123.5200	123.9200	-0.4000	**0.16**
HA23C	CAT3	379057.530	853849.810	154.1400	154.5460	-0.4060	**0.164836**
HA24C	CAT3	387284.050	847009.500	189.3400	189.4940	-0.1540	**0.023716**
HA25B	CAT2	393528.110	858919.700	104.9200	105.3570	-0.4370	**0.190969**
HB01B	CAT2	383411.930	923909.430	156.8100	157.4530	-0.6430	**0.413449**
HB02B	CAT2	396672.610	931899.940	146.8600	147.2530	-0.3930	**0.154449**
HB03A	CAT1	395351.420	932712.850	131.3500	131.5510	-0.2010	**0.040401**
HB04E	CAT5	390817.650	938787.250	101.2500	101.1720	0.0780	**0.006084**
HB05C	CAT3	391126.190	938473.430	107.5900	107.7410	-0.1510	**0.022801**
HB06D	CAT4	390974.580	938227.210	104.3200	104.8960	-0.5760	**0.331776**
HB07D	CAT4	390538.280	938470.610	86.7400	87.9930	-1.2530	**1.570009**
HB08D	CAT4	390551.730	939019.980	102.0900	102.7670	-0.6770	**0.458329**
HB09C	CAT3	385628.050	934893.760	80.1600	80.7290	-0.5690	**0.323761**
HB10B	CAT2	385579.440	935346.740	82.2600	82.4520	-0.1920	**0.036864**
HB11C	CAT3	376441.510	925801.390	105.2100	105.3510	-0.1410	**0.019881**
HB12A	CAT1	374044.500	918858.480	55.3800	54.9990	0.3810	**0.145161**
HB13B	CAT2	373645.010	918533.370	45.7100	45.3780	0.3320	**0.110224**
HB14D	CAT4	374583.130	919113.480	54.8700	54.9500	-0.0800	**0.0064**
HB15A	CAT1	374486.820	915130.430	41.9700	42.1560	-0.1860	**0.034596**
HB16C	CAT3	374366.950	914970.470	36.5700	36.6610	-0.0910	**0.008281**
HB17D	CAT4	374592.680	915516.320	43.2900	43.5090	-0.2190	**0.047961**
HB18D	CAT4	374852.610	915251.280	45.8800	45.5170	0.3630	**0.131769**
HB19C	CAT3	381419.190	916613.210	96.2600	96.6730	-0.4130	**0.170569**
HB20B	CAT2	387926.680	917894.020	162.4400	162.9770	-0.5370	**0.288369**
HB21E	CAT5	390031.440	909834.990	142.4300	142.3560	0.0740	**0.005476**

HB22E	CAT5	396190.670	916267.350	192.3900	192.6320	-0.2420	**0.058564**
HB23A	CAT1	390090.220	916509.650	162.0900	162.3340	-0.2440	**0.059536**
HB24E	CAT5	382100.250	929362.120	105.8200	105.9360	-0.1160	**0.013456**
HB25A	CAT1	380529.480	926491.870	155.7400	155.6660	0.0740	**0.005476**
HC01B	CAT2	337400.530	922862.950	21.7100	22.8530	-1.1430	**1.306449**
HC02A	CAT1	346783.010	927662.760	2.9600	3.3510	-0.3910	**0.152881**
HC03C	CAT3	345940.530	920630.390	27.0300	27.5620	-0.5320	**0.283024**
HC04E	CAT5	345547.190	919541.020	23.5400	23.6930	-0.1530	**0.023409**
HC05B	CAT2	345382.100	916049.840	24.5800	24.9320	-0.3520	**0.123904**
HC06C	CAT3	345455.260	911439.510	42.3700	43.2510	-0.8810	**0.776161**
HC07E	CAT5	345494.780	911634.170	41.8200	41.9390	-0.1190	**0.014161**
HC08D	CAT4	345508.400	911431.390	42.3900	43.1580	-0.7680	**0.589824**
HC09D	CAT4	345323.600	911368.920	41.4800	41.3260	0.1540	**0.023716**
HC10A	CAT1	340482.250	908423.030	23.2100	24.0870	-0.8770	**0.769129**
HC11C	CAT3	340097.260	908283.480	19.5800	20.7730	-1.1930	**1.423249**
HC12D	CAT4	340449.000	908532.030	23.5300	24.2340	-0.7040	**0.495616**
HC13D	CAT4	340327.220	907773.530	21.3600	22.2050	-0.8450	**0.714025**
HC14E	CAT5	339737.890	919396.580	17.6400	18.5130	-0.8730	**0.762129**
HC15B	CAT2	339751.390	919212.350	15.2400	16.3990	-1.1590	**1.343281**
HC16D	CAT4	339539.970	919172.370	15.5700	16.3180	-0.7480	**0.559504**
HC17B	CAT2	327380.970	924708.830	27.8800	28.8600	-0.9800	**0.9604**
HC18C	CAT3	327304.660	925271.060	28.4700	29.4410	-0.9710	**0.942841**
HC19B	CAT2	326389.020	921621.090	30.1500	30.8830	-0.7330	**0.537289**
HC20C	CAT3	329723.600	925369.780	11.1600	11.9880	-0.8280	**0.685584**
HC21E	CAT5	339493.830	922026.630	21.4000	22.0350	-0.6350	**0.403225**
HC22E	CAT5	340989.920	918230.500	14.9900	15.6980	-0.7080	**0.501264**
HC23A	CAT1	339746.470	920404.360	16.5000	17.3740	-0.8740	**0.763876**
HC25A	CAT1	337403.030	924171.990	22.3400	23.5130	-1.1730	**1.375929**

Average= **0.4**
RMSE= **0.63041259** feet
19.2149757 centimeter

Harrison County RMSE

Terrain Delivery Order By: J. Hendricks

Harrison County QC Points (20 Points In Open Areas) Comm # 60485 Date: 8/10/2005

Bm_id	Category	Northing_ft (Y)	Easting_ft (X)	Survey Elevation_ft (Z)	Lidar Elevation_ft (Z)	Error	Error^2	
HD01A	CAT1	312323.340	863254.330	21.4500	22.3310	-0.8810	**0.776161**	
HD02A	CAT1	305534.570	863027.520	10.9500	11.3600	-0.4100	**0.1681**	
HD07A	CAT1	306932.050	865405.370	26.6400	27.2540	-0.6140	**0.376996**	
HD10A	CAT1	309634.470	867506.250	26.5800	27.7570	-1.1770	**1.385329**	
HD18A	CAT1	314511.350	857000.050	11.2300	12.0430	-0.8130	**0.660969**	
HA01A	CAT1	385295.580	863885.770	134.1200	134.3640	-0.2440	**0.059536**	
HA08A	CAT1	384293.480	866663.890	92.0100	92.2800	-0.2700	**0.0729**	
HA09A	CAT1	384384.200	866280.520	90.6700	90.7070	-0.0370	**0.001369**	
HA14A	CAT1	388379.770	874825.580	127.4500	127.7570	-0.3070	**0.094249**	
HA20A	CAT1	374720.610	860505.100	133.8400	134.1560	-0.3160	**0.099856**	
HB03A	CAT1	395351.420	932712.850	131.3500	131.5510	-0.2010	**0.040401**	
HB12A	CAT1	374044.500	918858.480	55.3800	54.9990	0.3810	**0.145161**	
HB15A	CAT1	374486.820	915130.430	41.9700	42.1560	-0.1860	**0.034596**	
HB23A	CAT1	390090.220	916509.650	162.0900	162.3340	-0.2440	**0.059536**	
HB25A	CAT1	380529.480	926491.870	155.7400	155.6660	0.0740	**0.005476**	
HC02A	CAT1	346783.010	927662.760	2.9600	3.3510	-0.3910	**0.152881**	
HC10A	CAT1	340482.250	908423.030	23.2100	24.0870	-0.8770	**0.769129**	
HC23A	CAT1	339746.470	920404.360	16.5000	17.3740	-0.8740	**0.763876**	
HC24A	CAT1	337412.970	921628.670	19.7700	21.0430	-1.2730	**1.620529**	
HC25A	CAT1	337403.030	924171.990	22.3400	23.5130	-1.1730	**1.375929**	
						Average=	**0.43**	
						RMSE=	**0.658140525**	feet
							20.06012319	centimeter

Harrison County RMSE

Terrain Delivery Order By: J. Hendricks

Harrison County QC Points (20 Points In High Grass) Comm # 60485 Date: 8/10/2005

Bm_id	Category	Northing_ft (Y)	Easting_ft (X)	Survey Elevation_ft (Z)	Lidar Elevation_ft (Z)	Error	Error^2	
HD06B	CAT2	305638.330	860747.190	8.5400	9.0610	-0.5210	**0.271441**	
HD08B	CAT2	311775.700	869411.190	28.1600	29.1330	-0.9730	**0.946729**	
HD16B	CAT2	315502.840	864649.000	20.2600	21.1450	-0.8850	**0.783225**	
HD17B	CAT2	314440.220	860534.990	12.1400	12.8740	-0.7340	**0.538756**	
HD20B	CAT2	310663.470	858311.720	6.7800	7.8080	-1.0280	**1.056784**	
HA04B	CAT2	394759.720	865251.370	144.9800	145.4490	-0.4690	**0.219961**	
HA05B	CAT2	394576.510	865392.650	144.6700	144.8980	-0.2280	**0.051984**	
HA15B	CAT2	388044.580	875170.350	119.8400	119.7440	0.0960	**0.009216**	
HA22B	CAT2	376775.890	856776.070	123.5200	123.9200	-0.4000	**0.16**	
HA25B	CAT2	393528.110	858919.700	104.9200	105.3570	-0.4370	**0.190969**	
HB01B	CAT2	383411.930	923909.430	156.8100	157.4530	-0.6430	**0.413449**	
HB02B	CAT2	396672.610	931899.940	146.8600	147.2530	-0.3930	**0.154449**	
HB10B	CAT2	385579.440	935346.740	82.2600	82.4520	-0.1920	**0.036864**	
HB13B	CAT2	373645.010	918533.370	45.7100	45.3780	0.3320	**0.110224**	
HB20B	CAT2	387926.680	917894.020	162.4400	162.9770	-0.5370	**0.288369**	
HC01B	CAT2	337400.530	922862.950	21.7100	22.8530	-1.1430	**1.306449**	
HC05B	CAT2	345382.100	916049.840	24.5800	24.9320	-0.3520	**0.123904**	
HC15B	CAT2	339751.390	919212.350	15.2400	16.3990	-1.1590	**1.343281**	
HC17B	CAT2	327380.970	924708.830	27.8800	28.8600	-0.9800	**0.9604**	
HC19B	CAT2	326389.020	921621.090	30.1500	30.8830	-0.7330	**0.537289**	
						Average=	**0.5**	
						RMSE=	**0.689338197**	feet
							21.01102825	centimeter

Harrison County RMSE						WatershedConcepts		
Terrain Delivery Order						By:	J. Hendricks	
Harrison County QC Points (20 Points In Low Trees)					Comm # 60485	Date:	8/10/2005	
				Survey	**Lidar**			
Bm_id	**Category**	**Northing_ft (Y)**	**Easting_ft (X)**	**Elevation_ft (Z)**	**Elevation_ft (Z)**	**Error**	**Error^2**	
HD03C	CAT3	305511.760	862748.200	11.3500	11.9740	-0.6240	**0.389376**	
HD14C	CAT3	318148.350	867443.450	22.4600	23.4550	-0.9950	**0.990025**	
HD15C	CAT3	315911.330	865315.060	19.1100	20.3170	-1.2070	**1.456849**	
HD19C	CAT3	314466.740	858370.720	9.7700	10.8270	-1.0570	**1.117249**	
HD22C	CAT3	332086.810	853152.810	102.7600	104.7090	-1.9490	**3.798601**	
HA02C	CAT3	395056.030	866041.800	138.2200	138.6410	-0.4210	**0.177241**	
HA12C	CAT3	385496.980	873312.470	91.3500	92.3080	-0.9580	**0.917764**	
HA17C	CAT3	380690.970	878010.520	63.1800	63.7460	-0.5660	**0.320356**	
HA23C	CAT3	379057.530	853849.810	154.1400	154.5460	-0.4060	**0.164836**	
HA24C	CAT3	387284.050	847009.500	189.3400	189.4940	-0.1540	**0.023716**	
HB05C	CAT3	391126.190	938473.430	107.5900	107.7410	-0.1510	**0.022801**	
HB09C	CAT3	385628.050	934893.760	80.1600	80.7290	-0.5690	**0.323761**	
HB11C	CAT3	376441.510	925801.390	105.2100	105.3510	-0.1410	**0.019881**	
HB16C	CAT3	374366.950	914970.470	36.5700	36.6610	-0.0910	**0.008281**	
HB19C	CAT3	381419.190	916613.210	96.2600	96.6730	-0.4130	**0.170569**	
HC03C	CAT3	345940.530	920630.390	27.0300	27.5620	-0.5320	**0.283024**	
HC06C	CAT3	345455.260	911439.510	42.3700	43.2510	-0.8810	**0.776161**	
HC11C	CAT3	340097.260	908283.480	19.5800	20.7730	-1.1930	**1.423249**	
HC18C	CAT3	327304.660	925271.060	28.4700	29.4410	-0.9710	**0.942841**	
HC20C	CAT3	329723.600	925369.780	11.1600	11.9880	-0.8280	**0.685584**	
						Average=	**0.7**	
						RMSE=	**0.837023447**	feet
							25.51247465	centimeter

Harrison County RMSE

Terrain Delivery Order By: J. Hendricks

Harrison County QC Points (20 Points in Forested Areas) Comm # 60485 Date: 8/10/2005

Bm_id	Category	Northing_ft (Y)	Easting_ft (X)	Survey Elevation_ft (Z)	Lidar Elevation_ft (Z)	Error	Error^2
HD04D	CAT4	305379.260	863018.260	10.7900	11.4250	-0.6350	**0.403225**
HD05D	CAT4	305432.460	863329.660	10.4400	11.8450	-1.4050	**1.974025**
HD12D	CAT4	310021.060	867986.360	26.3100	27.3810	-1.0710	**1.147041**
HD13D	CAT4	309446.210	868117.650	25.5500	26.9420	-1.3920	**1.937664**
HA06D	CAT4	394883.410	865189.080	141.5300	142.0740	-0.5440	**0.295936**
HA07D	CAT4	394623.130	865159.050	134.2700	134.6570	-0.3870	**0.149769**
HA10D	CAT4	384167.150	866603.380	90.3300	90.4120	-0.0820	**0.006724**
HA11D	CAT4	384370.910	866628.670	89.4100	89.4680	-0.0580	**0.003364**
HA16D	CAT4	387954.920	875255.930	112.2700	111.7530	0.5170	**0.267289**
HB06D	CAT4	390974.580	938227.210	104.3200	104.8960	-0.5760	**0.331776**
HB07D	CAT4	390538.280	938470.610	86.7400	87.9930	-1.2530	**1.570009**
HB08D	CAT4	390551.730	939019.980	102.0900	102.7670	-0.6770	**0.458329**
HB14D	CAT4	374583.130	919113.480	54.8700	54.9500	-0.0800	**0.0064**
HB17D	CAT4	374592.680	915516.320	43.2900	43.5090	-0.2190	**0.047961**
HB18D	CAT4	374852.610	915251.280	45.8800	45.5170	0.3630	**0.131769**
HC08D	CAT4	345508.400	911431.390	42.3900	43.1580	-0.7680	**0.589824**
HC09D	CAT4	345323.600	911368.920	41.4800	41.3260	0.1540	**0.023716**
HC12D	CAT4	340449.000	908532.030	23.5300	24.2340	-0.7040	**0.495616**
HC13D	CAT4	340327.220	907773.530	21.3600	22.2050	-0.8450	**0.714025**
HC16D	CAT4	339539.970	919172.370	15.5700	16.3180	-0.7480	**0.559504**
						Average=	**0.7**
						RMSE=	**0.857418006** feet
							26.13410081 centimeter

Harrison County RMSE

Terrain Delivery Order By: J. Hendricks

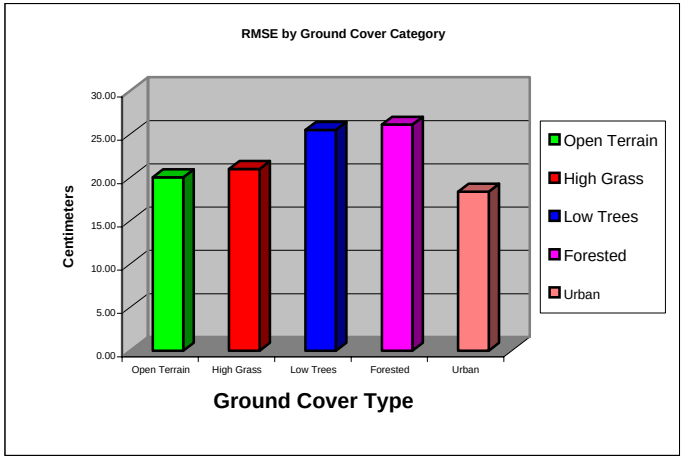
Harrison County QC Points (20 Points in Urban Areas) Comm # 60485 Date: 8/10/2005

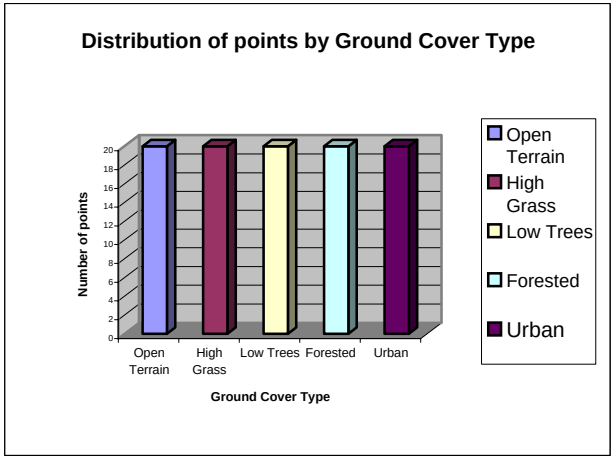
Bm_id	Category	Northing_ft (Y)	Easting_ft (X)	Survey Elevation_ft (Z)	Lidar Elevation_ft (Z)	Error	Error^2
HD09E	CAT5	309695.520	869818.980	27.2000	28.4900	-1.2900	**1.6641**
HD11E	CAT5	310105.260	867502.590	28.2900	29.2700	-0.9800	**0.9604**
HD21E	CAT5	329248.640	853703.970	77.3600	77.8700	-0.5100	**0.2601**
HD23E	CAT5	327930.580	853466.190	66.6100	67.0330	-0.4230	**0.178929**
HD24E	CAT5	327473.660	853477.820	60.5600	61.0740	-0.5140	**0.264196**
HD25E	CAT5	322131.270	855995.340	20.6600	20.8320	-0.1720	**0.029584**
HA03E	CAT5	395178.130	866232.060	143.3600	143.2880	0.0720	**0.005184**
HA13E	CAT5	388714.790	874152.290	121.4600	121.6350	-0.1750	**0.030625**
HA18E	CAT5	369432.190	877746.710	156.6900	156.3790	0.3110	**0.096721**
HA19E	CAT5	373990.340	863085.850	133.5100	133.1310	0.3790	**0.143641**
HA21E	CAT5	376292.330	857630.950	138.0000	137.8110	0.1890	**0.035721**
HB04E	CAT5	390817.650	938787.250	101.2500	101.1720	0.0780	**0.006084**
HB21E	CAT5	390031.440	909834.990	142.4300	142.3560	0.0740	**0.005476**
HB22E	CAT5	396190.670	916267.350	192.3900	192.6320	-0.2420	**0.058564**
HB24E	CAT5	382100.250	929362.120	105.8200	105.9360	-0.1160	**0.013456**
HC04E	CAT5	345547.190	919541.020	23.5400	23.6930	-0.1530	**0.023409**
HC07E	CAT5	345494.780	911634.170	41.8200	41.9390	-0.1190	**0.014161**
HC14E	CAT5	339737.890	919396.580	17.6400	18.5130	-0.8730	**0.762129**
HC21E	CAT5	339493.830	922026.630	21.4000	22.0350	-0.6350	**0.403225**
HC22E	CAT5	340989.920	918230.500	14.9900	15.6980	-0.7080	**0.501264**

Average=	**0.4**	
RMSE=	**0.602783543**	feet
	18.3728424	centimeter

Overall Statistics for Accuracy Assessment				
	Number Points	**Average Error**	**RMSE Feet**	**RMSE CM**
Open Terrain	20	0.43	0.66	20.06
High Grass	20	0.48	0.69	21.01
Low Trees	20	0.70	0.84	25.51
Forested	20	0.74	0.86	26.13
Urban	20	0.36	0.60	18.37

Outliers larger than the 95th percentile		
		Outliers are based on points larger than the 95th percentile. Using this method, 5 of the 100 points were removed from this dataset.
	Elevation Difference	
Low Trees	-1.949	
Forested	-1.405	
Forested	-1.392	
Urban	-1.29	
Open	-1.27	





Appendix C.1
MS Gulf Coast Post-Katrina LIDAR Acquisition Report

LIDAR REPORT

US Army Corps of Engineers®

MISSISSIPPI AND ALABAMA COASTAL MAPPING

U.S. ARMY CORPS OF ENGINEERS MOBILE DISTRICT

CONTRACTOR: R&M CONSULTANTS, INC.
CONTRACT NO. W91278-04-D-0001/0003
EN PROJECT NO. C-05-054

Prepared By:

WOOLPERT, INC.
PROJECT NO. 64557

November 2005

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Figure A—Project Boundary/LiDAR Coverage A-1

Figure B—LiDAR Coverage B-1

Figure C.1—LiDAR Flight Log C-1

Figure C.2—LiDAR Flight Log C-2

Figure C.3—LiDAR Flight Log C-3

Figure C.4—LiDAR Flight Log C-4

Figure C.5—LiDAR Flight Log C-5

Figure C.6—LiDAR Flight Log C-6

Figure C.7—LiDAR Flight Log C-7

Figure C.8—LiDAR Flight Log C-8

Section 1

SECTION 1: OVERVIEW

Introduction

The U.S. Army Corps of Engineers has a contract task order in place with Woolpert, Inc., through R&M Consultants, for the collection of GPS ground survey and airborne Light Detection and Ranging (LiDAR) for selected areas along the gulf coast of Alabama, Mississippi, and Louisiana. The U.S. Army Corps of Engineers requests permission to allow our contractor to perform the overflight/data acquisition where required as part of this tasking. The data is used to support the Corps mission in debris removal, 3D Modeling, Flood Study Analysis, etc. in coordination with, and in support of, other federal government agencies.

The Mississippi and Alabama Coastal Mapping project calls for the following:

- ✓ The LiDAR DEM was delivered as "first return", "last return", "bare earth", and "water" delivery in ASCII format.
- ✓ The LiDAR Intensity imagery was delivered in TIFF format (with associated world file) and MrSID format.

This report contains a review of the project requirements and detailed information for LiDAR data acquisition and quality control (QC) including:

- ✓ Documentation specifying altitude, airspeed, scan angle, scan rate, LiDAR pulse rates, and other flight and equipment information deemed appropriate
- ✓ A chart of position dilution of precision (PDOP)
- ✓ A LiDAR System Data Report
- ✓ A LiDAR Data Acquisition report
- ✓ A report for the airborne global positioning system (ABGPS) survey performed during the LiDAR mission
- ✓ A system calibration report

Project Area

The project area encompasses approximately 740 square miles of Hancock, Harrison, Jackson counties in Mississippi, and Mobile County in Alabama. The limits are from the land water interface (shoreline) to the north Right of Way of Interstate 10.

Project Requirements

General standards for the LiDAR mission include:

- ✓ High density LiDAR data acquisition within the project limits (see Figure A, Project Boundary/LiDAR Coverage) at a sufficient altitude and 1 meter average density to support digital terrain model (DTM) development with a vertical accuracy of 15 centimeters (NSSDA $RMSE_Z$) in flat and open areas (i.e. low grass, plowed fields, lawn, golf courses).

- ✓ Avoid inclement weather for flight missions.

- ✓ Choose a flight path that provides satisfactory coverage of the study area, including both parallel and enough cross flight lines to allow for proper quality control.

- ✓ Document flight mission date, time, flight altitude, airspeed, scan angle, scan rate, laser pulse rates and other information deemed pertinent.

Section 2

SECTION 2: LIDAR DATA ACQUISITION

This section provides an overview of the LiDAR acquisition methodology employed by Woolpert Inc. on the Mississippi and Alabama Coastal Mapping project. Typical LiDAR system parameters include:

- ✓ Altitude
- ✓ Airspeed
- ✓ Scan angle
- ✓ Scan rate
- ✓ Laser pulse repetition rate

Flight and equipment information is also included.

LiDAR Overview

LiDAR data was acquired across the project limits (see Figure A, Project Boundary/LiDAR Coverage) by Woolpert Inc for the USACE, Mobile District in September 2005 and October 2005 along the coastline of Hancock, Harrison, Jackson counties in Mississippi and Mobile County in Alabama from the land water interface (shoreline) to the north Right of Way of Interstate-10. The LiDAR DEM was delivered as "first return", "last return", "bare earth", and "water" delivery in ASCII format. The LiDAR Intensity imagery was delivered in TIFF format (with associated world file) and MrSID format. Contract Number: W91278-04-D-0001/0003 EN. Project Number: C-05-054. Contractor: R&M Consultants, Inc., Anchorage, AK. Subcontractor: Woolpert, Inc., Dayton, OH.

LiDAR Mission

The LiDAR data acquisition was executed in eight sessions, on September 19, September 20, September 21, October 3, October 4, October 5, October 8, October 9, 2005 using a Leica ALS50 LiDAR System. Specific details about the ALS50 system are included in Section 4 of this report.

The airborne GPS (ABGPS) base stations supporting the LiDAR acquisition was located in three areas, eastern area, central area, and western area, divided by mapping limit along coastline across Mississippi and Alabama. Dual Frequency data was logged continuously for the duration of each LiDAR flight mission at a one-second sampling rate. A table of control points for the LiDAR survey is included in Section 5 of this report.

The flight plan for LiDAR consisted of parallel flights in an east-west extent across eastern and central areas, and in a north-south extent across western area (see Figure B, LiDAR Flight Layout). One-hundred-fifteen (115) flight lines of LiDAR data were acquired in 8 sessions along the coast.

No significant problems were encountered during the LiDAR data acquisition phase of the project.

LiDAR Statistical Data

The LiDAR parameters are as follows:

Aircraft Speed:	130 knots indicated air speed
Flying Height:	3,000 feet above ground level
Scanner Field of View:	40 degrees
Scan Frequency:	36 Hertz
Pulse Repetition Rate:	52,300 Hertz

Data Acquisition Summary

Table 2.1 LiDAR Acquisition Log, Mississippi and Alabama Coastal Mapping Project.

Date	Julian Day	Lines	Base 1
9-19-05	26205	C16-C26	MOB Base 1
9-20-05	26305	A1-A18	Stennis
9-21-05	26405	A19-A44	Kiln
10-03-05	27605	B46-B78	MOB Base 2
10-04-05	27705	B1-B11, eastern B12-B24	Van RM 1
10-05-05	27805	Western B12-24, B25-B29, C15 (abort)	Van RM 1
10-08-05	28105	B30-B45, C10-C15	MOB Base 1
10-09-05	28205	C1-C9	MOB Base 2

Section 3

SECTION 3: PDOP INFORMATION

PDOP, the Positional Dilution of Precision, is a factor that describes the effects of satellite geometry on the accuracy of the airborne GPS solution. The geometric distribution of the satellites is measured relative to the locations of the receivers on the ground and in the aircraft. PDOP can be computed in advance, based on the approximate receiver locations and the predicted location of the satellite, which is called the satellite ephemeris.

Low PDOP numbers are preferable; the higher the PDOP number, the weaker the geometric quality of solution between the satellite, aircraft and reference receivers.

Woolpert's goal is to maintain a final PDOP of 2.5 or less during all LiDAR acquisition missions. Satellite geometry and the resultant PDOP levels are dynamic, changing with the position of the aircraft. Occasionally, one satellite in the network will drop below the horizon, breaking its connection to the receiver, and the PDOP level will spike above 2.5 momentarily. Small deviations of this type are accounted for during post-processing of the data through the use of Kalman filtering. If PDOP in the aircraft rises above 2.5 for a significant time period, the survey is usually stopped until the geometry improves.

The following table contains the average PDOP and distance separation between the aircraft and base station for each LiDAR acquisition mission.

Table 3.1. Mississippi and Alabama Coastal Mapping Project LiDAR Report, PDOP

Date	Base Station	PDOP	Dist. Separation, KM
9-19-05	MOB Base 1	2.2	35
9-20-05	Stennis	2.5	20
9-21-05	Kiln	2.4	30
10-03-05	MOB Base 2	2.4	30
10-04-05	Van RM 1	2.3	35
10-05-05	Van RM 1	2.5	35
10-08-05	MOB Base 1	2.3	45
10-09-05	MOB Base 2	2.2	30

Section 4

SECTION 4: LIDAR SYSTEM DATA REPORT

The LiDAR data was acquired using an ALS50 onboard a Cessna T404. The ALS50 LiDAR system, developed by Leica Geosystems of Boston, Massachusetts, includes the simultaneous first, intermediate and last pulse data capture module, the extended altitude range module, and the target signal intensity capture module. The system software is operated on a P-400 Diagnostic System Laptop Computer aboard the aircraft.

The ALS50 LiDAR System has the following specifications:

Nominal	
Operating Altitude	400 – 3,000 meters
Elevation accuracy	15cm single shot
Range Resolution	1 cm
Scan angle	Variable from 0 to 75°
Swath width	Variable from 0 to 1.5 X altitude
Angle resolution	0.01°
Scan frequency	Variable based on scan angle
Horizontal Accuracy	Better than 1/2000 X altitude
Supported GPS receivers	Ashtech Z12, Trimble 7400, Novatel Millenium
Laser repetition rate	58 kHz
Beam divergence	0.3 mrads
Laser classification	Class IV laser product (FDA CFR 21)
Eye safe range	400m single shot depending on laser repetition rate
Power requirements	28 VDC @ 25A
Operating temperature	10-35°C
Humidity	0-95% non-condensing

Figure C-1 and C-8 contain images of the LiDAR flight logs.

Section 5

SECTION 5: REPORT FOR AIRBORNE GPS SURVEY DURING LIDAR MISSION

Introduction

Woolpert performed ABGPS surveying during the LiDAR mission to derive the flight trajectory at a 1-second interval. ABGPS is a critical factor in LiDAR data collection. As such, we spent considerable time developing flight windows around the satellite constellation. We also developed multiple base stations to provide redundancy and to reduce ionospheric and atmospheric errors due to distance separation between the aircraft and the base stations.

At a minimum, two base stations were in operation for every LiDAR acquisition session, operating at a 1-second sampling rate.

To provide a common base line with the aerial photography, all base stations were located over photography control points (see Ground Control Report). Final adjusted control point values were used to process the LiDAR data. Using the same reference system for LiDAR and photography helps provide close correlation between photography and LiDAR. The survey report includes extensive data about the procedures and results for the ground control survey.

As a continuing quality control measure, data was downloaded each evening in the field to verify a strong GPS solution and then refined in-house to determine final trajectories.

A base-station control survey was performed to provide uniformity and to ensure consistency between the ground control and Airborne GPS. All ground control surveys were performed to achieve accuracies which meets criteria for LiDAR Mapping outlined in the “Guidelines and Specifications for Flood Hazard Mapping Partners” as published in February 2002.

Project Team

Woolpert Inc survey and flight crews were responsible for the successful completion of this LiDAR project. The airborne GPS survey was conducted with exceptional coordination between the Woolpert survey crews and the flight crews.

Weather

LiDAR acquisition occurred when the cloud ceiling was at least 5,500 feet above ground level (AGL) and there was no rain or thick haze (visibility less than 4 miles).

Datum Reference

The datums used for this project include the North American Datum of 1983 High Accuracy Reference Network (NAD83/HARN) and the North American Vertical Datum (NAVD88). The coordinates are based on the UTM, zone 16, and the units of measure are in meter. LiDAR points are later translated into Geographic NAD83/HARN horizontal and NAVD88 vertical in the units of meters.

Field Work

The Woolpert flight and survey crews coordinated twice daily to review weather, flight schedules and GPS base station locations. Flights were generally performed in sequence, except when outside factors interfered, such as controlled burns or localized clouds. Once the day's schedule was determined, field crews set receivers in relation to the appropriate base stations. Flight and ground crews were in constant communication during data acquisition sessions through air-to-ground radios; if ground crews saw developing problems, such as high PDOP levels, they would alert the flight crew.

At the close of each day's data acquisition session, the flight and ground crews would meet at the field office to download data from receivers, recharge batteries, process and quality check the data, and prepare data backups. By the end of each day, the field crews were ready for the next day and the first-level quality control was complete. LiDAR data was also downloaded and initial processing steps were completed to check for any voids in the data. For example, if the plane encounters windy conditions, gaps in data between flight lines may result.

Airborne Control Stations

Seven (7) NGS monumental control points was used as a base-station during the LiDAR survey.

Station	Ellipsoid Height(meters)	Latitude (deg min sec)	Longitude (Deg min sec)
Kiln	-13.007	N30 25 08.90571	W 089 27 01.30237
Stennis	-22.581	N 30 22 23.16202	W 089 27 10.92706
Van RM 1	9.436	N 30 35 22.43950	W 088 43 18.15487
Bridge Reset	-24.699	N 30 24 38.14109	W 088 50 29.88759
MOB Base 1	37.326	N 30 40 55.11650	W 088 14 56.15580
MOB Base 2	37.201	N 30 40 55.09518	W 088 14 57.98743
CODEN	-24.160	N 30 23 02.27242	W 088 14 26.13402

Equipment

Woolpert owns all the equipment used for the ground control and ABGPS missions. Two base-station units were mobilized every day during the LiDAR mission, and were operated by a member of the Woolpert survey crew. Each base-station setup consisted of one Trimble Navigation R7 dual frequency geodetic receiver with Zephyr geodetic antenna, one 2-meter fixed-height tripod, and essential battery power and cabling. The aircraft is configured with a Novatel Millennium 12-channel, dual frequency GPS receiver to support LiDAR acquisition missions.

Data Processing

All initial airborne data was processed using the Waypoint Consulting, Inc. GrafNav™ software. Data was gathered and processed at a one-second data capture rate. All data was recorded at an elevation mask of 10 degrees.

Airborne GPS Data

GPS base station log sheets are included in Ground Control Survey Report.

Section 6

SECTION 6: DATA PROCESSING AND QUALITY CONTROL

LiDAR Data Processing

In this process, Woolpert employed GPS differential processing and Kalman filtering techniques to derive an aircraft trajectory solution at 0.5-second intervals for each base station within the project limits. Statistics for each solution (base station) were generated and studied for quality. The goal for each solution is to have:

- maintained satellite lock throughout the session
- position standard deviation of less than 5 centimeters
- low ionospheric noise
- few or no cycle slips
- a fixed integer ambiguity solution throughout the trajectory
- a maximum number of satellites for a given constellation
- a low (2.5 or less) Position Dilution of Precision (PDOP)

Often times a solution for a given base station will meet all of the above parameters in certain portions of the trajectory while the other base station might meet the above conditions in different portions of the trajectory solution. In this case, further processing was done to form different combinations of base station solutions and/or satellites to arrive at the optimal trajectory.

When the calibration, data acquisition, and GPS processing phases were complete, the formal data reduction process began. Woolpert LiDAR specialists:

- ✓ Studied individual flight lines and how these lines match adjacent flight lines to ensure the accuracy meets expectations.

- ✓ Identified and removed systematic error locally (by flight) which is not possible if the lines are combined into a block. This is sometimes the case when a satellite loss of lock occurs during a flight and the GPS solution fixes on the wrong integer ambiguity.

- ✓ Adjusted any small residual error (due to system noise) between flight lines and across all flight lines to survey ground control (or existing mapping if available).

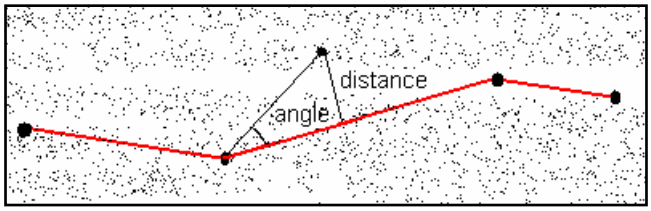
- ✓ Clipped the overlap region of each flight line to obtain a single homogenous coverage across the project area. This eliminated redundant, overlapping point data that could overwhelm terrain modeling software packages.

- ✓ Processed individual flight lines to derive “Point Cloud.”

  Given the airborne GPS aircraft trajectory and the raw LiDAR data subdivided by flight lines, we used manufacturer software to reduce raw information to a LiDAR point cloud on the ground. Woolpert has developed proprietary software to generate parameter files, allowing the manufacturer’s software to process a block; this allows us to batch process any number of flight lines. As part of this process, outliers in the data are removed. Typical outlying data points are a result of returns from clouds.

- ✓ Classified the point cloud data into ground and non-ground points

The classification algorithm classifies ground points by iteratively building a triangulated surface model. The routine starts by selecting some local low points as sure hits on the ground then builds an initial Triangulated Irregular Network (TIN) from selected low points. The routine then starts developing the ground model upward by iteratively adding new laser points to it. Each added point makes the model follow the ground surface more closely. Two iteration parameters, iteration angle and iteration distance, determine how close a point must be to a triangle plane so that the point can be accepted to the ground model. **Iteration angle** is the maximum angle between points, its projection on triangle plane and closest triangle vertex. **Iteration distance** parameter makes sure that the iteration does not make big jumps upwards when triangles are large. This helps to keep low buildings out of the ground model.



The vegetation and buildings are removed to obtain bare-earth. Even in areas covered by dense vegetation, ground points are correctly classified.

- ✓ Filtered the bare-earth data to remove small undulations.

Small random errors exist in the data due to electronic noise within the system. These errors manifest themselves as small undulations in the data. Woolpert developed a software application based on a Laplacian of Gaussian (LOG) operator modified to fit LiDAR data and remove small undulations. The filter controls accuracy by an elevation tolerance setting to meet a given accuracy threshold. The tolerance determines the maximum allowable elevation change of laser points. We developed a data structure suitable for LiDAR so that the searching routine is very fast [O(1)] computational complexity] making this algorithm quite efficient.

- ✓ Edge matched individual flight lines, generated statistics on the fit, and clipped the flight lines to butt match each other.

The next step in our process is to clip individual flight lines such that adjacent flight lines butt match and a homogenous LiDAR coverage is provided across the entire mapping limit, without overlap. A software routine was developed to follow the overlap region between two adjacent flight lines and place a “cut line” in the middle of the overlap region. The software will also generate statistics along each seamline as to how well each flight matches with its neighbor in flight.

If all flights are consistent within the mapping specifications, cross flight and ground control data is imported and studied for fit. As a QC measure, Woolpert has developed software to generate accuracy statistical reports by comparison among LiDAR points, ground control, and TINs generated by LiDAR points. The absolute accuracy is determined by comparison with ground control. Statistical analysis is then performed on the fit between the LiDAR data and the ground control. Based on the statistical analysis, the LiDAR data is then adjusted in relation to the ground control.

- ✓ Water removal and data QC.

This step requires LiDAR technicians visually go through all tiles to remove points on water from ground layer to water layer, and to remove any bridges and buildings remaining in ground layer to default layer.

- ✓ Generate LiDAR intensity images.

  LiDAR intensity images in GeoTIFF format are generated from all layers of LiDAR points in tile sized pieces. A MrSID image is made from TIFF images.

- ✓ Translated the Data Into the Appropriate Map Projection

  Once all of the data has been reduced and quality controlled, the bare-earth data is translated into the final map projection. Note that the airborne GPS aircraft trajectory is processed in the target datums in relation to the orthometric height. Woolpert used National Geodetic Survey's GEOID03 software to derive the orthometric height.

  The raw LiDAR point cloud data is derived in UTM coordinates. All subsequent processing is carried out in this projection to avoid introducing errors associated with and moving across larger scale map projection zones. The data is translated into the target map projection through the Tralaine software package, a coordinate system converter. The entire transformation is generally setup and run in a batch mode.

  As a quality control step, the orthometric heights are compared against ground survey results. In our experience, GEOID03 is sometimes inaccurate in certain areas of the country. If a problem is detected, we will have to acquire additional ground control that will allow us to calculate our own transformation by determining the rotation matrix.

Section 7

SECTION 7: ALS50 SYSTEM CALIBRATION REPORT

Introduction

This Woolpert ALS50 LiDAR System Calibration Report shall be used to represent confirmation of the LiDAR system specifications, performance, and requirements. The system functionality, elevation, and horizontal accuracy performance shall be demonstrated for calibration purposes.

This report contains various test results and information pertaining to the system. It should be noted that all numbers shown in this report are in **meters** unless otherwise stated. All coordinates stated in the report are in the WGS84 coordinate system with ellipsoidal elevation.

System Model Number: ALS50

Client Name: U.S. Army Corps of Engineers, Mobile District

Calibration Date October 18, 2005

Report Prepared By: Qian Xiao

System Specifications and Requirements

The ALS50 LiDAR system, built by Leica Geosystems for Woolpert Inc, has the following specifications:

Nominal	
Operating Altitude	400 – 3,000 meters
Elevation accuracy	15cm single shot
Range Resolution	1 cm
Scan angle	Variable from 0 to 75°
Swath width	Variable from 0 to 1.5 X altitude
Angle resolution	0.01°
Scan frequency	Variable based on scan angle
Horizontal Accuracy	Better than 1/2000 X altitude
Supported GPS receivers	Ashtech Z12, Trimble 7400, Novatel Millenium
Laser repetition rate	58 kHz
Beam divergence	0.3 mrads
Laser classification	Class IV laser product (FDA CFR 21)
Eye safe range	400m single shot depending on laser repetition rate
Power requirements	28 VDC @ 25A
Operating temperature	10-35°C
Humidity	0-95% non-condensing

On Site Antenna Offsets and Location

Aircraft GPS Antenna

The following measurements were calculated for Woolpert's aircraft N404CP equipped with LiDAR. The POS/AV and ALS50 processing numbers were calculated from internal measurements completed in Leica's lab, and the positioning of the GPS antenna on the aircraft was field surveyed by Woolpert using a total station.

Reference Point to GPS Antenna	
X	**0.646 m**
Y	**0.014 m**
Z	**-1.304 m**

The following measurements were calculated in the lab at Leica and will remain constant.

User to IMU Lever Arm (POS/AV)	
X	**-0.269 m**
Y	**0.139 m**
Z	**-0.017 m**

Base Station GPS Antenna

Monument Description:	
GPS Receiver Type: Trimble 4700 Antenna Type: Trimble	Epoch Interval: 1 sec Elevation Mask: 10 degrees Observation Type: Static
Station Names used in processing the acceptance data: #1: COLB N 39 57 35.11261 Lat. W 083 02 44.74737 Long. 186.57 Ellipsoidal. HI. #2: Woolpert N 39 45 56.36709 Lat. W 84 11 12.26236 Long. 194.775 Ellipsoidal. HI.	

Flight Calibration Methodology

Data Collection

To accomplish the formal calibration, Woolpert has established calibration ranges consisting of an airport runway, buildings, and parking lots. The calibration range has been ground surveyed to an accuracy of better than 1 cm. Four flight lines with two different altitude and opposing headings (see figure 7-3) are required in order to capture pitch, roll, heading (see figure 7-1) and torsion errors (see figure 7-2).

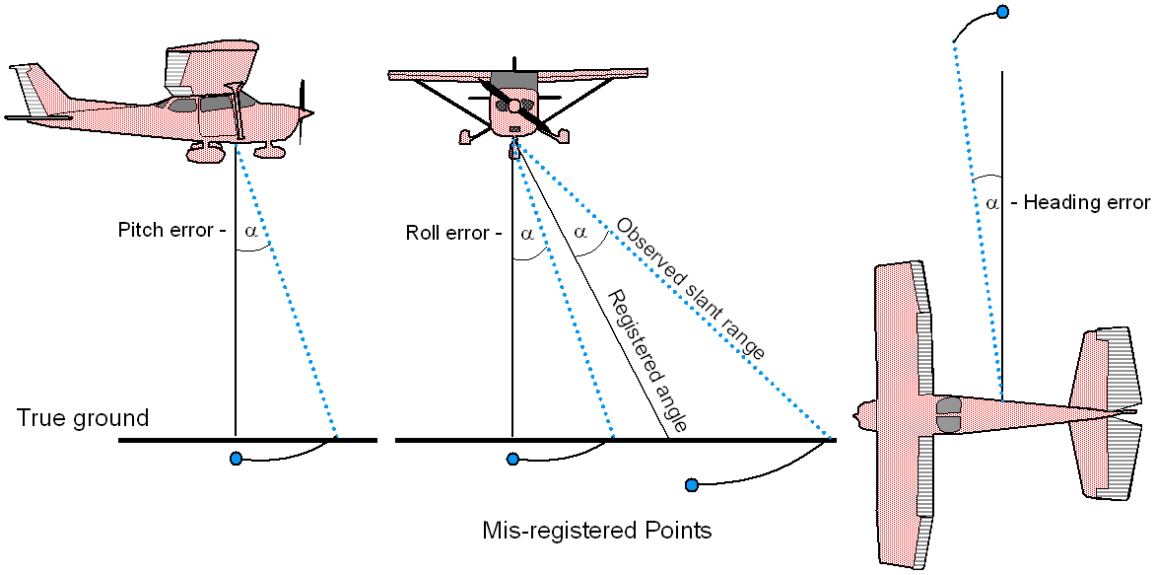


Figure 7-1: Misalignment Errors.

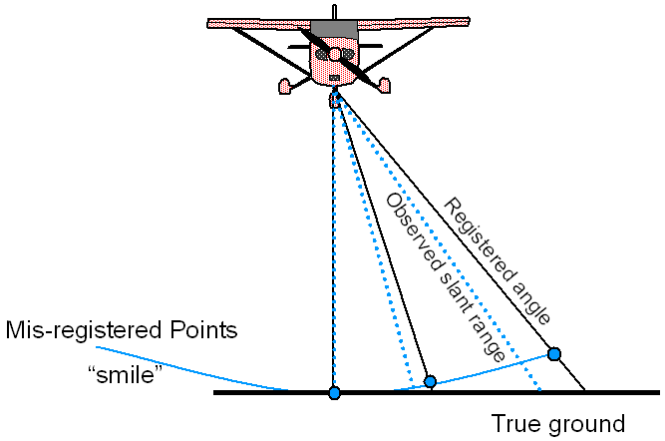


Figure 7-2: Torsion Error

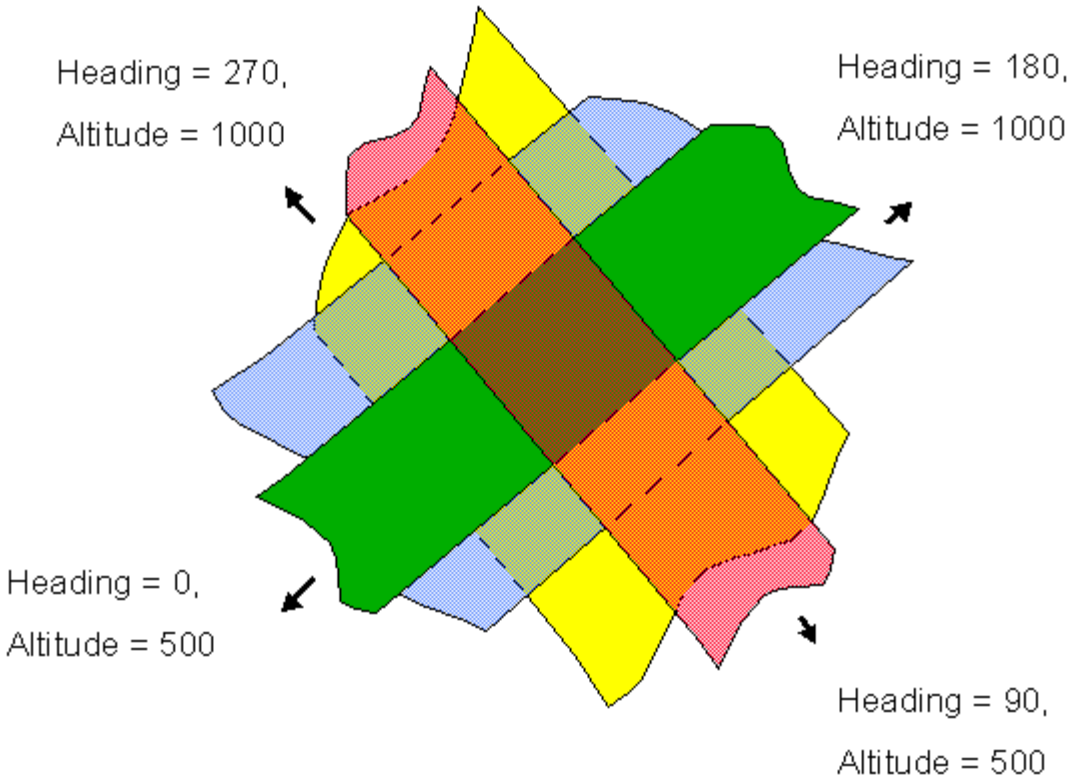


Figure 7-3: Optimal Flight Pattern for Calibration

Intensity Images

Four images from LiDAR intensity reflectance are generated in order to pick up tie points (see figure 7-4). A least square adjustment (LSA) is performed using AutoBoresighting software provided by system manufacturer. Pitch, roll, heading, and torsion errors are calculated by LSA.

Figure 7-4: Ortho photo generated from LiDAR intensity reflectance.

Ground Control Points

Ground control points were collected along and across an airport runway. A total of 116 runway points were surveyed. The LiDAR collects scan data over the control points and the data is then used to determine the absolute Z accuracy of the system. The distribution of the runway points can be found in Figure 7.5.

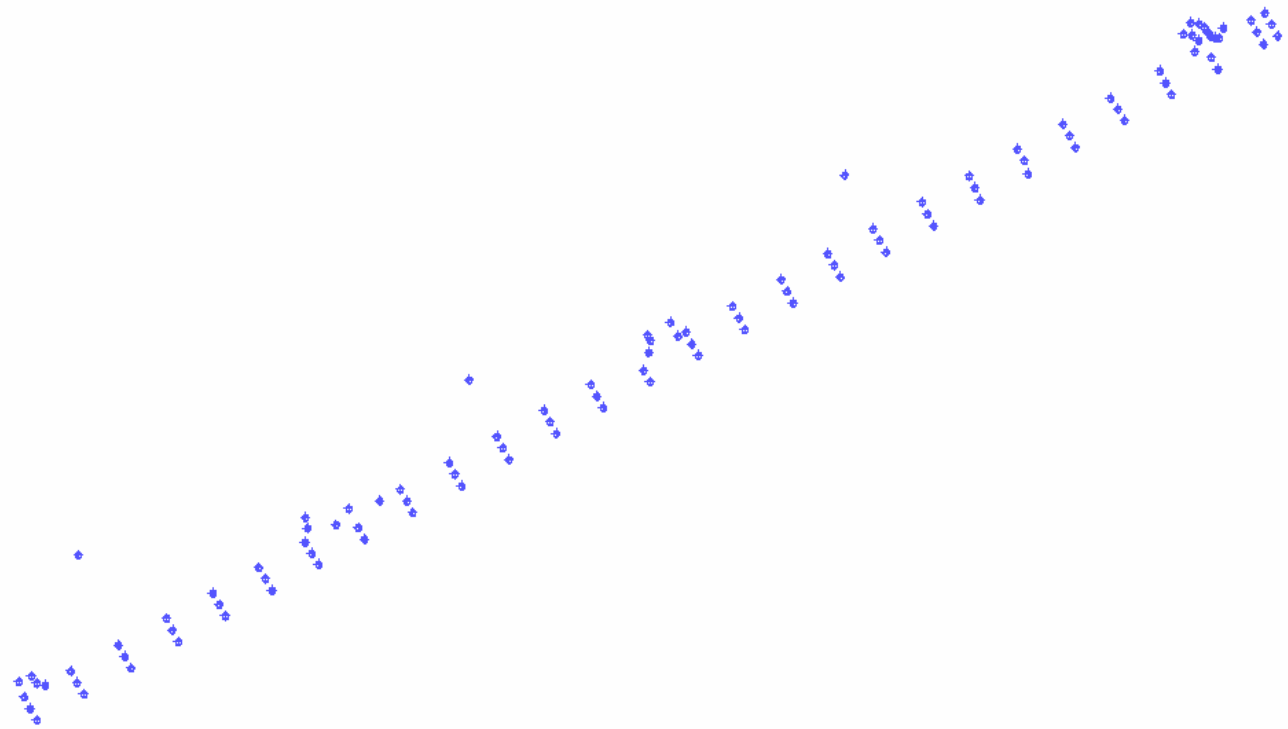


Figure 7-5: Ground control points on the runway

Flight over Ground Control Points

Flight lines, flown parallel and perpendicular to the runway control points, were used to determine the elevation (Z) error of the LiDAR data as well as pitch, roll, heading, and torsion can be seen in Figure 7-6. Each day the runway was flown, multiple overlapping strips were performed to assure that most control points were covered and to increase the likelihood that a laser point would strike within 0.5 meters of a control point.

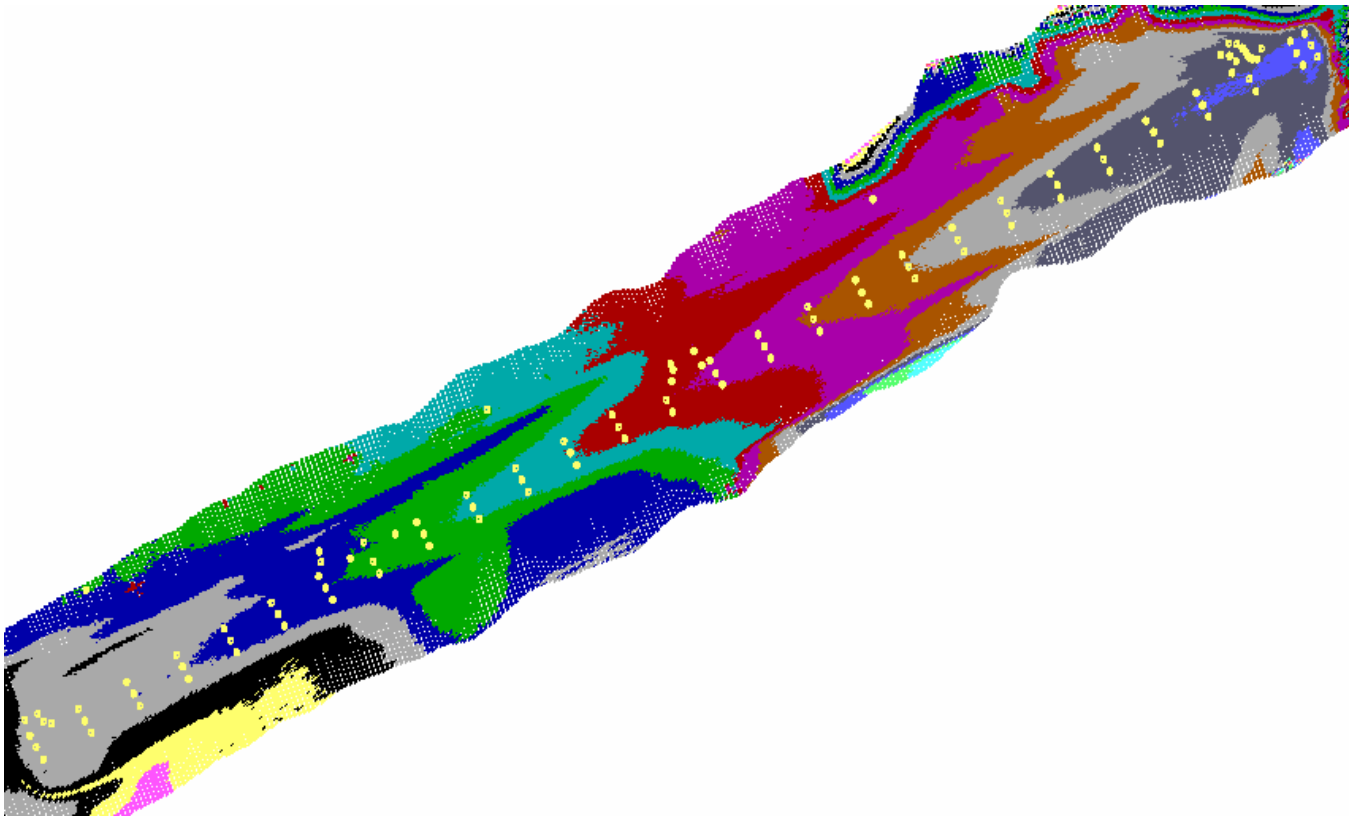


Figure 7-6: One flight line parallel to the runway ground control points. The flight line is color coded at one-meter elevation intervals. The LiDAR data was collected at about 500 meters AGL.

CALIBRATION RESULTS

Calibration Flight Summary

The following report summarizes the results of the calibration flights and error analysis.

Table 1 indicates the analysis of the LiDAR data when compared with ground truth data. The LiDAR specification stipulates that position accuracy should have a one-sigma (σ) value of 1/2000 times altitude (68% of all the values considered must be equal to or less than the σ-value). The elevation accuracy should have a one-sigma (σ) value of 15 cm.

Table 1. LiDAR Performance Accuracy

Flight	Base Station Used	Calibration Attribute	Standard Deviation	Mean Difference from Target	RMS	# of Points Evaluated	Elevation Flown (m AGL)
Day 29105	COLB	Elevation	0.015 m	-0.002 m	0.015	990387	900

Note: For Z calculations, all points are compared against existing DTM.

The error analysis between the ground truth elevation points and the LiDAR data can be seen in Table 1. The results of this analysis produced better elevation accuracy than one-sigma (σ) value of 15 cm. All comparisons fell within the required specifications.

Besides calibration over Woolpert calibration site, on-site calibration using data acquired for project was performed to calibrate pitch, roll, heading, and latency in a relative orientation way. This kind of calibration is employed to ensure relative accuracy.

Intensity based range correction was performed over a site with various surface types and known elevations. An intensity based range correction table was calculated based on statistics of measurements. This table was used for point cloud reduction.

Final Calibration Parameters

The following numbers were derived by Leica through lab calibration, and from data acquired on Woolpert's LiDAR calibration site as well as from data for the project.

Parameter	Value	Format
Lab fixed parameters		
Range 1 Correction	2.400 m	0.000
Range 2 Correction	2.400 m	0.000
Encoder Latency	0.00 mcr sec	0.00
Ticks Per Revolution	8401818 ticks	0000000
Attitude		
*Roll (radian)	0.041013671	0.0000
*Pitch (radian)	-0.002854899	0.0000
*Heading (radian)	0.001416112	0.0000
*Scan angle correct	-12613 ticks	00000
Mechanic		
*Torsion (no unit)	-85000 units	0000

* Value calibrated on site from calibration data

Based on the analysis of the LiDAR data the accuracy of the system meets the required specifications.

Approved By:			
Title	**Name**	**Signature**	**Date**
LiDAR Specialist	**Qian Xiao**		**November 4, 2005**

Figure A

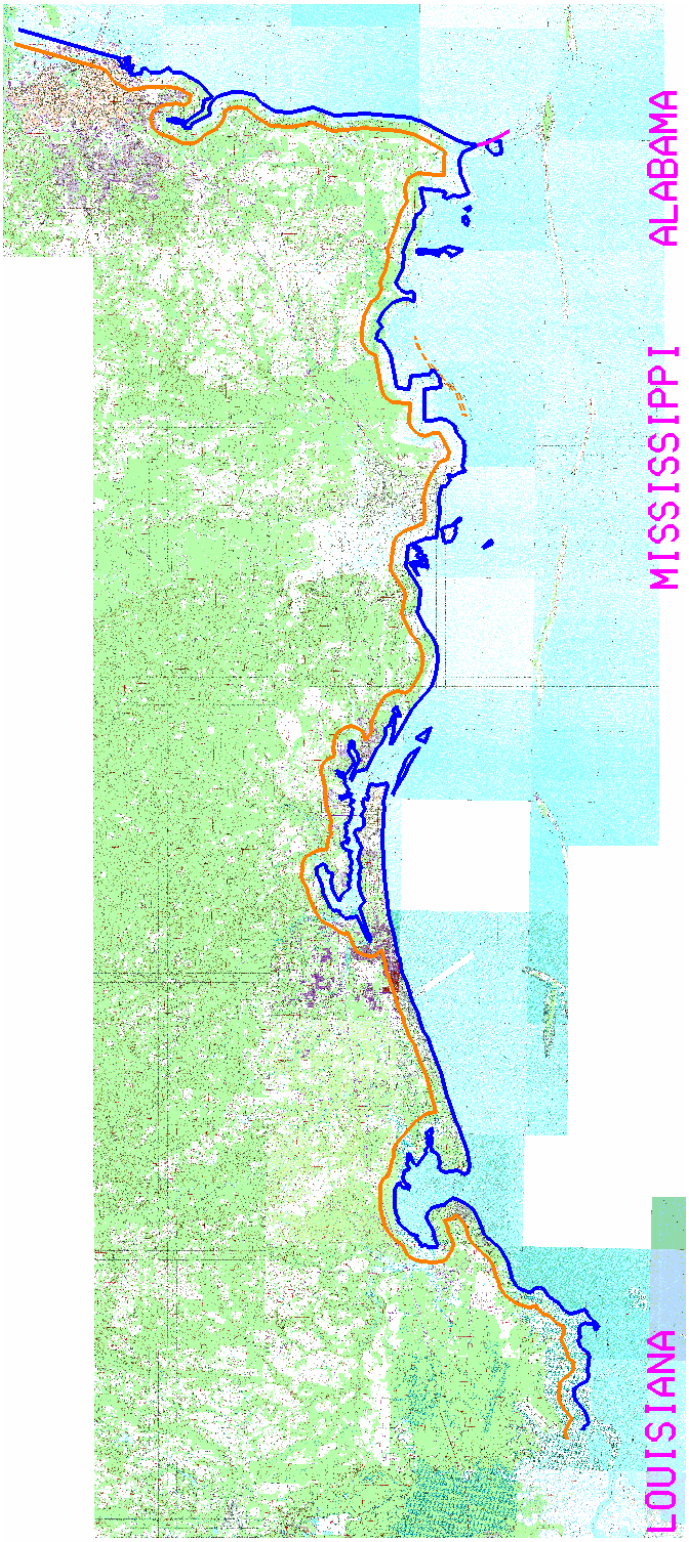


Figure A – Project Boundary/LiDAR Coverage

Figure B

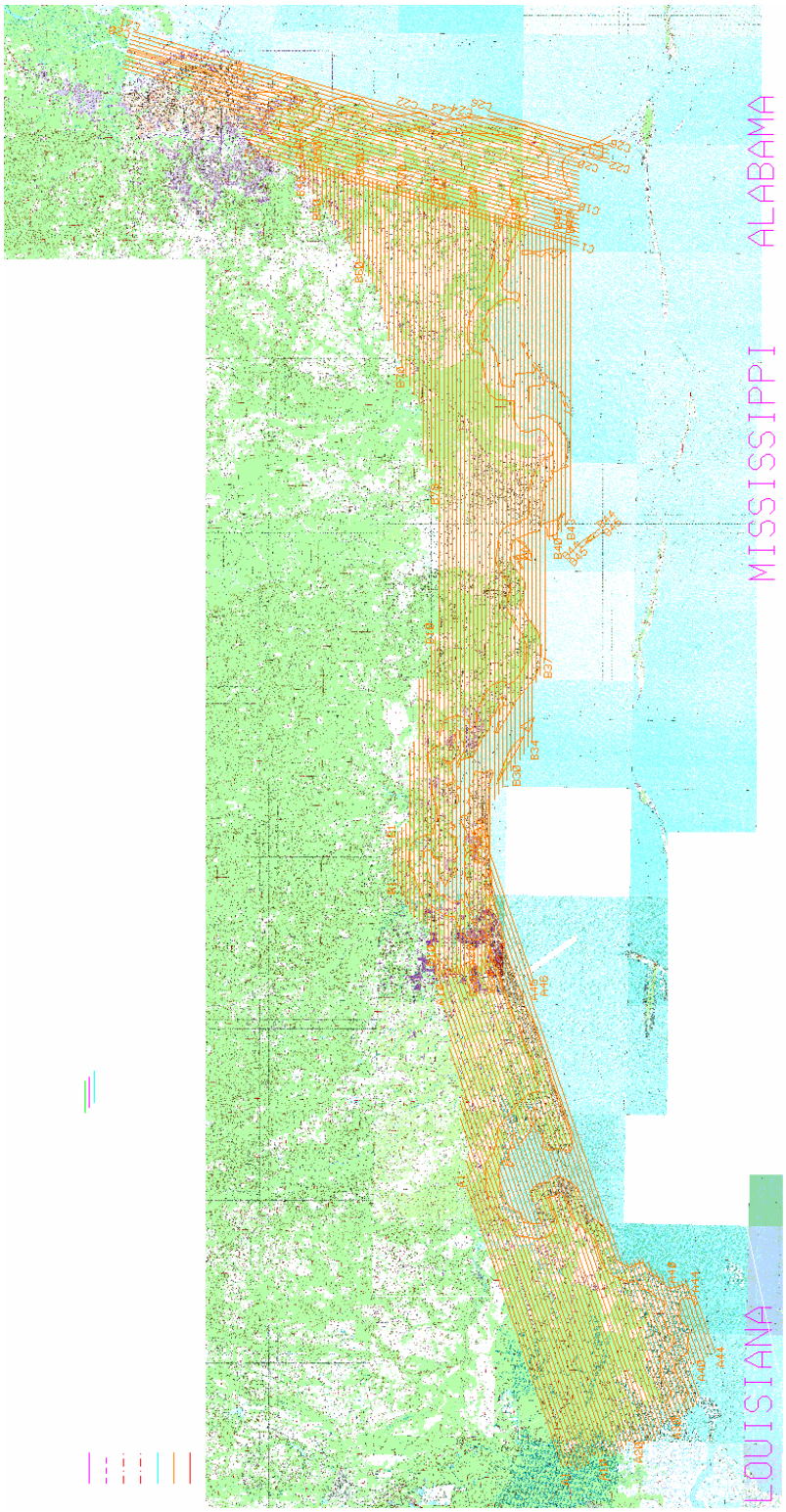


Figure B–LiDAR Coverage

Figure C

LiDAR Data Acquisition Log (for use with Lieca ASL50 unit)	Date: 19 9 05 DD MM YY	Julian Day: 262	Client/Mission Name/Project Number: KATRINA 64557
Operator: Rahbek / Oneill / Smith / Kibler	Aircraft: N4040P / N4032C	Survey Type: Wires / ~~Terrain~~ / Calibration	Applanix GPS began logging at: 8:27 pm (central)
Pilot: Gebhart / Rader	Passenger:		Mission Start Time (Wheels Up): 8:40 pm
Tempurature (C): 30	Dew Point: 22	Pressure: 3016	Mission End Time (Wheels Down): 11:22 pm
Horizontal Visibility:	Wind Direction:	Wind Speed:	From MOB Airport -- To MOB Airport
Cloud Cover:	Surface Conditions: Wet / Dry / Snow	Precipitation: Y / N	Using Digital Camera Images? Y / N

---------- LASER SPECIFICATIONS ----------

Scan Angle (FOV):	Scan Frequency (Hz)	Pulse Rate (kHz):	Ranges & Intensities	Attentuator Setting	Approx. Air Speed (knots)	
40	36	52.3	1+1 / ~~2+2~~ / 3+3	0 (0.0) / ~~1 (0.5)~~ / 2 (1.0)	136	Specified AGL: 3000 MSL: 3050 Range Gate: 1575 --- 3622 (from pulse rate value) Max Range Values _____ _____ _____ ft Adjusted AGL: _____

Flt Line	Mission ID#	Heading	HDOP	VDOP	SV's	Course Setting	Flight Setting	Line Notes
~~C25~~	~~050920~~ 613217					9	16	ok ~~PPO~~ ABC
	050920							
C21	" 014733	S	0.996	1.394	8	"	"	
C22	" 020428	N	1.179	1.781	7	"	"	
C23	" 021534	S	1.171	1.808	7	"	"	
C24	" 022427	N	1.166	1.799	7	"	"	
C25	" 023313	S	1.147	1.748	7	"	"	
C26	" 024036	N	1.037	1.518	8	"	"	
C20	" 025132	N	0.994	1.471	8	"	"	
C19	" 030838	S	0.936	1.617	8	"	"	
C18	" 032539	N	0.924	1.663	8	"	"	
C17	" 034234	S	1.046	1.689	7	"	"	
C16	" 035927	N	0.918	1.362	8	"	"	

Figure C.1 – LiDAR Flight Log

LiDAR Data Aquisition Log (for use with Lieca ASL50 unit)	Date: 20 / 9 / 05 DD MM YY	Julian Day: 263	Client/Mission Name/Project Number: KATRINA 64557
Operator: Rahbek / Oneill / Smith / Kibler	Aircraft: N404CP / N4032C	Survey Type: Wires / Terrain / Calibration	Applanix GPS began logging at: 9:00 pm CENTRAL
Pilot: Gebhart / Rader	Passenger:		Mission Start Time (Wheels Up): 9:12 pm
Tempurature (C): 28	Dew Point: 19	Pressure: 3006	Mission End Time (Wheels Down): 2:50 Am
Horizontal Visibility: 10	Wind Direction:	Wind Speed: 6	From MOB Airport -- To MOB Airport
Cloud Cover:	Surface Conditions: Wet / Dry / Snow	Precipitation: Y / N	Using Digital Camera Images? Y / N

---------- LASER SPECIFICATIONS ----------

Scan Angle (FOV):	Scan Frequency (Hz)	Pulse Rate (kHz):	Ranges & Intensities	Attentuator Setting	Approx. Air Speed (knots)	
40	36	52.3	1+1 / 2+2 / 3+3	0 (0.0) / 1 (0.5) / 2 (1.0)	130	Specified AGL: 3000 MSL: 3050 Range Gate: 1575 -- 3622 (from pulse rate value) Max Range Values _____ _____ _____ ft Adjusted AGL: _____

Flt Line	Mission ID#	Heading	HDOP	VDOP	SV's	Course Setting	Mine Setting	Line Notes
TEST	050921 _020549					9	16	OK ICOIAGC
A10	" _023253	W	1.047	1.529	8	"	"	
A9	" _025047	E	0.986	1.457	8	"	"	
A8	" _030714	W	0.927	1.628	8	"	"	
A7	" _032253	E	0.928	1.642	8	"	"	
A6	" _033931	W	1.044	1.686	7	"	"	
A5	" _035134	E	0.916	1.373	8	"	"	
A4	" _040515	W	1.054	1.778	7	"	"	
A3	" _041825	E	1.185	1.874	7	"	"	
A2	" _043114	W	1.236	2.043	7	"	"	
A1	" _044359	E	1.261	2.059	7	"	"	
A11	" _050206	W	1.212	1.873	7	"	"	
A12	" _052042	E	0.931	1.305	8	"	"	
A13	" _053921	W	0.902	1.430	8	"	"	
A14	" _055849	E	0.911	1.663	8	"	"	
A15	" _061753	W	1.055	2.240	8	"	"	
A16	" _063654	E	1.049	2.648	8	"	"	
A17	" _065519	W	1.019	2.177	9	"	"	
A18	" _071349	E	0.963	1.771	9	"	"	

Figure C.2 – LiDAR Flight Log

LiDAR Data Aquisition Log (for use with Lieca ASL50 unit)	Date: 21/09/05 DD MM YY	Julian Day: 264	Client/Mission Name/Project Number: KATRINA 64557
Operator: Rahbek / Oneill / Smith / Kibler	Aircraft: N404CP / N4032C	Survey Type: Wires / Terrain / Calibration	Applanix GPS began logging at: 8:46 pm central
Pilot: Gebhart / Rader	Passenger:		Mission Start Time (Wheels Up): 9:02 pm
Tempurature (C): 28	Dew Point: 17	Pressure: 2994	Mission End Time (Wheels Down):
Horizontal Visibility: 10	Wind Direction: 40	Wind Speed: 6	From MOB Airport -- To MOB Airport
Cloud Cover:	Surface Conditions: Wet / Dry / Snow	Precipitation: Y / N	Using Digital Camera Images? Y / N

---------- LASER SPECIFICATIONS ----------

Scan Angle (FOV):	Scan Frequency (Hz)	Pulse Rate (kHz):	Ranges & Intensities 1+1 / 2+2 / 3+3	Attentuator Setting 0 (0.0) / 1 (0.5) / 2 (1.0)	Approx. Air Speed (knots)	Specified AGL: 3000 MSL: 3050 Range Gate: 1575 --- 3622 (from pulse rate value) Max Range Values ____ ____ ____ ft Adjusted AGL: ____
40	36	52.3	2+2	1 (0.5)	130	

Flt Line	Mission ID#	Heading	HDOP	VDOP	SV's	Course Setting	Fine Setting	Line Notes
TEST	050922 _015332					9	16	OK 120.1 AGL
A19	" _021728	W	1.162	1.793	7	"	"	
A20	" _023654	E	1.010	1.493	8	"	"	
A21	" _025605	W	0.933	1.578	8	"	"	
A22	" _031434	E	0.923	1.663	8	"	"	
A23	" _033353	W	1.044	1.693	7	"	"	
A24	" _035327	E	1.063	1.797	7	"	"	
A25	" _041245	W	1.171	1.860	7	"	"	
A26	" _044204	E	1.260	2.049	7	"	"	
A27	" _050120	W	1.204	1.835	7	"	"	
A28	" _052051	E	0.931	1.321	8	"	"	
A45	" _054049	W	0.902	1.491	8	"	"	
A46	" _054846	E	0.905	1.592	8	"	"	
A29	" _055645	W	0.911	1.684	8	"	"	
A44	" _061837	E	1.046	2.392	8	"	"	
A43	" _062358	W	1.053	2.522	8	"	"	
A42	" _063009	E	1.050	2.627	8	"	"	
A41	" _063616	W	1.050	2.641	8	"	"	
A40	" _064229	E	1.032	2.276	9	"	"	
A39	" _064820	W	1.008	2.183	9	"	"	
A38	" _065425	E	0.998	2.128	9	"	"	
A37	" _070015	W	0.984	1.996	9	"	"	
A36	" _070757	E	0.965	1.816	9	"	"	
A35	" _071528	W	0.961	1.670	9	"	"	
A34	" _072320	E	1.032	1.701	8	"	"	
A33	" _073120	W	1.043	1.576	8	"	"	
A32	" _074000	E	1.056	1.469	8	"	"	
A31	" _074758	W	1.071	1.400	8	"	"	
A30	" _075621	E	1.088	1.359	8	"	"	

Figure C.3 – LiDAR Flight Log

LiDAR Data Aquisition Log (for use with Lieca ASL50 unit)	Date: 03/10/05 DD MM YY	Julian Day: 276	Client/Mission Name/Project Number: KATRINA
Operator: Rahbek / Oneill / Smith / Kibler	Aircraft: N404CP / N4032C	Survey Type: Wires / Terrain / Calibration	Applanix GPS began logging at: 9:12 pm CENTRAL
Pilot: Gebhart / Rader	Passenger:		Mission Start Time (Wheels Up): 9:27 pm
Tempurature (C): 26	Dew Point: 18	Pressure: 3009	Mission End Time (Wheels Down): 1:39 Am
Horizontal Visibility: 10	Wind Direction: 050	Wind Speed: 8	From MOB Airport -- To MOB Airport
Cloud Cover:	Surface Conditions: Wet / Dry / Snow	Precipitation: Y / N	Using Digital Camera Images? Y / N

LASER SPECIFICATIONS

Scan Angle (FOV):	Scan Frequency (Hz)	Pulse Rate (kHz):	Ranges & Intensities 1+1 / 2+2 / 3+3	Attentuator Setting 0 (0.0) / 1 (0.5) / 2 (1.0)	Approx. Air Speed (knots)	Specified AGL: 3000 MSL: 3050 Range Gate: 1575 — 3622 (from pulse rate value) Max Range Values ____ ____ ____ ft Adjusted AGL: ____
40	36	52.5			130	

Flt Line	Mission ID		Heading	HDOP	VDOP	ASVS			Line Notes
45T	051004	021651							OK 119.8 ABC
46B	"	023431	E	0.931	1.629	8	9	16	
47B	"	023844	W	0.933	1.607	8	"	"	
48 B	"	024341	E	1.046	1.694	7	"	"	
49 B	"	024756	W	1.047	1.669	7	"	"	
50 B	"	025217	E	1.049	1.629	7	"	"	
51 B	"	025655	W	0.921	1.379	8	"	"	
52 B	"	030146	E	0.917	1.367	8	"	"	
53 B	"	030716	W	0.916	1.348	8	"	"	
54 B	"	031201	E	0.918	1.347	8	"	"	
55 B	"	031706	W	0.921	1.354	8	"	"	
56 B	"	032152	E	1.146	1.823	7	"	"	
57 B	"	032744	W	1.172	1.925	7	"	"	
58 B	"	033301	E	1.196	1.996	7	"	"	
59 B	"	033857	W	1.216	2.062	7	"	"	
60 B	"	034430	E	1.230	2.092	7	"	"	
61 B	"	035102	W	1.233	2.086	7	"	"	
62 B	"	035726	E	1.229	2.035	7	"	"	
63 B	"	040431	W	1.213	1.955	7	"	"	
64 B	"	041113	E	1.199	1.872	7	"	"	
65 B	"	041804	W	0.833	1.194	9	"	"	
66 B	"	042514	E	0.838	1.228	9	"	"	
67 B	"	043402	W	0.842	1.265	9	"	"	
68 B	"	044144	E	0.983	1.516	7	"	"	
69 B	"	045014	W	0.899	1.467	8	"	"	
70 B	"	045855	E	0.902	1.579	8	"	"	
71 B	"	050818	W	0.907	1.684	8	"	"	
72 B	"	051724	E	0.917	1.757	8	"	"	
73 B	"	052638	W	1.066	2.280	8	"	"	
74 B	"	053545	E	1.073	2.560	8	"	"	
75 B	"	054602	W	1.076	2.621	8	"	"	
76 B	"	055649	E	1.042	2.239	9	"	"	
77 B	"	060817	W	1.012	2.053	9	"	"	
78 B	"	061939	E	0.977	1.790	9	"	"	

Figure C.4 – LiDAR Flight Log

LiDAR Data Aquisition Log (for use with Lieca ASL50 unit)	Date: 04/10/05 DD MM YY	Julian Day: 278	Client/Mission Name/Project Number: KATRINA
Operator: Rahbek / Oneill / Smith / Kibler	Aircraft: N404CP / N4032C	Survey Type: Wires / Terrain / Calibration	Applanix GPS began logging at: 9:00 pm central
Pilot: Gebhart / Rader	Passenger:		Mission Start Time (Wheels Up): 9:16 pm
Tempurature (C): 26	Dew Point: 20	Pressure: 3001	Mission End Time (Wheels Down):
Horizontal Visibility: 10	Wind Direction: 050	Wind Speed: 5	From MOB Airport -- To MOB Airport
Cloud Cover: CLR	Surface Conditions: Wet / Dry / Snow	Precipitation: Y / N	Using Digital Camera Images? Y / N

---------- LASER SPECIFICATIONS ----------

Scan Angle (FOV):	Scan Frequency (Hz)	Pulse Rate (kHz):	Ranges & Intensities 1+1 / 2+2 / 3+3	Attentuator Setting 0 (0.0) / 1 (0.5) / 2 (1.0)	Approx. Air Speed (knots)	Specified AGL: 3000 MSL: 3050 Range Gate: 1575 -- 3622 (from pulse rate value) Max Range Values ____ ____ ____ ft Adjusted AGL: ____
40	36	52.3			130	

Flt Line	Mission ID#		Heading	HDOP	VDOP	SVs	Start	Stop	Line Notes
TEST	051005	020549							
1B	"	022623	W	0.929	1.643	8	9	16	119.9 AGL
2B	"	023128	E	0.932	1.618	8	"	"	
3B	"	023651	W	0.935	1.592	8	"	"	
4B	"	024229	E	1.046	1.675	7	"	"	
5B	"	025040	W	1.050	1.611	7	"	"	
6B	"	025856	E	0.915	1.364	8	"	"	FULL LINES
7B	"	030918	W	0.918	1.350	8	"	"	
8B	"	031946	E	1.163	1.855	7	"	"	
9B	"	033243	W	1.218	2.041	7	"	"	
10B	"	034331	E	1.247	2.088	7	"	"	
11B	"	035606	W	1.230	2.012	7	"	"	
12B	"	041020	E	1.200	1.812	7	"	"	
13B	"	042433	W	0.842	1.245	9	"	"	
14B	"	043848	E	0.985	1.527	7	"	"	PARTIALS
15B	"	045303	W	0.902	1.556	8	"	"	
16B	"	050644	E	0.914	1.713	8	"	"	
17B	"	052056	W	1.055	2.254	8	"	"	
18B	"	053504	E	1.057	2.581	8	"	"	IN BETWEEN
19B	"	054919	W	1.047	2.261	9	"	"	
20B	"	060324	E	0.995	2.037	9	"	"	HAD TO STOP LINE WRONG
21B	"	061724	W	0.974	1.767	9	"	"	
22B	"	063136	E	1.038	1.664	8	"	"	
23B	"	064905	W	1.065	1.449	8	"	"	
24B	"	070232	E	1.235	1.315	8	"	"	

Figure C.5 – LiDAR Flight Log

LiDAR Data Acquisition Log (for use with Leica ASL50 unit)	Date: 05/10/05 DD MM YY	Julian Day: 278	Client/Mission Name/Project Number: KATRINA
Operator: Rahbek / Oneill / Smith / Kibler	Aircraft: N404CP / N4032C	Survey Type: Wires / Terrain / Calibration	Applanix GPS began logging at: 9:02 pm central
Pilot: Gebhart / Rader	Passenger:		Mission Start Time (Wheels Up): 9:17 pm
Tempurature (C): 25	Dew Point: 19	Pressure: 2991	Mission End Time (Wheels Down):
Horizontal Visibility: 10	Wind Direction: 040	Wind Speed: 7	From MOB Airport -- To MOB Airport
Cloud Cover:	Surface Conditions: Wet / Dry / Snow	Precipitation: Y / N	Using Digital Camera Images? Y / N

---------- LASER SPECIFICATIONS ----------

Scan Angle (FOV):	Scan Frequency (Hz)	Pulse Rate (kHz):	Ranges & Intensities	Attenuator Setting	Approx. Air Speed (knots)	
40	36	52.3	1+1 / 2+2 / 3+3	0 (0.0) / 1 (0.5) / 2 (1.0)	130	Specified AGL: 3000 MSL: 3050 Range Gate: 1575 — 3622 (from pulse rate value) Max Range Values ____ ____ ____ ft Adjusted AGL: ____

Flt Line	Mission ID#	Heading	HDOP	VDOP	SVs			Line Notes
TEST	051006 020701							OK
12B	" 022545	W	0.929	1.634	8	9	16	120 AGS
13B	" 024249	E	1.047	1.648	7	"	"	
14B	" 025839	W	1.078	1.811	7	"	"	
15B	" 031446	E	1.153	1.833	7	"	"	
16B	" 033046	W	1.216	2.060	7	"	"	
17B	" 034624	E	1.240	2.063	7	"	"	PARTIALS
18B	" 040232	W	1.198	1.881	7	"	"	
19B	" 041849	E	0.841	1.240	9	"	"	
20B	" 043436	W	0.983	1.523	7	"	"	
21B	" 045017	E	0.902	1.576	8	"	"	
22B	" 050517	W	0.912	1.736	8	"	"	
23B	" 052010	E	1.057	2.332	8	"	"	
24B	" 053453	W	1.075	2.619	8	"	"	
25B	" 055255	E	1.020	2.180	9	"	"	
26B	" 061224	W	0.979	1.773	9	"	"	
27B	" 063237	E	1.045	1.593	8	"	"	
28B	" 065228	W	1.079	1.392	8	"	"	
29B	" 071252	E	1.190	1.288	8	"	"	
15C	" 073520	N	0.906	1.251	9	"	"	⇒ RAIN?

Figure C.6 – LiDAR Flight Log

LiDAR Data Aquisition Log (for use with Lieca ASL50 unit)	Date: 08 10 05 (DD MM YY)	Julian Day: 281	Client/Mission Name/Project Number: KATRINA
Operator: Rahbek / Oneill / Smith / Kibler	Aircraft: N404CP / N4032C	Survey Type: Wires / ~~Terrain~~ / Calibration	Applanix GPS began logging at: 8:53 pm central
Pilot: Gebhart / Rader	Passenger:		Mission Start Time (Wheels Up): 9:04 pm
Tempurature (C): 21	Dew Point: 15	Pressure: 2980	Mission End Time (Wheels Down): 2:47 Am
Horizontal Visibility: 10	Wind Direction: 350	Wind Speed: 5	From MOB Airport -- To MOB Airport
Cloud Cover: clr	Surface Conditions: Wet / Dry / Snow	Precipitation: Y / N	Using Digital Camera Images? Y / N

---------- LASER SPECIFICATIONS ----------

Scan Angle (FOV):	Scan Frequency (Hz)	Pulse Rate (kHz):	Ranges & Intensities	Attentuator Setting	Approx. Air Speed (knots)	
40	36	52.3	1+1 / 2+2 / 3+3	0 (0.0) / 1 (0.5) / 2 (1.0)	130	Specified AGL: 3000 MSL: 3050 Range Gate: 1575 -- 3622 (from pulse rate value) Max Range Values _____ _____ _____ ft Adjusted AGL: _____

Flt Line	Mission Date	Mission ID#	Heading	HDOP	VDOP	SVs			Line Notes
TEST	051009	015857							ok
15C	"	021245	S	0.934	1.632	8	9	16	119.7 AGL
30B	"	023125	W	1.048	1.639	7	"	"	
31B	"	025016	E	1.068	1.813	7	"	"	
32B	"	030904	W	1.177	1.954	7	"	"	
33B	"	032739	E	1.245	2.094	7	"	"	
34B	"	034531	W	1.211	1.950	7	"	"	
35B	"	040417	E	0.840	1.228	9	"	"	
36B	"	042105	W	0.983	1.517	7	"	"	
37B	"	043719	E	0.902	1.567	8	"	"	
38B	"	045256	W	0.911	1.738	8	"	"	
39B	"	050504	E	1.053	2.247	8	"	"	
40B	"	051702	W	1.073	2.553	8	"	"	
41B	"	052933	E	1.056	2.591	8	"	"	
42B	"	054059	W	1.029	2.170	9	"	"	
45B	"	055350	SE	0.987	1.924	9	"	"	
44B	"	055811	NW	0.977	1.813	9	"	"	
43B	"	060327	E	0.970	1.710	9	"	"	
14C	"	061633	N	1.043	1.646	8	"	"	
13C	"	063314	S	1.070	1.439	8	"	"	
12C	"	065013	N	1.228	1.306	8	"	"	
11C	"	070919	S	1.925	2.349	7	"	"	
10C	"	072327	N	0.906	1.255	9	"	"	

Figure C.7 – LiDAR Flight Log

LiDAR Data Aquisition Log (for use with Lieca ASL50 unit)	Date: 09 / 10 / 05 DD MM YY	Julian Day: 282	Client/Mission Name/Project Number: KATRINA
Operator: Rahbek / Oneill / Smith / Kibler	Aircraft: N404CP / N4032C	Survey Type: Wires / Terrain / Calibration	Applanix GPS began logging at: 8:44 pm central
Pilot: Gebhart / Bader	Passenger:		Mission Start Time (Wheels Up): 8:59 pm
Tempurature (C): 19	Dew Point: 12	Pressure: 2985	Mission End Time (Wheels Down): 11:14 pm
Horizontal Visibility: 10	Wind Direction: 030	Wind Speed: 5	From MOB Airport -- To MOB Airport
Cloud Cover:	Surface Conditions: Wet / Dry / Snow	Precipitation: Y / N	Using Digital Camera Images? Y / N

---------- LASER SPECIFICATIONS ----------

Scan Angle (FOV):	Scan Frequency (Hz)	Pulse Rate (kHz):	Ranges & Intensities	Attentuator Setting	Approx. Air Speed (knots)	
40	36	52.3	1+1 / 2+2 / 3+3	0 (0.0) / 1 (0.5) / 2 (1.0)	130	Specified AGL: 3000 MSL: 3050 Range Gate: 1575 -- 3622 (from pulse rate value) Max Range Values _____ _____ _____ ft Adjusted AGL: _____

Flt Line	Mission ID#	Heading	HDOP	VDOP	SVs			Line Notes
TEST	051010 _ 015044							ok
9c	" _ 020259	S	0.932	1.643	8	9	16	119.6 AGL
8c	" _ 021657	N	0.931	1.585	8	"	"	
7c	" _ 023025	S	1.051	1.610	7	"	"	
6c	" _ 024419	N	1.079	1.818	7	"	"	
5c	" _ 025730	S	1.140	1.824	7	"	"	
4c	" _ 031054	N	1.205	2.023	7	"	"	
3c	" _ 032356	S	1.229	2.101	7	"	"	
2c	" _ 033658	N	1.225	2.600	7	"	"	
1c	" _ 034935	S	1.189	1.841	7	"	"	

Figure C.8 – LiDAR Flight Log

Appendix C.2
MS Gulf Coast Post-Katrina LIDAR Quality Control Report

GROUND CONTROL REPORT

US Army Corps of Engineers®

MISSISSIPPI AND ALABAMA COASTAL MAPPING

U.S. ARMY CORPS OF ENGINEERS MOBILE DISTRICT

CONTRACTOR: R&M CONSULTANTS, INC.
CONTRACT NO. W91278-04-D-0001/0003
EN PROJECT NO. C-05-054

Prepared By:

WOOLPERT, INC.
PROJECT NO. 64557

November 2005

Mississippi and Alabama Coastal Mapping Project
Ground Control Survey Report

for:
Department of the Army
Mobile District, Corps of Engineers
P.O. Box 2288-0001
Mobile, Alabama 36628-0001

Contracted through:
R & M Consultants, Inc.
9101 Vanguard Dr.
Anchorage, AK 99507

Woolpert, Inc.
409 East Monument Avenue
Dayton, Ohio 45402
(937) 461-5660

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Section 1

SECTION 1: GROUND CONTROL SURVEY REPORT

Introduction

This report contains an outline of the Photogrammetric Ground Control Survey that supported the Mississippi and Alabama Coastal LIDAR Mapping for the U.S. Army Corps of Engineers, which was contracted through R & M Consultants, Inc; Contract Number: W91278-04-D-0001/0003, EN Project Number C-05-054. The intent of this survey was to establish 3-dimensional coordinates for 7 GPS LIDAR base station control stations and seventy (70) Quality Control points to support the LIDAR mission. The data will be used to support the Corps mission in debris removal, 3D Modeling, Flood Study Analysis, etc. This project will be in coordination with, and in support of, other federal government agencies.

Project Area

The project area encompasses approximately 740 square miles of Hancock, Harrison, Jackson counties in Mississippi, and Mobile County in Alabama. The limits are from the land water interface (shoreline) to the north Right of Way of Interstate 10.

Monumentation

The intent was to utilize published National Geodetic Survey (NGS) control stations in suitable locations as GPS base stations to support the LIDAR mission. However, after investigating the placement and suitability of the existing control, it was determined that Woolpert field crew would have to establish at a minimum of two temporary control stations (MOB Base 1 & MOB Base 2) to serve as the LIDAR GPS base stations. These two temporary control stations consist of a 5/8-inch diameter by 24-inch long rebar with a plastic logo cap and were placed in a secure location at the Mobile Regional Airport.

Quality Assurance Control Checks

Quality Control field observations were implemented to verify the accuracy of the LIDAR mission. Woolpert established a total of seventy (70) quality control points in specified areas throughout the project mapping limits. Each control point (101-122, 201-234, and 301-314) observation was taken on flat and open areas that were suitable for both GPS and LIDAR measurements.

Methodology

Rapid-Static GPS surveying techniques were used for measuring all ground control stations. Rapid-Static GPS surveying requires a minimum of two receivers to occupy stations at either end of a baseline for approximately 5-20 minutes, depending upon baseline length, number of satellites, and satellite geometry. This is similar in theory to static surveying; however, shorter observation time is made possible due to advances in both hardware and software.

The survey was conducted using four (4), Woolpert-owned, Trimble Navigation R 7 dual-frequency geodetic receivers with Zephyr Geodetic antennas and two (1), Woolpert-owned, Trimble Navigation 4000SSE/SSI dual-frequency geodetic GPS receivers with Compact L1/L2 antennas. Each observation session utilized a 5-second sync rate, lasting between 35-65 minutes each.

Date of Survey

All ground control field operations took place between September 20 and October 9, 2005.

Datum Reference

All horizontal GPS control was based the Universal Transverse Mercator (UTM) Coordinate System (Zone 16), reference to the North American Datum 1983 High Accuracy Reference Network (NAD83/HARN). The vertical datum used for this survey was the North American Vertical Datum of 1988 (NAVD 88).

GPS Data Processing

The field crew chief processed all session baselines each day using *Trimble Navigation's* Trimble Geomatics Office (TGO) Version 1.62 baseline processor and using the broadcast ephemeris. *Trimble Navigation's* Trimble Geomatics Office (TGO) Wave Software User's Guide (November 1999) was used as a reference. The ratio and root-mean-square (RMS) criteria on pages 3-4 to 3-6 of the guide were followed. Other criteria used a maximum of 10.5 percent rejections, along with float-versus-fixed deltas of 10 cm. All cases that failed to meet any of these criteria were rejected and not used. Fixed solutions were obtained for all vector baselines.

Daily processing allowed the field crew to discover any weak links in the network and immediately schedule re-observations of the affected baselines. Once the fieldwork was complete, the processed baselines were then run through a rigorous loop closure analysis. Baselines that failed this analysis were either reprocessed or removed from the network.

GPS Adjustments

Upon completion of all field data processing, Woolpert performed both minimally constrained and fully constrained least-squares adjustments using *Trimble Navigation's* Trimble Geomatics Office (TGO) Version 1.62 adjustment software. After an acceptable minimally constrained least-squares adjustment was obtained, Woolpert performed a fully constrained least-squares adjustment by fixing the GPS networks to existing NGS control stations. Geoid03 was used to model the elevations. For this survey the following stations were held fixed:

Dimension	Existing Control Stations Used
3-D Control Stations	**873 5180 TIDAL 1, CODEN, VAN RM 1, FONTAINE AZ MK, K 364,** and **STENNIS**
2-D Control Stations	**MORRIS, BRIDGE RESET,** and **COVINGTON CORS L1 PHASE CENTER**
1-D Control Stations	**G 482, H 234,** and **KILN**

After close examinations of the residuals for stations WILMER and KILN showed distortions in the x and y components and for station MORRIS showed distortions in the z component, which resulted in these

stations not being constrained to in the final adjustment. The National Geodetic Survey (NGS) control data sheets for each of these observed control stations will be found in Section 2.

Final Coordinates

The final NAD83/HARN Universal Transverse Mercator coordinates (UTM 16 Zone) and NAVD88 elevations for the GPS LIDAR base stations/Quality Assurance control network stations are presented in Section 3 in Meters.

Accuracy Specifications

The final constrained adjustment for the GPS control network indicates that the GPS survey exceeds criteria for LIDAR mapping outlined in the *Guidelines and Specifications for Flood Hazard Mapping Partners* as published February 2002.

Section 2

SECTION 2: EXISTING CONTROL STATION INFORMATION

The following are the published data sheets used to constrain the final adjustment.

The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

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DATABASE = Sybase ,PROGRAM = datasheet, VERSION = 7.28
1        National Geodetic Survey,   Retrieval Date = OCTOBER 27, 2005
 BH1756 ***********************************************************************
 BH1756  FBN         -  This is a Federal Base Network Control Station.
 BH1756  TIDAL BM    -  This is a Tidal Bench Mark.
 BH1756  DESIGNATION -  873 5180 TIDAL 1
 BH1756  PID         -  BH1756
 BH1756  STATE/COUNTY-  AL/MOBILE
 BH1756  USGS QUAD   -  FORT MORGAN (1982)
 BH1756
 BH1756                        *CURRENT SURVEY CONTROL
 BH1756  ___________________________________________________________________
 BH1756* NAD 83(1992)-  30 14 58.49540(N)    088 04 31.76194(W)     ADJUSTED
 BH1756* NAVD 88     -         5.341  (meters)      17.52   (feet)  ADJUSTED
 BH1756  ___________________________________________________________________
 BH1756  X           -     185,186.979 (meters)                     COMP
 BH1756  Y           -  -5,511,241.065 (meters)                     COMP
 BH1756  Z           -   3,194,292.830 (meters)                     COMP
 BH1756  LAPLACE CORR-           0.48  (seconds)                   DEFLEC99
 BH1756  ELLIP HEIGHT-         -22.41  (meters)          (06/19/02) GPS OBS
 BH1756  GEOID HEIGHT-         -27.74  (meters)                     GEOID03
 BH1756  DYNAMIC HT  -           5.334 (meters)      17.50  (feet)  COMP
 BH1756  MODELED GRAV-     979,320.4   (mgal)                       NAVD 88
 BH1756
 BH1756  HORZ ORDER  -  A
 BH1756  VERT ORDER  -  FIRST     CLASS II
 BH1756  ELLP ORDER  -  FOURTH    CLASS I
 BH1756
 BH1756.The horizontal coordinates were established by GPS observations
 BH1756.and adjusted by the National Geodetic Survey in June 2002.
 BH1756
 BH1756.The orthometric height was determined by differential leveling
 BH1756.and adjusted by the National Geodetic Survey in June 1991.
 BH1756
 BH1756.This Tidal Bench Mark is designated as VM 787
 BH1756.by the Center for Operational Oceanographic Products and Services.
 BH1756
 BH1756.This Tidal Bench Mark is designated as VM 17817
 BH1756.by the Center for Operational Oceanographic Products and Services.
 BH1756
 BH1756.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 BH1756
 BH1756.The Laplace correction was computed from DEFLEC99 derived deflections.
 BH1756
 BH1756.The ellipsoidal height was determined by GPS observations
 BH1756.and is referenced to NAD 83.
 BH1756
 BH1756.The geoid height was determined by GEOID03.
 BH1756
 BH1756.The dynamic height is computed by dividing the NAVD 88
 BH1756.geopotential number by the normal gravity value computed on the
 BH1756.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 BH1756.degrees latitude (g = 980.6199 gals.).
 BH1756
 BH1756.The modeled gravity was interpolated from observed gravity values.
 BH1756
 BH1756;                    North         East     Units Scale Factor Converg.
 BH1756;SPC AL W     -    27,805.585   544,615.868   MT  0.99997116   -0 17 23.7
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BH1756;UTM  16      - 3,346,930.846   396,529.063   MT  0.99973208   -0 32 30.6
BH1756
BH1756!             -  Elev Factor  x  Scale Factor =   Combined Factor
BH1756!SPC AL W     -   1.00000352  x   0.99997116  =   0.99997468
BH1756!UTM  16      -   1.00000352  x   0.99973208  =   0.99973560
BH1756
BH1756                          SUPERSEDED SURVEY CONTROL
BH1756
BH1756  NAD 83(1992)-  30 14 58.49539(N)    088 04 31.76130(W) AD(       ) A
BH1756  ELLIP H (08/31/99)  -22.41   (m)                       GP(       ) 3 1
BH1756  NGVD 29 (06/24/99)    5.300  (m)           17.39   (f) ADJUSTED    1 2
BH1756
BH1756.Superseded values are not recommended for survey control.
BH1756.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
BH1756.See file dsdata.txt to determine how the superseded data were derived.
BH1756
BH1756_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RCU9652946931(NAD 83)
BH1756_MARKER: DB = BENCH MARK DISK
BH1756_SETTING: 37 = SET IN A MASSIVE RETAINING WALL
BH1756_SP_SET: MASSIVE RETAINING WALL/GUN MOUNT
BH1756_STAMPING: BM. NO. 1 1960
BH1756_MARK LOGO: CGS
BH1756_MAGNETIC: N = NO MAGNETIC MATERIAL
BH1756_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
BH1756_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BH1756+SATELLITE: SATELLITE OBSERVATIONS - December 03, 2003
BH1756
BH1756  HISTORY     - Date     Condition        Report By
BH1756  HISTORY     - 1960     MONUMENTED       CGS
BH1756  HISTORY     - 1984     GOOD             NGS
BH1756  HISTORY     - 19980126 GOOD             NGS
BH1756  HISTORY     - 20031203 GOOD             JCLS
BH1756
BH1756                          STATION DESCRIPTION
BH1756
BH1756'DESCRIBED BY NATIONAL GEODETIC SURVEY 1984
BH1756'4.0 KM (2.5 MI) EAST FROM DAUPHIN ISLAND.
BH1756'4.0 KM (2.5 MI) EAST ALONG BIENVILLE BOULEVARD FROM THE JUNCTION OF
BH1756'STATE HIGHWAY 163 ON DAUPHIN ISLAND TO FORT GAINES, AT THE EAST END OF
BH1756'THE ISLAND, A DISK SET IN TOP OF A CONCRETE GUN MOUNT AT THE NORTHEAST
BH1756'CORNER OF THE MOUNT WHICH IS LOCATED OUTSIDE THE MAIN FORT WALL NEAR
BH1756'THE NORTHWEST CORNER OF THE MAIN FORT, 15.24 METERS (50.0 FT) EAST OF
BH1756'A RADIO TOWER.
BH1756
BH1756                          STATION RECOVERY (1998)
BH1756
BH1756'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1998 (CSM)
BH1756'THE STATION IS LOCATED ABOUT 45.0 KM (27.95 MI) SOUTH OF MOBILE, NEAR
BH1756'THE EAST END OF DAUPHIN ISLAND, AT FORT GAINES, OUTSIDE AND NORTHEAST
BH1756'OF THE MAIN FORT WALL, SET IN TOP OF AND NEAR THE WEST-NORTHWEST
BH1756'CORNER OF A LARGE ABANDONED CONCRETE GUN MOUNT ON TOP OF A HILL,
BH1756'EAST-SOUTHEAST OF THE EASTERNMOST 1 OF 2 ENTRANCES TO THE FORT.
BH1756'OWNERSHIP--STATE OF ALABAMA.  TO REACH THE STATION FROM THE JUNCTION
BH1756'OF STATE HIGHWAY 193 (LEMOYNE DR) AND BIENVILLE BLVD NEAR THE WATER
BH1756'TOWER/PIPE STAND ON DAUPHIN ISLAND, GO EASTERLY FOR 3.76 KM (2.35 MI)
BH1756'ON THE BOULEVARD PASSING THE 2 OLD FORT ENTRANCES AND AROUND A CURVE
BH1756'TO THE SOUTH TO THE GUN MOUNT AND STATION ON THE RIGHT.  STATION IS
BH1756'7.45 M (24.44 FT) SOUTH-SOUTHWEST OF A CORPS OF ENGINEERS ALUMINUM
BH1756'DISK STAMPED 21D-2C ELEV. 17.82 1979, 6.95 M (22.80 FT) WEST OF A
BH1756'WITNESS POST, 0.5 M (1.6 FT) EAST-SOUTHEAST OF THE WEST-NORTHWEST
BH1756'CONCRETE CORNER OF THE GUN MOUNT, ABOUT 5.0 M (16.4 FT) ABOVE THE
BH1756'BOULEVARD AND FLUSH WITH THE TOP OF THE MOUNT.
BH1756
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BH1756                          STATION RECOVERY (2003)
BH1756
BH1756'RECOVERY NOTE BY JOHN CHANCE LAND SURVEYS INC 2003 (MRY)
BH1756'RECOVERED IN GOOD CONDITION.
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The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER 27, 2005
 BH3293 ***********************************************************************
 BH3293  CBN         -  This is a Cooperative Base Network Control Station.
 BH3293  DESIGNATION -  BRIDGE RESET
 BH3293  PID         -  BH3293
 BH3293  STATE/COUNTY-  MS/JACKSON
 BH3293  USGS QUAD   -  OCEAN SPRINGS (1992)
 BH3293
 BH3293                        *CURRENT SURVEY CONTROL
 BH3293  ___________________________________________________________________
 BH3293* NAD 83(1993)-  30 24 38.14110(N)    088 50 29.88757(W)     ADJUSTED
 BH3293* NAVD 88     -         3.6    (meters)      12.     (feet)  GPS OBS
 BH3293  ___________________________________________________________________
 BH3293  X           -     111,295.310 (meters)                     COMP
 BH3293  Y           -  -5,504,210.788 (meters)                     COMP
 BH3293  Z           -   3,209,698.107 (meters)                     COMP
 BH3293  LAPLACE CORR-          -0.19  (seconds)                    DEFLEC99
 BH3293  ELLIP HEIGHT-         -24.69  (meters)          (04/15/02) GPS OBS
 BH3293  GEOID HEIGHT-         -28.33  (meters)                     GEOID03
 BH3293
 BH3293  HORZ ORDER  -  A
 BH3293  ELLP ORDER  -  FOURTH    CLASS II
 BH3293
 BH3293.The horizontal coordinates were established by GPS observations
 BH3293.and adjusted by the National Geodetic Survey in January 1994.
 BH3293
 BH3293.The orthometric height was determined by GPS observations and a
 BH3293.high-resolution geoid model.
 BH3293
 BH3293.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 BH3293
 BH3293.The Laplace correction was computed from DEFLEC99 derived deflections.
 BH3293
 BH3293.The ellipsoidal height was determined by GPS observations
 BH3293.and is referenced to NAD 83.
 BH3293
 BH3293.The geoid height was determined by GEOID03.
 BH3293
 BH3293;                    North         East     Units Scale Factor Converg.
 BH3293;SPC MS E     -   100,935.960   299,202.319   MT  0.99995001   -0 00 15.1
 BH3293;UTM  16      - 3,365,723.432   323,099.316   MT  0.99998607   -0 55 56.9
 BH3293
 BH3293!             -  Elev Factor  x  Scale Factor =   Combined Factor
 BH3293!SPC MS E     -   1.00000388  x   0.99995001  =   0.99995389
 BH3293!UTM  16      -   1.00000388  x   0.99998607  =   0.99998995
 BH3293
 BH3293:                Primary Azimuth Mark                     Grid Az
 BH3293:SPC MS E     -  BAY                                     133 34 55.4
 BH3293:UTM  16      -  BAY                                     134 30 37.2
 BH3293
 BH3293|---------------------------------------------------------------------|
 BH3293| PID    Reference Object                     Distance      Geod. Az  |
 BH3293|                                                           dddmmss.s |
 BH3293| BH0384 BRIDGE RM 2                           8.803 METERS 05039     |
 BH3293| BH2383 BRIDGE 1935 TEMP                     50.417 METERS 06027     |
 BH3293| BH2368 BAY                                APPROX. 3.9 KM 1333440.3 |
 BH3293| BH2366 BILOXI HARBOR BEACON 48            APPROX. 1.5 KM 1652444.2 |
 BH3293| BH2364 BILOXI CHANNEL BEACON 36           APPROX. 2.8 KM 1943610.9 |
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BH3293| BH2365 BILOXI BAY RTE 90 DRAWSPAN LT       APPROX. 0.7 KM 2272551.3 |
BH3293| BH2369 BILOXI RR BRIDGE CENTER LIGHT       APPROX. 0.9 KM 2543308.4 |
BH3293| BH2407 BILOXI BAY HWY 57 DRAWSPAN LT       APPROX. 4.9 KM 2825221.9 |
BH3293| BH0382 BRIDGE RM 1                           6.840 METERS 31746     |
BH3293|-----------------------------------------------------------------------|
BH3293
BH3293                          SUPERSEDED SURVEY CONTROL
BH3293
BH3293  ELLIP H (02/15/02)  -24.69   (m)                        GP(       ) 4 1
BH3293  NAD 83(1993)-  30 24 38.16081(N)    088 50 29.87355(W) AD(       ) 1
BH3293  ELLIP H (01/12/94)  -24.53   (m)                        GP(       ) 3 1
BH3293  NAD 83(1993)-  30 24 38.15406(N)    088 50 29.87609(W) AD(       ) 2
BH3293  NAD 83(1986)-  30 24 38.16087(N)    088 50 29.87353(W) AD(       ) 2
BH3293  NAD 27      -  30 24 37.45100(N)    088 50 29.75900(W) AD(       ) 2
BH3293
BH3293.Superseded values are not recommended for survey control.
BH3293.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
BH3293.See file dsdata.txt to determine how the superseded data were derived.
BH3293
BH3293_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RCU2309965723(NAD 83)
BH3293_MARKER: DH = HORIZONTAL CONTROL DISK
BH3293_SETTING: 38 = SET IN THE ABUTMENT OR PIER OF A LARGE BRIDGE
BH3293_SP_SET: CONCRETE SIDEWALK OF BRIDGE
BH3293_STAMPING: BRIDGE 1935 1984
BH3293_MARK LOGO: NGS
BH3293_MAGNETIC: N = NO MAGNETIC MATERIAL
BH3293_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
BH3293_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BH3293+SATELLITE: SATELLITE OBSERVATIONS - March 27, 2004
BH3293
BH3293  HISTORY     - Date     Condition        Report By
BH3293  HISTORY     - 1984     MONUMENTED       NGS
BH3293  HISTORY     - 19921112 GOOD             MSHD
BH3293  HISTORY     - 19930524 GOOD
BH3293  HISTORY     - 20000801 GOOD             NGS
BH3293  HISTORY     - 20030227 GOOD             INDIV
BH3293  HISTORY     - 20040327 GOOD             USPSQD
BH3293
BH3293                          STATION DESCRIPTION
BH3293
BH3293'DESCRIBED BY NATIONAL GEODETIC SURVEY 1984 (CLN)
BH3293'THE DRILL HOLE FOR THE STATION WAS RECOVERED WITH THE DISK REMOVED,
BH3293'REFERENCE MARKS NO 1 AND NO 2 WERE RECOVERED IN GOOD CONDITION A NEW
BH3293'STATION DISK WAS ESTABLISHED IN THE DRILL HOLE OF THE OLD DISK AT THIS
BH3293'DATE.  IT IS A STANDARD NGS DISK STAMPED---BRIDGE 1935 1984---THE 1968
BH3293'DESCRIPTION BY H.B.T.  (MSHD) IS ADEQUATE AND COMPLETE FOR RECOVERY AT
BH3293'THIS DATE.
BH3293
BH3293                          STATION RECOVERY (1992)
BH3293
BH3293'RECOVERY NOTE BY MISSISSIPPI STATE HIGHWAY DEPARTMENT 1992
BH3293'STATION IS LOCATED 0.8 MI (1.3 KM) SOUTHWEST OF OCEAN SPRINGS, NEAR
BH3293'THE NORTHEAST END OF THE OLD BILOXI BAY BRIDGE (NOW A FISHING PIER),
BH3293'ON PROPERTY OF THE STATE.
BH3293'TO REACH FROM THE U.S. HIGHWAY 90 DRAW BRIDGE OVER BILOXI BAY, BETWEEN
BH3293'BILOXI AND OCEAN SPRINGS, GO NORTHEAST ON U.S. HIGHWAY 90 FOR 0.45 MI
BH3293'(0.72 KM) TO NORTHEAST END OF BRIDGE AND STATION ON THE LEFT IN OLD
BH3293'HIGHWAY BRIDGE AS DESCRIBED.
BH3293'STATION MARK IS A STANDARD NGS DISK, STAMPED---BRIDGE 1935 1984---SET
BH3293'IN A DRILL HOLE IN THE CENTER OF SOUTH CONCRETE WALKWAY OF OLD ABANDO
BH3293'NED BRIDGE, 175.0 FT (53.3 M) SOUTHWEST OF THE NORTHEAST END OF
BH3293'ABANDONED BRIDGE, 92.0 FT (28.0 M) NORTHWEST OF THE CENTER OF NEW
BH3293'HIGHWAY 90 BRIDGE, 12.0 FT (3.7 M) SOUTHEAST OF THE CENTER OF
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BH3293'ABANDONED BRIDGE AND 2.0 FT (0.6 M) SOUTHEAST OF THE EDGE OF
BH3293'SIDEWALK.
BH3293
BH3293                          STATION RECOVERY (1993)
BH3293
BH3293'RECOVERED 1993
BH3293'RECOVERED IN GOOD CONDITION.
BH3293
BH3293                          STATION RECOVERY (2000)
BH3293
BH3293'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 2000
BH3293'RECOVERED AS DESCRIBED.
BH3293
BH3293                          STATION RECOVERY (2003)
BH3293
BH3293'RECOVERY NOTE BY INDIVIDUAL CONTRIBUTORS 2003 (RL)
BH3293'RECOVERED BY COMPASSCOM, INC.
BH3293'
BH3293
BH3293                          STATION RECOVERY (2004)
BH3293
BH3293'RECOVERY NOTE BY US POWER SQUADRON 2004 (CE)
BH3293'RECOVERED IN GOOD CONDITION.
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The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER 27, 2005
 BH0275 ***********************************************************************
 BH0275  DESIGNATION -  CODEN
 BH0275  PID         -  BH0275
 BH0275  STATE/COUNTY-  AL/MOBILE
 BH0275  USGS QUAD   -  CODEN (1985)
 BH0275
 BH0275                        *CURRENT SURVEY CONTROL
 BH0275  ___________________________________________________________________
 BH0275* NAD 83(1992)-  30 23 02.27398(N)    088 14 26.13448(W)     ADJUSTED
 BH0275* NAVD 88     -         4.005  (meters)      13.14   (feet)  POSTED
 BH0275  ___________________________________________________________________
 BH0275  LAPLACE CORR-           0.36  (seconds)                    DEFLEC99
 BH0275  GEOID HEIGHT-         -28.17  (meters)                     GEOID03
 BH0275  DYNAMIC HT  -           4.000 (meters)      13.12  (feet)  COMP
 BH0275  MODELED GRAV-     979,325.1   (mgal)                       NAVD 88
 BH0275
 BH0275  HORZ ORDER  -  FIRST
 BH0275  VERT ORDER  -  * POSTED, Code B , SEE BELOW
 BH0275
 BH0275.The horizontal coordinates were established by classical geodetic methods
 BH0275.and adjusted by the National Geodetic Survey in May 1994.
 BH0275
 BH0275.The orthometric height was determined by differential leveling
 BH0275.and adjusted by the National Geodetic Survey in 1992.
 BH0275.* This is a POSTED BENCH MARK height.  Code B indicates a distribution
 BH0275.rate of 1.1 thru 2.0 mm/km.
 BH0275
 BH0275.The Laplace correction was computed from DEFLEC99 derived deflections.
 BH0275
 BH0275.The geoid height was determined by GEOID03.
 BH0275
 BH0275.The dynamic height is computed by dividing the NAVD 88
 BH0275.geopotential number by the normal gravity value computed on the
 BH0275.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 BH0275.degrees latitude (g = 980.6199 gals.).
 BH0275
 BH0275.The modeled gravity was interpolated from observed gravity values.
 BH0275
 BH0275;                    North         East     Units Scale Factor Converg.
 BH0275;SPC AL W     -    42,794.541   528,823.400   MT  0.99999581   -0 22 28.6
 BH0275;UTM  16      - 3,361,985.776   380,806.402   MT  0.99977527   -0 37 39.2
 BH0275
 BH0275!             -  Elev Factor  x  Scale Factor =   Combined Factor
 BH0275!SPC AL W     -   1.00000379  x   0.99999581  =   0.99999960
 BH0275!UTM  16      -   1.00000379  x   0.99977527  =   0.99977906
 BH0275
 BH0275:                Primary Azimuth Mark                     Grid Az
 BH0275:SPC AL W     -  CODEN AZ MK                              329 14 49.0
 BH0275:UTM  16      -  CODEN AZ MK                              329 29 59.6
 BH0275
 BH0275|---------------------------------------------------------------------|
 BH0275| PID    Reference Object                     Distance      Geod. Az  |
 BH0275|                                                           dddmmss.s |
 BH0275| BH0274 CODEN RM 1                           37.481 METERS 04806     |
 BH0275| DD7723 CODEN RM 3                           41.667 METERS 06428     |
 BH0275| BH0276 CODEN RM 2                           69.334 METERS 17600     |
 BH0275| BH2198 SOUTHERN PAPER COMPANY SOUTH STACK  APPROX.24.7 KM 2781034.3 |
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BH0275| BH2208 MOSS PT SOUTHERN PAPER N STACK      APPROX.24.7 KM 2781243.3 |
BH0275| DD7722 CODEN AZ MK                                       3285220.4 |
BH0275|-----------------------------------------------------------------------|
BH0275
BH0275                          SUPERSEDED SURVEY CONTROL
BH0275
BH0275  NAD 83(1992)-  30 23 02.27470(N)    088 14 26.13502(W) AD(       ) 1
BH0275  NAD 83(1986)-  30 23 02.29702(N)    088 14 26.13562(W) AD(       ) 1
BH0275  NAD 27      -  30 23 01.57900(N)    088 14 26.11600(W) AD(       ) 1
BH0275  NGVD 29 (06/24/99)    3.967  (m)           13.02   (f) ADJUSTED    1 2
BH0275
BH0275.Superseded values are not recommended for survey control.
BH0275.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
BH0275.See file dsdata.txt to determine how the superseded data were derived.
BH0275
BH0275_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RCU8080661986(NAD 83)
BH0275_MARKER: DS = TRIANGULATION STATION DISK
BH0275_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
BH0275_SP_SET: TOP OF SQUARE CONCRETE MONUMENT
BH0275_STAMPING: CODEN 1930
BH0275_MAGNETIC: N = NO MAGNETIC MATERIAL
BH0275_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
BH0275+STABILITY: SURFACE MOTION
BH0275
BH0275  HISTORY     - Date     Condition        Report By
BH0275  HISTORY     - 1930     MONUMENTED       CGS
BH0275  HISTORY     - 1935     GOOD             CGS
BH0275  HISTORY     - 1940     GOOD             CGS
BH0275  HISTORY     - 1955     GOOD             CGS
BH0275  HISTORY     - 1958     GOOD             CGS
BH0275  HISTORY     - 1970     GOOD             NGS
BH0275  HISTORY     - 1976     GOOD             NGS
BH0275  HISTORY     - 1978     GOOD             NGS
BH0275  HISTORY     - 1986     GOOD             NOS
BH0275
BH0275                          STATION DESCRIPTION
BH0275
BH0275'DESCRIBED BY COAST AND GEODETIC SURVEY 1930 (FLG)
BH0275'IN THE VILLAGE OF CODEN ABOUT 1/4 MILE NW OF THE HIGHWAY BRIDGE OVER
BH0275'BAYOU COQ D INDE OR CODEN, 125 FEET SW OF THE SW PROPERTY LINE OF
BH0275'THIS HIGHWAY, OR 150 FEET SW OF THE CENTER LINE OF HIGHWAY, IN A
BH0275'SUB-DIVISION ON LAND OWNED BY JAKE RABBY OF CODEN.  IT IS ON A
BH0275'LOT LINE AND IS NOT LIKELY TO BE DISTURBED.  IT IS ABOUT 125 FEET SW
BH0275'OF THE NORTHERN OF TWO ORNAMENTAL GATE POSTS MARKING ENTRANCE TO
BH0275'SUB-DIVISION.
BH0275'
BH0275'SURFACE, UNDERGROUND, AND REFERENCE MARKS ARE STANDARD BRONZE DISKS
BH0275'SET IN CONCRETE.
BH0275'
BH0275'REFERENCE MARK NO. 1 IS NEAR THE SOUTHERN OF THE TWO GATE POSTS,
BH0275'28.45 FEET W OF THE CENTER LINE OF HIGHWAY.  THIS GATEWAY IS
BH0275'MARKED PINE AVENUE.
BH0275'
BH0275'REFERENCE MARK NO. 2 IS ABOUT 300 FEET SW OF THE CENTER OF HIGHWAY,
BH0275'50 FEET NW OF A PROMINENT LIVE OAK ABOUT 14 INCHES IN DIAMETER, AND
BH0275'IS ON A LINE OF STAKES MARKING WESTERN EDGE OF WESTERNMOST STREET OF
BH0275'THE SUB-DIVISION.  IT IS MIDWAY BETWEEN STAKES MARKED 4 AND 5.
BH0275'
BH0275'HEIGHT OF SIGNAL ABOVE STATION MARK - 34.4 METERS.
BH0275
BH0275                          STATION RECOVERY (1935)
BH0275
BH0275'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1935 (GLA)
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BH0275'STATION AND REFERENCE MARKS WERE RECOVERED AND AN AZIMUTH MARK WAS
BH0275'ADDED.  A NEW DESCRIPTION FOLLOWS-
BH0275'
BH0275'THE STATION IS IN THE VILLAGE OF CODEN ABOUT 1/4 MILE NW OF THE
BH0275'HIGHWAY BRIDGE OVER BAYOU COQ D INDE OR CODEN, 125 FEET SW OF THE SW
BH0275'PROPERTY LINE OF THIS HIGHWAY, OR 150 FEET SW OF THE CENTER LINE OF
BH0275'THE HIGHWAY, ABOUT 125 FEET SW OF THE NORTHERLY OF TWO ORNAMENTAL
BH0275'GATE POSTS, IN A SUB-DIVISION OF LAND OWNED BY JAKE REBBY OF CODEN.
BH0275'IT IS MARKED ACCORDING TO.
BH0275'
BH0275'REFERENCE MARK NO. 1 IS NEAR THE NORTHERLY OF THE TWO GATE POSTS,
BH0275'28.0 FEET S OF THE CENTER LINE OF THE HIGHWAY.
BH0275'
BH0275'REFERENCE MARK NO. 2 IS ABOUT 300 FEET SW OF THE HIGHWAY, 72 FEET NW
BH0275'OF A PROMINENT LIVE OAK, ABOUT 20 INCHES IN DIAMETER, AND 2
BH0275'FEET SE OF THE SE CORNER OF A FENCE SURROUNDING A TIN-ROOFED FRAME
BH0275'HOUSE.
BH0275'
BH0275'THE AZIMUTH MARK IS ABOUT 0.25 MILE W OF THE STATION, 20 FEET S OF
BH0275'THE CENTER LINE OF THE CONCRETE HIGHWAY.
BH0275
BH0275                          STATION RECOVERY (1940)
BH0275
BH0275'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1940 (JNM)
BH0275'DUE TO AN AUTOMOBILE WRECK, THE CODEN AZIMUTH MARK WAS DISTURBED.  IT
BH0275'WAS REPLACED IN APPROXIMATELY THE ORIGINAL POSITION.  AZIMUTH
BH0275'FROM STATION CODEN TO RE-LOCATED AZIMUTH MARK WAS DETERMINED BY ANGLE
BH0275'FROM REFERENCE MARK NO. 2, USING DATA SHOWN IN RECOVERY
BH0275'DESCRIPTION OF G.L.A., 1935.
BH0275'
BH0275'LINE FROM STATION CODEN TO CROSS ON CATHOLIC CHURCH IS NO LONGER
BH0275'INTERVISIBLE, DUE TO NEW BUILDING.  STATION CODEN AND OTHER MARKS
BH0275'IN GOOD CONDITION, AND AS DESCRIBED.
BH0275
BH0275                          STATION RECOVERY (1955)
BH0275
BH0275'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1955
BH0275'IN CODEN.
BH0275'AT CODEN, ABOUT 0.2 MILE NORTHWEST ALONG A PAVED ROAD FROM BRIDGE OVER
BH0275'BAYOU CODEN, ABOUT 0.1 MILE NORTHWEST OF THE POST OFFICE, AT THE
BH0275'JUNCTION OF A GRADED STREET LEADING SOUTHWEST, IN A GROVE OF PINE
BH0275'TREES ON A VACANT LOT, 150 FEET SOUTHWEST OF CENTER LINE OF PAVED
BH0275'ROAD, 38 1/2 FEET NORTHWEST OF CENTER LINE OF GRADED STREET SOUTHWEST,
BH0275'151 FEET NORTHEAST OF CENTER LINE OF A NORTHWEST-SOUTHEAST GRADED
BH0275'STREET, 122.1 FEET SOUTHWEST OF RM NO. 1, 228 FEET NORTH AND ACROSS
BH0275'STREETS FROM RM NO. 2, ABOUT 1/2 FOOT ABOVE LEVEL OF STREET SOUTHWEST
BH0275'AND SET IN THE TOP OF A CONCRETE POST PROJECTING 4 INCHES.
BH0275
BH0275                          STATION RECOVERY (1958)
BH0275
BH0275'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1958 (RFL)
BH0275'THE STATION IS IN THE VILLAGE OF CODEN 0.15 MILE NORTHWEST OF THE
BH0275'POST OFFICE ON STATE HWY NO. 188 AND THE FIRST STREET SOUTHWEST OF
BH0275'THE POST OFFICE, ON A VACANT LOT COVERED WITH PINE TREES OWNED BY
BH0275'ENID RABBY, 150.0 FT SW OF STATE HWY NO.  188, 39.5 FT W OF THE
BH0275'UNPAVED STREET AND 56.4 FT W OF A STEEL WIRE FENCE.
BH0275'
BH0275'RM NO. 2 PUBLISHED DESCRIPTION IS ADEQUATE.
BH0275'
BH0275'RM NO. 1 IS 28.0 FT S OF STATE HWY NO. 188, 22.0 FT W OF UNPAVED
BH0275'STREET AND 38.7 FT W OF A FENCE CORNER.
BH0275
BH0275                          STATION RECOVERY (1970)
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BH0275
BH0275'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1970 (WGT)
BH0275'THE STATION AND REFERENCE MARKS RECOVERED AND FOUND IN GOOD
BH0275'CONDITION.  THE STATION MARK IS 0.1 MILE NORTHWEST ALONG STATE
BH0275'HIGHWAY 188 THENCE SOUTHWEST ALONG A DIRT STREET FOR 150 FEET TO THE
BH0275'MARK ON THE RIGHT.  IT IS 147 FEET NORTH-NORTHEAST OF A STREET
BH0275'INTERSECTION, 81 FEET NORTH OF NORTH POST OF DOUBLE GATE IN CYCLONE
BH0275'FENCE AND 37 FEET NORTHWEST OF OF CENTERLINE OF DIRT STREET.
BH0275'
BH0275'R.M. NO. 1 IS NORTHEAST OF STATION, 28 FEET SOUTHWEST OF CENTERLINE
BH0275'OF HIGHWAY 188, 22 FEET NORTHWEST OF CENTERLINE OF DIRT STREET AND
BH0275'39 FEET NORTHWEST OF A FENCE CORNER.
BH0275'
BH0275'R.M. NO. 2 IS 69 METERS SOUTH OF THE STATION, 22 FEET NORTHWEST OF
BH0275'SOUTHEAST CORNER OF YARD, 14 FEET SOUTHWEST OF CENTER OF STREET, 30
BH0275'FEET NORTHWEST OF 3-FOOT LIVE OAK TREE AND 1 FOOT NORTHEAST OF A
BH0275'FENCE.
BH0275'
BH0275'THE AZIMUTH MARK WAS NOT RECOVERED
BH0275'
BH0275'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN- AT CODEN.
BH0275
BH0275                          STATION RECOVERY (1976)
BH0275
BH0275'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1976 (WOM)
BH0275'STATION MARK WAS RECOVERED AND FOUND IN GOOD CONDITION.  REFERENCE
BH0275'MARK NO. 1 WAS FOUND LAYING ON TOP OF GROUND, REFERENCE MARK
BH0275'NO. 2 WAS NOT RECOVERED THERE IS A FENCE LINE WHERE THE MARK
BH0275'WAS DESCRIBED, AZIMUTH MARK WAS SEARCHED FOR BUT NOT RECOVERED.
BH0275'
BH0275'THE 1930 DESCRIPTION IS ADEQUATE.
BH0275'
BH0275'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN
BH0275'IN THE VILLAGE OF CODEN.
BH0275
BH0275                          STATION RECOVERY (1978)
BH0275
BH0275'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1978 (CLN)
BH0275'THE STATION MARK AND REFERENCE MARK NO.2 WERE RECOVERED IN GOOD
BH0275'CONDITION.  REFERENCE MARK NO.1 WAS FOUND DESTROYED AND THE DISK WAS
BH0275'RECLAIMED.  THE AZIMUTH MARK WAS NOT FOUND AND IS BELIEVED
BH0275'DESTROYED.  A NEW REFERENCE MARK NO.3 WAS ESTABLISHED AT THIS
BH0275'TIME.  NO SUITABLE LOCATION COULD BE FOUND FOR AN AZIMUTH MARK DUE
BH0275'TO WOODS AND BUILDINGS A COMPLETE NEW DESCRIPTION FOLLOWS.
BH0275'
BH0275'STATION IS LOCATED IN THE VILLAGE OF CODEN, ABOUT 0.25 MILE
BH0275'NORTHWEST OF THE BRIDGE OVER BAYOU CODEN.
BH0275'
BH0275'TO REACH FROM THE POST OFFICE IN CODEN, GO WESTERLY ON STATE HWY. 188
BH0275'FOR 0.12 MILE TO A SIDE ROAD ON THE LEFT, TURN LEFT FOR ABOUT 150
BH0275'FEET TO STATION ON THE RIGHT.
BH0275'
BH0275'STATION MARK IS A STANDARD DISK STAMPED CODEN 1930, SET IN THE TOP OF
BH0275'A SQUARE CONCRETE POST, PROJECTING 3 INCHES.  IT IS 150 FEET
BH0275'SOUTH-SOUTHWEST OF THE CENTER OF STATE HWY. 188, 47 FEET
BH0275'WEST-SOUTHWEST OF POWER POLE NO.3872 WITH TRANSFORMER ATTACHED, 39
BH0275'FEET WEST OF THE CENTER OF SAND ROAD AND 2 FEET EAST OF A METAL
BH0275'WITNESS POST AND SIGN.
BH0275'
BH0275'REFERENCE MARK NO.2 IS A STANDARD DISK, STAMPED CODEN NO 2 1930, SET
BH0275'IN THE TOP OF A SQUARE CONCRETE POST, PROJECTING 3 INCHES.  IT IS 33
BH0275'FEET NORTHWEST OF A 5 FOOT LIVE OAK TREE, 26.8 FEET NORTH-NORTHEAST
BH0275'OF THE NORTHEAST CORNER OF PORCH OF FRAME HOUSE, 17 FEET SOUTH OF THE
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BH0275'CENTER OF EAST-WEST SAND ROAD AND 0.5 FOOT NORTH OF A METAL WITNESS
BH0275'POST AND SIGN IN FENCELINE.
BH0275'
BH0275'REFERENCE MARK NO.3 IS A STANDARD DISK, STAMPED CODEN 1930 NO.3 1978,
BH0275'SET IN TOP OF A ROUND CONCRETE POST, FLUSH WITH THE GROUND.  IT IS 26
BH0275'FEET SOUTH OF THE CENTER OF STATE HWY. 188, 18 FEET EAST OF THE
BH0275'CENTER OF NORTH-SOUTH SAND ROAD, 1.3 FEET SOUTH OF A POWER POLE AND
BH0275'1.3 FEET NORTHWEST OF A METAL WITNESS POST AND SIGN.
BH0275
BH0275                          STATION RECOVERY (1986)
BH0275
BH0275'RECOVERY NOTE BY NATIONAL OCEAN SERVICE 1986 (WVH)
BH0275'THE LOT HAS BEEN CLEARED BY THE PRESENT OWNER, MICHAEL ESFELLER
BH0275'OF ROCK ROAD, CODEN ALABAMA 824-2290.  REFERENCE MARK NO 2 WAS
BH0275'RECOVERED AND THE DISTANCE CHECKED.  REFERENCE NO 1 WAS SEARCHED
BH0275'FOR BUT NOT RECOVERED.  LOCAL RESIDENTS CLAIMED THE MONUMENT WAS
BH0275'DESTROYED AND REMOVED BY CONSTRUCTION.  A REFERENCE MARK NO 4
BH0275'NOT MENTIONED IN THE NGS DESCRIPTION, WAS FOUND NORTH-NORTHEAST
BH0275'FROM THE STATION A DISTANCE OF 136.7 FEET.  IT WAS ASSUMED THIS WAS
BH0275'SET BY THE NGS MARK DUSTER.
BH0275'
BH0275'RECOVERED BY R DECROIX.
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The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER 27, 2005
 DG6569 ***********************************************************************
 DG6569  CORS         -  This is a GPS Continuously Operating Reference Station.
 DG6569  DESIGNATION -  COVINGTON CORS L1 PHASE CENTER
 DG6569  CORS_ID      -  COVG
 DG6569  PID          -  DG6569
 DG6569  STATE/COUNTY-  LA/ST TAMMANY
 DG6569  USGS QUAD    -  COVINGTON (1994)
 DG6569
 DG6569                        *CURRENT SURVEY CONTROL
 DG6569  ___________________________________________________________________
 DG6569* NAD 83(CORS)-  30 28 33.26967(N)    090 05 43.92325(W)     ADJUSTED
 DG6569* NAVD 88      -
 DG6569  ___________________________________________________________________
 DG6569  EPOCH DATE   -        2002.00
 DG6569  X            -      -9,173.433 (meters)                    COMP
 DG6569  Y            -  -5,501,676.954 (meters)                    COMP
 DG6569  Z            -   3,215,950.739 (meters)                    COMP
 DG6569  ELLIP HEIGHT-          -4.45  (meters)          (08/??/04) GPS OBS
 DG6569  GEOID HEIGHT-         -26.98  (meters)                    GEOID03
 DG6569
 DG6569  HORZ ORDER   -  SPECIAL (CORS)
 DG6569  ELLP ORDER   -  SPECIAL (CORS)
 DG6569
 DG6569.ITRF positions are available for this station.
 DG6569.The coordinates were established by GPS observations
 DG6569.and adjusted by the National Geodetic Survey in August 2004.
 DG6569.The coordinates are valid at the epoch date displayed above.
 DG6569.The epoch date for horizontal control is a decimal equivalence
 DG6569.of Year/Month/Day.
 DG6569
 DG6569
 DG6569.The PID for the CORS ARP is DG6568.
 DG6569
 DG6569.The XYZ, and position/ellipsoidal ht. are equivalent.
 DG6569
 DG6569.The ellipsoidal height was determined by GPS observations
 DG6569.and is referenced to NAD 83.
 DG6569
 DG6569.The geoid height was determined by GEOID03.
 DG6569
 DG6569;                    North         East     Units Scale Factor Converg.
 DG6569;SPC LA S      -   219,662.521 1,118,849.594   MT  0.99996000   +0 37 08.1
 DG6569
 DG6569!              -  Elev Factor  x  Scale Factor =   Combined Factor
 DG6569!SPC LA S      -   1.00000070  x   0.99996000  =   0.99996070
 DG6569
 DG6569                          SUPERSEDED SURVEY CONTROL
 DG6569
 DG6569.No superseded survey control is available for this station.
 DG6569
 DG6569_U.S. NATIONAL GRID SPATIAL ADDRESS: 15RYP7884175108(NAD 83)
 DG6569_MARKER: STATION IS THE L1 PHASE CENTER OF THE GPS ANTENNA
 DG6569
 DG6569                          STATION DESCRIPTION
 DG6569
 DG6569'DESCRIBED BY NATIONAL GEODETIC SURVEY
 DG6569'STATION IS A GPS CORS.  LATEST INFORMATION INCLUDING POSITIONS AND
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DG6569'VELOCITIES ARE AVAILABLE IN THE COORDINATE AND LOG FILES ACCESSIBLE
DG6569'BY ANONYMOUS FTP OR THE WORLDWIDE WEB.
DG6569'   FTP CORS.NGS.NOAA.GOV: CORS/COORD  AND  CORS/STATION_LOG
DG6569'   HTTP://WWW.NGS.NOAA.GOV  UNDER PRODUCTS AND SERVICES.
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The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER 27, 2005
 BH0364 ***********************************************************************
 BH0364  DESIGNATION -  FONTAINE AZ MK
 BH0364  PID         -  BH0364
 BH0364  STATE/COUNTY-  MS/JACKSON
 BH0364  USGS QUAD   -  OCEAN SPRINGS (1992)
 BH0364
 BH0364                        *CURRENT SURVEY CONTROL
 BH0364  ___________________________________________________________________
 BH0364* NAD 83(1993)-  30 23 13.05978(N)    088 45 11.26337(W)     ADJUSTED
 BH0364* NAVD 88     -         6.383  (meters)      20.94   (feet)  ADJUSTED
 BH0364  ___________________________________________________________________
 BH0364  X           -     119,826.613 (meters)                     COMP
 BH0364  Y           -  -5,505,360.050 (meters)                     COMP
 BH0364  Z           -   3,207,439.641 (meters)                     COMP
 BH0364  LAPLACE CORR-          -0.03  (seconds)                    DEFLEC99
 BH0364  ELLIP HEIGHT-         -22.02  (meters)          (09/30/02) GPS OBS
 BH0364  GEOID HEIGHT-         -28.30  (meters)                     GEOID03
 BH0364  DYNAMIC HT  -           6.374 (meters)      20.91  (feet)  COMP
 BH0364  MODELED GRAV-     979,319.6   (mgal)                       NAVD 88
 BH0364  OBS GRAVITY -     979,320.3   (mgal)                       GRAV_OBS
 BH0364
 BH0364  HORZ ORDER  -  FIRST
 BH0364  VERT ORDER  -  FIRST     CLASS I
 BH0364  ELLP ORDER  -  FOURTH    CLASS I
 BH0364
 BH0364.The horizontal coordinates were established by GPS observations
 BH0364.and adjusted by the National Geodetic Survey in May 1994.
 BH0364
 BH0364.The orthometric height was determined by differential leveling
 BH0364.and adjusted by the National Geodetic Survey in June 1991.
 BH0364
 BH0364.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 BH0364
 BH0364.The Laplace correction was computed from DEFLEC99 derived deflections.
 BH0364
 BH0364.The ellipsoidal height was determined by GPS observations
 BH0364.and is referenced to NAD 83.
 BH0364
 BH0364.The geoid height was determined by GEOID03.
 BH0364
 BH0364.The dynamic height is computed by dividing the NAVD 88
 BH0364.geopotential number by the normal gravity value computed on the
 BH0364.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 BH0364.degrees latitude (g = 980.6199 gals.).
 BH0364
 BH0364.The modeled gravity was interpolated from observed gravity values.
 BH0364.The observed gravity was obtained from relative gravimeter ties
 BH0364.to the IGSN71 gravity network.
 BH0364
 BH0364;                    North         East     Units Scale Factor Converg.
 BH0364;SPC MS E     -    98,318.777   307,708.062   MT  0.99995073   +0 02 26.1
 BH0364;UTM  16      - 3,362,968.798   331,561.709   MT  0.99995002   -0 53 13.2
 BH0364
 BH0364!             -  Elev Factor  x  Scale Factor =   Combined Factor
 BH0364!SPC MS E     -   1.00000346  x   0.99995073  =   0.99995419
 BH0364!UTM  16      -   1.00000346  x   0.99995002  =   0.99995348
 BH0364
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BH0364                          SUPERSEDED SURVEY CONTROL
BH0364
BH0364  ELLIP H (05/13/94)  -21.88   (m)                      GP(       ) 4 1
BH0364  ELLIP H (01/21/93)  -21.96   (m)                      GP(       ) 4 2
BH0364  NAD 83(1993)-  30 23 13.06904(N)    088 45 11.26475(W) AD(       ) 1
BH0364  NAD 83(1986)-  30 23 13.08089(N)    088 45 11.25387(W) AD(       ) 3
BH0364  NAD 83(1986)-  30 23 13.07688(N)    088 45 11.26000(W) AD(       ) 1
BH0364  NAD 27      -  30 23 12.36826(N)    088 45 11.16414(W) AD(       ) 3
BH0364  NGVD 29 (??/??/??)    6.343  (m)           20.81   (f) ADJUSTED    1 1
BH0364
BH0364.Superseded values are not recommended for survey control.
BH0364.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
BH0364.See file dsdata.txt to determine how the superseded data were derived.
BH0364
BH0364_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RCU3156262969(NAD 83)
BH0364_MARKER: DZ = AZIMUTH MARK DISK
BH0364_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
BH0364_SP_SET: SQUARE CONCRETE MONUMENT
BH0364_STAMPING: FONTAINE 1943
BH0364_MARK LOGO: CGS
BH0364_MAGNETIC: N = NO MAGNETIC MATERIAL
BH0364_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
BH0364+STABILITY: SURFACE MOTION
BH0364_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BH0364+SATELLITE: SATELLITE OBSERVATIONS - March 01, 2000
BH0364
BH0364  HISTORY     - Date     Condition        Report By
BH0364  HISTORY     - 1943     MONUMENTED       CGS
BH0364  HISTORY     - 1969     GOOD             CGS
BH0364  HISTORY     - 19810301 GOOD             MSSU
BH0364  HISTORY     - 1984     GOOD             LA-051
BH0364  HISTORY     - 1987     GOOD             LADTD
BH0364  HISTORY     - 1988     GOOD             NGS
BH0364  HISTORY     - 1988     GOOD             MSU
BH0364  HISTORY     - 19880920 GOOD             LADTD
BH0364  HISTORY     - 19890119 GOOD
BH0364  HISTORY     - 20000301 GOOD             NGS
BH0364
BH0364                          STATION DESCRIPTION
BH0364
BH0364'DESCRIBED BY COAST AND GEODETIC SURVEY 1969
BH0364'5.2 MI SE FROM OCEAN SPRINGS.
BH0364'ABOUT 4.2 MILES EAST ALONG THE LOUISVILLE AND NASHVILLE RAILROAD FROM
BH0364'THE STATION AT OCEAN SPRINGS, THENCE 0.75 MILE SOUTH ALONG A BLACK
BH0364'TOPPED ROAD, THENCE 0.25 MILE EAST ALONG A BLACK TOP ROAD, AT THE
BH0364'GULFPORT ESTATES AIRPORT, NEAR THE SOUTHEAST CORNER OF THE AIRPORT, 51
BH0364'FEET EAST OF THE SOUTHEAST CORNER LIGHT FOR THE RUNWAY, 11 FEET EAST
BH0364'OF A CHAIN LINK FENCE ALONG THE EAST SIDE OF THE RUNWAY, 33 FEET
BH0364'SOUTHWEST OF THE CENTER LINE OF A BLACK TOP ROAD AT CENTER OF A CURVE
BH0364'IN THE ROAD, 75 FEET NORTH OF THE SOUTH END OF THE CHAIN LINK FENCE.
BH0364'0.2 FOOT EAST OF A METAL WITNESS POST, ABOUT 0.25 MILE SOUTHEAST AND
BH0364'ACROSS THE RUNWAY FROM THE ADMINISTRATION BUILDING, IN SECTION 35, R 8
BH0364'W, T 7 S, SET IN THE TOP OF A CONCRETE POST PROJECTING 2 INCHES ABOVE
BH0364'THE LEVEL OF THE GROUND.
BH0364
BH0364                          STATION RECOVERY (1981)
BH0364
BH0364'RECOVERY NOTE BY MISSISSIPPI STATE UNIVERSITY 1981 (RB)
BH0364'RECOVERED IN GOOD CONDITION.
BH0364
BH0364                          STATION RECOVERY (1984)
BH0364
BH0364'RECOVERY NOTE BY JEFFERSON PARISH LOUISIANA 1984
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BH0364'RECOVERED IN GOOD CONDITION.
BH0364
BH0364                          STATION RECOVERY (1987)
BH0364
BH0364'RECOVERY NOTE BY LA TRANSP AND DEV 1987 (TLH)
BH0364'THE DESIGNATED MARK WAS RECOVERED AS PREVIOUSLY DESCRIBED.
BH0364'A COMPLETE NEW DESCRIPTION FOLLOWS.
BH0364'
BH0364'THE STATION IS LOCATED AT THE OCEAN SPRINGS AIRPORT JUST SOUTHEAST
BH0364'OF OCEAN SPRINGS CITY LIMITS.
BH0364'OWNERSHIP--MISSISSIPPI DEPARTMENT OF TRANSPORTATION.
BH0364'
BH0364'TO REACH THE STATION FROM THE JUNCTION OF INTERSTATE HIGHWAY 10 AND
BH0364'A PAVED ROAD (EXIT 50)(ABOUT 4 KM (2.5 MI) NORTH OF OCEAN SPRINGS), GO
BH0364'SOUTH FOR 4.64 KM (2.9 MI) ON THE PAVED ROAD (BECOMES WASHINGTON
BH0364'STREET) TO ITS JUNCTION WITH U.S. HIGHWAY 90.
BH0364'TURN LEFT AND GO EAST FOR 4.42 KM (2.7 MI) ON HIGHWAY 90 (BIENVILLE
BH0364'AVENUE) TO THE OCEAN SPRINGS HOSPITAL ON THE LEFT.
BH0364'CONTINUE STRAIGHT AHEAD AND GO EAST FOR 2.41 KM (1.5 MI) ON HIGHWAY
BH0364'90 TO A PAVED ROAD ON THE RIGHT.
BH0364'TURN RIGHT AND GO SOUTH FOR 1.43 KM (0.9 MI) ON HANSHAW ROAD TO A
BH0364'CROSS ROAD (OLD SPANISH TRAIL).
BH0364'TURN LEFT AND GO EAST FOR 0.39 KM (0.3 MI) ON OLD SPANISH TRAIL TO
BH0364'A PAVED ROAD ON THE RIGHT, JUST PASSED AN AIRPORT RUNWAY ON THE
BH0364'RIGHT.
BH0364'TURN RIGHT AND GO SOUTH FOR 0.94 KM (0.6 MI) ON FOUNTAINBLEAU ROAD
BH0364'TO A ROAD CURVE AND THE STATION ON THE RIGHT.
BH0364'
BH0364'THE STATION IS A STANDARD CGS DISK
BH0364'STAMPED---FONTAINE 1943---,
BH0364'SET INTO THE TOP OF A SQUARE CONCRETE MONUMENT
BH0364'30 CM ON SIDE PROJECTING 10 CM ABOVE GROUND.  LOCATED
BH0364'13.7 METERS (45 FT) NORTHWEST FROM A UTILITY POLE,
BH0364'11.6 METERS (38.1 FT) SOUTHWEST FROM THE CENTER OF THE ROAD,
BH0364'3.4 METERS (11.2 FT) EAST FROM AN AIRPORT FENCE,
BH0364'0.5 METERS (1.6 FT) EAST FROM THE DITCH EDGE AND
BH0364'0.3 METERS (1 FT) EAST FROM A METAL WITNESS POST.
BH0364
BH0364                          STATION RECOVERY (1988)
BH0364
BH0364'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1988 (AJL)
BH0364'THE STATION WAS RECOVERED AT THIS DATE.
BH0364'AS DESCRIBED IN THE SUBSIDANCE STUDY IN LOUISIANA 1987.
BH0364'
BH0364'TYPED BY R.L. ZURFLUH.
BH0364
BH0364                          STATION RECOVERY (1988)
BH0364
BH0364'RECOVERY NOTE BY UNIVERSITY OF MISSISSIPPI 1988 (MS)
BH0364'RECOVERED IN GOOD CONDITION.
BH0364
BH0364                          STATION RECOVERY (1988)
BH0364
BH0364'RECOVERY NOTE BY LA TRANSP AND DEV 1988
BH0364'THE STATION IS LOCATED BETWEEN A PAVED COUNTY ROAD AND THE OCEAN
BH0364'SPRINGS AIRPORT JUST SOUTHEAST OF THE OCEAN SPRINGS CITY LIMIT.
BH0364'OWNERSHIP--DEPARTMENT OF TRANSPORTATION.
BH0364'TO REACH THE STATION FROM THE JUNCTION OF INTERSTATE HIGHWAY 10 AND A
BH0364'PAVED ROAD (EXIT 50, ABOUT 4 KM (2.50 MI) NORTH OF OCEAN SPRINGS), GO
BH0364'SOUTH ON THE PAVED ROAD (BECOMES WASHINGTON AVENUE) FOR 4.64 KM
BH0364'(2.90 MI) TO ITS JUNCTION WITH U S HIGHWAY 90.  TURN LEFT AND GO EAST
BH0364'FOR 4.42 KM (2.75 MI) ON HIGHWAY 90 (BIENVILLE AVENUE) TO THE OCEAN
BH0364'SPRINGS HOSPITAL ON THE LEFT.  CONTINUE STRAIGHT AHEAD AND GO EAST FOR
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BH0364'1.43 KM (0.90 MI) TO A CROSSROAD (OLD SPANISH TRAIL).  TURN LEFT AND
BH0364'GO EAST FOR 0.39 KM (0.25 MI) ON OLD SPANISH TRAIL TO A PAVED ROAD ON
BH0364'THE RIGHT, JUST PAST THE AIRPORT ON THE RIGHT.  TURN RIGHT AND GO
BH0364'SOUTH FOR 0.94 KM (0.60 MI) ON FOUNTAINBLEAU ROAD TO A CURVE LEFT AND
BH0364'THE STATION ON THE RIGHT.
BH0364'THE STATION IS IN A VEE FORMED BY A ROADSIDE DITCH AND A DITCH ALONG
BH0364'THE AIRPORT FENCE, 13.7 M (44.9 FT) NORTHWEST OF A UTILITY POLE, 11.6
BH0364'M (38.1 FT) SOUTHWEST OF THE CENTER OF THE ROAD, 7 M (23.0 FT) SOUTH
BH0364'OF THE POINT OF THE VEE, 3.4 M (11.2 FT) EAST OF THE AIRPORT FENCE,
BH0364'0.5 M (1.6 FT) EAST OF THE DITCH EDGE AND 0.3 M (1.0 FT) EAST OF A
BH0364'METAL WITNESS POST.
BH0364
BH0364                          STATION RECOVERY (1989)
BH0364
BH0364'RECOVERED 1989
BH0364'RECOVERED IN GOOD CONDITION.
BH0364
BH0364                          STATION RECOVERY (2000)
BH0364
BH0364'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 2000
BH0364'RECOVERED AS DESCRIBED.  STATION HAS MARGINAL SKY VISIBILITY FOR GPS
BH0364'OBSERVATIONS.
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The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER 27, 2005
 BH1736 ***********************************************************************
 BH1736  DESIGNATION -  G 482
 BH1736  PID         -  BH1736
 BH1736  STATE/COUNTY-  AL/MOBILE
 BH1736  USGS QUAD   -  LITTLE DAUPHIN ISLAND (1982)
 BH1736
 BH1736                        *CURRENT SURVEY CONTROL
 BH1736  ___________________________________________________________________
 BH1736* NAD 83(1992)-  30 21 03.39082(N)    088 07 16.90573(W)     ADJUSTED
 BH1736* NAVD 88     -         0.608  (meters)       1.99   (feet)  ADJUSTED
 BH1736  ___________________________________________________________________
 BH1736  LAPLACE CORR-           0.59  (seconds)                    DEFLEC99
 BH1736  GEOID HEIGHT-         -28.04  (meters)                     GEOID03
 BH1736  DYNAMIC HT  -           0.608 (meters)       1.99  (feet)  COMP
 BH1736  MODELED GRAV-     979,325.0   (mgal)                       NAVD 88
 BH1736
 BH1736  HORZ ORDER  -  THIRD
 BH1736  VERT ORDER  -  FIRST     CLASS II
 BH1736
 BH1736.The horizontal coordinates were established by GPS observations
 BH1736.and adjusted by the National Geodetic Survey in December 1992.
 BH1736
 BH1736.The orthometric height was determined by differential leveling
 BH1736.and adjusted by the National Geodetic Survey in June 1991.
 BH1736
 BH1736.The Laplace correction was computed from DEFLEC99 derived deflections.
 BH1736
 BH1736.The geoid height was determined by GEOID03.
 BH1736
 BH1736.The dynamic height is computed by dividing the NAVD 88
 BH1736.geopotential number by the normal gravity value computed on the
 BH1736.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 BH1736.degrees latitude (g = 980.6199 gals.).
 BH1736
 BH1736.The modeled gravity was interpolated from observed gravity values.
 BH1736
 BH1736;                    North         East     Units Scale Factor Converg.
 BH1736;SPC AL W     -    39,064.893   540,262.500   MT  0.99997734   -0 18 50.3
 BH1736;UTM  16      - 3,358,206.547   392,226.336   MT  0.99974329   -0 34 00.0
 BH1736
 BH1736!             -  Elev Factor  x  Scale Factor =   Combined Factor
 BH1736!SPC AL W     -   1.00000431  x   0.99997734  =   0.99998165
 BH1736!UTM  16      -   1.00000431  x   0.99974329  =   0.99974760
 BH1736
 BH1736                          SUPERSEDED SURVEY CONTROL
 BH1736
 BH1736  NAD 83(1986)-  30 21 03.41041(N)    088 07 16.90873(W) AD(       ) 3
 BH1736  NGVD 29 (06/24/99)    0.567  (m)            1.86   (f) ADJUSTED    1 2
 BH1736
 BH1736.Superseded values are not recommended for survey control.
 BH1736.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
 BH1736.See file dsdata.txt to determine how the superseded data were derived.
 BH1736
 BH1736_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RCU9222658207(NAD 83)
 BH1736_MARKER: I = METAL ROD
 BH1736_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 BH1736_SP_SET: STAINLESS STEEL ROD
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BH1736_STAMPING: G 482 1984
BH1736_MARK LOGO: NGS
BH1736_PROJECTION: FLUSH
BH1736_MAGNETIC: N = NO MAGNETIC MATERIAL
BH1736_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
BH1736_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BH1736+SATELLITE: SATELLITE OBSERVATIONS - March 05, 2005
BH1736_ROD/PIPE-DEPTH: 18.1 meters
BH1736
BH1736  HISTORY     - Date     Condition        Report By
BH1736  HISTORY     - 1984     MONUMENTED       NGS
BH1736  HISTORY     - 19910129 GOOD             NGS
BH1736  HISTORY     - 20031208 GOOD             JCLS
BH1736  HISTORY     - 20050305 GOOD             USPSQD
BH1736
BH1736                         STATION DESCRIPTION
BH1736
BH1736'DESCRIBED BY NATIONAL GEODETIC SURVEY 1984
BH1736'1.6 KM (1.0 MI) SSW FROM ALABAMA PORT.
BH1736'THE MARK IS 0.61 M BELOW HIGHWAY.
BH1736'1.6 KM (1.0 MI) SOUTH-SOUTHWEST ALONG STATE HIGHWAY 163 FROM THE
BH1736'JUNCTION OF STATE HIGHWAY 188 IN ALABAMA PORT TO THE MARK SET ON THE
BH1736'RIGHT AT A SAND ROAD LEADING EAST-SOUTHEAST BETWEEN TWO WITNESS POST,
BH1736'9.84 METERS (32.3 FT) WEST-NORTHWEST OF THE CENTERLINE OF THE HIGHWAY,
BH1736'4.57 METERS (15.0 FT) SOUTHWEST OF THE APPROXIMATE CENTER OF THE
BH1736'EXTENDED CENTER OF THE SAND ROAD, AND 1.01 METERS (3.3 FT) NORTHEAST
BH1736'OF A GUYED POWERLINE POLE.
BH1736'THE MARK IS 0.30 METERS  SW FROM A WITNESS POST.
BH1736
BH1736                         STATION RECOVERY (1991)
BH1736
BH1736'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1991
BH1736'THE STATION IS LOCATED 1.45 KM (0.90 MI) SOUTH OF THE SMALL COMMUNITY
BH1736'OF ALABAMA PORT, 12.9 KM (8.0 MI) NORTH OF DAUPHIN ISLAND AND ON THE
BH1736'WEST SIDE OF STATE HIGHWAY 193.  OWNERSHIP--ALABAMA DEPARTMENT OF
BH1736'HIGHWAYS, 1409 COLISEUME BOULEVARD, MONTGOMERY, AL 36130.  PHONE
BH1736'205-242-6597.
BH1736'TO REACH THE STATION FROM THE JUNCTION OF STATE HIGHWAYS 193 AND 188
BH1736'IN THE SMALL COMMUNITY OF ALABAMA PORT, GO SOUTH ON STATE HIGHWAY 193
BH1736'FOR 1.45 KM (0.90 MI) TO A SHELL DRIVEWAY ON THE LEFT AND THE STATION
BH1736'ON THE RIGHT ON THE NORTH SIDE OF A POWER POLE AND BETWEEN TWO
BH1736'FIBERGLASS WITNESS POSTS.
BH1736'THE STATION IS FLUSH WITH THE GROUND LOCATED 9.84 M (32.28 FT) WEST OF
BH1736'THE CENTER OF HIGHWAY 193, 4.57 M (14.99 FT) SOUTH OF THE PROJECTED
BH1736'EXTENDED CENTER OF THE SHELL DRIVEWAY, 1.01 M (3.31 FT) NORTHEAST OF
BH1736'A POWER POLE WITH A GUY WIRE, 0.3 M (1.0 FT) SOUTH OF A FIBERGLASS
BH1736'WITNESS POST AND 0.25 M (0.82 FT) NORTH OF A FIBERGLASS WITNESS POST.
BH1736
BH1736                         STATION RECOVERY (2003)
BH1736
BH1736'RECOVERY NOTE BY JOHN CHANCE LAND SURVEYS INC 2003
BH1736'RECOVERED IN GOOD CONDITION.
BH1736
BH1736                         STATION RECOVERY (2005)
BH1736
BH1736'RECOVERY NOTE BY US POWER SQUADRON 2005 (RW)
BH1736'RECOVERED IN GOOD CONDITION.
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The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER 27, 2005
 BH0370 ***********************************************************************
 BH0370  TIDAL BM     -  This is a Tidal Bench Mark.
 BH0370  DESIGNATION -  H 234
 BH0370  PID          -  BH0370
 BH0370  STATE/COUNTY-  MS/JACKSON
 BH0370  USGS QUAD    -  OCEAN SPRINGS (1992)
 BH0370
 BH0370                         *CURRENT SURVEY CONTROL
 BH0370  ___________________________________________________________________
 BH0370* NAD 83(1986)-  30 24 57.     (N)    088 49 06.     (W)     SCALED
 BH0370* NAVD 88      -         6.658  (meters)      21.84   (feet)  ADJUSTED
 BH0370  ___________________________________________________________________
 BH0370  GEOID HEIGHT-         -28.36  (meters)                      GEOID03
 BH0370  DYNAMIC HT   -           6.649 (meters)      21.81  (feet)  COMP
 BH0370  MODELED GRAV-     979,318.8   (mgal)                        NAVD 88
 BH0370
 BH0370  VERT ORDER   -  FIRST     CLASS I
 BH0370
 BH0370.The horizontal coordinates were scaled from a topographic map and have
 BH0370.an estimated accuracy of +/- 6 seconds.
 BH0370
 BH0370.The orthometric height was determined by differential leveling
 BH0370.and adjusted by the National Geodetic Survey in June 1991.
 BH0370
 BH0370.This Tidal Bench Mark is designated as VM 11609
 BH0370.by the Center for Operational Oceanographic Products and Services.
 BH0370
 BH0370.The geoid height was determined by GEOID03.
 BH0370
 BH0370.The dynamic height is computed by dividing the NAVD 88
 BH0370.geopotential number by the normal gravity value computed on the
 BH0370.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 BH0370.degrees latitude (g = 980.6199 gals.).
 BH0370
 BH0370.The modeled gravity was interpolated from observed gravity values.
 BH0370
 BH0370;                    North         East    Units  Estimated Accuracy
 BH0370;SPC MS E     -   101,520.      301,440.      MT  (+/- 180 meters Scaled)
 BH0370
 BH0370                          SUPERSEDED SURVEY CONTROL
 BH0370
 BH0370  NGVD 29 (??/??/??)    6.618  (m)           21.71   (f) ADJUSTED    1 1
 BH0370
 BH0370.Superseded values are not recommended for survey control.
 BH0370.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
 BH0370.See file dsdata.txt to determine how the superseded data were derived.
 BH0370
 BH0370_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RCU253662(NAD 83)
 BH0370_MARKER: DB = BENCH MARK DISK
 BH0370_SETTING: 46 = COPPER-CLAD STEEL ROD W/O SLEEVE (10 FT.+)
 BH0370_SP_SET: 42.7 FEET
 BH0370_STAMPING: H 234 1968
 BH0370_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 BH0370
 BH0370  HISTORY      - Date     Condition        Report By
 BH0370  HISTORY      - 1968     MONUMENTED       CGS
 BH0370  HISTORY      - 1969     GOOD             CGS
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BH0370  HISTORY     - 1981     GOOD             LOCSUR
BH0370
BH0370                          STATION DESCRIPTION
BH0370
BH0370'DESCRIBED BY COAST AND GEODETIC SURVEY 1969
BH0370'IN OCEAN SPRINGS.
BH0370'AT OCEAN SPRINGS, ABOUT 0.5 MILE EAST ALONG THE LOUISVILLE AND
BH0370'NASHVILLE RAILROAD FROM THE STATION, IN SECTION 19, R 8 W, T 7 S, AT
BH0370'THE CROSSING OF VERMONT STREET, 167 FEET NORTH OF THE NORTH RAIL, 66
BH0370'1/2 FEET EAST OF THE CENTER LINE OF VERMONT STREET, 81 FEET SOUTH OF
BH0370'THE CENTER LINE OF THE EASTBOUND LANE OF U.S. HIGHWAY 90, 1.5 FEET
BH0370'SOUTH OF THE NORTHEAST CORNER OF A CHAIN LINK FENCE AROUND A POWER
BH0370'SUB-STATION, 0.5 FOOT EAST OF THE NORTH-SOUTH FENCE AROUND THE
BH0370'STATION, 0.4 FOOT EAST OF A METAL WITNESS POST, ABOUT LEVEL WITH THE
BH0370'HIGHWAY, 3 FEET BELOW THE LEVEL OF THE TRACK AND IS A DISK ON THE TOP
BH0370'OF A COPPER COATED STEEL ROD PROJECTING 2 INCHES ABOVE THE LEVEL OF
BH0370'THE GROUND AND PROTECTED BY A 4 INCH METAL PIPE WHICH PROJECTS 3
BH0370'INCHES ABOVE THE LEVEL OF THE GROUND.  THE ROD WAS DRIVEN TO REFUSAL
BH0370'AT A DEPTH OF 42.7 FEET.
BH0370
BH0370                          STATION RECOVERY (1981)
BH0370
BH0370'RECOVERY NOTE BY LOCAL SURVEYOR (INDIVIDUAL OR FIRM) 1981
BH0370'RECOVERED IN GOOD CONDITION.
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The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER 27, 2005
 BH3225 ***********************************************************************
 BH3225  CBN         -  This is a Cooperative Base Network Control Station.
 BH3225  DESIGNATION -  K 364
 BH3225  PID         -  BH3225
 BH3225  STATE/COUNTY-  MS/JACKSON
 BH3225  USGS QUAD   -  GAUTIER NORTH (1982)
 BH3225
 BH3225                        *CURRENT SURVEY CONTROL
 BH3225  ___________________________________________________________________
 BH3225* NAD 83(1993)-  30 24 10.44247(N)    088 43 06.87162(W)     ADJUSTED
 BH3225* NAVD 88     -         7.566  (meters)      24.82   (feet)  ADJUSTED
 BH3225  ___________________________________________________________________
 BH3225  X           -     123,126.730 (meters)                     COMP
 BH3225  Y           -  -5,504,394.070 (meters)                     COMP
 BH3225  Z           -   3,208,964.476 (meters)                     COMP
 BH3225  LAPLACE CORR-          -0.14  (seconds)                    DEFLEC99
 BH3225  ELLIP HEIGHT-         -20.73  (meters)          (04/15/02) GPS OBS
 BH3225  GEOID HEIGHT-         -28.34  (meters)                     GEOID03
 BH3225  DYNAMIC HT  -           7.556 (meters)      24.79  (feet)  COMP
 BH3225  MODELED GRAV-     979,320.7   (mgal)                       NAVD 88
 BH3225
 BH3225  HORZ ORDER  -  B
 BH3225  VERT ORDER  -  FIRST     CLASS II
 BH3225  ELLP ORDER  -  FOURTH    CLASS II
 BH3225
 BH3225.The horizontal coordinates were established by GPS observations
 BH3225.and adjusted by the National Geodetic Survey in February 2002.
 BH3225
 BH3225.The orthometric height was determined by differential leveling
 BH3225.and adjusted by the National Geodetic Survey in September 1993.
 BH3225
 BH3225.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 BH3225
 BH3225.The Laplace correction was computed from DEFLEC99 derived deflections.
 BH3225
 BH3225.The ellipsoidal height was determined by GPS observations
 BH3225.and is referenced to NAD 83.
 BH3225
 BH3225.The geoid height was determined by GEOID03.
 BH3225
 BH3225.The dynamic height is computed by dividing the NAVD 88
 BH3225.geopotential number by the normal gravity value computed on the
 BH3225.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 BH3225.degrees latitude (g = 980.6199 gals.).
 BH3225
 BH3225.The modeled gravity was interpolated from observed gravity values.
 BH3225
 BH3225;                    North         East     Units Scale Factor Converg.
 BH3225;SPC MS E     -   100,088.603   311,027.013   MT  0.99995150   +0 03 29.1
 BH3225;UTM  16      - 3,364,684.636   334,908.856   MT  0.99993624   -0 52 11.7
 BH3225
 BH3225!             -  Elev Factor  x  Scale Factor =   Combined Factor
 BH3225!SPC MS E     -   1.00000326  x   0.99995150  =   0.99995476
 BH3225!UTM  16      -   1.00000326  x   0.99993624  =   0.99993950
 BH3225
 BH3225                          SUPERSEDED SURVEY CONTROL
 BH3225
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BH3225  ELLIP H (02/15/02)  -20.73   (m)                        GP(       ) 4 1
BH3225  NAVD 88 (02/15/02)    7.57   (m)           24.8    (f) LEVELING    3
BH3225
BH3225.Superseded values are not recommended for survey control.
BH3225.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
BH3225.See file dsdata.txt to determine how the superseded data were derived.
BH3225
BH3225_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RCU3490964685(NAD 83)
BH3225_MARKER: F = FLANGE-ENCASED ROD
BH3225_SETTING: 59 = STAINLESS STEEL ROD IN SLEEVE (10 FT.+)
BH3225_SP_SET: STAINLESS STEEL ROD IN SLEEVE
BH3225_STAMPING: K 364 1993
BH3225_MARK LOGO: NGS
BH3225_PROJECTION: FLUSH
BH3225_MAGNETIC: N = NO MAGNETIC MATERIAL
BH3225_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
BH3225+STABILITY: POSITION/ELEVATION WELL
BH3225_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BH3225+SATELLITE: SATELLITE OBSERVATIONS - January 10, 2004
BH3225_ROD/PIPE-DEPTH: 17.0 meters
BH3225_SLEEVE-DEPTH  : 7.0 meters
BH3225
BH3225  HISTORY     - Date     Condition        Report By
BH3225  HISTORY     - 1993     MONUMENTED       NGS
BH3225  HISTORY     - 20000316 GOOD             NGS
BH3225  HISTORY     - 20040110 GOOD             COMPA
BH3225
BH3225                          STATION DESCRIPTION
BH3225
BH3225'DESCRIBED BY NATIONAL GEODETIC SURVEY 1993
BH3225'14.2 KM (8.80 MI) SOUTHERLY ALONG STATE HIGHWAY 57 FROM THE POST
BH3225'OFFICE IN VANCLEAVE, 70.1 M (230.0 FT) EAST OF THE CENTERLINE OF THE
BH3225'NORTHBOUND LANES OF THE HIGHWAY, 60.9 M (199.8 FT) NORTH-NORTHEAST OF
BH3225'THE CENTERLINE OF THE WESTBOUND LANES OF U.S. HIGHWAY 90, 3.5 M
BH3225'(11.5 FT) SOUTH OF A UTILITY POLE, 1.5 M (4.9 FT) SOUTHWEST OF A
BH3225'WITNESS POST, AND 0.5 M (1.6 FT) ABOVE THE LEVEL OF THE HIGHWAY.
BH3225'NOTE--ACCESS TO THE DATUM POINT IS THROUGH A 5-INCH LOGO CAP.
BH3225
BH3225                          STATION RECOVERY (2000)
BH3225
BH3225'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 2000
BH3225'RECOVERED AS DESCRIBED.
BH3225
BH3225                          STATION RECOVERY (2004)
BH3225
BH3225'RECOVERY NOTE BY COMPASSCOM INC 2004 (IR)
BH3225'RECOVERED IN GOOD CONDITION.
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The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER 27, 2005
 BH1014 ***********************************************************************
 BH1014  DESIGNATION -  KILN
 BH1014  PID         -  BH1014
 BH1014  STATE/COUNTY-  MS/HANCOCK
 BH1014  USGS QUAD   -  KILN (1976)
 BH1014
 BH1014                        *CURRENT SURVEY CONTROL
 BH1014  ___________________________________________________________________
 BH1014* NAD 83(1993)-  30 25 08.90683(N)    089 27 01.30002(W)     ADJUSTED
 BH1014* NAVD 88     -        14.608  (meters)      47.93   (feet)  ADJUSTED
 BH1014  ___________________________________________________________________
 BH1014  X           -      52,807.419 (meters)                     COMP
 BH1014  Y           -  -5,504,613.105 (meters)                     COMP
 BH1014  Z           -   3,210,521.097 (meters)                     COMP
 BH1014  LAPLACE CORR-          -2.40  (seconds)                    DEFLEC99
 BH1014  ELLIP HEIGHT-         -12.91  (meters)          (05/13/94) GPS OBS
 BH1014  GEOID HEIGHT-         -27.63  (meters)                     GEOID03
 BH1014  DYNAMIC HT  -          14.589 (meters)      47.86  (feet)  COMP
 BH1014  MODELED GRAV-     979,331.3   (mgal)                       NAVD 88
 BH1014
 BH1014  HORZ ORDER  -  FIRST
 BH1014  VERT ORDER  -  FIRST     CLASS II
 BH1014  ELLP ORDER  -  FOURTH    CLASS I
 BH1014
 BH1014.The horizontal coordinates were established by classical geodetic methods
 BH1014.and adjusted by the National Geodetic Survey in May 1994.
 BH1014
 BH1014.The orthometric height was determined by differential leveling
 BH1014.and adjusted by the National Geodetic Survey in February 1994.
 BH1014
 BH1014.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 BH1014
 BH1014.The Laplace correction was computed from DEFLEC99 derived deflections.
 BH1014
 BH1014.The ellipsoidal height was determined by GPS observations
 BH1014.and is referenced to NAD 83.
 BH1014
 BH1014.The geoid height was determined by GEOID03.
 BH1014
 BH1014.The dynamic height is computed by dividing the NAVD 88
 BH1014.geopotential number by the normal gravity value computed on the
 BH1014.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 BH1014.degrees latitude (g = 980.6199 gals.).
 BH1014
 BH1014.The modeled gravity was interpolated from observed gravity values.
 BH1014
 BH1014;                    North         East     Units Scale Factor Converg.
 BH1014;SPC MS E     -   102,044.914   240,719.459   MT  0.99999334   -0 18 44.7
 BH1014;UTM  16      - 3,367,780.308   264,632.573   MT  1.00028347   -1 14 28.5
 BH1014
 BH1014!             -  Elev Factor  x  Scale Factor =   Combined Factor
 BH1014!SPC MS E     -   1.00000203  x   0.99999334  =   0.99999537
 BH1014!UTM  16      -   1.00000203  x   1.00028347  =   1.00028550
 BH1014
 BH1014:                Primary Azimuth Mark                     Grid Az
 BH1014:SPC MS E     -  KILN AZ MK                               316 28 56.5
 BH1014:UTM  16      -  KILN AZ MK                               317 24 40.3
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BH1014
BH1014|-----------------------------------------------------------------|
BH1014| PID    Reference Object                    Distance      Geod. Az  |
BH1014|                                                          dddmmss.s |
BH1014| BH1017 KILN RM 1                         161.325 METERS 03344     |
BH1014| BH1016 KILN RM 2                          30.742 METERS 25813     |
BH1014| DD9014 KILN AZ MK                                       3161011.8 |
BH1014| BH2727 ROCKY HILL LOT                    APPROX. 3.6 KM 3541551.8 |
BH1014| BH1015 KILN RM 3                          41.029 METERS 35613     |
BH1014|-----------------------------------------------------------------|
BH1014
BH1014                          SUPERSEDED SURVEY CONTROL
BH1014
BH1014  ELLIP H (01/21/93)  -12.96   (m)                       GP(       ) 4 2
BH1014  NAD 83(1986)-  30 25 08.92105(N)    089 27 01.29433(W) AD(       ) 1
BH1014  NAD 27      -  30 25 08.22700(N)    089 27 01.10700(W) AD(       ) 1
BH1014  NGVD 29 (??/??/??)   14.673  (m)           48.14   (f) ADJUSTED    1 2
BH1014
BH1014.Superseded values are not recommended for survey control.
BH1014.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
BH1014.See file dsdata.txt to determine how the superseded data were derived.
BH1014
BH1014_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RBU6463367780(NAD 83)
BH1014_MARKER: DS = TRIANGULATION STATION DISK
BH1014_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
BH1014_SP_SET: CONCRETE POST
BH1014_STAMPING: KILN 1931
BH1014_MARK LOGO: CGS
BH1014_MAGNETIC: N = NO MAGNETIC MATERIAL
BH1014_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
BH1014+STABILITY: SURFACE MOTION
BH1014_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BH1014+SATELLITE: SATELLITE OBSERVATIONS - November 13, 1999
BH1014
BH1014  HISTORY     - Date     Condition        Report By
BH1014  HISTORY     - 1931     MONUMENTED       CGS
BH1014  HISTORY     - 1943     GOOD             CGS
BH1014  HISTORY     - 1951     GOOD             CGS
BH1014  HISTORY     - 1959     GOOD             CGS
BH1014  HISTORY     - 1972     GOOD             NGS
BH1014  HISTORY     - 1972     GOOD             NGS
BH1014  HISTORY     - 1975     GOOD             LOCENG
BH1014  HISTORY     - 1986     GOOD             NGS
BH1014  HISTORY     - 19880304 GOOD
BH1014  HISTORY     - 1989     GOOD             USPSQD
BH1014  HISTORY     - 19930312 GOOD             NGS
BH1014  HISTORY     - 19991113 GOOD             LOCSUR
BH1014
BH1014                          STATION DESCRIPTION
BH1014
BH1014'DESCRIBED BY COAST AND GEODETIC SURVEY 1931 (FLG)
BH1014'ABOUT 11 MILES NW OF BAY ST. LOUIS, AND 3 MILES NW OF THE HINES
BH1014'SAWMILL AT KILN, ON THE S SIDE OF THE KILN-PICAYUNE GRAVEL ROAD,
BH1014'0.8 MILE NW OF THE CROSSROADS IN KILN.  THE STATION IS ON
BH1014'UNCULTIVATED LAND OWNED BY ALBERT DUBUISSON WHO LIVES ABOUT 550
BH1014'FEET N.  THE HOUSE AND STORE OF MR. DEPREO IS ABOUT THE SAME DISTANCE
BH1014'W.  THE MARK, WHICH IS 6 INCHES ABOVE THE SURFACE, IS 205 FEET
BH1014'S OF A ABANDONED LOGGING RAILROAD, 51 FEET S OF THE CENTER LINE OF
BH1014'THE PICAYUNE ROAD, 210 FEET E OF THE LANE TO MR. DUBUISSONS HOUSE.
BH1014'
BH1014'SURFACE, UNDERGROUND, AND REFERENCE MARKS ARE BRONZE DISKS SET IN
BH1014'CONCRETE.
BH1014'
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BH1014'REFERENCE MARK NO. 1, 4 INCHES ABOVE, IS JUST OUTSIDE THE SE CORNER
BH1014'OF THE FRONT YARD OF MR. DUBUISSONS HOUSE, 35 FEET SE OF THE HOUSE,
BH1014'AND 1 FOOT SE OF THE FENCE CORNER.
BH1014'
BH1014'REFERENCE MARK NO. 2, 4 INCHES ABOVE, IS 135 FEET S OF THE CENTER
BH1014'LINE OF THE HIGHWAY.
BH1014'
BH1014'REACHED FROM KILN BY GOING 0.8 MILE NW ON THE PICAYUNE ROAD FROM ITS
BH1014'JUNCTION IN THE VILLAGE WITH THE BAY ST. LOUIS ROAD.
BH1014'
BH1014'HEIGHT OF SIGNAL ABOVE STATION MARK 31 METERS.
BH1014
BH1014                          STATION RECOVERY (1943)
BH1014
BH1014'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1943 (KBJ)
BH1014'STATION WAS RECOVERED AS DESCRIBED, ALL MARKS WERE FOUND TO BE IN
BH1014'GOOD CONDITION, ALL DISTANCES TO REFERENCE MARKS WERE CHECKED
BH1014'AND FOUND TO BE CORRECT, A SLIGHT DIFFERENCE WAS FOUND IN THE
BH1014'DIRECTION OF REFERENCE MARK AS NOTED BELOW.  A NEW AZIMUTH MARK WAS
BH1014'ESTABLISHED BY THIS PARTY AS DESCRIBED BELOW.
BH1014'
BH1014'AZIMUTH MARK IS ABOUT 0.4 MILE NW OF THE STATION, 2.3 FEET E OF A
BH1014'STANDARD REFERENCE POST, 37.0 FEET E OF THE CENTER OF THE ROAD.
BH1014'THE DISK IS STAMPED KILN 1943.
BH1014'
BH1014'TO REACH AZIMUTH MARK FROM THE STATION GO NW 0.4 MILE ON MAIN ROAD TO
BH1014'A T-ROAD RIGHT, TURN RIGHT AND GO 0.05 MILE TO AZIMUTH MARK ON
BH1014'THE RIGHT SIDE OF THE ROAD.
BH1014
BH1014                          STATION RECOVERY (1951)
BH1014
BH1014'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1951 (PLB)
BH1014'STATION MARK, REFERENCE MARKS 1 AND 2, AND AZIMUTH MARK WERE ALL
BH1014'RECOVERED IN GOOD CONDITION.  DISTANCES TO REFERENCE MARKS 1 AND 2
BH1014'WERE MEASURED AND FOUND CORRECT AS IN 1943 RECOVERY NOTE BY K.B.J.
BH1014'THE ORIGINAL DESCRIPTION AND 1943 RECOVERY ARE INADEQUATE AND A
BH1014'COMPLETE NEW DESCRIPTION FOLLOW-
BH1014'
BH1014'STATION IS LOCATED ABOUT 11.0 MILES NW OF BAY ST. LOUIS AND 1.2 MILES
BH1014'NW OF THE TOWN OF KILN.  IT IS ON UNCULTIVATED LAND OWNED BY J.J.
BH1014'TOOMEY, WHOSE HOUSE IS ABOUT 550 FEET N OF THE STATION.  THE HOUSE OF
BH1014'MR DEPREO IS ABOUT THE SAME DISTANCE W.  THE STATION IS 8 FEET NW
BH1014'OF A WOODEN WITNESS POST, 205 FEET S OF A POWER LINE, 51 FEET S OF
BH1014'THE CENTER LINE OF KILN-PICAYUNE ROAD, 210 FEET E OF THE
BH1014'DRIVEWAY TO J.J. TOOMEYS HOUSE.
BH1014'
BH1014'STATION MARK IS A STANDARD DISK, STAMPED KILN 1931, AND SET IN A
BH1014'SQUARE CONCRETE MONUMENT PROJECTING APPROXIMATELY 8 INCHES.
BH1014'
BH1014'REFERENCE MARK 1 IS NE OF THE STATION, JUST OUTSIDE THE SW CORNER OF
BH1014'THE FRONT YARD OF J.J. TOOMEYS HOUSE, ABOUT 25 FEET SW OF THE
BH1014'HOUSE, AND 1 FOOT SW OF THE FENCE CORNER.  IT IS STAMPED NO 1 KILN
BH1014'1931, AND IS SET IN SQUARE CONCRETE MONUMENT PROJECTING
BH1014'APPROXIMATELY 4 INCHES.
BH1014'
BH1014'REFERENCE MARK 2 IS SW OF THE STATION AND APPROXIMATELY 135 FEET S OF
BH1014'THE CENTER LINE OF KILN-PICAYUNE ROAD.  IT IS STAMPED NO 2 KILN
BH1014'1931, AND IS SET IN SQUARE CONCRETE MONUMENT PROJECTING APPROXIMATELY
BH1014'3 INCHES.
BH1014'
BH1014'AZIMUTH MARK IS APPROXIMATELY 0.4 MILE NW OF THE STATION AND 37 FEET
BH1014'E OF THE CENTER LINE OF A N-S DIRT ROAD.  IT IS STAMPED KILN
BH1014'1943, AND IS SET IN SQUARE CONCRETE MONUMENT PROJECTING APPROXIMATELY
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BH1014'4 INCHES.  TO REACH FROM THE STATION, GO NW ON KILN-PICAYUNE
BH1014'ROAD 0.4 MILE TO T ROAD TO RIGHT, GO N 0.15 MILE TO AZIMUTH MARK ON E
BH1014'SIDE OF THE ROAD, AND APPROXIMATELY HALFWAY BETWEEN TWO
BH1014'TELEPHONE POLES.
BH1014'
BH1014'TO REACH THE STATION FROM THE W END OF U.S. HIGHWAY 90 BRIDGE IN BAY
BH1014'ST LOUIS, GO W ON U.S. HIGHWAY 90 FOR 3.4 MILES TO MISSISSIPPI
BH1014'STATE HIGHWAY 603 (NICHOLSON AVENUE OR KILN ROAD), N ON STATE HIGHWAY
BH1014'603 FOR 10.2 MILES TO THE CROSSROADS IN KILN (STATE HIGHWAY
BH1014'603 AND KILN-PICAYUNE ROAD), W ON KILN-PICAYUNE ROAD 1.2 MILE TO
BH1014'STATION SITE S OF THE ROAD.
BH1014
BH1014                          STATION RECOVERY (1959)
BH1014
BH1014'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1959 (CRR)
BH1014'THE STATION WAS VISITED 3-16-59 AND ALL MARKS WERE FOUND IN GOOD
BH1014'CONDITION.  THE 51 RECOVERY NOTE BY P.L.B. IS ADEQUATE.  A
BH1014'METAL WITNESS POST WAS SET 1 FOOT NORTH OF STATION.
BH1014
BH1014                          STATION RECOVERY (1972)
BH1014
BH1014'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1972 (LFS)
BH1014'THE STATION WAS VISITED 7-16-72 AND THE STATION AND THE AZIMUTH MARK
BH1014'WERE FOUND IN GOOD CONDITION.  THE AZIMUTH MARK IS OBSTRUCTED
BH1014'FROM THE STATION.  RM NO 1 WAS DISTURBED SLIGHTLY AND A NEW DISTANCE
BH1014'AND DIRECTION WAS TAKEN TO THE MARK.  A POLARIS OBSERVATION
BH1014'WAS TAKEN TO THE MARK.  RM NO 2 WAS DISTURBED SLIGHTLY.  RM NO 3 WAS
BH1014'ESTABLISHED AT THIS DATE.  A NEW DESCRIPTION FOLLOWS-
BH1014'
BH1014'THE STATION IS LOCATED 1.1 MILES NORTHWEST OF KILN, 9.9 MILES
BH1014'NORTHWEST OF BAY ST. LOUIS, 15.5 MILES SOUTHEAST OF PICAYUNE
BH1014'IN THE SOUTHEAST 1/4 OF SECTION 24, T 7S, R 15W, ON LAND OWNED BY MR.
BH1014'J. CALIX WHOSE RESIDENCE IS AT THE STATION.  IT IS 38 FEET
BH1014'SOUTHWEST OF THE CENTER OF A BLACK TOP ROAD, 20 FEET SOUTHEAST OF THE
BH1014'CENTER OF A DRIVEWAY, 36 FEET EAST-NORTHEAST OF THE NORTHWEST
BH1014'CORNER OF THE PORCH OF A FRAME HOUSE, 99.5 FEET EAST OF A POWER
BH1014'SERVICE POLE, 65.5 FEET NORHTWEST OF THE EAST CORNER OF THE YARD
BH1014'
BH1014'IT IS A TRIANGULATION DISK, STAMPED KILN 1931 PROJECTING 8 INCHES.
BH1014'
BH1014'REFERENCE MARK NO 1 IS 529.28 FEET NORTHEAST OF THE STATION.  IT IS
BH1014'27.5 FEET SOUTHWEST OF THE SOUTHWEST CORNER OF A FRAME HOUSE
BH1014'OWNED BY MR. A.V. NECAISE, 44 FEET SOUTH OF A POWER SERVICE POLE,
BH1014'34.5 FEET WEST OF THE SOUTHWEST CORNER OF A WALK, 22 FEET
BH1014'WEST OF THE PROJECTED PLANE OF THE WEST WALL OF A FRAME HOUSE AND 69
BH1014'FEET NORTH OF THE PROJECTED CENTER OF A PRIVATE ROAD, IT IS A
BH1014'REFERENCE MARK DISK, STAMPED NO 1 KILN 1931.
BH1014'
BH1014'REFERENCE MARK NO 2 IS 100.86 FEET SOUTHWEST OF THE STATION.  IT IS
BH1014'126 FEET SOUTHWEST OF THE CENTER OF A BLACK TOP ROAD, 42.5 FEET
BH1014'WEST OF THE SOUTHWEST CORNER OF A FRAME HOUSE, 38 FEET SOUTH OF A
BH1014'POWER SERVICE POLE, 21.5 FEET SOUTH OF A FENCE CORNER AND 1
BH1014'FOOT EAST OF A FENCE.  IT IS A REFERENCE MARK DISK, STAMPED NO 2 KILN
BH1014'1931.
BH1014'
BH1014'REFERENCE MARK NO 3 IS 134.61 FEET NORTH OF THE STATION.  IT IS 45
BH1014'FEET NORTHEAST OF THE CENTER LINE OF A BLACK TOP ROAD, 6.5 FEET
BH1014'WEST OF AN 18 INCH PINE TREE, 1.5 FEET SOUTHWEST OF A FENCE LINE, AND
BH1014'1 FOOT NORTHEAST OF A METAL WITNESS POST.  A REFERENCE MARK
BH1014'DISK STAMPED KILN 1931 NO 3 1972 PROJECTING 3 INCHES.
BH1014'
BH1014'THE AZIMUTH MARK IS 0.5 MILES NORTHWEST OF THE STATION.  IT IS 189
BH1014'FEET SOUTH OF THE PROJECTED CENTER OF A DRIVEWAY, 36 FEET EAST OF
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BH1014'THE CENTER OF A GRAVELED ROAD, 27 FEET WEST OF A POWER LINE, 87 FEET
BH1014'SOUTHEAST AND ACROSS THE ROAD FROM A T FENCE CORNER AND 1.5
BH1014'FEET EAST OF A METAL WITNESS POST.  IT IS AN AZIMUTH MARK DISK,
BH1014'STAMPED KILN 1943 PROJECTING 4 INCHES.
BH1014'
BH1014'TO REACH THE STATION FROM THE U.S. POST OFFICE IN KILN GO EAST AND
BH1014'NORTH ON STATE HIGHWAY 603 AND 43 FOR 0.6 MILES TO A CROSSROAD.
BH1014'TURN LEFT AND GO WEST ON A BLACK TOP ROAD FOR 0.6 MILES TO A SIDE
BH1014'ROAD LEFT JUST BEFORE REACHING A CONCRETE BRIDGE.  CONTINUE
BH1014'NORTHWEST ON A BLACK TOP ROAD FOR 0.65 MILES TO A FRAME HOUSE AND THE
BH1014'STATION ON THE LEFT.  TO REACH THE AZIMUTH CONTINUE NORTHWEST ON A
BH1014'BLACK TOP ROAD FOR 0.45 MILES TO A SIDE ROAD RIGHT, 0.1 MILES BEYOND
BH1014'ANOTHER SIDE ROAD RIGHT.  TURN RIGHT AND GO NORTH ON A GRAVELED
BH1014'ROAD 0.15 MILES TO THE MARK ON THE RIGHT.
BH1014
BH1014                          STATION RECOVERY (1972)
BH1014
BH1014'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1972
BH1014'2.15 MI W FROM KILN.
BH1014'LOCATED ABOUT 2.15 MILES WEST ALONG BLACK TOP ROAD FROM THE
BH1014'CONSOLIDATED SCHOOL IN KILN, 1.15 MILE NORTHWEST OF THE JUNCTION WITH
BH1014'STATE HIGHWAY 603 IN THE S 1/4 OD SEC. 29, T 7 S., R 15 W, ON LAND
BH1014'OWNED AND IN THE FRONT YARD OF THE RESIDENCE OF J CALIX.  IT IS 38
BH1014'FEET SOUTHWEST OF THE CENTER OF THE BLACK TOP ROAD, 20 FEET SOUTHEAST
BH1014'OF THE CENTER OF THE DRIVEWAY, 36 FEET EAST-NORTHEAST OF THE NORTHWEST
BH1014'CORNER OF THE PORCH OF THE HOUSE, 99.5 FEET EAST OF A POWER POLE, 65.5
BH1014'FEET NORTHWEST OF THE EAST CORNER OF A YARD FENCE, 8 FEET SOUTHWEST OF
BH1014'A FENCE.  IT IS A TRIANGULATION STATION DISK PROJECTING 8 INCHES.
BH1014
BH1014                          STATION RECOVERY (1975)
BH1014
BH1014'RECOVERY NOTE BY LOCAL ENGINEER (INDIVIDUAL OR FIRM) 1975 (CDS)
BH1014'KILN 1931 TRIANGULATION STATION GOOD - THE DISC IS SCRATCHED
BH1014'SLIGHTLY, HOWEVER ALL STAMPINGS ARE LEGIBLE.
BH1014'
BH1014'KILN 1943 AZI. MK. GOOD
BH1014'
BH1014'KILN NO. 1 1931 REF. MK. GOOD - NOTE, THIS R.M. WAS DISTURBED
BH1014'SLIGHTLY WHEN A LARGE PECAN TREE NEAR THE MARK WAS BLOWN DOWN
BH1014'AND A BULLDOZER CLEARING THE AREA HIT THE CONCRETE POST CAUSING
BH1014'IT TO LEAN TOWARD THE NORTHEAST.  THE DISC WAS NOT DAMAGED AND
BH1014'THE CONCRETE POST IS SOLID IN THE GROUND.  THE N.E. CORNER OF
BH1014'THE POST IS APPROX., 1-1/2 IN LOWER THAN THE S.W. CORNER.  THE
BH1014'MARK IS ABOUT LEVEL WITH THE GROUND.
BH1014'
BH1014'KILN NO.2 1931 R.M. GOOD
BH1014'
BH1014'KILN NO 3 1931 1972 RM GOOD
BH1014
BH1014                          STATION RECOVERY (1986)
BH1014
BH1014'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1986 (AJL)
BH1014'THE STATION WAS RECOVERED AT THIS DATE.
BH1014'A NEW TO REACH FOLLOWS.
BH1014'
BH1014'OWNERSHIP--FRANCIS NECAISE, PHONE (601) 255-1690.
BH1014'
BH1014'TO REACH THE STATION FROM THE POST OFFICE IN KILN, GO
BH1014'NORTHEAST FOR 1.0 KM (0.6 MI) ON STATE HIGHWAYS 43 AND 603 TO A
BH1014'CROSSROAD.
BH1014'TURN LEFT AND GO WEST FOR 2.0 KM (1.25 MI) ON KILN-PICAYUNE ROAD TO
BH1014'THE FIRST SMALL WHITE FRAME HOUSE IN A GROUP OF HOUSES AND THE
BH1014'STATION ON THE LEFT, IN THE FRONT LAWN OF THE HOUSE.
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BH1014'
BH1014'DESCRIBED BY D.D. REXRODE, TYPED BY R.L. ZURFLUH.
BH1014
BH1014                          STATION RECOVERY (1988)
BH1014
BH1014'RECOVERED 1988
BH1014'RECOVERED IN GOOD CONDITION.
BH1014
BH1014                          STATION RECOVERY (1989)
BH1014
BH1014'RECOVERY NOTE BY US POWER SQUADRON 1989 (RLR)
BH1014'RECOVERED IN GOOD CONDITION.
BH1014
BH1014                          STATION RECOVERY (1993)
BH1014
BH1014'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1993
BH1014'15.8 KM (9.80 MI) NORTHERLY ALONG STATE HIGHWAY 43 FROM THE JUNCTION
BH1014'OF U.S. HIGHWAY 90 IN WAVELAND, THENCE 1.9 KM (1.20 MI)
BH1014'NORTHWESTERLY ALONG OLD KILN ROAD, 30.8 M (101.0 FT) NORTHEAST OF
BH1014'REFERENCE MARK 2, 14.7 M (48.2 FT) NORTH OF THE EAST CORNER OF HOUSE
BH1014'NUMBER 7301, 11.7 M (38.4 FT) SOUTHWEST OF THE CENTERLINE OF THE
BH1014'ROAD, 6.5 M (21.3 FT) SOUTHEAST OF THE CENTER OF A GRAVELED DRIVEWAY,
BH1014'0.3 M (1.0 FT) ABOVE THE LEVEL OF THE ROAD, AND THE MONUMENT PROJECTS
BH1014'0.15 M (0.49 FT) ABOVE THE GROUND SURFACE.
BH1014
BH1014                          STATION RECOVERY (1999)
BH1014
BH1014'RECOVERY NOTE BY LOCAL SURVEYOR (INDIVIDUAL OR FIRM) 1999 (BMF)
BH1014'RECOVERED AS DESCRIBED.
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The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER 27, 2005
 BH0485 ***********************************************************************
 BH0485  CBN         -  This is a Cooperative Base Network Control Station.
 BH0485  DESIGNATION -  MORIS
 BH0485  PID         -  BH0485
 BH0485  STATE/COUNTY-  MS/JACKSON
 BH0485  USGS QUAD   -  HARLESTON (1982)
 BH0485
 BH0485                        *CURRENT SURVEY CONTROL
 BH0485  ___________________________________________________________________
 BH0485* NAD 83(1993)-  30 42 22.17874(N)    088 30 34.56789(W)     ADJUSTED
 BH0485* NAVD 88     -        33.3    (meters)     109.     (feet)  GPS OBS
 BH0485  ___________________________________________________________________
 BH0485  X           -     142,757.927 (meters)                     COMP
 BH0485  Y           -  -5,486,845.007 (meters)                     COMP
 BH0485  Z           -   3,237,928.965 (meters)                     COMP
 BH0485  LAPLACE CORR-           0.45  (seconds)                   DEFLEC99
 BH0485  ELLIP HEIGHT-           4.58  (meters)          (04/15/02) GPS OBS
 BH0485  GEOID HEIGHT-         -28.72  (meters)                     GEOID03
 BH0485
 BH0485  HORZ ORDER  -  B
 BH0485  VERT ORDER  -  SECOND    CLASS 0 (See Below)
 BH0485  ELLP ORDER  -  FOURTH    CLASS II
 BH0485
 BH0485.The horizontal coordinates were established by GPS observations
 BH0485.and adjusted by the National Geodetic Survey in February 2002.
 BH0485
 BH0485.The orthometric height was determined by GPS observations and a
 BH0485.high-resolution geoid model.
 BH0485.The vertical order pertains to the NGVD 29 superseded value.
 BH0485
 BH0485.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 BH0485
 BH0485.The Laplace correction was computed from DEFLEC99 derived deflections.
 BH0485
 BH0485.The ellipsoidal height was determined by GPS observations
 BH0485.and is referenced to NAD 83.
 BH0485
 BH0485.The geoid height was determined by GEOID03.
 BH0485
 BH0485;                    North         East     Units Scale Factor Converg.
 BH0485;SPC MS E     -   133,746.039   331,010.629   MT  0.99996186   +0 09 55.1
 BH0485;UTM  16      - 3,398,010.527   355,436.156   MT  0.99985781   -0 46 15.6
 BH0485
 BH0485!             -  Elev Factor  x  Scale Factor =   Combined Factor
 BH0485!SPC MS E     -   0.99999928  x   0.99996186  =   0.99996114
 BH0485!UTM  16      -   0.99999928  x   0.99985781  =   0.99985709
 BH0485
 BH0485:                Primary Azimuth Mark                     Grid Az
 BH0485:SPC MS E     -  MACE                                     173 23 35.2
 BH0485:UTM  16      -  MACE                                     174 19 45.9
 BH0485
 BH0485|---------------------------------------------------------------------|
 BH0485| PID    Reference Object                     Distance      Geod. Az  |
 BH0485|                                                           dddmmss.s |
 BH0485| BH0487 MACE                                APPROX. 0.6 KM 1733330.3 |
 BH0485| DD9185 MORIS RM 1                                        23332     |
 BH0485| BH0486 MORIS RM 2                                        35046     |
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BH0485|---------------------------------------------------------------------|
BH0485
BH0485                          SUPERSEDED SURVEY CONTROL
BH0485
BH0485  ELLIP H (02/15/02)    4.58   (m)                       GP(       ) 4 1
BH0485  NAD 83(1993)-  30 42 22.17796(N)    088 30 34.56370(W) AD(       ) 2
BH0485  NAD 83(1993)-  30 42 22.18348(N)    088 30 34.55901(W) AD(       ) 2
BH0485  NAD 83(1986)-  30 42 22.19817(N)    088 30 34.56316(W) AD(       ) 2
BH0485  NAD 27      -  30 42 21.50700(N)    088 30 34.50100(W) AD(       ) 2
BH0485  NGVD 29 (??/??/??)   33.364  (m)          109.46   (f) ADJUSTED    2 0
BH0485
BH0485.Superseded values are not recommended for survey control.
BH0485.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
BH0485.See file dsdata.txt to determine how the superseded data were derived.
BH0485
BH0485_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RCU5543698011(NAD 83)
BH0485_MARKER: DS = TRIANGULATION STATION DISK
BH0485_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
BH0485_SP_SET: SET IN TOP OF CONCRETE MONUMENT
BH0485_STAMPING: MORIS 1921
BH0485_MARK LOGO: CGS
BH0485_MAGNETIC: T = STEEL SPIKE ADJACENT TO MONUMENT
BH0485_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
BH0485+STABILITY: SURFACE MOTION
BH0485_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BH0485+SATELLITE: SATELLITE OBSERVATIONS - March 01, 2000
BH0485
BH0485  HISTORY     - Date     Condition        Report By
BH0485  HISTORY     - 1921     MONUMENTED       CGS
BH0485  HISTORY     - 1968     GOOD             MSHD
BH0485  HISTORY     - 1968     GOOD             MSHD
BH0485  HISTORY     - 20000301 GOOD             NGS
BH0485
BH0485                          STATION DESCRIPTION
BH0485
BH0485'DESCRIBED BY COAST AND GEODETIC SURVEY 1921 (JSB)
BH0485'STATION IS 1-1/4 MILES S OF HARLESTON ON W (LEFT) SIDE OF TRACK ON
BH0485'EXTENSION OF BACK AND FORWARD TANGENT OF E (RIGHT) RAIL, 300
BH0485'METERS N OF MILEPOST P 27, AND 7.605 METERS (24.95 FEET) W OF W AND
BH0485'NEAREST RAIL.
BH0485'
BH0485'SURFACE, UNDERGROUND, AND REFERENCE MARKS ARE STANDARD BRONZE DISKS
BH0485'SET IN CONCRETE.
BH0485'
BH0485'REFERENCE MARKS ARE ON THE SAME SIDE OF TRACK AS STATION.
BH0485
BH0485                          STATION RECOVERY (1968)
BH0485
BH0485'RECOVERY NOTE BY MISSISSIPPI STATE HIGHWAY DEPARTMENT 1968 (HBT)
BH0485'THE STATION WAS VISITED 7-9-68 AND THE STATION MARK WAS FOUND IN GOOD
BH0485'CONDITION.  RM-1 AND RM-2 WERE FOUND DESTROYED.
BH0485'
BH0485'THE STATION IS LOCATED 1.2 MILES SOUTH OF THE APPROXIMATE CENTER OF
BH0485'HARLESTON, 3.4 MILES NORTHWEST OF HURLEY, 5.7 MILES NORTHEAST OF
BH0485'WADE ON THE WEST R.O.W. OF THE MISSISSIPPI EXPORT RAILROAD TRACK AND
BH0485'IS IN THE SOUTHWEST 1/4 OF SECTION 8, T 4S, R 5W.  IT IS 86 FEET
BH0485'NORTHWEST OF THE CENTER OF THE CROSSING, 24.5 FEET WEST OF THE WEST
BH0485'RAIL, 82 FEET NORTH OF THE CENTER OF A BLACKTOP ROAD, 109 FEET
BH0485'NORTHEAST OF A POWER LINE POLE, 204 FEET SOUTHEAST OF A POWER LINE
BH0485'POLE WITH GUY WIRES, 1 FOOT EAST OF A METAL WITNESS POST.  IT IS SET
BH0485'IN THE TOP OF A 10-INCH SQUARE CONCRETE POST ABOUT LEVEL WITH THE
BH0485'TRACK AND IS FLUSH WITH THE GROUND, STAMPED MORIS 1921.
BH0485'
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BH0485'TO REACH FROM THE U.S. POST OFFICE IN MOSS POINT GO NORTH AND
BH0485'NORTHWEST ON STATE HIGHWAY 63 FOR 0.85 MILE TO THE SWING BRIDGE
BH0485'OVER THE ESCATAWPA RIVER.  CONTINUE NORTH ON MISSISSIPPI HIGHWAY 63
BH0485'FOR 7.0 MILES TO THE JUNCTION OF MISSISSIPPI HIGHWAY 613.  CONTINUE
BH0485'NORTHEAST ON MISSISSIPPI HIGHWAY 613 FOR 11.1 MILES TO A CROSSROADS
BH0485'IN THE VILLAGE OF HURLEY.  CONTINUE NORTHWEST ON MISSISSIPPI
BH0485'HIGHWAY 613 FOR 3.75 MILES TO ANOTHER CROSSROADS.  TURN RIGHT (EAST)
BH0485'AND CONTINUE ON A BLACKTOP ROAD FOR 0.15 MILE TO THE CROSSING OF THE
BH0485'MISSISSIPPI EXPORT RAILROAD TRACK AND THE MARK ON THE LEFT IN THE
BH0485'NORTHWEST ANGLE OF THE CROSSING.
BH0485
BH0485                          STATION RECOVERY (1968)
BH0485
BH0485'RECOVERY NOTE BY MISSISSIPPI STATE HIGHWAY DEPARTMENT 1968
BH0485'1.2 MI S FROM HARLESTON.
BH0485'THE MARK IS LOCATED 1.2 MILES SOUTH OF THE APPROXIMATE CENTER OF
BH0485'HARLESTON, 3.4 MILES NORTHWEST OF HURLEY, 5.7 MILES NORTHEAST OF WADE
BH0485'ON THE WEST RIGHT-OF-WAY OF THE MISSISSIPPI EXPORT RAILROAD TRACK AND
BH0485'IS IN THE SOUTHWEST 1/4 OF SECTION 8, T 4S, R 5W.  IT IS 86 FEET
BH0485'NORTHWEST OF THE CENTER OF THE CROSSING, 24.5 FEET WEST OF THE WEST
BH0485'RAIL, 82 FEET NORTH OF THE CENTER OF A BLACKTOP ROAD, 109 FEET
BH0485'NORTHEAST OF A POWER LINE POLE, 204 FEET SOUTHEAST OF A POWER LINE
BH0485'POLE WITH GUY WIRES, 1 FOOT EAST OF A METAL WITNESS POST SET IN THE
BH0485'TOP OF A 10 INCH SQUARE CONCRETE POST ABOUT LEVEL WITH THE TRACK AND
BH0485'IS FLUSH WITH THE GROUND.  TO REACH FROM THE U.S. POST OFFICE IN MOSS
BH0485'POINT GO NORTH AND NORTHWEST ON MISSISSIPPI HIGHWAY 63 FOR 0.85 MILE
BH0485'TO THE SWING BRIDGE OVER THE ESCATAWPA RIVER.  CONTINUE NORTH ON
BH0485'MISSISSIPPI HIGHWAY 63 FOR 7.0 MILES TO THE JUNCTION OF MISSISSIPPI
BH0485'HIGHWAY 613.  CONTINUE NORTHEAST ON MISSISSIPPI HIGHWAY 613 FOR 11.1
BH0485'MILES TO A CROSSROADS IN THE VILLAGE OF HURLEY.  CONTINUE NORTHWEST ON
BH0485'MISSISSIPPI HIGHWAY 613 FOR 3.75 MILES TO ANOTHER CROSSROADS. TURN
BH0485'RIGHT (EAST) AND CONTINUE ON A BLACKTOP ROAD FOR 0.15 MILE TO THE
BH0485'CROSSING OF THE MISSISSIPPI EXPORT RAILROAD TRACK AND THE MARK ON THE
BH0485'LEFT IN THE NORTHWEST ANGLE OF THE CROSSING.
BH0485
BH0485                          STATION RECOVERY (2000)
BH0485
BH0485'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 2000
BH0485'RECOVERED IN GOOD CONDITION.  NOTE--THE SIDE ROAD OFF OF ROUTE 613 IS
BH0485'NOW CALLED LILLY COLEMAN ROAD,  1.5 FT (0.5 M) SOUTH OF AN ORANGE
BH0485'WITNESS POST, AND ABOUT 40 FT (12.2 M) EAST OF A SMALL FRAME AND
BH0485'PLYWOOD DWELLING.
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The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER 27, 2005
 BH2999 ***********************************************************************
 BH2999  CBN         -  This is a Cooperative Base Network Control Station.
 BH2999  DESIGNATION -  STENNIS
 BH2999  PID         -  BH2999
 BH2999  STATE/COUNTY-  MS/HANCOCK
 BH2999  USGS QUAD   -  WAVELAND (1976)
 BH2999
 BH2999                        *CURRENT SURVEY CONTROL
 BH2999  ___________________________________________________________________
 BH2999* NAD 83(1993)-  30 22 23.16202(N)    089 27 10.92706(W)     ADJUSTED
 BH2999* NAVD 88     -         4.911  (meters)      16.11   (feet)  ADJUSTED
 BH2999  ___________________________________________________________________
 BH2999  X           -      52,575.074 (meters)                     COMP
 BH2999  Y           -  -5,507,189.560 (meters)                     COMP
 BH2999  Z           -   3,206,113.774 (meters)                     COMP
 BH2999  LAPLACE CORR-          -2.34  (seconds)                    DEFLEC99
 BH2999  ELLIP HEIGHT-         -22.61  (meters)          (03/26/02) GPS OBS
 BH2999  GEOID HEIGHT-         -27.50  (meters)                     GEOID03
 BH2999  DYNAMIC HT  -           4.904 (meters)      16.09  (feet)  COMP
 BH2999  MODELED GRAV-     979,332.1   (mgal)                       NAVD 88
 BH2999
 BH2999  HORZ ORDER  -  B
 BH2999  VERT ORDER  -  FIRST     CLASS II
 BH2999  ELLP ORDER  -  FOURTH    CLASS II
 BH2999
 BH2999.This mark is at Stennis Intl Airport (HSA)
 BH2999
 BH2999.The horizontal coordinates were established by GPS observations
 BH2999.and adjusted by the National Geodetic Survey in January 1994.
 BH2999
 BH2999.The orthometric height was determined by differential leveling
 BH2999.and adjusted by the National Geodetic Survey in February 1994.
 BH2999
 BH2999.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 BH2999
 BH2999.The Laplace correction was computed from DEFLEC99 derived deflections.
 BH2999
 BH2999.The ellipsoidal height was determined by GPS observations
 BH2999.and is referenced to NAD 83.
 BH2999
 BH2999.The geoid height was determined by GEOID03.
 BH2999
 BH2999.The dynamic height is computed by dividing the NAVD 88
 BH2999.geopotential number by the normal gravity value computed on the
 BH2999.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 BH2999.degrees latitude (g = 980.6199 gals.).
 BH2999
 BH2999.The modeled gravity was interpolated from observed gravity values.
 BH2999
 BH2999;                    North         East     Units Scale Factor Converg.
 BH2999;SPC MS E     -    96,942.447   240,434.602   MT  0.99999375   -0 18 48.1
 BH2999;UTM  16      - 3,362,681.641   264,264.991   MT  1.00028562   -1 14 27.2
 BH2999
 BH2999!             -  Elev Factor  x  Scale Factor =   Combined Factor
 BH2999!SPC MS E     -   1.00000355  x   0.99999375  =   0.99999730
 BH2999!UTM  16      -   1.00000355  x   1.00028562  =   1.00028917
 BH2999
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BH2999:                Primary Azimuth Mark                     Grid Az
BH2999:SPC MS E     -  STENNIS AZ MK                            180 44 24.4
BH2999:UTM  16      -  STENNIS AZ MK                            181 40 03.5
BH2999
BH2999|---------------------------------------------------------------------|
BH2999| PID    Reference Object                     Distance      Geod. Az  |
BH2999|                                                           dddmmss.s |
BH2999| BH3002 STENNIS AZ MK                       APPROX. 0.7 KM 1802536.3 |
BH2999|---------------------------------------------------------------------|
BH2999
BH2999                          SUPERSEDED SURVEY CONTROL
BH2999
BH2999  ELLIP H (08/18/00)  -22.61   (m)                       GP(       ) 4 1
BH2999  ELLIP H (01/12/94)  -22.53   (m)                       GP(       ) 4 1
BH2999  NAD 83(1993)-  30 22 23.17596(N)    089 27 10.93762(W) AD(       ) 3
BH2999  ELLIP H (01/21/93)  -22.81   (m)                       GP(       ) 4 2
BH2999  NAD 83(1986)-  30 22 23.17857(N)    089 27 10.91867(W) AD(       ) 3
BH2999  NAD 27      -  30 22 22.47961(N)    089 27 10.73071(W) AD(       ) 3
BH2999  NAVD 88 (08/18/00)    4.91   (m)           16.1    (f) LEVELING    3
BH2999  NGVD 29 (09/20/88)    4.9    (m)           16.     (f) GPS OBS
BH2999
BH2999.Superseded values are not recommended for survey control.
BH2999.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
BH2999.See file dsdata.txt to determine how the superseded data were derived.
BH2999
BH2999_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RBU6426562682(NAD 83)
BH2999_MARKER: DH = HORIZONTAL CONTROL DISK
BH2999_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
BH2999_SP_SET: CONCRETE POST
BH2999_STAMPING: STENNIS 1986
BH2999_MARK LOGO: NGS
BH2999_MAGNETIC: N = NO MAGNETIC MATERIAL
BH2999_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
BH2999+STABILITY: SURFACE MOTION
BH2999_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BH2999+SATELLITE: SATELLITE OBSERVATIONS - February 22, 2000
BH2999
BH2999  HISTORY     - Date     Condition        Report By
BH2999  HISTORY     - 1986     MONUMENTED       NGS
BH2999  HISTORY     - 1988     GOOD             NGS
BH2999  HISTORY     - 19921113 GOOD             MSHD
BH2999  HISTORY     - 19930312 GOOD             NGS
BH2999  HISTORY     - 20000222 GOOD             NASA
BH2999  HISTORY     - 20000222 GOOD             NASA
BH2999
BH2999                          STATION DESCRIPTION
BH2999
BH2999'DESCRIBED BY NATIONAL GEODETIC SURVEY 1988 (AJL)
BH2999'THE STATION IS LOCATED ABOUT 12.9 KM (8.0 MI)
BH2999'NORTHWEST OF BAY ST LOUIS AT THE STENNIS INTERNATIONAL AIRPORT.
BH2999'OWNERSHIP--HANCOCK COUNTY PORT AND HARBOR COMMISSION, P.O. BOX 2267,
BH2999'C/O AIRPORT MANAGER WILLIAM CARSON, BAY ST LOUIS MS 39521.
BH2999'PHONE (601) 467-5434.
BH2999'
BH2999'TO REACH THE STATION FROM THE JUNCTION OF INTERSTATE HIGHWAY 10 AND
BH2999'STATE HIGHWAYS 43 AND 603, ABOUT 8.0 KM (5.0 MI) NORTH OF WAVELAND, GO
BH2999'NORTH FOR 2.2 KM (1.35 MI) ON HIGHWAYS 43 AND 603 TO A PAVED ROAD
BH2999'ON THE LEFT, AT SIGN STENNIS INTERNATIONAL AIRPORT.
BH2999'TURN LEFT AND GO WEST FOR 1.6 KM (1.0 MI) ON THE PAVED ROAD TO THE
BH2999'AIRPORT OFFICE AND MAIN HANGAR.  CONTINUE STRAIGHT AHEAD AND GO
BH2999'WEST FOR 0.1 KM (0.05 MI) THROUGH GATE AND ACROSS PARKING RAMP TO
BH2999'THE WINDSOCK AND STATION.
BH2999'
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BH2999'THE STATION IS A STANDARD NGS DISK
BH2999'STAMPED---STENNIS 1986---,
BH2999'SET INTO THE TOP OF A ROUND CONCRETE MONUMENT
BH2999'30 CM IN DIAMETER PROJECTING 1 CM ABOVE GROUND.  LOCATED
BH2999'48.9 METERS (160.5 FT) WEST-NORTHWEST FROM THE NORTHWEST CORNER OF
BH2999'A PARKING RAMP,
BH2999'148.0 METERS (45.1 FT) NORTH FROM THE NORTH EDGE OF TAXIWAY (RAMP
BH2999'E),
BH2999'18.9 METERS (62.0 FT) EAST FROM THE EAST EDGE OF THE NORTH-SOUTH
BH2999'TAXIWAY,
BH2999'14.8 METERS (48.5 FT) WEST FROM THE CENTER POLE OF WINDSOCK, AND
BH2999'0.5 METERS (1.5 FT) SOUTH FROM A CARSONITE WITNESS POST.
BH2999'THE UNDERGROUND MARK IS A STANDARD NGS DISK
BH2999'STAMPED---STENNIS 1986---,
BH2999'SET INTO AN IRREGULAR MASS OF CONCRETE 1.2 METERS BELOW THE SURFACE.
BH2999'
BH2999'DESCRIBED BY D.D. REXRODE, TYPED BY R.L. ZURFLUH.
BH2999
BH2999                          STATION RECOVERY (1992)
BH2999
BH2999'RECOVERY NOTE BY MISSISSIPPI STATE HIGHWAY DEPARTMENT 1992
BH2999'STATION IS LOCATED ABOUT 8.0 MI (12.9 KM) NORTHWEST OF BAY ST LOUIS,
BH2999'AT THE STENNIS INTERNATIONAL AIRPORT. OWNERSHIP--HANCOCK COUNTY PORT
BH2999'AND HARBOR COMMISSION, P.O. BOX 69, BAY ST LOUIS, MS. 39520, C/O
BH2999'AIRPORT MANAGER HAROLD OLSON, PHONE (601) 467 9231.
BH2999'TO REACH THE STATION FROM THE JUNCTION OF I-10 AND STATE HIGHWAYS 43
BH2999'AND 603, ABOUT 5.0 MI (8.0 KM) NORTH OF WAVELAND, GO NORTH ON
BH2999'HIGHWAYS 43 AND 603 FOR 1.35 MI (2.17 KM) TO A PAVED ROAD ON THE
BH2999'LEFT, AT SIGN (STENNIS INTERNATIONAL AIRPORT), TURN LEFT AND GO WEST
BH2999'ON PAVED ROAD FOR 1.0 MI (1.6 KM) TO AIRPORT OFFICE AND MAIN HANGER,
BH2999'CONTINUE STRAIGHT AHEAD AND GO WEST THROUGH GATE AND ACROSS PARKING
BH2999'RAMP FOR 0.05 MI (0.08 KM) TO THE WINDSOCK AND STATION AS DESCRIBED.
BH2999'STATION MARK IS A STANDARD NGS DISK, STAMPED---STENNIS 1986---SET IN
BH2999'TOP OF A ROUND CONCRETE MONUMENT, FLUSH WITH THE GROUND.  IT IS 160.5
BH2999'FT (48.9 M) WEST NORTHWEST OF THE NORTHWEST CORNER OF PARKING RAMP,
BH2999'45.1 FT (13.7 M) NORTH OF THE NORTH EDGE OF TAXIWAY, 62.0 FT
BH2999'(18.9 M) EAST OF THE EAST EDGE OF NORTH-SOUTH TAXIWAY, 48.5 FT
BH2999'(14.8 M) WEST OF THE CENTER POLE OF WINDSOCK AND 1.5 FT (0.5 M) SOUTH
BH2999'OF A CARSONITE WITNESS POST.
BH2999
BH2999                          STATION RECOVERY (1993)
BH2999
BH2999'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1993
BH2999'11.0 KM (6.85 MI) NORTHERLY ALONG STATE HIGHWAY 43 FROM THE JUNCTION
BH2999'OF U.S. HIGHWAY 90 IN WAVELAND, THENCE 1.7 KM (1.05 MI) WESTERLY
BH2999'ALONG A ROAD LEADING TO THE STENNIS INTERNATIONAL AIRPORT, THENCE 0.2
BH2999'KM (0.10 MI) WESTERLY ALONG A ROAD, AN APRON AND A TAXIWAY, 59.8 M
BH2999'(196.2 FT) NORTH OF AND LEVEL WITH THE CENTERLINE OF A TAXIWAY, 26.7
BH2999'M (87.6 FT) EAST OF THE CENTERLINE OF A TAXIWAY, 14.8 M (48.6 FT)
BH2999'WEST OF THE CENTER SUPPORT POLE OF A WINDSOCK, 0.5 M (1.6 FT) SOUTH
BH2999'OF A WITNESS POST, AND THE MONUMENT IS FLUSH WITH THE GROUND SURFACE.
BH2999'NOTE--THE MARK IS ON PROPERTY OWNED BY STENNIS INTERNATIONAL AIRPORT,
BH2999'CONTACT--GENE PHILLIPS--AIRPORT MANAGER, TELEPHONE NUMBER (601)
BH2999'467-5434.
BH2999
BH2999                          STATION RECOVERY (2000)
BH2999
BH2999'RECOVERY NOTE BY NAT AERO SPACE ADMIN 2000 (RBS)
BH2999'RECOVERED IN GOOD CONDITION.
BH2999
BH2999                          STATION RECOVERY (2000)
BH2999
BH2999'RECOVERY NOTE BY NAT AERO SPACE ADMIN 2000 (RBS)
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BH2999'RECOVERED AS DESCRIBED.

The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER 27, 2005
 BH3208 ***********************************************************************
 BH3208  CBN         -  This is a Cooperative Base Network Control Station.
 BH3208  DESIGNATION -  VAN RM 1
 BH3208  PID         -  BH3208
 BH3208  STATE/COUNTY-  MS/JACKSON
 BH3208  USGS QUAD   -  VANCLEAVE (1982)
 BH3208
 BH3208                        *CURRENT SURVEY CONTROL
 BH3208  ___________________________________________________________________
 BH3208* NAD 83(1993)-  30 35 22.43949(N)    088 43 18.15487(W)     ADJUSTED
 BH3208* NAVD 88     -        38.130  (meters)     125.10   (feet)  ADJUSTED
 BH3208  ___________________________________________________________________
 BH3208  X           -     122,591.925 (meters)                     COMP
 BH3208  Y           -  -5,493,927.630 (meters)                     COMP
 BH3208  Z           -   3,226,810.954 (meters)                     COMP
 BH3208  LAPLACE CORR-           0.08  (seconds)                   DEFLEC99
 BH3208  ELLIP HEIGHT-           9.45  (meters)          (04/15/02) GPS OBS
 BH3208  GEOID HEIGHT-         -28.69  (meters)                     GEOID03
 BH3208  DYNAMIC HT  -          38.079 (meters)     124.93  (feet)  COMP
 BH3208  MODELED GRAV-     979,318.4   (mgal)                       NAVD 88
 BH3208
 BH3208  HORZ ORDER  -  B
 BH3208  VERT ORDER  -  FIRST     CLASS II
 BH3208  ELLP ORDER  -  FOURTH    CLASS II
 BH3208
 BH3208.The horizontal coordinates were established by GPS observations
 BH3208.and adjusted by the National Geodetic Survey in February 2002.
 BH3208
 BH3208.The orthometric height was determined by differential leveling
 BH3208.and adjusted by the National Geodetic Survey in September 1993.
 BH3208
 BH3208.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 BH3208
 BH3208.The Laplace correction was computed from DEFLEC99 derived deflections.
 BH3208
 BH3208.The ellipsoidal height was determined by GPS observations
 BH3208.and is referenced to NAD 83.
 BH3208
 BH3208.The geoid height was determined by GEOID03.
 BH3208
 BH3208.The dynamic height is computed by dividing the NAVD 88
 BH3208.geopotential number by the normal gravity value computed on the
 BH3208.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 BH3208.degrees latitude (g = 980.6199 gals.).
 BH3208
 BH3208.The modeled gravity was interpolated from observed gravity values.
 BH3208
 BH3208;                    North         East     Units Scale Factor Converg.
 BH3208;SPC MS E     -   120,781.219   310,705.387   MT  0.99995141   +0 03 24.5
 BH3208;UTM  16      - 3,385,379.432   334,923.341   MT  0.99993617   -0 52 34.9
 BH3208
 BH3208!             -  Elev Factor  x  Scale Factor =   Combined Factor
 BH3208!SPC MS E     -   0.99999852  x   0.99995141  =   0.99994993
 BH3208!UTM  16      -   0.99999852  x   0.99993617  =   0.99993469
 BH3208
 BH3208                          SUPERSEDED SURVEY CONTROL
 BH3208
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BH3208  ELLIP H (02/15/02)    9.44   (m)                        GP(       ) 4 1
BH3208  NAVD 88 (02/15/02)   38.13   (m)          125.1    (f) LEVELING    3
BH3208
BH3208.Superseded values are not recommended for survey control.
BH3208.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
BH3208.See file dsdata.txt to determine how the superseded data were derived.
BH3208
BH3208_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RCU3492385379(NAD 83)
BH3208_MARKER: DR = REFERENCE MARK DISK
BH3208_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
BH3208_SP_SET: CONCRETE POST
BH3208_STAMPING: VAN NO 1 1943
BH3208_MARK LOGO: CGS
BH3208_MAGNETIC: N = NO MAGNETIC MATERIAL
BH3208_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
BH3208+STABILITY: SURFACE MOTION
BH3208_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BH3208+SATELLITE: SATELLITE OBSERVATIONS - December 12, 2000
BH3208
BH3208  HISTORY     - Date     Condition        Report By
BH3208  HISTORY     - 1943     MONUMENTED       CGS
BH3208  HISTORY     - 19930315 GOOD             NGS
BH3208  HISTORY     - 20001212 GOOD             NGS
BH3208
BH3208                          STATION DESCRIPTION
BH3208
BH3208'DESCRIBED BY NATIONAL GEODETIC SURVEY 1993
BH3208'9.2 KM (5.70 MI) NORTHERLY ALONG STATE HIGHWAY 57 FROM THE POST OFFICE
BH3208'IN VANCLEAVE, 27.8 M (91.2 FT) NORTH-NORTHEAST OF TRIANGULATION
BH3208'STATION VAN RESET, 12.4 M (40.7 FT) WEST OF THE CENTERLINE OF THE
BH3208'HIGHWAY, 7.1 M (23.3 FT) NORTH OF THE CENTER OF A DRIVEWAY, 4.3 M
BH3208'(14.1 FT) NORTHEAST OF THE NORTH POST OF A GATE, 1.2 M (3.9 FT) SOUTH
BH3208'OF A FENCE POST, 0.6 M (2.0 FT) ABOVE THE LEVEL OF THE HIGHWAY, 0.3 M
BH3208'(1.0 FT) EAST OF A WITNESS POST, AND THE MONUMENT IS FLUSH WITH THE
BH3208'GROUND SURFACE.
BH3208
BH3208                          STATION RECOVERY (2000)
BH3208
BH3208'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 2000
BH3208'RECOVERED AS DESCRIBED.
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The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER 27, 2005
 BH2057 ***********************************************************************
 BH2057  DESIGNATION -  WILMER
 BH2057  PID         -  BH2057
 BH2057  STATE/COUNTY-  AL/MOBILE
 BH2057  USGS QUAD   -  HOWELL (1985)
 BH2057
 BH2057                        *CURRENT SURVEY CONTROL
 BH2057  ___________________________________________________________________
 BH2057* NAD 83(1992)-  30 49 45.59940(N)    088 23 28.52757(W)     ADJUSTED
 BH2057* NAVD 88     -        80.8    (meters)     265.     (feet)  VERTCON
 BH2057  ___________________________________________________________________
 BH2057  X           -     153,895.735 (meters)                     COMP
 BH2057  Y           -  -5,479,596.455 (meters)                     COMP
 BH2057  Z           -   3,249,686.911 (meters)                     COMP
 BH2057  LAPLACE CORR-           0.50  (seconds)                   DEFLEC99
 BH2057  ELLIP HEIGHT-          52.23  (meters)          (07/29/02) GPS OBS
 BH2057  GEOID HEIGHT-         -28.61  (meters)                     GEOID03
 BH2057
 BH2057  HORZ ORDER  -  FIRST
 BH2057  ELLP ORDER  -  FOURTH    CLASS I
 BH2057
 BH2057.The horizontal coordinates were established by GPS observations
 BH2057.and adjusted by the National Geodetic Survey in December 1992.
 BH2057
 BH2057.The NAVD 88 height was computed by applying the VERTCON shift value to
 BH2057.the NGVD 29 height (displayed under SUPERSEDED SURVEY CONTROL.)
 BH2057
 BH2057.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 BH2057
 BH2057.The Laplace correction was computed from DEFLEC99 derived deflections.
 BH2057
 BH2057.The ellipsoidal height was determined by GPS observations
 BH2057.and is referenced to NAD 83.
 BH2057
 BH2057.The geoid height was determined by GEOID03.
 BH2057
 BH2057;                    North         East     Units Scale Factor Converg.
 BH2057;SPC AL W     -    92,273.188   514,733.919   MT  1.00002299   -0 27 24.4
 BH2057;SPC MS E     -   147,439.807   342,293.202   MT  0.99997206   +0 13 35.6
 BH2057;UTM  16      - 3,411,516.021   366,939.903   MT  0.99981840   -0 42 47.2
 BH2057
 BH2057!             -  Elev Factor  x  Scale Factor =   Combined Factor
 BH2057!SPC AL W     -   0.99999180  x   1.00002299  =   1.00001479
 BH2057!SPC MS E     -   0.99999180  x   0.99997206  =   0.99996386
 BH2057!UTM  16      -   0.99999180  x   0.99981840  =   0.99981020
 BH2057
 BH2057:                Primary Azimuth Mark                     Grid Az
 BH2057:SPC AL W     -  WILMER AZ MK                             118 43 07.2
 BH2057:SPC MS E     -  WILMER AZ MK                             118 02 07.2
 BH2057:UTM  16      -  WILMER AZ MK                             118 58 30.0
 BH2057
 BH2057|---------------------------------------------------------------------|
 BH2057| PID    Reference Object                     Distance      Geod. Az  |
 BH2057|                                                           dddmmss.s |
 BH2057| DD9264 WILMER RM 1                          30.861 METERS 00935     |
 BH2057| DD9267 WILMER 2 RM 3                        56.757 METERS 01734     |
 BH2057| BH2046 GARRISON FIRE TOWER                 APPROX.14.7 KM 0192858.0 |
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BH2057| DD9265 WILMER RM 2                          29.815 METERS 10006     |
BH2057| BH2052 CRAFT FIRE TOWER                    APPROX.15.2 KM 1174435.2 |
BH2057| DD9263 WILMER AZ MK                                       1181542.8 |
BH2057| DD9268 WILMER 2 RM 5                                      1304951.6 |
BH2057| BH2028 BEAVER CREEK FIRE TOWER             APPROX.18.8 KM 1672515.7 |
BH2057| BH2059 WILMER 2 RM A                        19.268 METERS 32411     |
BH2057| DD9266 WILMER 2 RM 4                        78.751 METERS 33852     |
BH2057| BH2060 WILMER 2                             44.485 METERS 35303     |
BH2057|-----------------------------------------------------------------------|
BH2057
BH2057                          SUPERSEDED SURVEY CONTROL
BH2057
BH2057  ELLIP H (12/04/92)   52.27   (m)                       GP(       ) 4 1
BH2057  NAD 83(1986)-  30 49 45.61661(N)    088 23 28.53081(W) AD(       ) 1
BH2057  NAD 27      -  30 49 44.94700(N)    088 23 28.48800(W) AD(       ) 1
BH2057  NGVD 29 (12/04/92)   80.8    (m)          265.     (f) GPS OBS
BH2057
BH2057.Superseded values are not recommended for survey control.
BH2057.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
BH2057.See file dsdata.txt to determine how the superseded data were derived.
BH2057
BH2057_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RCV6694011516(NAD 83)
BH2057_MARKER: DS = TRIANGULATION STATION DISK
BH2057_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
BH2057_SP_SET: CONCRETE POST
BH2057_STAMPING: WILMER 1942
BH2057_MARK LOGO: CGS
BH2057_MAGNETIC: A = STEEL ROD ADJACENT TO MONUMENT
BH2057_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
BH2057+STABILITY: SURFACE MOTION
BH2057_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BH2057+SATELLITE: SATELLITE OBSERVATIONS - April 10, 1991
BH2057
BH2057  HISTORY     - Date     Condition        Report By
BH2057  HISTORY     - 1942     MONUMENTED       CGS
BH2057  HISTORY     - 1942     GOOD             CGS
BH2057  HISTORY     - 1964     SEE DESCRIPTION  CGS
BH2057  HISTORY     - 19910410 GOOD             ALHD
BH2057
BH2057                          STATION DESCRIPTION
BH2057
BH2057'DESCRIBED BY COAST AND GEODETIC SURVEY 1942 (RAE)
BH2057'STATION IS ABOUT 2 MILES W AND 1/2 MILE N OF THE VILLAGE OF WILMER,
BH2057'IN THE NE 1/4 OF THE SW 1/4 OF SEC. 33, T. 2 S, R. 4 W, ON THE
BH2057'PROPERTY OWNED BY MRS. N.L. WHATELY, 1655 CHEROKEE STREET, MOBILE,
BH2057'ALABAMA, APPROXIMATELY 0.25 MILE W OF THE FARM BUILDINGS ON THE
BH2057'HIGHEST POINT OF A KNOLL AT THE W EDGE OF A PINE GROVE, 35 FEET SW OF
BH2057'THE MOST WESTERLY PINE TREE AND 20 FEET E OF THE E EDGE OF FIELD.
BH2057'MARK IS STAMPED WILMER 1942 AND PROJECTS 6 INCHES.
BH2057'
BH2057'SURFACE, UNDERGROUND, REFERENCE, AND AZIMUTH MARKS ARE STANDARD DISKS
BH2057'SET IN CONCRETE.
BH2057'
BH2057'REFERENCE MARK NO.1 IS 30.861 METERS, 101.25 FEET, N OF THE STATION
BH2057'AND 5 FEET SE OF A 6-INCH BLACK OAK TREE.  THE MARK IS STAMPED
BH2057'WILMER NO.1 1942 AND PROJECTS 4 INCHES.
BH2057'
BH2057'REFERENCE MARK NO.2 IS 29.815 METERS 97.82 FEET, E OF THE STATION AND
BH2057'30 FEET W OF THE W EDGE OF SMALL GARDEN.  MARK IS STAMPED WILMER
BH2057'NO.2 1942 AND PROJECTS 4 INCHES.
BH2057'
BH2057'AZIMUTH MARK IS 0.3 MILE ESE OF THE STATION ON THE RIGHT SIDE OF FARM
BH2057'ENTRANCE, 25 FEET N OF THE CENTER LINE OF DIRT ROAD, 29 FEET SE
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BH2057'OF E POST OF FARM ENTRANCE, AND 1 FOOT SW OF FENCE LINE.
BH2057'
BH2057'TO REACH THE STATION FROM THE SCHOOLHOUSE IN WILMER, GO WESTERLY ON
BH2057'ALABAMA 42 FOR 1.1 MILES TO CURVE AND DIRT ROAD STRAIGHT AHEAD,
BH2057'GO STRAIGHT AHEAD ON DIRT ROAD FOR 0.4 MILE TO GATE AND FARM ENTRANCE
BH2057'ON THE RIGHT.  (AZIMUTH MARK ON THE RIGHT.) PASS THROUGH GATE AND
BH2057'PROCEED 0.05 MILE TO FARMHOUSE, CONTINUE THROUGH GATE ON THE LEFT AND
BH2057'BARN LOT, FOLLOW DIM TRAIL ALONG FENCE LINE TO THE HIGHEST
BH2057'POINT ON KNOLL AND STATION SITE.
BH2057'
BH2057'HEIGHT OF LIGHT ABOVE STATION MARK - 30 METERS.
BH2057
BH2057                          STATION RECOVERY (1942)
BH2057
BH2057'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1942
BH2057'RECOVERED IN GOOD CONDITION.
BH2057
BH2057                          STATION RECOVERY (1964)
BH2057
BH2057'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1964 (AJ)
BH2057'THE SURFACE STATION MARK AND REFERENCE MARK NO. 1 WERE FOUND LYING ON
BH2057'TOP OF THE GROUND.  THE SUB-SURFACE STATION MARK WAS RECOVERED IN
BH2057'GOOD CONDITION.  THE AZIMUTH MARK WAS ALSO RECOVERED AND FOUND TO BE
BH2057'IN GOOD CONDITION.  REFERENCE MARK NO. 2 WAS NOT RECOVERED.  TWO NEW
BH2057'REFERENCE MARKS NO. 3 AND 4 WERE ESTABLISHED AT THIS TIME.  A
BH2057'COMPLETE NEW DESCRIPTION FOLLOWS- STATION IS LOCATED IN PASTURE
BH2057'ABOUT 2-1/2 MILES WEST-NORTHWEST OF THE VILLAGE OF WILMER, ON
BH2057'PROPERTY OWNED BY MR. W.W. DUNN.  THE MARK IS A STANDARD DISK, SET IN
BH2057'THE TOP OF A CONCRETE MONUMENT 30-INCHES BELOW THE SURFACE OF THE
BH2057'GROUND AND IS STAMPED WILMER 1942.  IT IS 191 FEET SOUTH OF A 20-INCH
BH2057'OAK TREE WITH A TRIANGLE BLAZE AND 261 FEET SOUTHEAST OF A
BH2057'24-INCH OAK TREE.
BH2057'
BH2057'TO REACH FROM THE POST OFFICE IN WILMER, GO WESTERLY ON U.S. HIGHWAY
BH2057'98 FOR 1.5 MILES TO WARD ROAD ON THE LEFT.  TURN LEFT AND GO SOUTH
BH2057'AND WEST ON WARD ROAD FOR 0.4 MILE TO AN IRON GATE ON THE RIGHT AND
BH2057'THE AZIMUTH MARK ON THE RIGHT, CONTINUE WESTERLY FOR 0.05 MILE TO
BH2057'A WOOD AND WIRE GATE ON THE RIGHT AT THE SOUTHEAST CORNER OF A LARGE
BH2057'OPEN PASTURE.  TURN RIGHT, PASS THROUGH GATE AND GO NORTHWEST
BH2057'ACROSS PASTURE FOR 0.2 MILE TO THE HIGHEST POINT OF KNOLL AND
BH2057'STATION.
BH2057'
BH2057'REFERENCE MARK NO. 3 IS A STANDARD DISK, SET IN THE TOP OF A CONCRETE
BH2057'MONUMENT PROJECTING 2-INCHES AND IS STAMPED WILMER 2 NO 3 1964.  IT
BH2057'IS 44.3 FEET SOUTH-SOUTHWEST OF A FENCE LINE AND 8-1/2 FEET
BH2057'WEST-SOUTHWEST OF A 20-INCH OAK TREE WITH A TRIANGLE BLAZE.
BH2057'
BH2057'REFERENCE MARK NO. 4 IS A STANDARD DISK, SET IN THE TOP OF A CONCRETE
BH2057'MONUMENT PROJECTING 2-INCHES AND IS STAMPED WILMER 2 NO 4 1964.  IT
BH2057'IS 8.9 FEET SOUTHWEST OF A 24-INCH OAK TREE, 2.3 FEET WEST OF A METAL
BH2057'WITNESS POST AND SIGN AND 1.7 FEET SOUTH-SOUTHWEST OF A FENCE
BH2057'LINE.
BH2057'
BH2057'AZIMUTH MARK IS A STANDARD DISK, SET IN THE TOP OF A CONCRETE
BH2057'MONUMENT PROJECTING 2-INCHES AND IS STAMPED WILMER 1942.  IT IS 52
BH2057'FEET NORTH OF THE CENTER OF WARD ROAD (GRADED SAND ROAD), 27 FEET
BH2057'EAST OF THE CENTER OF A FARM DRIVE AND IRON GATE, 9 FEET
BH2057'EAST-SOUTHEAST OF A 20-INCH PECAN TREE, 2.3 FEET SOUTHEAST OF A METAL
BH2057'WITNESS POST AND SIGN AND 1 FOOT SOUTH OF A FENCE LINE.
BH2057'
BH2057'A TRAVERSE CONNECTION WAS MADE TO STATIONS WILMER 2 AND WILMER 2
BH2057'RM.A.  FOR THE DESCRIPTION OF WILMER 2 AND WILMER 2 RM A, SEE
BH2057'SEPARATE CARDS.
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BH2057
BH2057                          STATION RECOVERY (1991)
BH2057
BH2057'RECOVERY NOTE BY ALABAMA HIGHWAY DEPARTMENT 1991
BH2057'THE UNDERGROUND MARK WAS RECOVERED IN GOOD CONDITION AS STATED IN THE
BH2057'1964 DESCRIPTION.  IT WAS OCCUPIED AS THE STATION.  A NEW DESCRIPTION
BH2057'FOLLOWS.
BH2057'THE STATION IS LOCATED IN MOBILE COUNTY ON PROPERTY OWNED BY MR. GRADY
BH2057'W. DUNN, ABOUT 1.80 MI (2.90 KM) WEST-NORTHWEST OF WILMER AND ABOUT
BH2057'20.15 MI (32.43 KM) SOUTH-SOUTHWEST OF CITRONELLE.
BH2057'TO REACH THE STATION FROM THE U.S. 98 UNDERPASS UNDER I-65 (MILE POST
BH2057'21.90 ON U. S 98) IN MOBILE, DRIVE NORTHWEST ON U.S. 98 FOR 18.65 MI
BH2057'(30.01 KM) TO MILE POST 3.25 AND A GRAVEL ROAD ON THE LEFT, TURN LEFT
BH2057'ON THE GRAVEL ROAD AND DRIVE SOUTH AND THEN WEST FOR 0.40 MI
BH2057'(0.64 KM) TO A PAVED DRIVEWAY ON THE RIGHT, TURN RIGHT ON THE PAVED
BH2057'DRIVEWAY AND DRIVE NORTH FOR 0.05 MI, 0.08 KM, TO MR. GRADY W. DUNNS
BH2057'BRICK RESIDENCE ON THE RIGHT, CONTINUE NORTH AND THEN WEST, AROUND
BH2057'THE SOUTH SIDE OF AN EQUIPMENT SHED AND SILOS AND ALONG THE NORTH
BH2057'SIDE OF A PASTURE FOR 0.25 MI (0.40 KM) TO THE STATION ON THE LEFT IN
BH2057'THE PASTURE.
BH2057'THE STATION IS 63.9 FT (19.5 M) SOUTHEAST OF A CARSONITE WITNESS POST
BH2057'AT RM A, 96.4 FT (29.4 M) SOUTH OF A CARSONITE WITNESS POST IN THE
BH2057'NORTH FENCE LINE, 96.6 FT (29.4 M) SOUTH OF A FOUR-STRAND EAST-WEST
BH2057'BARBED WIRE FENCE ON STEEL POSTS, AND SET 2.3 FT (0.7 M) UNDERGROUND
BH2057'WITH FOUR RAILROAD SPIKES DRIVEN AROUND THE MARK AND A FIVE-EIGHTHS
BH2057'INCH REBAR DRIVEN 1.0 FT (0.3 M) UNDERGROUND OVER THE MARK.
BH2057'WILMER 2 1964 NO. 5 1974 MAY BE USED AS AN AZIMUTH FOR THIS STATION.
BH2057'BEFORE USING THIS STATION AT ANY TIME, PLEASE NOTIFY
BH2057'MR. OR MRS. GRADY W. DUNN
BH2057'1452 WARD ROAD
BH2057'WILMER, ALABAMA 36587
BH2057'PHONE 205-649-2564.
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Section 3

SECTION 3: STATION COORDINATE LISTING

This section includes:

- Complete list of the final NAD83/HARN Coordinates and Ellipsoid Heights.
- Complete list of the final Universal Transverse Mercator (UTM) zone 16 Coordinates and Orthometric Heights

Mississippi and Alabama Coastal LIDAR Mapping Project

Horizontal Datum: NAD83/HARN
Vertical Datum: NAVD 88
Units: Meters
Coordinate Zone: UTM 16
Geoid Model: Geoid 03
Coordinate System: Geographical

LIDAR Base Stations:

Station Name	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	E-Height (Meters)	Y St. Dev.	X St. Dev.	Z St. Dev.
CODEN	30.383964561	-88.240592784	-24.160	0.014	0.014	0.000
MOB Base 1	30.681976808	-88.248932165	37.325	0.001	0.001	0.002
MOB Base 2	30.681970887	-88.249440950	37.201	0.001	0.001	0.002
KILN	30.419140478	-89.450361767	-13.008	0.001	0.001	0.000
STENNIS	30.373100562	-89.453035293	-22.580	0.000	0.000	0.000
BRIDGE RESET	30.410594746	-88.841635441	-24.700	0.000	0.000	0.003
VAN RM 1	30.589566529	-88.721709686	9.435	0.000	0.000	0.000

CORS Station Used:

Station Name	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	E-Height (Meters)	Y St. Dev.	X St. Dev.	Z St. Dev.
COVINGTON CORS L1 PHASE CENTER	30.475908245	-90.095534232	-4.450	0.000	0.000	0.000

Profile QA/QC Points:

Station Name	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	E-Height (Meters)	Y St. Dev.	X St. Dev.	Z St. Dev.
101	30.216600567	-89.576870615	-22.088	0.005	0.005	0.006
102	30.239846927	-89.611038800	-24.318	0.006	0.006	0.011
103	30.320728335	-89.603063994	-21.182	0.004	0.004	0.005
104	30.303897242	-89.554097821	-22.795	0.005	0.004	0.007
105	30.282160035	-89.536378017	-22.168	0.003	0.003	0.005
106	30.210661771	-89.503146020	-25.139	0.005	0.004	0.005
107	30.269529178	-89.449426890	-22.097	0.004	0.004	0.010
108	30.327473145	-89.421979718	-25.981	0.002	0.002	0.005
109	30.276760398	-89.374499787	-22.361	0.005	0.005	0.008
110	30.325499003	-89.344490111	-21.838	0.003	0.003	0.006
111	30.388969521	-89.358996537	-1.861	0.002	0.002	0.003
112	30.388167104	-89.277447925	-8.139	0.005	0.005	0.009
113	30.354515844	-89.259452163	-25.038	0.004	0.004	0.006
114	30.311420113	-89.286678637	-23.047	0.005	0.005	0.007

Station Name	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	E-Height (Meters)	Y St. Dev.	X St. Dev.	Z St. Dev.
115	30.338014765	-89.172057238	-24.744	0.006	0.006	0.006
116	30.398469160	-89.209277094	-22.864	0.004	0.004	0.005
117	30.416468776	-89.136270427	-19.602	0.007	0.007	0.008
118	30.364750961	-89.095146648	-24.053	0.007	0.007	0.007
119	30.427350681	-89.101286205	-20.105	0.008	0.008	0.011
120	30.384057938	-89.153257418	-21.655	0.007	0.007	0.008
121	30.382299597	-89.027076578	-25.845	0.008	0.008	0.009
122	30.391423267	-88.964012499	-25.386	0.013	0.010	0.019
201	30.393522253	-88.888327134	-26.010	0.002	0.002	0.004
202	30.451470935	-89.039043156	-20.367	0.006	0.006	0.007
203	30.419702037	-89.031445592	-22.148	0.006	0.006	0.007
204	30.437870215	-88.955089644	-20.060	0.004	0.004	0.006
205	30.469537876	-88.994695017	-14.106	0.005	0.005	0.007
206	30.455960322	-88.887462189	-21.022	0.002	0.002	0.004
207	30.439294039	-88.834909547	-20.942	0.002	0.002	0.004
208	30.456023559	-88.781971784	-12.772	0.003	0.003	0.006
209	30.395536699	-88.760246595	-22.440	0.003	0.003	0.005
210	30.361349787	-88.721208977	-23.177	0.004	0.004	0.006
211	30.397378659	-88.685058363	-22.128	0.004	0.004	0.006
212	30.441309509	-88.722117686	-26.319	0.004	0.004	0.007
213	30.366399981	-88.645828018	-22.993	0.005	0.005	0.007
214	30.421500377	-88.648705361	-23.180	0.005	0.005	0.006
215	30.410797203	-88.652391951	-24.194	0.005	0.005	0.007
216	30.437233403	-88.622321219	-19.963	0.005	0.005	0.006
217	30.378330323	-88.588788364	-24.691	0.005	0.005	0.007
218	30.418732793	-88.565891172	-23.756	0.005	0.005	0.007
219	30.440167051	-88.543843206	-24.328	0.005	0.005	0.007
220	30.389249337	-88.543921334	-24.935	0.005	0.005	0.007
221	30.355631976	-88.535681403	-24.621	0.006	0.006	0.007
222	30.332550871	-88.494022424	-25.896	0.006	0.007	0.008
223	30.398546636	-88.477953671	-26.110	0.005	0.005	0.006
224	30.456547604	-88.489095471	-24.471	0.004	0.004	0.005
225	30.452835849	-88.422085722	-24.331	0.004	0.004	0.005
226	30.387805274	-88.440552152	-27.398	0.004	0.004	0.005
227	30.495509449	-88.336063859	-1.516	0.003	0.003	0.004
228	30.431926927	-88.351791051	-6.140	0.003	0.002	0.004
229	30.449669446	-88.281755816	1.012	0.002	0.002	0.003
230	30.385516215	-88.241190488	-23.989	0.001	0.001	0.002
231	30.380474025	-88.308425492	-27.051	0.002	0.002	0.004
232	30.493113638	-88.189003389	-16.569	0.003	0.003	0.004
233	30.518699383	-88.267834736	11.451	0.003	0.003	0.004
234	30.575278506	-88.152518513	-19.595	0.004	0.004	0.005
301	30.381487200	-88.209102596	-23.623	0.001	0.001	0.002
302	30.366134385	-88.114472409	-26.391	0.003	0.003	0.004
303	30.385924669	-88.163209167	-23.222	0.002	0.002	0.003
304	30.452013856	-88.168232403	-21.229	0.003	0.003	0.003

Station Name	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	E-Height (Meters)	Y St. Dev.	X St. Dev.	Z St. Dev.
305	30.434083048	-88.110401544	-22.467	0.003	0.003	0.004
306	30.464824341	-88.114835200	-21.739	0.003	0.003	0.003
307	30.524484487	-88.170828658	-12.659	0.003	0.003	0.003
308	30.563779876	-88.089731512	-27.350	0.003	0.003	0.004
309	30.598102760	-88.099672582	-21.874	0.003	0.003	0.004
310	30.636858717	-88.063477171	-20.097	0.003	0.003	0.004
311	30.674116350	-88.074294132	-19.500	0.003	0.003	0.003
312	30.709776215	-88.050044269	-26.987	0.003	0.003	0.004
313	30.763923362	-88.061873856	-27.301	0.003	0.003	0.004
314	30.523958396	-88.123768529	-20.182	0.003	0.003	0.004

Mississippi and Alabama Coastal LIDAR Mapping Project

Horizontal Datum: NAD83/HARN
Vertical Datum: NAVD 88
Units: Meters
Coordinate Zone: UTM 16
Geoid Model: Geoid 03
Coordinate System: Grid

LIDAR Base Stations:

Station Name	Northing (Meters)	Easting (Meters)	Elevation (Meters)	Y St. Dev.	X St. Dev.	Z St. Dev.
CODEN	3361985.728	380806.414	4.005	0.014	0.014	0.000
MOB Base 1	3395023.221	380370.943	65.932	0.001	0.001	0.002
MOB Base 2	3395023.107	380322.198	65.808	0.001	0.001	0.002
KILN	3367780.275	264632.510	14.608	0.001	0.001	0.000
STENNIS	3362681.641	264264.991	4.911	0.000	0.000	0.000
BRIDGE RESET	3365723.432	323099.316	3.634	0.000	0.000	0.003
VAN RM 1	3385379.432	334923.341	38.130	0.000	0.000	0.000

CORS Station Used:

Station Name	Northing (Meters)	Easting (Meters)	Elevation (Meters)	Y St. Dev.	X St. Dev.	Z St. Dev.
COVINGTON CORS L1 PHASE CENTER	3375595.987	202807.012	22.548	0.000	0.000	0.000

Profile QA/QC Points:

Station Name	Northing (Meters)	Easting (Meters)	Elevation (Meters)	Y St. Dev.	X St. Dev.	Z St. Dev.
101	3345595.096	251966.728	4.805	0.005	0.005	0.006
102	3348247.411	248735.962	2.594	0.006	0.006	0.011
103	3357197.085	249709.219	5.928	0.004	0.004	0.005
104	3355223.979	254376.976	4.342	0.005	0.004	0.007
105	3352775.810	256027.761	4.939	0.003	0.003	0.005
106	3344778.217	259050.784	1.824	0.005	0.004	0.005
107	3351191.842	264363.890	5.108	0.004	0.004	0.010
108	3357559.001	267142.183	1.441	0.002	0.002	0.005
109	3351840.407	271590.750	4.986	0.005	0.005	0.008
110	3357183.537	274589.874	5.713	0.003	0.003	0.006
111	3364248.835	273341.268	25.850	0.002	0.002	0.003
112	3363999.377	281176.954	19.711	0.005	0.005	0.009
113	3360234.249	282832.057	2.741	0.004	0.004	0.006

Station Name	Northing (Meters)	Easting (Meters)	Elevation (Meters)	Y St. Dev.	X St. Dev.	Z St. Dev.
114	3355509.279	280118.151	4.550	0.005	0.005	0.007
115	3358240.768	291199.019	3.108	0.006	0.006	0.006
116	3365011.583	287750.894	5.125	0.004	0.004	0.005
117	3366872.206	294804.069	8.539	0.007	0.007	0.008
118	3361065.330	298648.916	3.978	0.007	0.007	0.007
119	3368015.529	298187.578	8.108	0.008	0.008	0.011
120	3363310.301	293103.676	6.370	0.007	0.007	0.008
121	3362891.535	305226.873	2.306	0.008	0.008	0.009
122	3363796.058	311305.160	2.835	0.013	0.010	0.019
201	3363904.978	318581.923	2.256	0.002	0.002	0.004
202	3370579.799	304215.030	7.972	0.006	0.006	0.007
203	3367045.087	304881.407	6.112	0.006	0.006	0.007
204	3368929.712	312251.572	8.301	0.004	0.004	0.006
205	3372506.483	308509.464	14.311	0.005	0.005	0.007
206	3370824.527	318780.535	7.411	0.002	0.002	0.004
207	3368894.055	323797.098	7.467	0.002	0.002	0.004
208	3370667.058	328910.662	15.690	0.003	0.003	0.006
209	3363929.938	330892.505	5.879	0.003	0.003	0.005
210	3360083.014	334585.840	5.057	0.004	0.004	0.006
211	3364024.164	338119.950	6.207	0.004	0.004	0.006
212	3368947.036	334633.342	2.120	0.004	0.004	0.007
213	3360535.124	341839.346	5.261	0.005	0.005	0.007
214	3366646.325	341651.739	5.215	0.005	0.005	0.006
215	3365465.176	341280.290	4.175	0.005	0.005	0.007
216	3368353.487	344211.127	8.466	0.005	0.005	0.006
217	3361779.179	347339.987	3.587	0.005	0.005	0.007
218	3366226.553	349602.297	4.617	0.005	0.005	0.007
219	3368573.114	351752.600	4.089	0.005	0.005	0.007
220	3362929.758	351668.091	3.359	0.005	0.005	0.007
221	3359193.045	352409.328	3.583	0.006	0.006	0.007
222	3356581.394	356379.820	2.234	0.006	0.007	0.008
223	3363875.627	358020.078	2.184	0.005	0.005	0.006
224	3370318.117	357034.254	3.960	0.004	0.004	0.005
225	3369823.861	363463.242	4.059	0.004	0.004	0.005
226	3362638.821	361598.293	0.854	0.004	0.004	0.005
227	3374452.631	371779.040	26.906	0.003	0.003	0.004
228	3367423.684	370185.270	22.171	0.003	0.002	0.004
229	3369311.761	376933.726	29.325	0.002	0.002	0.003
230	3362158.323	380750.868	4.180	0.001	0.001	0.002
231	3361672.220	374284.176	1.132	0.002	0.002	0.004
232	3374029.251	385890.568	11.787	0.003	0.003	0.004
233	3376947.244	378356.345	39.876	0.003	0.003	0.004
234	3383099.112	389485.354	8.868	0.004	0.004	0.005
301	3361678.449	383829.219	4.524	0.001	0.001	0.002
302	3359883.717	392905.155	1.677	0.003	0.003	0.004
303	3362124.057	388244.022	4.916	0.002	0.002	0.003

Station Name	Northing (Meters)	Easting (Meters)	Elevation (Meters)	Y St. Dev.	X St. Dev.	Z St. Dev.
304	3369453.458	387837.004	7.047	0.003	0.003	0.003
305	3367410.294	393370.228	5.744	0.003	0.003	0.004
306	3370821.417	392978.045	6.532	0.003	0.003	0.003
307	3377487.789	387671.002	15.739	0.003	0.003	0.003
308	3381764.811	395494.015	1.062	0.003	0.003	0.004
309	3385578.007	394577.751	6.591	0.003	0.003	0.004
310	3389839.898	398088.500	8.389	0.003	0.003	0.004
311	3393978.967	397091.348	9.033	0.003	0.003	0.003
312	3397909.135	399451.389	1.559	0.003	0.003	0.004
313	3403920.914	398375.417	1.282	0.003	0.003	0.004
314	3377383.556	392185.646	8.192	0.003	0.003	0.004

Section 4

SECTION 4: BASE STATION GPS LOGS

This section includes the GPS Station Logs for all base station occupations.

GPS STATION LOG

WOOLPERT

tation Name: MOB BASE 2
Receiver No.:
Day of Year:
ession No.:

Project Name: Gulf Coast COE
Job Number:
Local Date:
Operator:

VA CODE POSITION
at: 30 ° 40 ' 55.10" N
ong: 88 ° 14 ' 57.97" W
llip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other R7
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.: Zephyr
Tribrach No.: FHT
File Name:

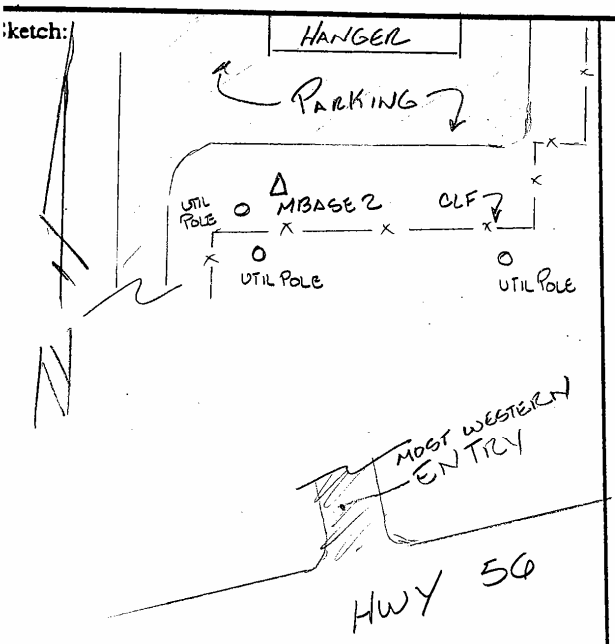
ntenna H.I. ==> Before: 2.000 M Ft
After: 2.000 M Ft
apid Static, Static, Kinematic Survey

Actual ==> Start : Stop : UTC
Start : Stop : Local
Local-UTC Time Offset:

V's Used:

Weather:

Sketch:



Description:
SURVEY CONTROL POINT IS ON THE WEST SIDE OF MOBILE REGINAL AIRPORT. IT CAN BE REACHED BY ENTERING THE MOST WESTERN ENTRY OFF HWY 56 IT ABOUT .5 MILE NORTH OF ENTRY. POINT IS A REBAR & CAP SET IN GRASS SWALE SOUTH OF PARKING LOT.

Type of Mark: REBAR / CAP
Stamping: WOOLPERT
Agency:

Indicate North

Remarks:

WOOLPERT

GPS STATION LOG

Station Name: STENNIS
Receiver No.:
Day of Year: 263
Session No.: 1

Project Name: Gulf Coast COE
Job Number:
Local Date: 9/20/05
Operator: S.L.

C/A CODE POSITION
Lat: 30 ° 22 ' 23.15 " N
Long: 89 ° 27 ' 10.90 " W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other 27
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.: Replyr
Tribrach No.: FNT
File Name:

Antenna H.I. ==> Before: 2.000 M Ft
After: M Ft
Rapid Static, Static, Kinematic Survey

Actual ==> Start : Stop : UTC
Start : Stop : Local
Local-UTC Time Offset:

SV's Used:

Weather:

Sketch:

Description:

F.A.D.

Type of Mark: Brass Disk in Conc.
Stamping: STENNIS
Agency:

Indicate North

Remarks:

WOOLPERT

GPS STATION LOG

Station Name: KILN
Receiver No.: R7
Day of Year: 262
Session No.: 1

Project Name: Gulf Coast GPS
Job Number:
Local Date: 9/21/05
Operator: JTC

C/A CODE POSITION
Lat: 30 ° 25 ' 08.89 " N
Long: 89 ° 27 ' 07.31 " W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other R7
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.: Zephyr
Tribrach No.: FIAT
File Name:

Antenna H.I. ==> Before: 2.000 M Ft
After: M Ft

Actual ==> Start : Stop : UTC
Start : Stop : Local

Rapid Static, Static, Kinematic Survey

Local-UTC Time Offset:

SV's Used:

Weather:

Sketch:

Description:

F.A.D.

Type of Mark: Brass Disk
Stamping: KILN
Agency:

Indicate North

Remarks:

WOOLPERT

GPS STATION LOG

Station Name: STENNIS
Receiver No.: R7
Day of Year: 262
Session No.: 1

Project Name: Gulf Coast COB
Job Number:
Local Date: 9/21/05
Operator: JDS

C/A CODE POSITION
Lat: 30 ° 22 ' 23.16 " N
Long: 89 ° 27 ' 10.91 " W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other R7
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.: Zephyr
Tribrach No.: FHT
File Name:

Antenna H.I. ==> Before: 2.000 M Ft
After: M Ft

Actual ==> Start : Stop : UTC
Start : Stop : Local

Rapid Static, Static, Kinematic Survey

Local-UTC Time Offset:

SV's Used:

Weather:

Sketch:

Description:

Type of Mark:
Stamping:
Agency:

Indicate North

Remarks:

WOOLPERT

GPS STATION LOG

Station Name: STENNIS
Receiver No.: 27
Day of Year: 265
Session No.: 1

Project Name: GULF COAST COE
Job Number:
Local Date: 9/21/05
Operator: S. L.

C/A CODE POSITION
Lat: 30 ° 22 ' 23.16 " N
Long: 89 ° 27 ' 10.92 " W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other 27
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.: Zephyr
Tribrach No.: FGT
File Name:

Antenna H.I. ==> Before: 2.000 M Ft
After: M Ft

Actual ==> Start : Stop : UTC
Start : Stop : Local

Rapid Static, Static, Kinematic Survey

Local-UTC Time Offset:

SV's Used:

Weather:

Sketch:

Description:

Type of Mark: Brass Disk
Stamping: Stennis
Agency:

Indicate North

Remarks:

GPS STATION LOG

WOOLPERT

Station Name: BRIDGE RESET (BH3293)
Receiver No.:
Day of Year: 265
Session No.: 1

Project Name:
Job Number:
Local Date: 22 SEP 2005
Operator: S. ROBERTS

C/A CODE POSITION
Lat: 30 ° 24 ' 38.13 " N
Long: 88 ° 52 ' 29.90 " W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other R7 w/ZEPHYR
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.:
Tribrach No.: FHT
File Name:

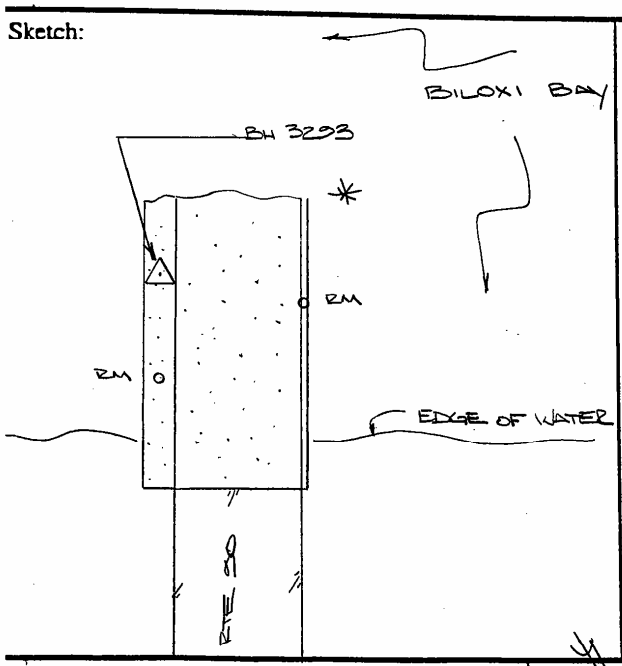
Antenna H.I. ==> Before: 2.063 (M) Ft
After: " (M) Ft
Rapid Static, Static, Kinematic Survey

Actual ==> Start 11 : 34 AM Stop 7 : 00 PM UTC
Start : Stop : Local
Local-UTC Time Offset:

SV's Used:

Weather: 90° ± 100% HUMIDITY, PRETTY SUNNY

Sketch:



Description: BRASS DISK IN CONC S.W.

* BRIDGE IS DESTROYED

Type of Mark: BRASS DISK
Stamping: "BRIDGE"
Agency: NGS

Indicate North

Remarks:

GPS STATION LOG

WOOLPERT

Station Name: VAN RM 1
Receiver No.: S/N 0220337196
Day of Year:
Session No.:

Project Name: Gulf Coast CVB
Job Number:
Local Date: 10-4-05
Operator: MIGUEL A RODRIGUEZ

C/A CODE POSITION
Lat: 30 ° 35 ' 22.44 " N
Long: 88 ° 43 ' 18.16 " W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other 5700 R7
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.:
Tribrach No.: FHT
File Name:

Antenna H.I. ==> Before: 2.0 M ___ Ft
After: 2.0 M ___ Ft

Actual ==> Start ___ : ___ Stop ___ : ___ UTC
Start 9 : 30 Stop 6 : 11 Local

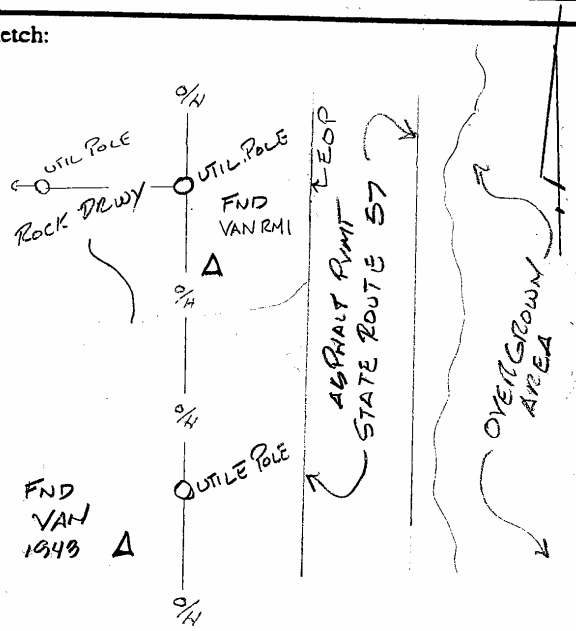
Rapid Static, Static, Kinematic Survey

Local-UTC Time Offset:

SV's Used:

Weather: CLEAR SUNNY

Sketch:



Description:
FND BRASS DISC ON CONC. MON STAMPED (VAN NO 1 1943) ± 25' WEST OF WEST EOP OF STATE ROUTE 57 & APROX 5.7 MILES NORTH OF VANCLEAVE POST OFFICE.

NOTE: EOP MEASUREMENT TAKEN FROM WHITE STRIPE

Type of Mark:
Stamping:
Agency:

Indicate North

Remarks:

WOOLPERT

GPS STATION LOG

Station Name: VAN RM 1 1949
Receiver No.: S/N 0220337196
Day of Year:
Session No.:

Project Name: Gulf Coast Cote
Job Number:
Local Date: 10-4-05
Operator: MIGUEL RODRIGUEZ

C/A CODE POSITION
Lat: 30 ° 35 ' 22.45 " N
Long: 88 ° 43 ' 18.16 " W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other 5700, R7
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.:
Tribrach No.: FHT
File Name:

Antenna H.I. ==> Before: 2.0 M — Ft
After: 2.0 M — Ft
Rapid Static, Static, Kinematic Survey

Actual ==> Start : Stop : UTC
Start 8:30 Stop 3:20 AM Local
Local-UTC Time Offset:

SV's Used:

Weather: CLEAR NIGHT

Sketch:
SEE LOG SHEET

Description:
SEE LOG SHEET

Type of Mark: NGS
Stamping:
Agency:

Indicate North

Remarks:

GPS STATION LOG

WOOLPERT

Station Name: BRIDGE RESET
Receiver No.:
Day of Year:
Session No.: 1

Project Name: Gulf Coast CVB
Job Number:
Local Date: OCT 4 2005
Operator: YN

C/A CODE POSITION
Lat: 30 ° 24 ' 38.14 " N
Long: 88 ° 50 ' 29.86 " W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other R7 - Zephy
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.: N/A
Tribrach No.: FHT
File Name:

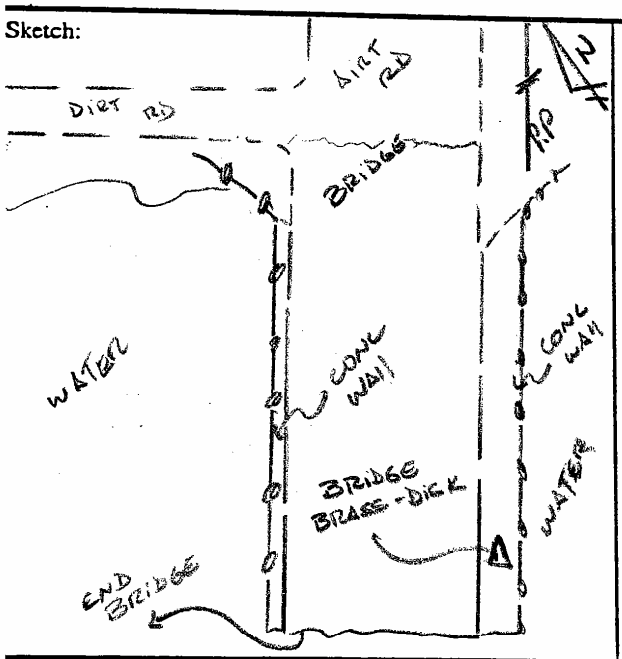
Antenna H.I. ==> Before: 2.0 (M) 6.56 (Ft)
After: 2.0 (M) 6.56 (Ft)
Rapid Static, (Static), Kinematic Survey

Actual ==> Start : Stop : UTC
Start : Stop : Local
Local-UTC Time Offset:

SV's Used:

Weather: 80° Sunny

Sketch:



Description:
BRASS - DISK
STAMP - BRIDGE

Type of Mark: BRASS DISK
Stamping: BRIDGE
Agency:

Indicate North

Remarks:

GPS STATION LOG

WOOLPERT

Station Name: BRIDGE RESET
Receiver No.:
Day of Year:
Session No.: 2

Project Name: CORP ENG
Job Number:
Local Date: 4 OCT 2004
Operator: Y.N

C/A CODE POSITION
Lat: 30 ° 24 ' 38.15 " N
Long: 88 ° 50 ' 29.87 " W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other R7- ZEPHYR
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.: N/A
Tribrach No.: FNT
File Name:

Antenna H.I. ==> Before: 2.0 (M) 6.56 (Ft)
After: 2.0 (M) 6.56 (Ft)
Rapid Static, (Static), Kinematic Survey

Actual ==> Start : Stop : UTC
Start 8 : 33 Stop : Local
Local-UTC Time Offset:

SV's Used:

Weather: CLEAR 75 ±

Sketch:

SEE SKETCH OF OCT 4 2005 SESSION 1.

Description:

Type of Mark: BRASS / DISK
Stamping: BRIDGE
Agency:

Indicate North

Remarks:

WOOLPERT

GPS STATION LOG

Station Name: VAN RM 1 1943
Receiver No.: S/N 0220337196
Day of Year:
Session No.:

Project Name: Gulf Coast CoE
Job Number:
Local Date: 10-5-05
Operator: MIGUEL RODRIGUEZ

C/A CODE POSITION
Lat: 30 · 35 '22.95" N
Long: 88 · 43 '18.16" W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other 5700, R7
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.:
Tribrach No.: DHT
File Name:

Antenna H.I. ==> Before: 2.0 M Ft
After: 2.0 M Ft
Rapid Static, Static, Kinematic Survey

Actual ==> Start : Stop : UTC
Start 10:00 Stop 4:51 Local
Local-UTC Time Offset:

SV's Used:

Weather: CLEAR SUNNY

Sketch:

SEE LOG SHEET

Description:

SEE LOG SHEET

Type of Mark: NGS
Stamping:
Agency:

Indicate North

Remarks:

WOOLPERT

GPS STATION LOG

Station Name: VAN RM 1
Receiver No.: R7
Day of Year:
Session No.: 1

Project Name: Gulf Coast COB
Job Number: 645057
Local Date: 10/05/05
Operator: JTO

C/A CODE POSITION
Lat: 30 ° 35 ' 22.44 " N
Long: 88 ° 43 ' 18.15 " W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other R7
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.: Zephyr
Tribrach No.: FLAT
File Name:

Antenna H.I. ==> Before: 2.000 M Ft
After: M Ft
Rapid Static, Static, Kinematic Survey

Actual ==> Start 1:32 Stop : UTC
Start 9:32 Stop : Local
Local-UTC Time Offset:

SV's Used:

Weather: clear 70°

Sketch:

Description:

Type of Mark: Brass Disk in Cone
Stamping: VAN NO 1 1945
Agency: NGS

Indicate North

Remarks:

GPS STATION LOG

WOOLPERT

Station Name: BRIDGE
Receiver No.:
Day of Year:
Session No.: 1

Project Name: CORP ENG
Job Number:
Local Date: 5 OCT 2005
Operator: Y.N

C/A CODE POSITION
Lat: 30 ° 24 ' 38.14 " N
Long: 88 ° 50 ' 29.87 " W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other 21 ZEPHYR
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.: N/A
Tribrach No.: FIT
File Name:

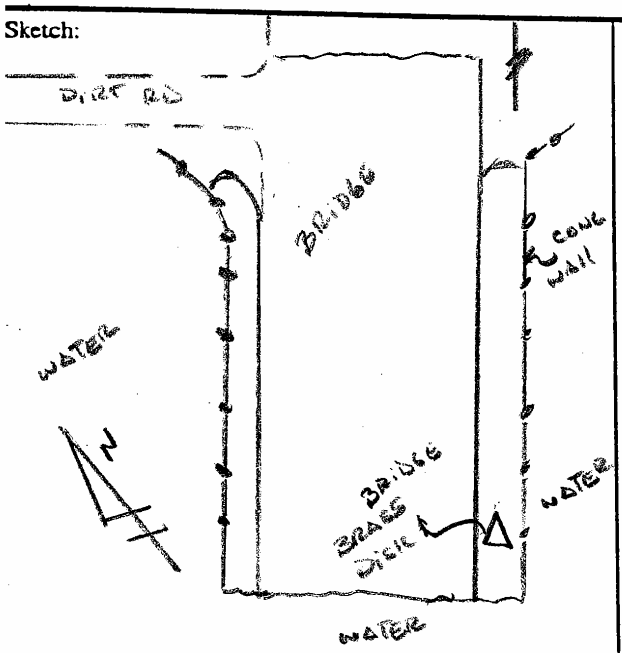
Antenna H.I. ==> Before: 2.0 M 6.56 Ft
After: 2.0 M 6.56 Ft
Rapid Static, Static, Kinematic Survey

Actual ==> Start : Stop : UTC
Start 10 :06 Stop : Local
Local-UTC Time Offset:

SV's Used:

Weather: 80+ SUNNY / CLEAR

Sketch:



Description:
BRASS DISK FOUND.

Type of Mark: BRASS - DISK
Stamping: BRIDGE
Agency:

Indicate North

Remarks:

GPS STATION LOG

WOOLPERT

Station Name: CODEN
Receiver No.: 7195
Day of Year: 1
Session No.:

Project Name: CORP ENG
Job Number: 063480
Local Date: 06 OCT 2005
Operator: Y.N

C/A CODE POSITION
Lat: 30 ° 23 ' 02.28 " N
Long: 88 ° 14 ' 26.14 " W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other R7 ZEPHYR
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.: N/A
Tribrach No.: FAT
File Name:

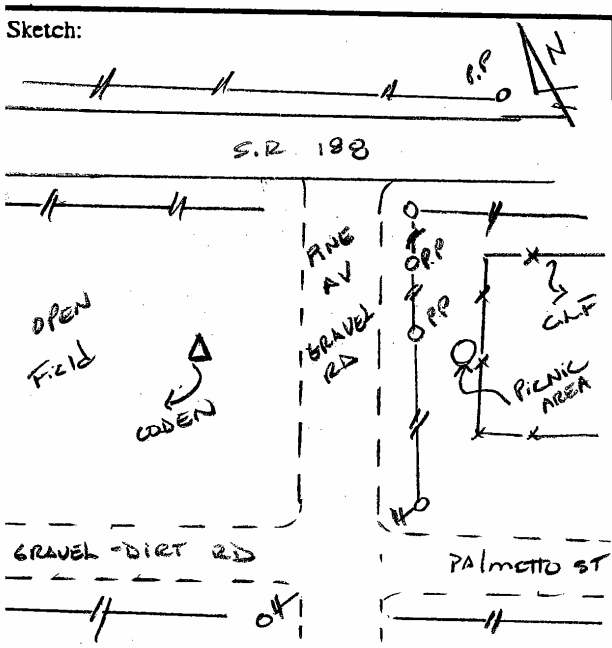
Antenna H.I. ==> Before: 3.007 M Ft
After: M Ft
Rapid Static, Static, Kinematic Survey

Actual ==> Start : Stop : UTC
Start : Stop : Local
Local-UTC Time Offset:

SV's Used:

Weather: 80's Cloudy

Sketch:



Description:
BRASS - DISK FOUND.

Type of Mark: BRASS DISK
Stamping: CODEN
Agency:

Indicate North

Remarks:

GPS STATION LOG

WOOLPERT

Station Name: CODEN
Receiver No.: 7195
Day of Year: 278
Session No.: AB LIDAR BASE

Project Name: GULF COAST COL KATRINA
Job Number: 063480
Local Date: 07OCT05
Operator: JKAIL

C/A CODE POSITION
Lat: 30 ° 23 ' 02.26 " N
Long: 88 ° 14 ' 26.15 " W
Ellip. Height: _____ M

Trimble: 4000 SSE, 4000 SSI, Other R7
Antenna: Kinematic, Compact, ~~Groundplane~~, Dome
Battery No.: ZEPHYR GEODETIC
Tribrach No.: FHT@2.0m + TOP SECTION OF BIPOD (D.954)
File Name: _____

Antenna H.I. ==> Before: 3.007 M _____ Ft
After: _____ M _____ Ft

Actual ==> Start ____ : ____ Stop ____ : ____ UTC
Start 08 : 15 Stop ____ : ____ Local

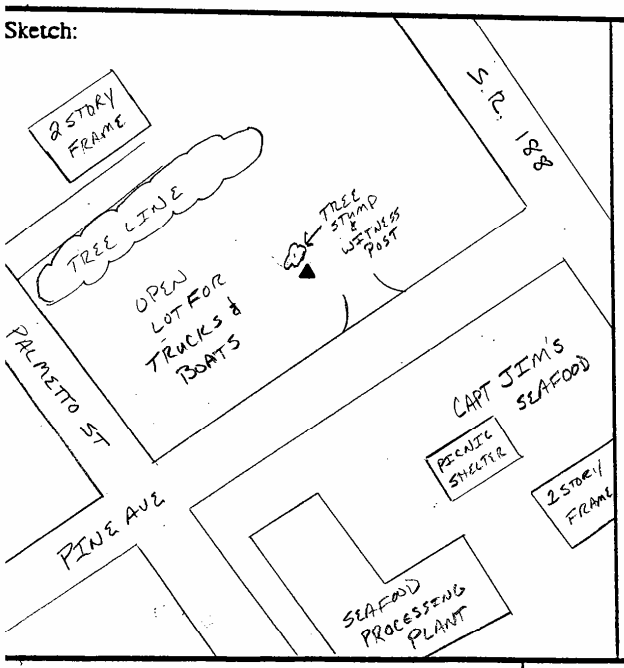
Rapid Static, Static, Kinematic Survey

Local-UTC Time Offset: _____

SV's Used: _____

Weather: CLEAR, BECOMING P. CLOUDY

Sketch:



Description:
NGS DESC. IS ADEQUATE

Type of Mark: BRASS DISK IN CONC
Stamping: CODEN 1930
Agency: CGS

Indicate North

Remarks: MARK IS APPROX 1.0' BELOW THE SURFACE

WOOLPERT

GPS STATION LOG

Station Name: VAN RM 1
Receiver No.: R7
Day of Year: 278
Session No.: 1

Project Name: Gulf Coast CDE
Job Number:
Local Date: 10/7/05
Operator: GRB

C/A CODE POSITION
Lat: 30 ° 35 ' 22.45 " N
Long: 88 ° 43 ' 18.16 " W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other R7
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.: Zephyr
Tribrach No.: FHT
File Name:

Antenna H.I. ==> Before: 2.000 M Ft
After: 2.000 M Ft
Rapid Static, Static, Kinematic Survey

Actual ==> Start : Stop : UTC
Start : Stop : Local
Local-UTC Time Offset:

SV's Used:
Weather:

Sketch:

Description:

F. A. D.

Type of Mark: Disk in Concrete
Stamping: VAN NO 1
Agency:

Indicate North

Remarks:

GPS STATION LOG

WOOLPERT

Station Name: CODEN
Receiver No.:
Day of Year:
Session No.:

Project Name: Corp Eng
Job Number:
Local Date: 08 OCT 2005
Operator: YN

C/A CODE POSITION
Lat: 30 ° 23 ' 02.29 " N
Long: 88 ° 14 ' 26.15 " W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, (Other) R7 Zephyr
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.:
Tribrach No.: FHT
File Name:

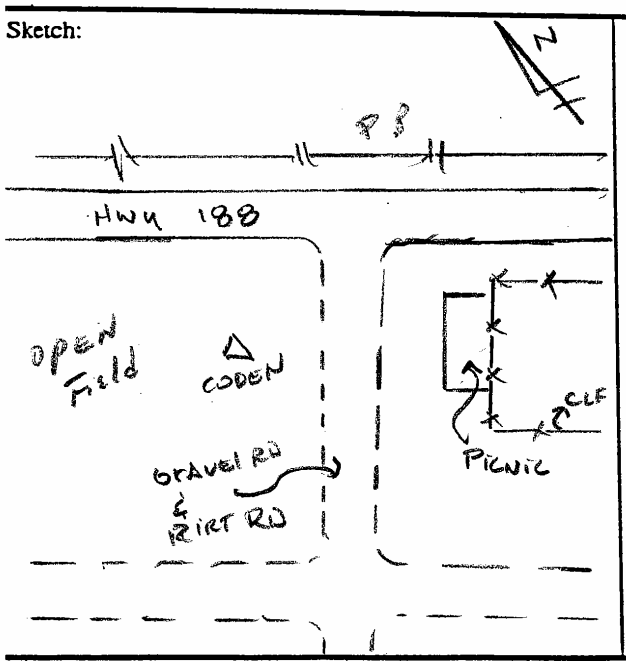
Antenna H.I. ==> Before: 3.007 M Ft
After: M Ft
Rapid Static, (Static), Kinematic Survey

Actual ==> Start : Stop : UTC
Start : Stop : Local
Local-UTC Time Offset:

SV's Used:

Weather: CLEAR 70°S.

Sketch:



Description:

BASE LIDAR

BRASS - DISK MON

Type of Mark: BRASS - DISK
Stamping: CODEN
Agency:

Indicate North

Remarks:

GPS STATION LOG

WOOLPERT

Station Name: CODEN
Receiver No.: 127
Day of Year: 279
Session No.: 1

Project Name: Gulf Coast CORS
Job Number: 64557
Local Date: 10/3/05
Operator: JNO

C/A CODE POSITION
Lat: 30 ° 23 ' 02.25 " N
Long: 88 ° 14 ' 28.16 " W
Ellip. Height: _____ M

Trimble: 4000 SSE, 4000 SSI, Other 127
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.: Zephyr
Tribrach No.: EMT + L 61010
File Name: _____

Antenna H.I. ==> Before: 3.007 M _____ Ft
After: _____ M _____ Ft
Rapid Static, Static, Kinematic Survey

Actual ==> Start ____:____ Stop ____:____ UTC
Start ____:____ Stop ____:____ Local
Local-UTC Time Offset: _____

SV's Used: _____ Weather: _____

Sketch:

Description:

Type of Mark: Disk in Conc.
Stamping: CODEN 1930
Agency: CGS

Indicate North

Remarks:

GPS STATION LOG

WOOLPERT

Station Name: MOB BASE 1
Receiver No.:
Day of Year:
Session No.:

Project Name: GULF COAST GPS
Job Number:
Local Date: 10 6 05
Operator: MIGUEL RODRIGUEZ

C/A CODE POSITION
Lat: 30 ° 40 ' 55.11 " N
Long: 88 ° 14 ' 53.16 " W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other 5700 R7
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.:
Tribrach No.: FHT
File Name:

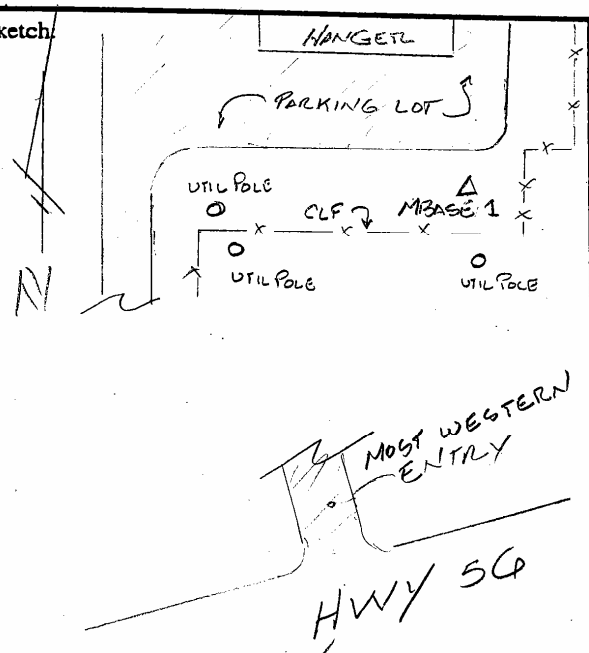
Antenna H.I. ==> Before: 2.0 M Ft
B.O.A. After: 2.0 M Ft
Rapid Static, (Static) Kinematic Survey

Actual ==> Start : Stop : UTC
Start 10:00 Stop 5:18 Local
Local-UTC Time Offset:

SV's Used:

Weather: CLOUDY SOME RAIN

Sketch:



Description:

SURVEY CONTROL POINT IS ON THE WEST SIDE OF MOBILE REGINAL AIRPORT. IT CAN BE REACHED BY ENTERING THE MOST WESTERN ENTRY OFF HWY 56. ITS ABOUT 1/2 MILE NORTH OF ENTRANCE. POINT IS A REBAR & CAP SET IN GRASS SWALE JUST SOUTH OF A PARKING LOT.

Type of Mark: REBAR / CAP
Stamping: WOOLPERT
Agency:

Indicate North

Remarks:

GPS STATION LOG

WOOLPERT

Station Name: KILN
Receiver No.:
Day of Year: 263
Session No.: 1

Project Name: Gulf Coast COE
Job Number:
Local Date: 20 SEP 2005
Operator: S. ROBERTS

C/A CODE POSITION
Lat: 30 ° 25 ' 08.90 " N
Long: 89 ° 27 ' 01.30 " W
Ellip. Height: M

Trimble: 4000 SSE, 4000 SSI, Other R-7 w/ ZEPHYR
Antenna: Kinematic, Compact, Groundplane, Dome
Battery No.:
Tribrach No.: FHT
File Name:

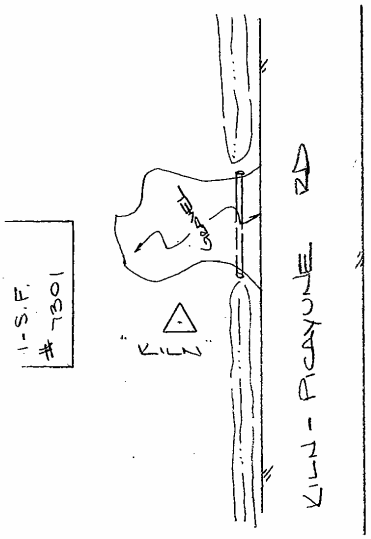
Antenna H.I. ==> Before: 2.0532 (M) Ft
After: " (M) Ft
Rapid Static, Static, Kinematic Survey

Actual ==> Start 1 : 36 PM Stop 21 SEP 05 3 : 00 AM UTC
Start : Stop : Local
Local-UTC Time Offset:

SV's Used:

Weather: 28° ± SUNNY, HUMID

Sketch:



Description: BRASS DISK IN CONC (F)

Type of Mark: BRASS DISK IN CONC
Stamping: "KILN"
Agency: NGS

Indicate North

Remarks: SET UP WAS STOLEN BY JIM

Section 5

SECTION 5: QUALITY CONTROL STATION LOGS

This section includes the GPS Station Logs for all Quality Control Profile occupations.

LOGSHEET FOR CROSS SECTIONS

LOCATION: Gulf COE Katrina
PROJECT NUMBER: 64557.01
OBSERVER: Jim Speelman
RECIEVER TYPE: 4000SSI
RECIEVER NUMBER: 2909
DATE: 20-Sep-05

Station Name	Antenna Height (m)	Antenna Type	Start Time	Stop Time	Description
102	2.163	Compact L1/L2	18:49	19:40	Concrete at Gas Station
101	2.163	Compact L1/L2	20:02	21:07	Short Grass at GE Plastics
106	2.163	Compact L1/L2	21:42	22:43	Sand
105	2.163	Compact L1/L2	23:17	0:00	Sand
103	2.163	Compact L1/L2	0:24	1:09	Gravel at Intersection

LOGSHEET FOR CROSS SECTIONS

LOCATION: Gulf COE Katrina
PROJECT NUMBER: 64557.01
OBSERVER: Jason Kail
RECIEVER TYPE: 4000SSI
RECIEVER NUMBER: 2926
DATE: 20-Sep-05

Station Name	Antenna Height (m)	Antenna Type	Start Time	Stop Time	Description
112	2.163	Compact L1/L2	18:57	19:27	Short Grass/ Bare Ground
113	2.163	Compact L1/L2	20:03	21:03	Short Grass
114	2.163	Compact L1/L2	21:24	21:50	Light Asphalt
115	2.163	Compact L1/L2	22:23	23:07	Concrete
118	2.163	Compact L1/L2	23:26	0:37	Concrete

LOGSHEET FOR CROSS SECTIONS

LOCATION: Gulf COE Katrina
PROJECT NUMBER: 64557.01
OBSERVER: Jim Speelman
RECIEVER TYPE: 4000SSI
RECIEVER NUMBER: 2909
DATE: 20-Sep-05

Station Name	Antenna Height (m)	Antenna Type	Start Time	Stop Time	Description
104	2.163	Compact L1/L2	16:31	17:16	CL of Sand Road
107	2.163	Compact L1/L2	17:31	18:11	Grass at Ball field
109	2.163	Compact L1/L2	18:47	19:18	Concrete Slab
110	2.163	Compact L1/L2	20:10	20:45	Gravel Lot
108	2.163	Compact L1/L2	21:11	21:45	Dirt
111	2.163	Compact L1/L2	22:07		Short Grass at Golf Green

LOGSHEET FOR CROSS SECTIONS

LOCATION: Gulf COE Katrina
PROJECT NUMBER: 64557.01
OBSERVER: Jason Kail
RECIEVER TYPE: 4000SSI
RECIEVER NUMBER: 2926
DATE: 21-Sep-05

Station Name	Antenna Height (m)	Antenna Type	Start Time	Stop Time	Description
122	2.163	Compact L1/L2	16:15	17:14	Sand with Sparse Short Grass
121	2.163	Compact L1/L2	17:30	18:55	Concrete
119	2.163	Compact L1/L2	19:35	20:25	Short/Medium Grass
117	2.163	Compact L1/L2	20:40	21:17	Gravel
120	2.163	Compact L1/L2	21:31	22:12	Bare Dirt
116	2.163	Compact L1/L2	22:24	22:56	Bare Dirt

LOGSHEET FOR CROSS SECTIONS

LOCATION: Gulf COE Katrina
PROJECT NUMBER: 64557.01
OBSERVER: Jim Speelman
RECIEVER TYPE: 4000SSI
RECIEVER NUMBER: 2909
DATE: 22-Sep-05

Station Name	Antenna Height (m)	Antenna Type	Start Time	Stop Time	Description
201	2.163 bipod	Compact L1/L2	16:28	17:04	Concrete Walk
203	2.163 bipod	Compact L1/L2	17:49	18:24	Gravel Lot
202	2.163 bipod	Compact L1/L2	18:45	19:26	Sand at a Belfield
204	2.163 bipod	Compact L1/L2	19:42	20:26	Grass at Woolmarket Baptist Church
205	2.063 fht	Compact L1/L2	20:58	21:51	Concrete Parking Lot

LOGSHEET FOR CROSS SECTIONS

LOCATION: Gulf COE Katrina
PROJECT NUMBER: 64557.01
OBSERVER: Jason Kail
RECIEVER TYPE: 4000SSI
RECIEVER NUMBER: 2926
DATE: 22-Sep-05

Station Name	Antenna Height (m)	Antenna Type	Start Time	Stop Time	Description
206	2.163	Compact L1/L2	16:53	17:19	Short Grass
207	2.163	Compact L1/L2	17:33	18:16	Concrete
208	2.163	Compact L1/L2	18:29	18:54	Gravel
209	2.163	Compact L1/L2	19:23	19:54	Short Grass
210	2.163	Compact L1/L2	20:15	16:35	Concrete, Abort Data Bad
210	2.163	Compact L1/L2	20:36	21:11	Concrete, Re-observed with better satellites
K 364	3.057 (ADDED EXT.)	Compact L1/L2	21:30	22:29	NGS Mon found as described
FONTAINE AZ MK	3.057 (ADDED EXT.)	Compact L1/L2	23:19	0:00	NGS Mon found as described

LOGSHEET FOR CROSS SECTIONS

LOCATION: Gulf COE Katrina
PROJECT NUMBER: 64557.01
OBSERVER: Jim Speelman
RECIEVER TYPE: 4000SSI
RECIEVER NUMBER: 2909
DATE: 22-Sep-05

Station Name	Antenna Height (m)	Antenna Type	Start Time	Stop Time	Description
201	2.163	Compact L1/L2	9:32	10:35	Concrete Walk
202	2.163	Compact L1/L2	11:12	11:55	Dirt at a ball field
203	2.163	Compact L1/L2	12:04	12:50	Gravel Lot
205	2.163	Compact L1/L2	1:06	1:46	Grass at Woolmarket Baptist Church
204	2.163	Compact L1/L2	2:01	2:56	Concrete Parking Lot
KILN	2.163	Compact L1/L2	3:37	4:55	Bras Disk in Concrete
H 234	2.163	Compact L1/L2	5:45	6:12	Brass Disk

LOGSHEET FOR CROSS SECTIONS

LOCATION: Gulf COE Katrina
PROJECT NUMBER: 64557.01
OBSERVER: Jason Kail
RECIEVER TYPE: 4000SSI
RECIEVER NUMBER: 2926
DATE: 4-Oct-05

Station Name	Antenna Height (m)	Antenna Type	Start Time	Stop Time	Description
206	2.163	Compact L1/L2	14:55	15:32	Short Grass
207	2.163	Compact L1/L2	15:44	16:18	Concrete
208	2.163	Compact L1/L2	16:33	17:03	Gravel
209	2.163	Compact L1/L2	17:29	18:45	Short Grass
210	2.163	Compact L1/L2	18:56	19:37	Concrete
210	2.163	Compact L1/L2	19:37	20:43	Concrete, Re-observed with better satellites
FONTAINE AZ MK	3.117 (ADDED EXT.)	Compact L1/L2	20:55	21:48	NGS Mon found as described
K 364	3.117 (ADDED EXT.)	Compact L1/L2	22:01	23:10	NGS Mon found as described

LOGSHEET FOR CROSS SECTIONS

LOCATION: Gulf COE Katrina
PROJECT NUMBER: 64557.01
OBSERVER: Jim Speelman
RECIEVER TYPE: 4000SSI
RECIEVER NUMBER: 2909
DATE: 5-Oct-05

Station Name	Antenna Height (m)	Antenna Type	Start Time	Stop Time	Description
212	2.163	Compact L1/L2	15:03	15:55	CL of Gravel Road
211	2.163	Compact L1/L2	16:09	16:55	Sand
213	2.163	Compact L1/L2	17:11	17:52	Concrete Pad at Bethel Baptist Church
215	2.163	Compact L1/L2	18:17	19:04	Grass at Abundant Life Christian Center
214	2.163	Compact L1/L2	19:26	20:11	Grass at Gas Station
216	2.163	Compact L1/L2	20:22	21:40	Concrete at Rest Area

LOGSHEET FOR CROSS SECTIONS

LOCATION: Gulf COE Katrina
PROJECT NUMBER: 64557.01
OBSERVER: Jason Kail
RECIEVER TYPE: 4000SSI
RECIEVER NUMBER: 2926
DATE: 6-Oct-05

Station Name	Antenna Height (m)	Antenna Type	Start Time	Stop Time	Description
217	2.163	Compact L1/L2	15:15	15:55	Short Grass
220	2.163	Compact L1/L2	16:09	16:54	Medium Grass
218	2.163	Compact L1/L2	17:07	17:53	Gravel
219	2.163	Compact L1/L2	18:06	19:03	Concrete
222	2.163	Compact L1/L2	19:23	20:23	Gravel
221	2.163	Compact L1/L2	20:37	21:39	Short Grass

LOGSHEET FOR CROSS SECTIONS

LOCATION: Gulf COE Katrina
PROJECT NUMBER: 64557.01
OBSERVER: Jim Speelman
RECIEVER TYPE: 4000SSI
RECIEVER NUMBER: 2909
DATE: 6-Oct-05

Station Name	Antenna Height (m)	Antenna Type	Start Time	Stop Time	Description
234	2.163	Compact L1/L2	16:10	16:50	Concrete Drive
232	2.163	Compact L1/L2	17:10	17:55	Short Grass at Open Lot
233	2.163	Compact L1/L2	18:14	19:00	CL of Sand Road
229	2.163	Compact L1/L2	19:25	20:06	CL of Gravel Road Intersection
231	2.163	Compact L1/L2	20:31	21:15	CL of Sand Drive
230	2.163	Compact L1/L2	21:36	22:16	CL of Gravel Road

LOGSHEET FOR CROSS SECTIONS

LOCATION: Gulf COE Katrina
PROJECT NUMBER: 64557.01
OBSERVER: Jason Kail
RECIEVER TYPE: 4000SSI
RECIEVER NUMBER: 2926
DATE: 6-Oct-05

Station Name	Antenna Height (m)	Antenna Type	Start Time	Stop Time	Description
223	2.163	Compact L1/L2	16:05		Concrete
226	2.163	Compact L1/L2	17:13	18:05	Medium Grass
225	2.163	Compact L1/L2	18:21	19:06	Concrete
224	2.163	Compact L1/L2	19:18	20:05	Dirt
227	2.163	Compact L1/L2	20:18	21:01	Medium Grass
228	2.163	Compact L1/L2	21:26	22:15	Dirt

LOGSHEET FOR CROSS SECTIONS

LOCATION: Gulf COE Katrina
PROJECT NUMBER: 64557.01
OBSERVER: Jim Speelman
RECIEVER TYPE: 4000SSI
RECIEVER NUMBER: 2909
DATE: 7-Oct-05

Station Name	Antenna Height (m)	Antenna Type	Start Time	Stop Time	Description
873 5180 TIDAL 1	2.063	Compact L1/L2	15:31	16:38	873 5180 Tidal 1 BM No1 1960
G 482	2.063	Compact L1/L2	17:10	18:02	Steel Rod in PVC
305	2.163	Compact L1/L2	18:21	19:05	Short Grass
302	2.163	Compact L1/L2	19:20	20:05	CL of Sand Road
303	2.063	Compact L1/L2	20:22	21:16	CL of Concrete Road
301	2.163	Compact L1/L2	21:26	22:39	Intersection of Gravel Road and Dirt Road

LOGSHEET FOR CROSS SECTIONS

LOCATION: Gulf COE Katrina
PROJECT NUMBER: 64557.01
OBSERVER: Jason Kail
RECIEVER TYPE: 4000SSI
RECIEVER NUMBER: 2926
DATE: 7-Oct-05

Station Name	Antenna Height (m)	Antenna Type	Start Time	Stop Time	Description
304	2.163	Compact L1/L2	16:16	17:42	Gravel
306	2.163	Compact L1/L2	17:14	18:00	Dirt
314	2.163	Compact L1/L2	18:11	19:00	Gravel
307	2.163	Compact L1/L2	19:16	20:16	Medium Grass
308	2.163	Compact L1/L2	20:37	21:28	Dirt
309	2.163	Compact L1/L2	21:50	22:39	Concrete

LOGSHEET FOR CROSS SECTIONS

LOCATION: Gulf COE Katrina
PROJECT NUMBER: 64557.01
OBSERVER: Jim Spellman
RECIEVER TYPE: 4000SSI
RECIEVER NUMBER: 2909
DATE: 8-Oct-05

Station Name	Antenna Height (m)	Antenna Type	Start Time	Stop Time	Description
310	2.163	Compact L1/L2	15:54	17:03	Concrete Road
311	2.163	Compact L1/L2	17:19	19:36	Short Grass, east of Stadium

LOGSHEET FOR CROSS SECTIONS

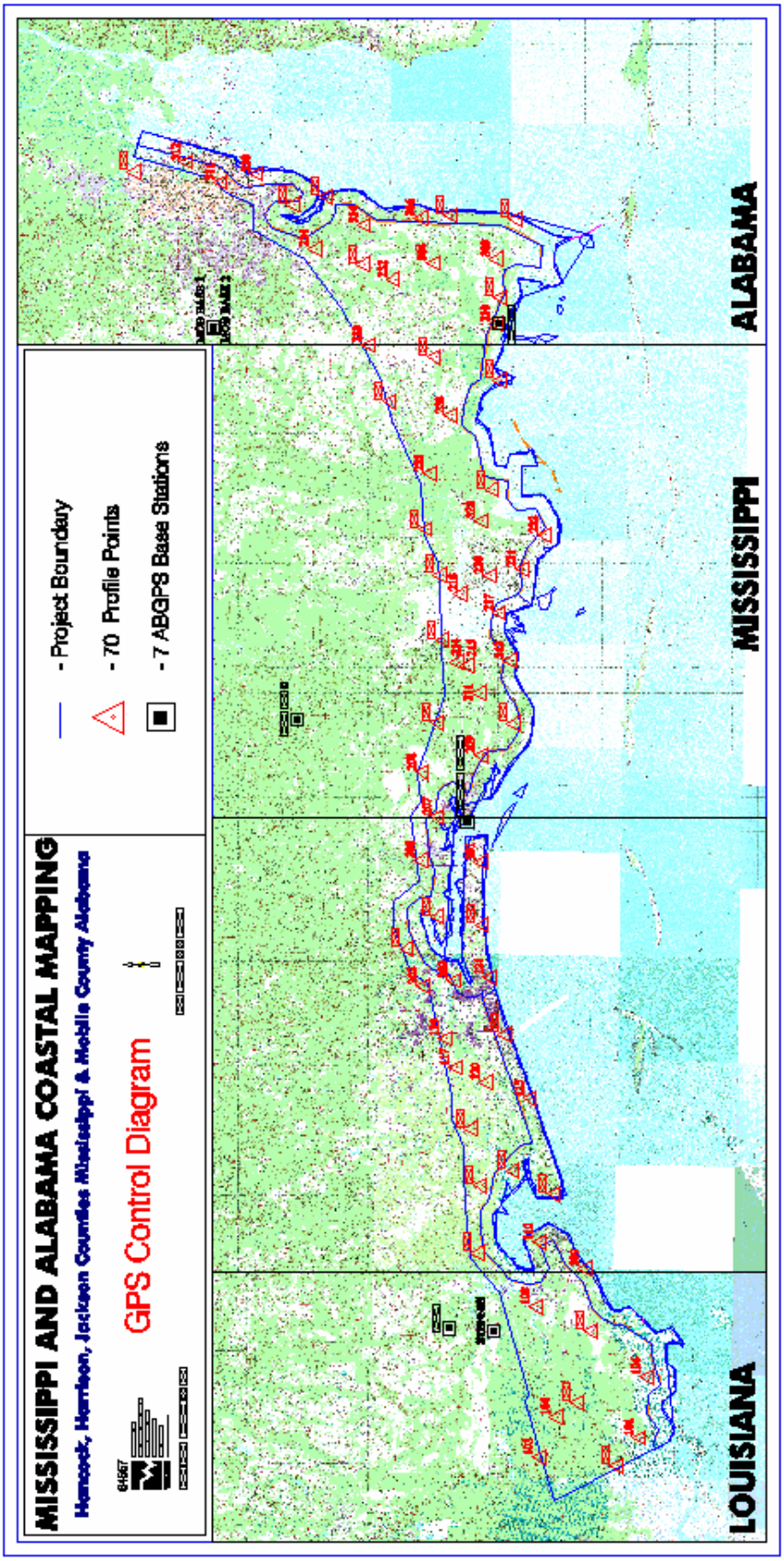
LOCATION: Gulf COE Katrina
PROJECT NUMBER: 64557.01
OBSERVER: Jason Kail
RECIEVER TYPE: 4000SSI
RECIEVER NUMBER: 2926
DATE: 8-Oct-05

Station Name	Antenna Height (m)	Antenna Type	Start Time	Stop Time	Description
312	2.163	Compact L1/L2	16:15	17:00	Short Grass
313	2.163	Compact L1/L2	17:46	18:48	Gravel

Section 6

SECTION 6: CONTROL DIAGRAM

This section includes the project control diagram.


MISSISSIPPI AND ALABAMA COASTAL MAPPING
Hancock, Harrison, Jackson Counties Mississippi & Mobile County Alabama
GPS Control Diagram
- Project Boundary
- 70 Profile Points
- 7 ABGPS Base Stations
LOUISIANA
MISSISSIPPI
ALABAMA

Appendix D
MS Barrier Islands Post-Katrina LIDAR Report

Report has not been released by USACE

For information contact:

Jeff Lillycrop, Director
USACE JALBTCX
7225 Stennis Airport Road
Kiln, MS 39556-8033
jeff.lillycrop@sam.usace.army.mil

Appendix E
Mobile County, AL LIDAR Report

Report has not been released by Mobile County

For information contact:

Bill Melton
Mobile County Commission
205 Government Street
Mobile, AL 36644-1600
bmelton@mobilecounty.net

Appendix F
St. Tammany Parish, LA LIDAR Report

GROUND CONTROL SURVEY

LIDAR SURVEY

FEMA MAP MODERNIZATION PROGRAM
Phase 1 Task Orders 3 & 4

Services provided by:

3001, INC. THE SPATIAL DATA COMPANY
5525 MOUNES STREET, SUITE 102
NEW ORLEANS, LOUISIANA 70123

Services provided for:

U. S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT
1222 SPRUCE STREET
ST. LOUIS, MO 62103-2833

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ABSTRACT

ABSTRACT

This report documents the GPS ground surveys conducted in support of LIDAR data collection for the FEMA Map Modernization Program, Phase 1, Task Orders 3 and 4. The LIDAR data in the western portion of the area were collected during February and March, 2000. The LIDAR data for the eastern portion of the area were collected during January and February, 2002. Initially a static GPS control network covering the area of the LIDAR surveys was performed utilizing three Trimble 4700 units and one Trimble 4000-SSE with fixed-height tripods.

Following the Control network surveys, Real-Time Kinematic and Continuous surveys were conducted at 17 sites utilizing the Base stations established in the static network. These surveys established "Ground Truth" data at each site on different surface types, including asphalt, brush and grass, concrete, dirt, gravel, limestone, mowed grass, tall grass, trees and brush, trees and short grass, and weeds and short grass. Additional ground truth data were collected in January, 2002, in areas under tree cover.

Statistical comparisons were made between ground truth points collected in the survey and airborne LIDAR points which fell within 1 meter of the ground truth points.

MAIN REPORT

STATIC GPS SUMMARY

The Standard Operating Procedure for the data collection includes a geodetic control network plan designed to maximize the use of the highest order control points in the area of interest, and to optimize the spatial distribution of geodetic control across the network.

Also included is the simultaneous occupation of points designed to provide redundant vectors and loop closures, as well as a collection of a superfluity of points to compare observed values against published values of geodetic control points.

In addition, the static GPS network was established to verify the compatibility and correlation of existing published NGS and COE furnished controls in the project area. Horizontal and vertical constraints were selected based on the order of accuracy and correlation of the controls selected.

PRELIMINARY ANALYSIS

The baselines were processed using GPSurvey's baseline processing module, WAVE (*Weighted Ambiguity Vector Estimator*). Ionosphere-free fixed solutions were found to provide the best results. Preliminary blunder detections were undertaken using "Redundant Vectors" and Global Network Closures and any extremely large errors were eliminated.

MINIMALLY CONSTRAINED ADJUSTMENT

The data are then processed using a minimally constrained geodetic control network to test the network internally, without external constraints, and produce a statistical summary. The minimally constrained report is given in section 3-A. The statistics from this process are required to be within the tolerance outlined in the Geometric Geodetic Accuracy Standards and Specifications for using GPS Relative Positioning Techniques, published by the FGCC and specified in the Quantitative Assessment in this section. These tolerances are represented as ellipsoids showing the margin of error value on a graph of the theoretical points, covariance values that indicate the degree of error of the vectors relative to the other vectors in the network, and a chi-squared test that compares the predicted variance determined through a least-squares analysis to the observed variance. The summary is evaluated to eliminate vectors that are outside of the error tolerances to be replaced with redundant vectors that are within the tolerances until all tolerances are met.

FULLY CONSTRAINED ADJUSTMENT

The quality of the existing horizontal controls is assessed before undertaking the constrained adjustment. Geodetic inverses between the published NAD83 Coordinates of existing stations were compared with the geodetic inverses derived from the minimally constrained least square adjustment results. This distance analysis is especially useful, since it provides a datum invariant means of comparison.

Once the minimally constrained network satisfies the requirements of the above tests, the highest order control points in the control network are selected with an optimum spatial relationship to fully constrain the network to known control points, and have their published values entered as the position for those points and the network re-adjusted. The fully constrained report is given in section 3-B. The same statistical tests are rerun on the adjusted network, as well as visually comparing adjusted values of geodetic control points to published values of control points not used as constraints. Again, the summary is evaluated to identify vectors outside of the tolerances and constraining points reselected to obtain the best fit to the geoid where all vectors are within the prescribed tolerances.

ERROR ELLIPSES

The adjustment results show that the a posteriori variance factor of the network was close to 1.0 as should be desired, and passed the χ_2 test. None of the residual components in the network were flagged for possible rejection under the τ-max test at the 0.05 level of significance. The relative confidence ellipses reveal that the horizontal positional accuracy between all directly connected pairs of stations in the network were better than (1:100,000) at the 95% level of confidence. The GPSurvey-generated horizontal and vertical Error ellipses are included in this report in section 3-C.

RTK GPS SUMMARY

Real Time Kinematic (RTK) GPS surveys were conducted to establish ground-truth data at representative sites throughout the project area. These sites were selected on the basis of the various types of ground surfaces and vegetation covers that would be encountered by the LIDAR surveys. As a quality control measure, a number of "check-in" points were surveyed along with the ground surface points. These "check-in" points consisted of published horizontal and vertical control points within the area. The RTK Base stations used in the surveys were included in the static GPS network, and were selected on the basis of their having an unobstructed view of the sky, as well as their suitability for broadcasting raw GPS observables to one or more roving receivers which use the information to calculate an accurate vector from each Base to rover. The horizontal and vertical accuracy of each base station was determined by the statistical tests performed in the least squares adjustment process.

SAMPLE POINTS/TEST POINTS

The test points were distributed and categorized into sites as shown in the Project Area RTK Site Map attached in this report (Section 4-A). These sites were selected on the basis of various types of ground surfaces and vegetation covers. At the time of LIDAR data acquisition, checkpoints were collected on asphalt, brush and grass, concrete, dirt, gravel, limestone, mowed grass, tall grass, trees and brush, trees and short grass, and weeds and short grass. Additional checkpoints were collected during January, 2002, in forested areas, to evaluate the LIDAR accuracy under tree canopies.

DATA ANALYSIS

Data analysis was accomplished by comparing ground truth checkpoints with LIDAR points from the edited data set which were within 1 meter horizontally from the ground truth points. The only exception to this were the ground truth points collected under tree canopy, where comparisons were made with LIDAR points that fell within 3 meters of the check points. This is because fewer LIDAR pulses are able to reach the ground in heavily forested areas, so the point spacing is larger than in cleared areas. Note that the edited LIDAR points are simply a subset of the raw LIDAR points. The points that fell above the ground surface on vegetation canopies, buildings, or other obstructions were removed from the data set.

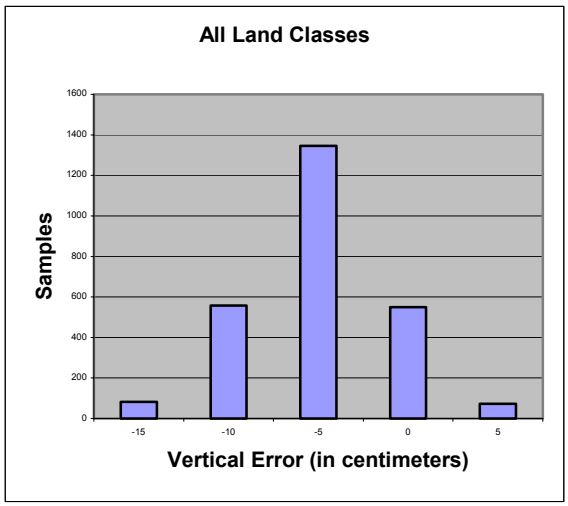
LIDAR POINT COMPARISON

The result of these comparisons of these values indicated a Vertical Root Mean Square Error (RMSEz) of 7.99 centimeters, which equates to Vertical Accuracy (Accuracyz) of 15.66 centimeters at the 95 percent confidence level.

OVERALL ACCURACY

A comparison of these values indicated a Vertical Root Mean Square Error (RMSEz) of 7.99 centimeters. This is within the vertical accuracy tolerance. The mean elevation difference for all points is -6.41 centimeters. Skewness is 0.88, indicating additional outliers exist other than the 31 outliers removed from the 2655 points. These outliers occur in areas of asphalt land cover. However, the standard deviation is low, 4.76 centimeters. Descriptive statistics and a histogram of the vertical error distribution for all sample points are shown below.

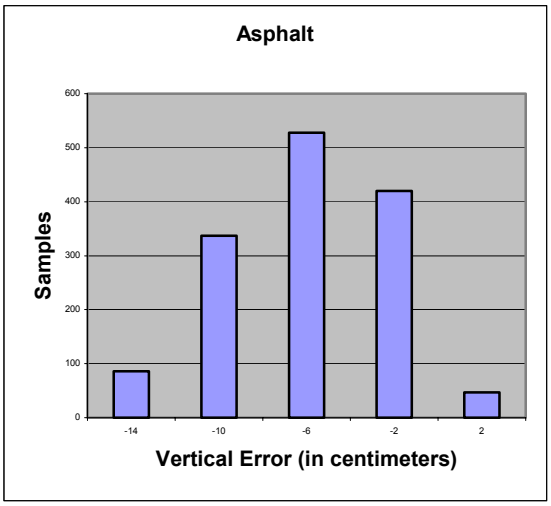
All Land Classes		
	Ft	Cm
RMSEz	0.262	7.99
Mean	-0.210	-6.41
Standard Error	0.003	0.09
Median	-0.208	-6.35
Standard Deviation	0.156	4.76
Sample Variance	0.024	22.70
Kurtosis	6.306	6.31
Skewness	0.876	0.88
Range	1.714	52.24
Minimum	-0.911	-27.78
Maximum	0.803	24.46
Sum	-559.967	-17067.81
Count	2655	2655



ASPHALT

This set includes only those points that were collected on asphalt road surfaces. The resulting RMSEz is 8.82 centimeters, which is within the accuracy specification. The skewness value is -0.76.

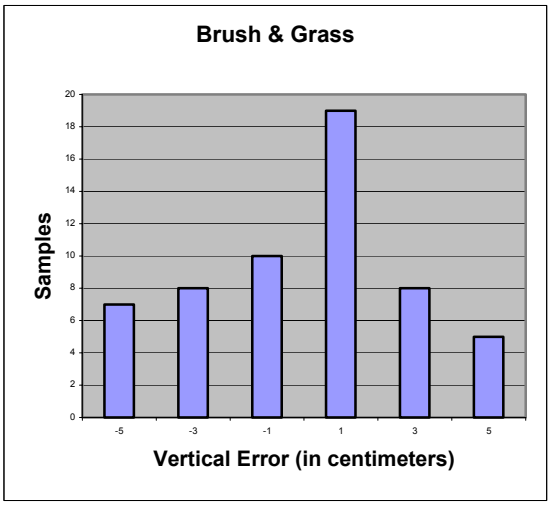
Asphalt		
	Ft	Cm
RMSEz	0.289	8.82
Mean	-0.256	-7.80
Standard Error	0.004	0.11
Median	-0.244	-7.43
Standard Deviation	0.135	4.11
Sample Variance	0.018	16.89
Kurtosis	1.160	1.16
Skewness	-0.742	-0.76
Range	1.020	29.32
Minimum	-0.911	-27.78
Maximum	0.109	1.55
Sum	-369.910	-11278.16
Count	1445	1445



BRUSH AND GRASS

This set includes only those points that were collected in brush and grass areas. The resulting RMSEz is 3.79 centimeters, which is within the accuracy specification. The skewness value is -0.33.

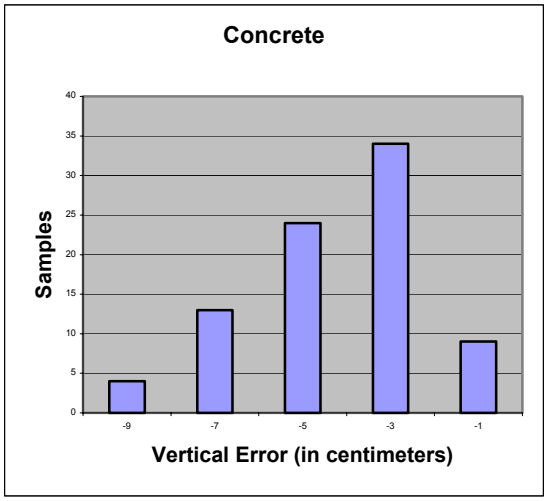
Brush & Grass		
	Ft	Cm
RMSEz	0.124	3.79
Mean	-0.074	-2.26
Standard Error	0.013	0.40
Median	-0.060	-1.82
Standard Deviation	0.101	3.07
Sample Variance	0.010	9.41
Kurtosis	-0.632	-0.63
Skewness	-0.328	-0.33
Range	0.392	11.95
Minimum	-0.289	-8.81
Maximum	0.103	3.14
Sum	-4.372	-133.27
Count	59	59



CONCRETE

This set includes only those points that were collected in concrete areas. The resulting RMSEz is 6.03 centimeters, which is within the accuracy specification. The skewness value is -0.51.

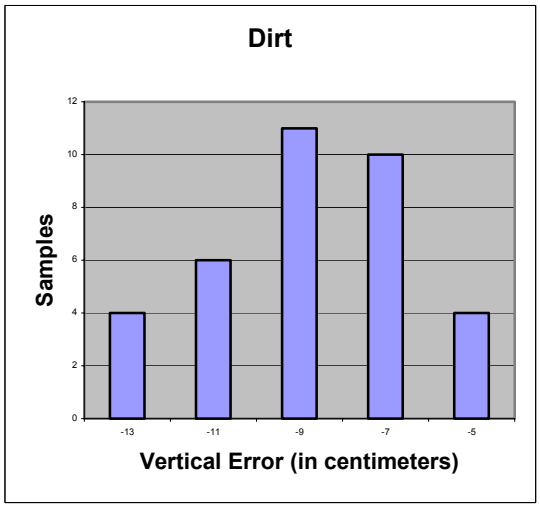
Concrete		
	Ft	Cm
RMSEz	0.198	6.03
Mean	-0.187	-5.69
Standard Error	0.007	0.22
Median	-0.179	-5.46
Standard Deviation	0.066	2.00
Sample Variance	0.004	4.01
Kurtosis	-0.148	-0.15
Skewness	-0.513	-0.51
Range	0.298	9.08
Minimum	-0.364	-11.08
Maximum	-0.066	-2.00
Sum	-15.693	-478.34
Count	84	84



DIRT

This set includes only those points that were collected in areas of dirt. The resulting RMSEz is 10.57 centimeters, which is within the accuracy specification. The skewness value is 0.23.

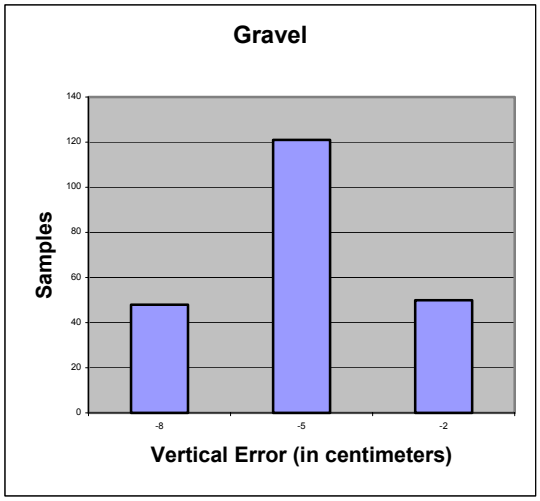
Dirt		
	Ft	Cm
RMSEz	0.347	10.57
Mean	-0.337	-10.29
Standard Error	0.013	0.41
Median	-0.346	-10.55
Standard Deviation	0.080	2.45
Sample Variance	0.006	6.02
Kurtosis	0.031	0.03
Skewness	0.227	0.23
Range	0.359	10.94
Minimum	-0.493	-15.02
Maximum	-0.134	-4.08
Sum	-12.149	-370.29
Count	36	36



GRAVEL

This set includes only those points that were collected in gravel areas. The resulting RMSEz is 7.99 centimeters, which is within the accuracy specification. The skewness value is -0.86.

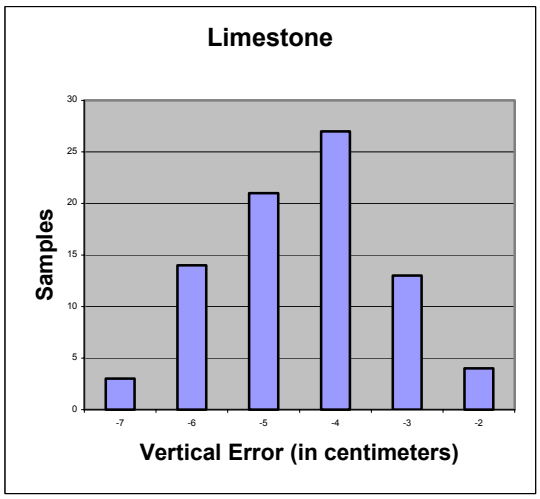
Gravel		
	Ft	Cm
RMSEz	0.262	7.99
Mean	-0.252	-7.68
Standard Error	0.005	0.14
Median	-0.249	-7.59
Standard Deviation	0.072	2.19
Sample Variance	0.005	4.78
Kurtosis	2.430	2.43
Skewness	-0.857	-0.86
Range	0.492	14.98
Minimum	-0.576	-17.55
Maximum	-0.084	-2.56
Sum	-57.477	-1751.90
Count	228	228



LIMESTONE

This set includes only those points that were collected in limestone areas. The resulting RMSEz is 5.60 centimeters, which is within the accuracy specification. The skewness value is -0.17.

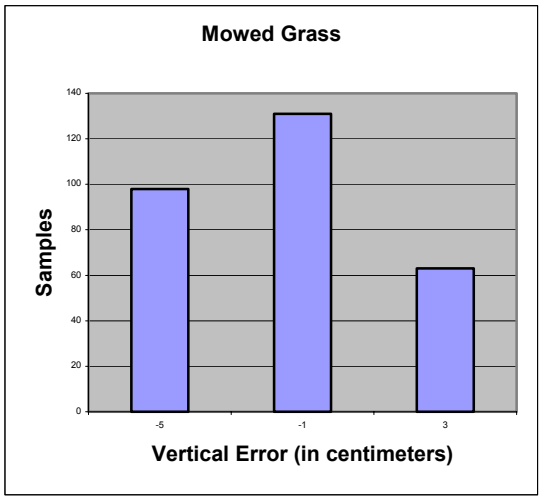
Limestone		
	Ft	Cm
RMSEz	0.184	5.60
Mean	-0.177	-5.40
Standard Error	0.005	0.16
Median	-0.172	-5.24
Standard Deviation	0.049	1.50
Sample Variance	0.002	2.26
Kurtosis	0.225	0.22
Skewness	-0.170	-0.17
Range	0.232	7.06
Minimum	-0.301	-9.18
Maximum	-0.069	-2.11
Sum	-15.768	-480.62
Count	89	89



MOWED GRASS

This set includes only those points that were collected in areas of mowed grass. The resulting RMSEz is 6.86 centimeters, which is within the accuracy specification. The skewness value is 2.96.

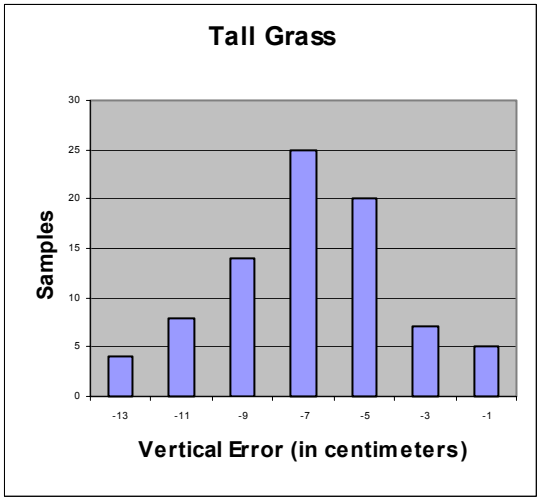
Mowed Grass		
	Ft	Cm
RMSEz	0.225	6.86
Mean	-0.107	-3.25
Standard Error	0.011	0.34
Median	-0.164	-4.99
Standard Deviation	0.199	6.06
Sample Variance	0.039	36.69
Kurtosis	9.377	9.38
Skewness	2.959	2.96
Range	1.183	36.06
Minimum	-0.381	-11.60
Maximum	0.803	24.46
Sum	-33.457	-1019.76
Count	314	314



TALL GRASS

This set includes only those points that were collected in areas of tall grass. The resulting RMSEz is 8.18 centimeters, which is within the accuracy specification. The skewness value is 0.31.

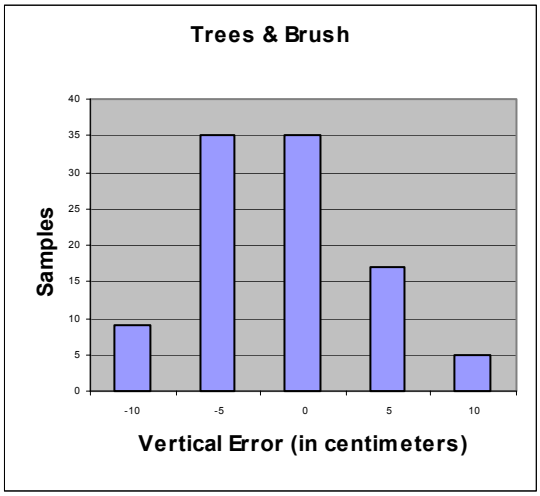
Tall Grass		
	Ft	Cm
RMSEz	0.268	8.18
Mean	-0.241	-7.34
Standard Error	0.013	0.39
Median	-0.235	-7.15
Standard Deviation	0.120	3.65
Sample Variance	0.014	13.31
Kurtosis	2.074	2.07
Skewness	0.312	0.31
Range	0.753	22.95
Minimum	-0.546	-16.63
Maximum	0.207	6.32
Sum	-21.179	-645.53
Count	88	88



TREES AND BRUSH

This set includes only those points that were collected in trees and brush areas. The resulting RMSEz is 7.72 centimeters, which is within the accuracy specification. The skewness value is 0.53.

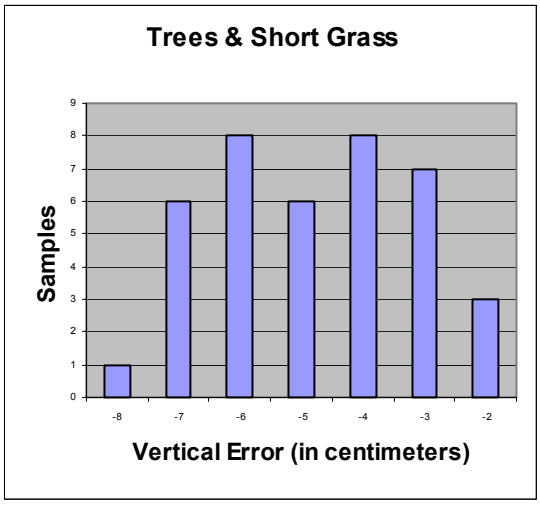
Trees and Brush		
	Ft	Cm
RMSEz	0.253	7.72
Mean	-0.183	-5.59
Standard Error	0.017	0.53
Median	-0.199	-6.07
Standard Deviation	0.175	5.34
Sample Variance	0.031	28.54
Kurtosis	0.758	0.76
Skewness	0.526	0.53
Range	0.966	29.43
Minimum	-0.540	-16.44
Maximum	0.426	12.99
Sum	-18.712	-570.34
Count	102	102



TREES & SHORT GRASS

This set includes only those points that were collected in trees and short grass areas, such as lawns, the shoulders of roads, etc. The resulting RMSEz is 5.94 centimeters, which is within the accuracy specification. The skewness value is -0.07.

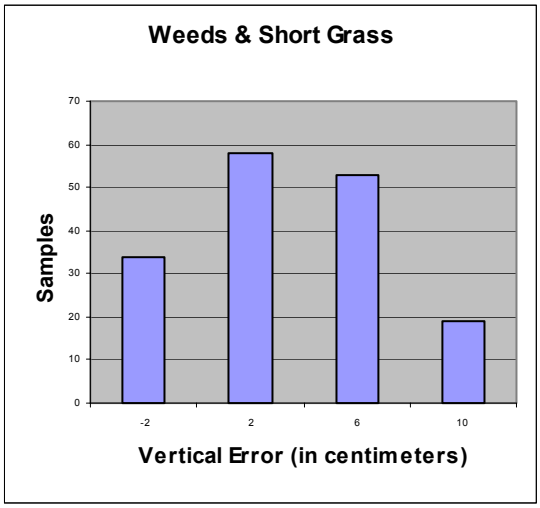
Trees & Short Grass		
	Ft	Cm
RMSEz	0.20	5.94
Mean	-0.19	-5.72
Standard Error	0.01	0.26
Median	-0.18	-5.61
Standard Deviation	0.05	1.63
Sample Variance	0.00	2.64
Kurtosis	-0.82	-0.82
Skewness	-0.07	-0.07
Range	0.21	6.41
Minimum	-0.30	-9.04
Maximum	-0.09	-2.63
Sum	-7.32	-223.23
Count	39	39



WEEDS AND SHORT GRASS

This set includes only those points that were collected in weeds and short grass areas. The resulting RMSEz is 4.37 centimeters, which is within the accuracy specification. The skewness value is -0.45.

Weeds & Short Grass		
	Ft	Cm
RMSEz	0.144	4.37
Mean	-0.026	-0.80
Standard Error	0.011	0.33
Median	-0.027	-0.82
Standard Deviation	0.142	4.31
Sample Variance	0.020	18.61
Kurtosis	1.457	1.46
Skewness	-0.450	-0.45
Range	0.939	28.63
Minimum	-0.618	-18.82
Maximum	0.322	9.81
Sum	-4.474	-136.38
Count	171	171



GPS NETWORK

A. Minimally Constrained

LA / FEMA Task Orders 3 & 4

Florida Parishes & Lakes Maurepas / Pontchartrain area, Louisiana
GPS Primary Control Network
(Minimally-Constrained Adjustment)

Horizontal Datum is NAD83
Vertical Datum is NAVD88

Station	Latitude	Longitude	Geoid Ht. (meters)	Ellip Ht. (meters)	Orth Ht. (meters)	Orth Ht. (feet)
ALCO	30 01 36.522979	90 06 46.210342	-26.317	-24.3550	1.962	6.437
CARR	30 49 08.637731	89 51 51.563102	-27.810	7.9088	35.719	117.187
Eng1	29 52 44.246138	89 56 30.198006	-25.932	-17.0217	8.910	29.233
Ndbc*	30 21 22.591720	89 36 36.976290	-27.158	-10.1900	16.968	55.669
NICO	30 20 26.611552	89 49 16.237880	-26.894	-19.3090	7.585	24.885
SMIT	30 47 07.163876	90 12 42.879233	-27.411	44.4095	71.820	235.623
TO4B	30 04 31.922790	89 51 41.667916	-26.426	-25.3502	1.076	3.530
TO4C	30 13 40.294922	89 40 41.024651	-26.772	-24.5484	2.224	7.296
TO4E	30 15 43.976968	89 57 23.357673	-26.713	-25.6206	1.092	3.583
TO4F	30 24 15.501293	90 09 05.583659	-26.833	-25.3509	1.483	4.865
TO4G	30 26 09.898942	89 55 21.187998	-27.009	-14.4914	12.518	41.068
TO4H	30 28 17.162552	89 41 20.758695	-27.342	-13.2514	14.091	46.229
TO4I	30 34 34.751821	89 52 17.067491	-27.402	-5.8601	21.542	70.675
TO4K	30 43 35.558325	90 03 04.230253	-27.525	8.4541	35.979	118.041
TO4L	30 38 35.566339	90 04 33.012760	-27.349	27.9106	55.2596	181.297
TO4M	30 32 16.926963	90 02 43.237124	-27.144	-3.5764	23.568	77.321
TO4N	30 52 19.622119	90 07 08.258821	-27.523	47.4649	19.942	65.426
TO4O	30 57 39.946289	89 57 31.857784	-27.597	35.3722	62.969	206.591
TO4P	30 58 37.944280	89 45 36.503184	-27.796	5.9864	33.782	110.834

- **Constrained horizontally and/or vertically to NGS published values**

B. Fully Constrained

LA / FEMA Task Orders 3 & 4

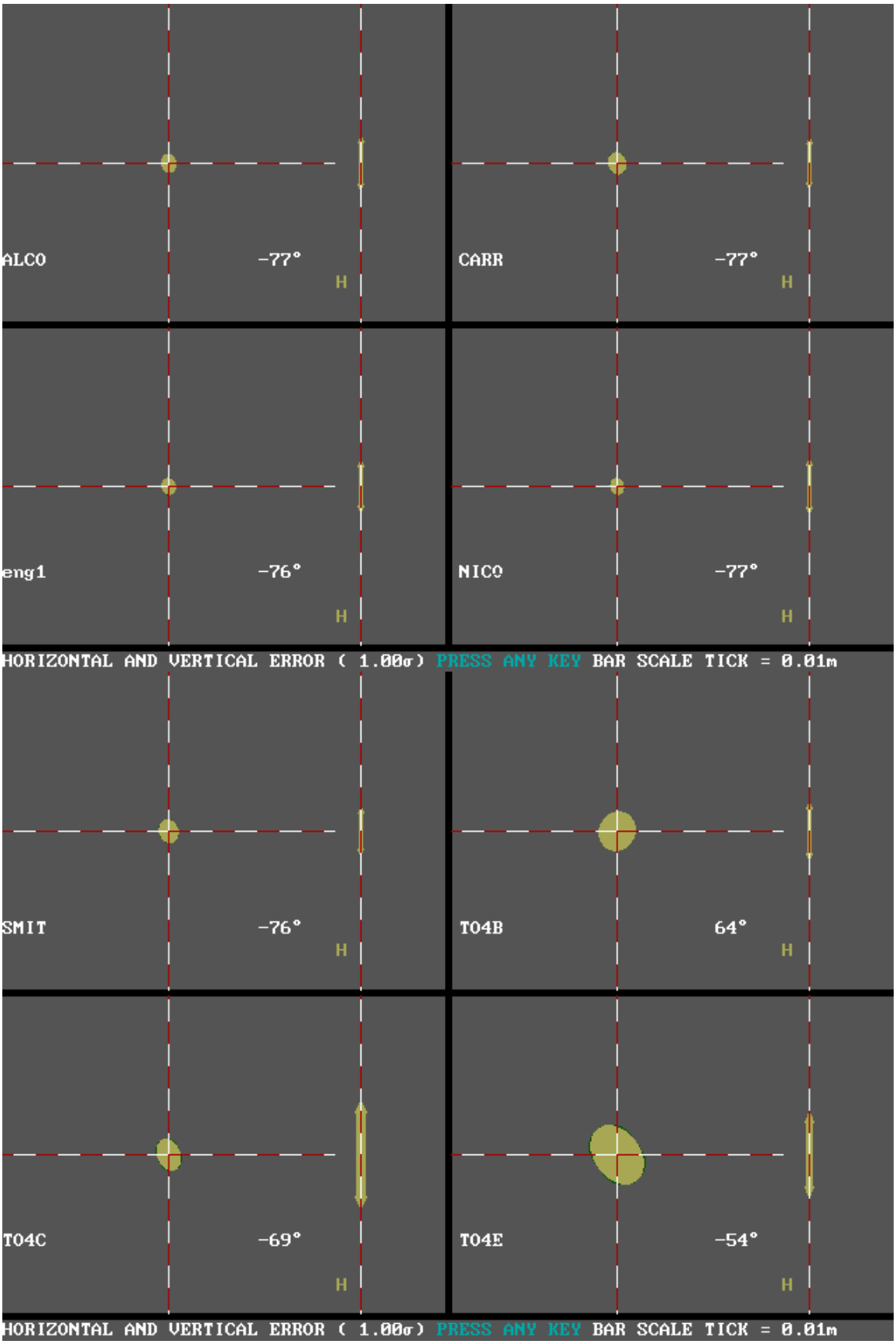
Florida Parishes & Lakes Maurepas / Pontchartrain area, Louisiana
GPS Primary Control Network
(Fully-Constrained Adjustment)

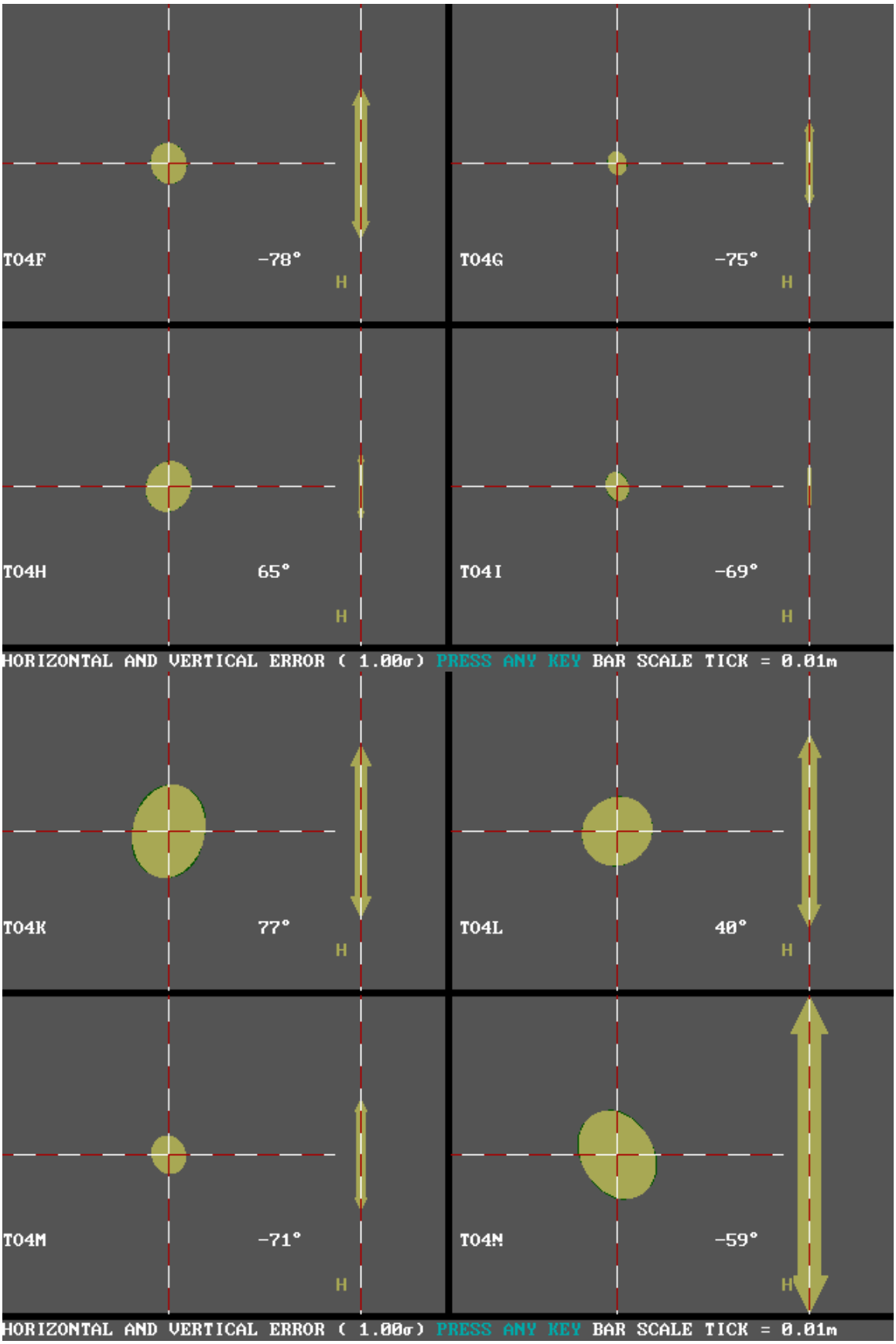
Horizontal Datum is NAD83
Vertical Datum is NAVD88

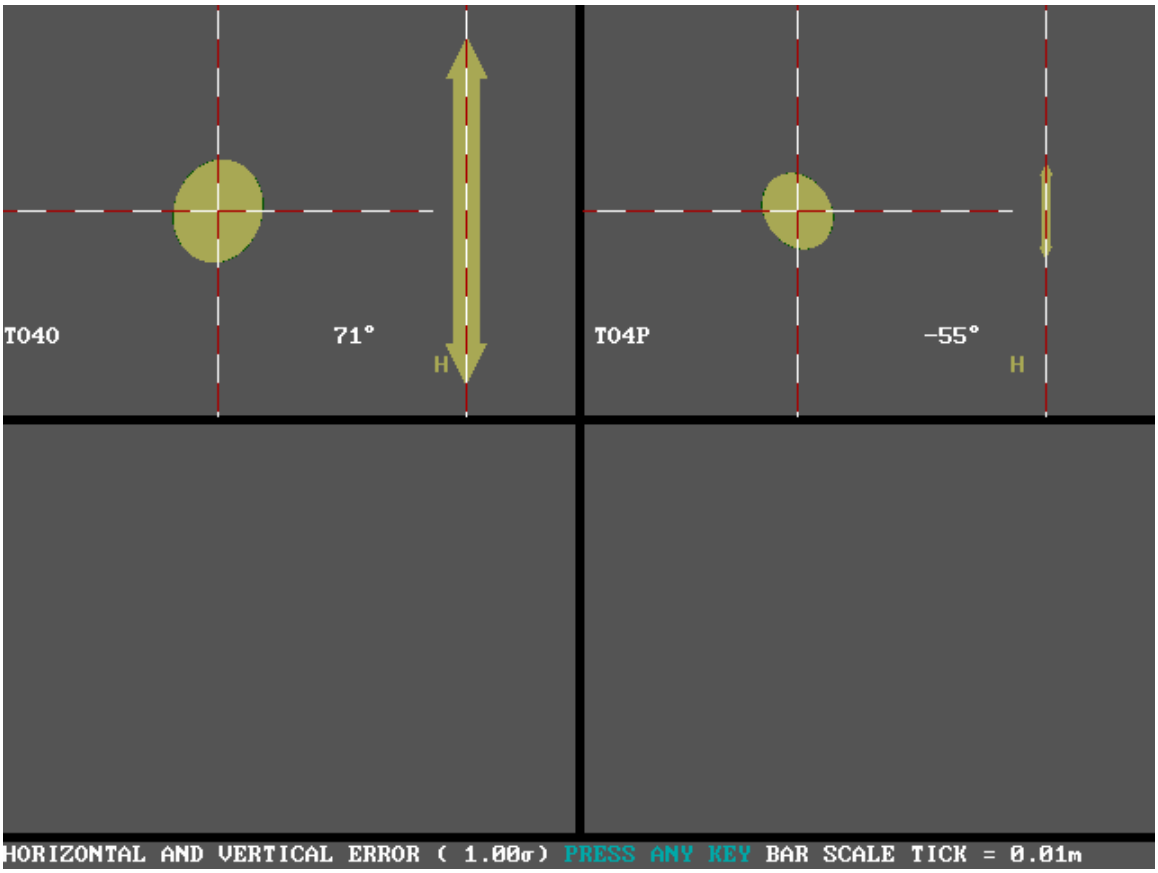
Station	Latitude	Longitude	Geoid Ht. (meters)	Ellip Ht. (meters)	Orth Ht. (meters)	Orth Ht. (feet)
ALCO	30 01 36.522979	90 06 46.210343	-26.311	-24.3738	1.372	6.356
CARR	30 49 08.637738	89 51 51.563103	-27.810	7.9038	35.714	117.171
Engl*	29 52 44.246152	89 56 30.198000	-25.932	-17.0800	8.852	29.042
Ndbc*	30 21 22.591720	89 36 36.976290	-27.158	-10.1900	16.968	55.669
NICO	30 20 26.611551	89 49 16.237879	-26.894	-19.3226	7.572	24.842
SMIT	30 47 07.163887	90 12 42.879834	-27.411	44.4014	71.812	235.603
TO4B	30 04 31.922792	89 51 41.667918	-26.426	-25.3717	1.054	3.458
TO4C	30 13 40.294922	89 40 41.024652	-26.772	-24.5637	2.208	7.244
TO4E	30 15 43.976968	89 57 23.357674	-26.713	-25.6378	1.075	3.527
TO4F	30 24 15.501293	90 09 05.583660	-26.833	-25.3672	1.466	4.810
TO4G	30 26 09.898942	89 55 21.187999	-27.009	-14.5012	12.508	41.037
TO4H	30 28 17.162558	89 41 20.758695	-27.342	-13.2556	14.086	46.214
TO4I	30 34 34.751827	89 52 17.067492	-27.402	-5.8649	21.537	70.659
TO4K	30 43 35.558334	90 03 04.230253	-27.525	8.4488	35.974	111.463
TO4L	30 38 35.566349	90 04 33.012761	-27.349	27.9040	55.253	181.276
TO4M	30 32 16.926971	90 02 43.237125	-27.144	-3.5813	23.563	77.306
TO4N	30 52 19.622128	90 07 08.258822	-27.523	47.4584	74.981	246.001
TO4O	30 57 39.946289	89 57 31.857785	-27.597	35.3662	62.963	206.572
TO4P	30 58 37.944285	89 45 36.503184	-27.796	5.9821	33.778	110.820

*** Constrained horizontally and/or vertically to NGS published values**

C. Error Ellipses


ALCO
-77°
H
CARR
-77°
H
eng1
-76°
H
NICO
-77°
H
HORIZONTAL AND VERTICAL ERROR (1.00σ) PRESS ANY KEY BAR SCALE TICK = 0.01m
SMIT
-76°
H
T04B
64°
H
T04C
-69°
H
T04E
-54°
H
HORIZONTAL AND VERTICAL ERROR (1.00σ) PRESS ANY KEY BAR SCALE TICK = 0.01m


T04F
-78°
H
T04G
-75°
H
T04H
65°
H
T04I
-69°
H
HORIZONTAL AND VERTICAL ERROR (1.00σ) PRESS ANY KEY BAR SCALE TICK = 0.01m
T04K
77°
H
T04L
40°
H
T04M
-71°
H
T04N
-59°
H
HORIZONTAL AND VERTICAL ERROR (1.00σ) PRESS ANY KEY BAR SCALE TICK = 0.01m

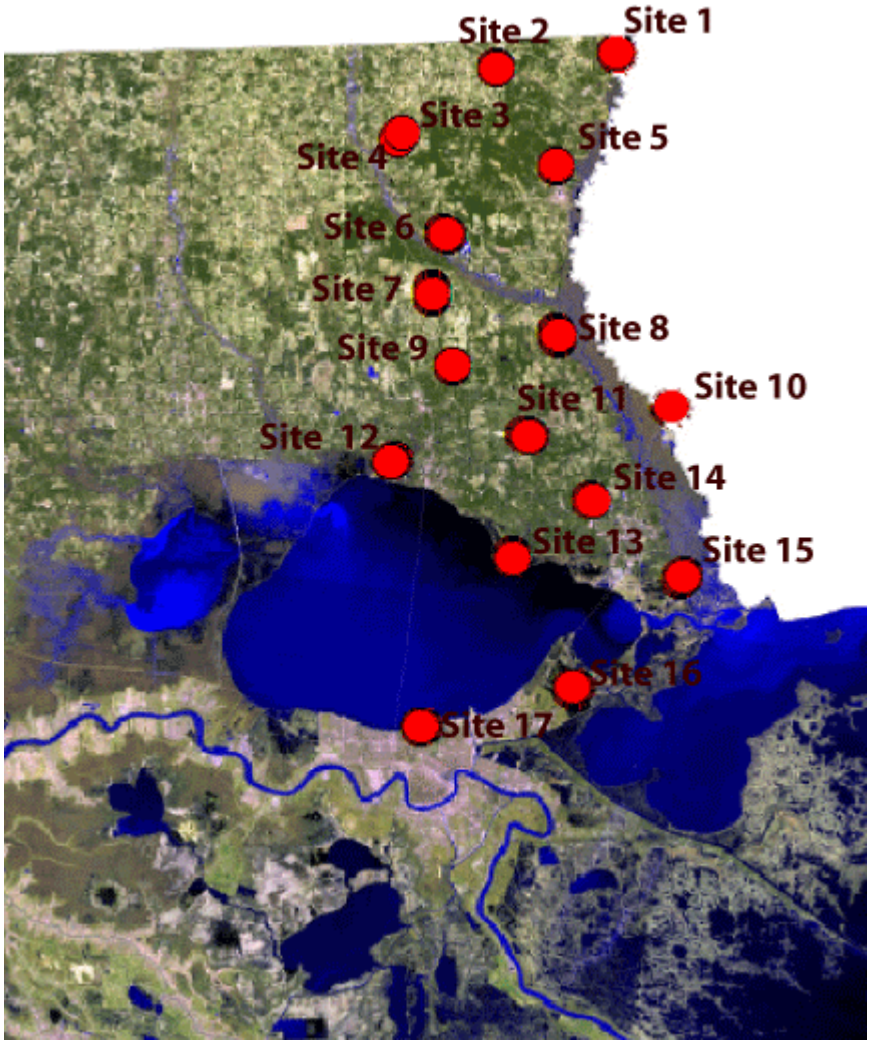

T040
71°
H
T04P
-55°
H
HORIZONTAL AND VERTICAL ERROR (1.00σ) PRESS ANY KEY BAR SCALE TICK = 0.01m

RTK SURVEY
QUALITY CONTROL DATA

A. Ground Truth Site Map

FEMA Map Modernization Program
Phase 1, Task Orders 3 and 4

Ground Truth Locations



B. Ground Truth Analysis of LIDAR Points

GROUND TRUTH ANALYSIS
Comparison of LIDAR points to RTK Ground-Truth points

Horizontal units = Meters (UTM Coordinates, Zone 15)
Vertical units = U.S. Survey Feet

Point ID	Survey X	Survey Y	Survey Z	LIDAR X	LIDAR Y	LIDAR Z	dz	Feature Code
I33	800050.45	3386908.64	21.04	800050.45	3386908.64	20.89	-0.15	Asphalt
I34	800045.24	3386908.65	20.93	800045.24	3386908.65	20.65	-0.28	Asphalt
I35	800041.21	3386908.60	20.86	800041.21	3386908.60	20.37	-0.48	Asphalt
I36	800036.62	3386908.49	20.86	800036.62	3386908.49	20.33	-0.53	Asphalt
I37	800031.46	3386908.31	20.89	800031.46	3386908.31	20.44	-0.46	Asphalt
I38	800025.76	3386908.14	20.91	800025.76	3386908.14	20.53	-0.38	Asphalt
I39	800014.02	3386907.88	20.95	800014.02	3386907.88	20.04	-0.91	Asphalt
I40	800008.68	3386907.80	20.98	800008.68	3386907.80	20.17	-0.81	Asphalt
I41	800003.61	3386907.67	21.03	800003.61	3386907.67	20.32	-0.71	Asphalt
I42	799998.61	3386907.52	21.03	799998.61	3386907.52	20.36	-0.67	Asphalt
I43	799993.32	3386907.32	21.07	799993.32	3386907.32	20.37	-0.70	Asphalt
I44	799982.14	3386906.99	21.05	799982.14	3386906.99	20.35	-0.70	Asphalt
I45	799970.40	3386906.55	21.10	799970.40	3386906.55	20.34	-0.76	Asphalt
I46	799964.01	3386906.33	21.10	799964.01	3386906.33	20.43	-0.67	Asphalt
I47	799957.30	3386906.04	21.15	799957.30	3386906.04	20.43	-0.71	Asphalt
I48	799943.03	3386905.53	21.06	799943.03	3386905.53	20.41	-0.66	Asphalt
I49	799935.69	3386905.22	21.26	799935.69	3386905.22	20.93	-0.33	Asphalt
I50	799913.53	3386904.49	21.11	799913.53	3386904.49	20.97	-0.14	Asphalt
I51	799905.98	3386904.20	21.15	799905.98	3386904.20	20.79	-0.36	Asphalt
I52	799898.31	3386903.94	21.09	799898.31	3386903.94	20.54	-0.55	Asphalt
I53	799800.50	3386898.36	21.22	799800.50	3386898.36	20.97	-0.25	Asphalt
I54	799801.01	3386898.35	21.22	799801.01	3386898.35	20.97	-0.25	Asphalt
I55	799802.78	3386898.35	21.20	799802.78	3386898.35	20.97	-0.23	Asphalt
I56	799805.70	3386898.38	21.16	799805.70	3386898.38	20.97	-0.19	Asphalt
I57	799809.50	3386898.45	21.18	799809.50	3386898.45	21.01	-0.17	Asphalt

I58	799814.06	3386898.55	21.16	799814.06	3386898.55	20.90	-0.26	Asphalt
I59	799819.23	3386898.69	21.17	799819.23	3386898.69	20.86	-0.31	Asphalt
I60	799824.93	3386898.87	21.14	799824.93	3386898.87	20.46	-0.68	Asphalt
I61	799831.12	3386899.10	21.13	799831.12	3386899.10	20.98	-0.15	Asphalt
I62	799837.79	3386899.34	21.12	799837.79	3386899.34	20.76	-0.36	Asphalt
I63	799845.05	3386899.53	21.11	799845.05	3386899.53	20.63	-0.48	Asphalt
I64	799852.79	3386899.74	21.10	799852.79	3386899.74	20.68	-0.43	Asphalt
I65	799860.97	3386900.00	21.08	799860.97	3386900.00	20.58	-0.50	Asphalt
I66	799869.57	3386900.29	21.09	799869.57	3386900.29	20.53	-0.56	Asphalt
I67	799878.53	3386900.62	21.10	799878.53	3386900.62	20.65	-0.45	Asphalt
I68	799897.33	3386901.36	21.08	799897.33	3386901.36	20.58	-0.50	Asphalt
I69	799958.44	3386903.45	21.13	799958.44	3386903.45	20.51	-0.62	Asphalt
I70	799990.53	3386904.53	21.08	799990.53	3386904.53	20.49	-0.59	Asphalt
I71	800001.02	3386904.90	21.00	800001.02	3386904.90	20.41	-0.59	Asphalt
I72	800011.28	3386905.17	20.97	800011.28	3386905.17	20.06	-0.91	Asphalt
I73	800021.03	3386905.39	20.91	800021.03	3386905.39	20.40	-0.51	Asphalt
I74	800059.36	3386900.32	21.37	800059.36	3386900.32	21.22	-0.15	Asphalt
I75	800060.85	3386893.72	21.44	800060.85	3386893.72	21.27	-0.18	Asphalt
I76	800061.06	3386889.18	21.45	800061.06	3386889.18	21.28	-0.17	Asphalt
I77	800061.30	3386883.54	21.45	800061.30	3386883.54	21.30	-0.15	Asphalt
I78	800061.57	3386876.84	21.46	800061.57	3386876.84	21.31	-0.15	Asphalt
I79	800061.91	3386869.19	21.49	800061.91	3386869.19	21.30	-0.19	Asphalt
I80	800062.24	3386860.66	21.52	800062.24	3386860.66	21.35	-0.17	Asphalt
I81	800062.58	3386851.27	21.57	800062.58	3386851.27	21.39	-0.18	Asphalt
I82	800063.00	3386841.07	21.65	800063.00	3386841.07	21.52	-0.13	Asphalt
I83	800063.41	3386830.23	21.67	800063.41	3386830.23	21.49	-0.18	Asphalt
I84	800063.82	3386818.75	21.75	800063.82	3386818.75	21.56	-0.18	Asphalt
I85	800064.10	3386806.71	21.81	800064.10	3386806.71	21.61	-0.20	Asphalt
I86	800064.43	3386794.11	21.85	800064.43	3386794.11	21.64	-0.21	Asphalt
I87	800064.73	3386781.00	21.88	800064.73	3386781.00	21.65	-0.23	Asphalt
I88	800065.00	3386767.44	21.92	800065.00	3386767.44	21.69	-0.23	Asphalt
I89	800065.26	3386753.54	21.94	800065.26	3386753.54	21.75	-0.20	Asphalt
I90	800065.56	3386739.25	21.98	800065.56	3386739.25	21.78	-0.19	Asphalt
I91	800065.90	3386724.67	22.01	800065.90	3386724.67	21.76	-0.24	Asphalt

I92	800066.18	3386709.80	22.05	800066.18	3386709.80	21.77	-0.28	Asphalt
I93	800066.47	3386694.70	22.08	800066.47	3386694.70	21.89	-0.19	Asphalt
I94	800066.79	3386679.42	22.13	800066.79	3386679.42	21.90	-0.23	Asphalt
I95	800066.99	3386663.95	22.12	800066.99	3386663.95	21.93	-0.20	Asphalt
I96	800067.13	3386648.27	22.10	800067.13	3386648.27	21.90	-0.21	Asphalt
I97	800067.29	3386632.32	22.06	800067.29	3386632.32	21.83	-0.23	Asphalt
I98	800067.46	3386616.15	21.95	800067.46	3386616.15	21.78	-0.17	Asphalt
I99	800067.62	3386599.77	21.84	800067.62	3386599.77	21.70	-0.14	Asphalt
I100	800067.82	3386583.20	21.77	800067.82	3386583.20	21.61	-0.17	Asphalt
I101	800068.02	3386566.48	21.66	800068.02	3386566.48	21.49	-0.17	Asphalt
I102	800068.22	3386549.69	21.57	800068.22	3386549.69	21.41	-0.16	Asphalt
I103	800068.45	3386532.83	21.47	800068.45	3386532.83	21.22	-0.25	Asphalt
I104	800068.69	3386515.92	21.37	800068.69	3386515.92	21.17	-0.19	Asphalt
I105	800068.93	3386499.11	21.30	800068.93	3386499.11	21.10	-0.20	Asphalt
I106	800069.23	3386482.39	21.25	800069.23	3386482.39	21.09	-0.17	Asphalt
I107	800069.48	3386465.80	21.23	800069.48	3386465.80	20.97	-0.25	Asphalt
I108	800069.67	3386449.30	21.19	800069.67	3386449.30	20.97	-0.22	Asphalt
I109	800069.82	3386432.92	21.17	800069.82	3386432.92	21.05	-0.12	Asphalt
I110	800070.07	3386416.47	21.14	800070.07	3386416.47	20.98	-0.16	Asphalt
I111	800070.30	3386399.95	21.09	800070.30	3386399.95	20.94	-0.15	Asphalt
I112	800070.46	3386383.37	21.10	800070.46	3386383.37	20.93	-0.17	Asphalt
I113	800070.65	3386366.76	21.11	800070.65	3386366.76	20.91	-0.20	Asphalt
I114	800071.05	3386335.79	21.14	800071.05	3386335.79	20.96	-0.18	Asphalt
I115	800078.71	3386298.97	21.14	800078.71	3386298.97	20.91	-0.23	Asphalt
I116	800076.41	3386316.25	20.99	800076.41	3386316.25	20.92	-0.07	Asphalt
I117	800075.55	3386321.70	21.02	800075.55	3386321.70	20.94	-0.08	Asphalt
I118	800074.99	3386334.51	21.11	800074.99	3386334.51	20.98	-0.13	Asphalt
I119	800074.78	3386349.86	21.04	800074.78	3386349.86	20.95	-0.09	Asphalt
I120	800074.68	3386358.50	21.04	800074.68	3386358.50	20.94	-0.10	Asphalt
I121	800074.57	3386367.70	21.03	800074.57	3386367.70	20.96	-0.07	Asphalt
I122	800074.00	3386409.43	20.96	800074.00	3386409.43	20.94	-0.02	Asphalt
I123	800073.85	3386420.94	20.96	800073.85	3386420.94	20.95	-0.02	Asphalt
I124	800072.30	3386613.40	22.18	800072.30	3386613.40	21.71	-0.47	Asphalt
I125	800071.51	3386619.26	22.22	800071.51	3386619.26	21.78	-0.44	Asphalt

I126	800071.05	3386633.98	22.28	800071.05	3386633.98	21.84	-0.44	Asphalt
I127	800070.99	3386642.51	22.33	800070.99	3386642.51	21.89	-0.44	Asphalt
I128	800070.91	3386651.90	22.32	800070.91	3386651.90	21.91	-0.41	Asphalt
I129	800070.77	3386662.15	22.33	800070.77	3386662.15	21.95	-0.38	Asphalt
I130	800070.32	3386696.95	22.29	800070.32	3386696.95	21.85	-0.44	Asphalt
I131	800070.11	3386709.74	22.26	800070.11	3386709.74	21.84	-0.42	Asphalt
I132	800069.88	3386722.97	22.21	800069.88	3386722.97	21.75	-0.46	Asphalt
I133	800069.61	3386736.59	22.22	800069.61	3386736.59	21.82	-0.39	Asphalt
I134	800069.00	3386764.71	22.13	800069.00	3386764.71	21.79	-0.34	Asphalt
I135	800068.66	3386779.22	22.08	800068.66	3386779.22	21.76	-0.33	Asphalt
I136	800068.31	3386793.98	22.07	800068.31	3386793.98	21.71	-0.36	Asphalt
I137	800067.93	3386809.01	21.99	800067.93	3386809.01	21.70	-0.29	Asphalt
I138	800067.47	3386824.31	21.88	800067.47	3386824.31	21.56	-0.32	Asphalt
I139	800067.01	3386839.87	21.78	800067.01	3386839.87	21.43	-0.35	Asphalt
I140	800066.44	3386855.71	21.68	800066.44	3386855.71	21.35	-0.33	Asphalt
I141	800065.78	3386871.78	21.61	800065.78	3386871.78	21.27	-0.33	Asphalt
I142	800062.42	3386955.24	21.42	800062.42	3386955.24	21.16	-0.26	Asphalt
I143	800060.97	3386989.67	21.37	800060.97	3386989.67	21.11	-0.26	Asphalt
I144	800060.23	3387007.14	21.37	800060.23	3387007.14	21.06	-0.31	Asphalt
I145	800059.50	3387024.80	21.32	800059.50	3387024.80	21.08	-0.24	Asphalt
I146	800058.83	3387042.65	21.29	800058.83	3387042.65	21.03	-0.26	Asphalt
I147	800056.63	3387097.05	21.00	800056.63	3387097.05	20.83	-0.17	Asphalt
I148	800055.90	3387115.48	20.96	800055.90	3387115.48	20.83	-0.12	Asphalt
I149	800055.17	3387134.03	20.95	800055.17	3387134.03	20.79	-0.16	Asphalt
I150	800054.45	3387152.71	20.89	800054.45	3387152.71	20.77	-0.13	Asphalt
I151	800053.77	3387171.52	20.87	800053.77	3387171.52	20.72	-0.16	Asphalt
I152	800053.09	3387190.43	20.83	800053.09	3387190.43	20.57	-0.26	Asphalt
I153	800052.35	3387209.46	20.81	800052.35	3387209.46	20.52	-0.29	Asphalt
I154	800051.58	3387228.60	20.74	800051.58	3387228.60	20.44	-0.30	Asphalt
I155	800050.82	3387247.84	20.78	800050.82	3387247.84	20.48	-0.29	Asphalt
I156	800050.03	3387267.23	20.66	800050.03	3387267.23	20.50	-0.17	Asphalt
I157	800047.61	3387326.12	20.70	800047.61	3387326.12	20.43	-0.27	Asphalt
I158	800043.10	3387444.67	21.11	800043.10	3387444.67	20.71	-0.39	Asphalt
I159	800037.75	3387579.10	21.41	800037.75	3387579.10	21.04	-0.37	Asphalt

I160	800037.06	3387597.98	21.49	800037.06	3387597.98	21.04	-0.45	Asphalt
I161	800028.72	3387647.94	21.23	800028.72	3387647.94	21.16	-0.07	Asphalt
I162	800032.48	3387617.15	21.24	800032.48	3387617.15	21.18	-0.06	Asphalt
I163	800033.56	3387592.45	21.19	800033.56	3387592.45	21.14	-0.05	Asphalt
I164	800034.52	3387565.83	21.13	800034.52	3387565.83	21.05	-0.08	Asphalt
I165	800035.02	3387551.82	21.04	800035.02	3387551.82	21.01	-0.04	Asphalt
I166	800035.62	3387537.35	21.00	800035.62	3387537.35	20.99	-0.01	Asphalt
I167	800036.19	3387522.43	20.98	800036.19	3387522.43	20.89	-0.09	Asphalt
I168	800036.77	3387507.24	20.95	800036.77	3387507.24	20.92	-0.04	Asphalt
I169	800037.32	3387491.76	20.95	800037.32	3387491.76	20.87	-0.08	Asphalt
I170	800038.47	3387459.99	20.85	800038.47	3387459.99	20.77	-0.09	Asphalt
I171	800039.15	3387443.70	20.78	800039.15	3387443.70	20.74	-0.04	Asphalt
I172	800039.81	3387427.14	20.75	800039.81	3387427.14	20.69	-0.06	Asphalt
I173	800040.48	3387410.34	20.69	800040.48	3387410.34	20.65	-0.04	Asphalt
I174	800041.13	3387393.33	20.65	800041.13	3387393.33	20.59	-0.06	Asphalt
I175	800041.78	3387376.11	20.61	800041.78	3387376.11	20.54	-0.07	Asphalt
I176	800042.43	3387358.74	20.60	800042.43	3387358.74	20.52	-0.08	Asphalt
I177	800043.09	3387341.28	20.64	800043.09	3387341.28	20.54	-0.10	Asphalt
I178	800043.73	3387323.73	20.60	800043.73	3387323.73	20.49	-0.11	Asphalt
I179	800044.39	3387306.10	20.57	800044.39	3387306.10	20.48	-0.09	Asphalt
I180	800045.10	3387288.38	20.60	800045.10	3387288.38	20.47	-0.13	Asphalt
I181	800045.83	3387270.54	20.60	800045.83	3387270.54	20.52	-0.07	Asphalt
I182	800046.56	3387252.57	20.67	800046.56	3387252.57	20.57	-0.11	Asphalt
I183	800047.30	3387234.48	20.70	800047.30	3387234.48	20.58	-0.12	Asphalt
I184	800048.78	3387198.09	20.80	800048.78	3387198.09	20.66	-0.14	Asphalt
I185	800049.58	3387179.82	20.83	800049.58	3387179.82	20.71	-0.12	Asphalt
I186	800050.29	3387161.45	20.87	800050.29	3387161.45	20.70	-0.17	Asphalt
I187	800050.98	3387142.99	20.89	800050.98	3387142.99	20.80	-0.09	Asphalt
I188	800051.75	3387124.46	20.93	800051.75	3387124.46	20.85	-0.08	Asphalt
I189	800053.89	3387068.58	21.03	800053.89	3387068.58	21.00	-0.04	Asphalt
I190	800056.71	3386994.31	21.19	800056.71	3386994.31	21.14	-0.05	Asphalt
I191	800057.44	3386975.98	21.21	800057.44	3386975.98	21.05	-0.16	Asphalt
I192	800058.18	3386957.91	21.31	800058.18	3386957.91	21.21	-0.10	Asphalt
I193	800058.88	3386940.37	21.35	800058.88	3386940.37	21.13	-0.23	Asphalt

I194	800059.52	3386923.63	21.37	800059.52	3386923.63	21.20	-0.18	Asphalt
I195	800060.19	3386907.89	21.39	800060.19	3386907.89	21.22	-0.17	Asphalt
I196	800060.74	3386893.60	21.45	800060.74	3386893.60	21.27	-0.18	Asphalt
P68	809681.17	3431035.64	34.41	809681.17	3431035.64	34.04	-0.37	Asphalt
P69	809681.14	3431034.16	34.40	809681.14	3431034.16	34.05	-0.36	Asphalt
P70	809681.05	3431031.58	34.37	809681.05	3431031.58	34.04	-0.33	Asphalt
P71	809680.98	3431025.18	34.28	809680.98	3431025.18	33.95	-0.34	Asphalt
P72	809680.96	3431021.57	34.22	809680.96	3431021.57	33.94	-0.28	Asphalt
P73	809680.64	3431011.96	34.03	809680.64	3431011.96	33.73	-0.30	Asphalt
P74	809680.39	3431006.40	33.92	809680.39	3431006.40	33.65	-0.27	Asphalt
P75	809680.10	3431000.55	33.80	809680.10	3431000.55	33.46	-0.34	Asphalt
P76	809679.76	3430994.61	33.68	809679.76	3430994.61	33.35	-0.33	Asphalt
P77	809678.46	3430976.67	33.51	809678.46	3430976.67	33.24	-0.27	Asphalt
P78	809678.01	3430970.55	33.56	809678.01	3430970.55	33.29	-0.27	Asphalt
P79	809677.43	3430964.18	33.64	809677.43	3430964.18	33.38	-0.27	Asphalt
P80	809676.13	3430951.08	33.82	809676.13	3430951.08	33.48	-0.34	Asphalt
P81	809675.68	3430944.46	33.93	809675.68	3430944.46	33.71	-0.23	Asphalt
P82	809675.24	3430937.95	34.06	809675.24	3430937.95	33.82	-0.24	Asphalt
P83	809674.85	3430931.50	34.13	809674.85	3430931.50	33.83	-0.30	Asphalt
P84	809674.37	3430918.78	33.99	809674.37	3430918.78	33.81	-0.17	Asphalt
P85	809674.23	3430912.30	33.76	809674.23	3430912.30	33.62	-0.14	Asphalt
P86	809674.11	3430905.60	33.49	809674.11	3430905.60	33.27	-0.22	Asphalt
P87	809673.96	3430898.64	33.26	809673.96	3430898.64	33.04	-0.22	Asphalt
P88	809673.42	3430884.43	33.01	809673.42	3430884.43	32.88	-0.13	Asphalt
P89	809672.88	3430870.33	32.89	809672.88	3430870.33	32.74	-0.15	Asphalt
P90	809671.39	3430842.21	32.43	809671.39	3430842.21	32.27	-0.16	Asphalt
P91	809671.06	3430835.17	32.37	809671.06	3430835.17	32.27	-0.10	Asphalt
P92	809670.69	3430828.23	32.37	809670.69	3430828.23	32.29	-0.08	Asphalt
P93	809669.45	3430814.74	32.36	809669.45	3430814.74	32.20	-0.16	Asphalt
P94	809668.64	3430808.20	32.38	809668.64	3430808.20	32.26	-0.13	Asphalt
P95	809666.53	3430795.83	32.46	809666.53	3430795.83	32.28	-0.17	Asphalt
P96	809664.43	3430785.38	32.56	809664.43	3430785.38	32.37	-0.20	Asphalt
P97	809664.65	3430786.10	32.56	809664.65	3430786.10	32.37	-0.19	Asphalt
P98	809665.27	3430787.93	32.53	809665.27	3430787.93	32.38	-0.16	Asphalt

P99	809666.22	3430790.90	32.52	809666.22	3430790.90	32.34	-0.18	Asphalt
P100	809669.03	3430804.14	32.40	809669.03	3430804.14	32.31	-0.10	Asphalt
P101	809669.82	3430809.63	32.37	809669.82	3430809.63	32.25	-0.13	Asphalt
P102	809670.49	3430815.55	32.34	809670.49	3430815.55	32.22	-0.12	Asphalt
P103	809671.45	3430828.79	32.39	809671.45	3430828.79	32.26	-0.13	Asphalt
P104	809672.15	3430843.24	32.45	809672.15	3430843.24	32.32	-0.14	Asphalt
P105	809672.63	3430850.62	32.55	809672.63	3430850.62	32.42	-0.13	Asphalt
P106	809672.96	3430857.98	32.69	809672.96	3430857.98	32.59	-0.10	Asphalt
P107	809673.81	3430873.05	32.90	809673.81	3430873.05	32.79	-0.11	Asphalt
P108	809674.31	3430880.49	32.98	809674.31	3430880.49	32.84	-0.14	Asphalt
P109	809674.81	3430887.96	33.04	809674.81	3430887.96	32.93	-0.10	Asphalt
P110	809675.12	3430895.55	33.18	809675.12	3430895.55	33.00	-0.18	Asphalt
P111	809675.46	3430903.32	33.39	809675.46	3430903.32	33.23	-0.16	Asphalt
P112	809675.74	3430918.93	33.98	809675.74	3430918.93	33.85	-0.12	Asphalt
P113	809675.90	3430926.73	34.11	809675.90	3430926.73	33.88	-0.22	Asphalt
P114	809677.51	3430951.51	33.83	809677.51	3430951.51	33.53	-0.30	Asphalt
P115	809678.17	3430960.27	33.70	809678.17	3430960.27	33.42	-0.29	Asphalt
P116	809678.94	3430969.18	33.60	809678.94	3430969.18	33.29	-0.30	Asphalt
P117	809679.71	3430978.15	33.54	809679.71	3430978.15	33.24	-0.29	Asphalt
P118	809680.40	3430987.14	33.58	809680.40	3430987.14	33.26	-0.32	Asphalt
P119	809681.20	3430996.07	33.73	809681.20	3430996.07	33.48	-0.25	Asphalt
P120	809454.63	3431528.45	33.52	809454.63	3431528.45	33.23	-0.28	Asphalt
P121	809453.77	3431531.46	33.56	809453.77	3431531.46	33.29	-0.27	Asphalt
P122	809452.91	3431534.46	33.61	809452.91	3431534.46	33.35	-0.26	Asphalt
P123	809451.94	3431538.18	33.65	809451.94	3431538.18	33.40	-0.25	Asphalt
P124	809450.97	3431542.46	33.72	809450.97	3431542.46	33.42	-0.31	Asphalt
P125	809450.02	3431547.11	33.76	809450.02	3431547.11	33.51	-0.25	Asphalt
P126	809449.10	3431552.01	33.80	809449.10	3431552.01	33.48	-0.32	Asphalt
P127	809448.24	3431557.14	33.82	809448.24	3431557.14	33.56	-0.26	Asphalt
P128	809447.46	3431562.25	33.85	809447.46	3431562.25	33.60	-0.25	Asphalt
P129	809446.60	3431567.20	33.88	809446.60	3431567.20	33.62	-0.26	Asphalt
P130	809445.18	3431572.26	33.92	809445.18	3431572.26	33.64	-0.28	Asphalt
P131	809443.65	3431577.88	33.92	809443.65	3431577.88	33.68	-0.24	Asphalt
P132	809443.10	3431584.17	33.93	809443.10	3431584.17	33.67	-0.26	Asphalt

P133	809443.20	3431590.88	33.93	809443.20	3431590.88	33.67	-0.26	Asphalt
P134	809442.75	3431597.96	33.95	809442.75	3431597.96	33.70	-0.25	Asphalt
P135	809441.91	3431605.45	33.99	809441.91	3431605.45	33.76	-0.23	Asphalt
P136	809440.94	3431613.11	34.02	809440.94	3431613.11	33.76	-0.25	Asphalt
P137	809439.95	3431620.77	34.02	809439.95	3431620.77	33.83	-0.19	Asphalt
P138	809439.05	3431628.23	34.05	809439.05	3431628.23	33.81	-0.24	Asphalt
P139	809438.21	3431635.46	34.06	809438.21	3431635.46	33.85	-0.22	Asphalt
P140	809437.44	3431642.15	34.09	809437.44	3431642.15	33.82	-0.27	Asphalt
P141	809436.61	3431648.01	34.06	809436.61	3431648.01	33.82	-0.24	Asphalt
P142	809433.45	3431648.96	34.04	809433.45	3431648.96	33.83	-0.21	Asphalt
P143	809433.53	3431648.39	34.10	809433.53	3431648.39	33.83	-0.27	Asphalt
P144	809433.84	3431646.45	34.10	809433.84	3431646.45	33.83	-0.28	Asphalt
P145	809434.37	3431643.30	34.10	809434.37	3431643.30	33.84	-0.26	Asphalt
P146	809434.99	3431639.04	34.09	809434.99	3431639.04	33.83	-0.26	Asphalt
P147	809435.73	3431633.80	34.08	809435.73	3431633.80	33.83	-0.25	Asphalt
P148	809436.58	3431627.71	34.06	809436.58	3431627.71	33.79	-0.26	Asphalt
P149	809437.40	3431621.06	34.04	809437.40	3431621.06	33.77	-0.26	Asphalt
P150	809438.33	3431613.87	34.02	809438.33	3431613.87	33.76	-0.26	Asphalt
P151	809439.30	3431606.29	34.00	809439.30	3431606.29	33.78	-0.22	Asphalt
P152	809440.30	3431598.36	33.97	809440.30	3431598.36	33.72	-0.25	Asphalt
P153	809441.31	3431590.12	33.92	809441.31	3431590.12	33.66	-0.26	Asphalt
P154	809442.40	3431581.79	33.90	809442.40	3431581.79	33.67	-0.23	Asphalt
P155	809443.47	3431573.63	33.88	809443.47	3431573.63	33.62	-0.27	Asphalt
P156	809444.67	3431565.67	33.86	809444.67	3431565.67	33.60	-0.27	Asphalt
P157	809445.86	3431557.90	33.83	809445.86	3431557.90	33.53	-0.29	Asphalt
P158	809447.10	3431550.35	33.79	809447.10	3431550.35	33.51	-0.28	Asphalt
O1	790361.43	3429137.05	63.95	790361.43	3429137.05	63.65	-0.30	Asphalt
O2	790363.58	3429138.20	63.90	790363.58	3429138.20	63.64	-0.26	Asphalt
O3	790366.12	3429139.68	63.85	790366.12	3429139.68	63.59	-0.26	Asphalt
O4	790369.47	3429141.72	63.80	790369.47	3429141.72	63.58	-0.23	Asphalt
O5	790373.39	3429144.18	63.79	790373.39	3429144.18	63.49	-0.31	Asphalt
O6	790377.82	3429146.88	63.71	790377.82	3429146.88	63.47	-0.24	Asphalt
O7	790388.21	3429153.15	63.57	790388.21	3429153.15	63.32	-0.25	Asphalt
O8	790394.23	3429156.76	63.50	790394.23	3429156.76	63.23	-0.27	Asphalt

O9	790400.70	3429160.63	63.45	790400.70	3429160.63	63.20	-0.25	Asphalt
O10	790407.58	3429164.69	63.41	790407.58	3429164.69	63.24	-0.17	Asphalt
O11	790414.77	3429168.95	63.35	790414.77	3429168.95	63.14	-0.21	Asphalt
O12	790422.14	3429173.32	63.32	790422.14	3429173.32	63.08	-0.24	Asphalt
O13	790429.61	3429177.82	63.28	790429.61	3429177.82	63.10	-0.17	Asphalt
O14	790437.06	3429182.38	63.24	790437.06	3429182.38	63.01	-0.23	Asphalt
O15	790444.48	3429186.95	63.20	790444.48	3429186.95	63.01	-0.19	Asphalt
O16	790451.94	3429191.42	63.18	790451.94	3429191.42	62.98	-0.20	Asphalt
O17	790459.42	3429195.79	63.16	790459.42	3429195.79	62.92	-0.24	Asphalt
O18	790466.86	3429200.20	63.15	790466.86	3429200.20	62.92	-0.24	Asphalt
O19	790474.33	3429204.54	63.11	790474.33	3429204.54	62.89	-0.22	Asphalt
O20	790481.79	3429208.89	63.07	790481.79	3429208.89	62.87	-0.20	Asphalt
O21	790489.22	3429213.28	63.03	790489.22	3429213.28	62.76	-0.27	Asphalt
O22	790496.50	3429217.46	63.01	790496.50	3429217.46	62.82	-0.19	Asphalt
O23	790503.21	3429221.25	63.01	790503.21	3429221.25	62.78	-0.23	Asphalt
O24	790522.17	3429232.96	63.11	790522.17	3429232.96	62.93	-0.17	Asphalt
O25	790524.32	3429235.32	63.15	790524.32	3429235.32	62.92	-0.23	Asphalt
O26	790525.78	3429238.74	63.18	790525.78	3429238.74	62.91	-0.27	Asphalt
O27	790525.63	3429242.95	63.15	790525.63	3429242.95	62.94	-0.21	Asphalt
O28	790523.97	3429247.47	63.14	790523.97	3429247.47	62.88	-0.26	Asphalt
O29	790521.57	3429252.56	63.16	790521.57	3429252.56	62.89	-0.27	Asphalt
O30	790518.77	3429258.28	63.18	790518.77	3429258.28	62.90	-0.28	Asphalt
O31	790515.59	3429264.60	63.21	790515.59	3429264.60	62.86	-0.35	Asphalt
O32	790512.00	3429271.54	63.25	790512.00	3429271.54	63.02	-0.23	Asphalt
O33	790508.11	3429279.20	63.27	790508.11	3429279.20	62.89	-0.38	Asphalt
O34	790499.91	3429296.11	63.36	790499.91	3429296.11	62.91	-0.45	Asphalt
O35	790495.69	3429305.22	63.43	790495.69	3429305.22	63.02	-0.40	Asphalt
O36	790491.61	3429314.79	63.54	790491.61	3429314.79	63.16	-0.38	Asphalt
O37	790487.62	3429324.66	63.66	790487.62	3429324.66	63.29	-0.37	Asphalt
O38	790483.87	3429334.81	63.86	790483.87	3429334.81	63.63	-0.23	Asphalt
O39	790465.29	3429385.05	65.60	790465.29	3429385.05	65.27	-0.33	Asphalt
O40	790466.45	3429383.24	65.51	790466.45	3429383.24	65.21	-0.30	Asphalt
O41	790467.82	3429379.81	65.36	790467.82	3429379.81	65.09	-0.26	Asphalt
O42	790469.26	3429374.94	65.16	790469.26	3429374.94	64.80	-0.36	Asphalt

O43	790470.75	3429368.67	64.96	790470.75	3429368.67	64.63	-0.34	Asphalt
O44	790472.57	3429361.36	64.75	790472.57	3429361.36	64.34	-0.41	Asphalt
O45	790474.65	3429353.25	64.52	790474.65	3429353.25	64.22	-0.31	Asphalt
O46	790477.26	3429344.29	64.26	790477.26	3429344.29	63.83	-0.43	Asphalt
O47	790480.49	3429334.50	64.01	790480.49	3429334.50	63.69	-0.32	Asphalt
O48	790488.80	3429313.02	63.64	790488.80	3429313.02	63.12	-0.52	Asphalt
O49	790512.31	3429264.94	63.25	790512.31	3429264.94	62.86	-0.39	Asphalt
O50	790513.40	3429262.54	63.25	790513.40	3429262.54	62.81	-0.43	Asphalt
O51	790514.84	3429259.47	63.22	790514.84	3429259.47	62.90	-0.33	Asphalt
O52	790516.54	3429255.66	63.19	790516.54	3429255.66	62.75	-0.44	Asphalt
O53	790518.24	3429251.19	63.15	790518.24	3429251.19	62.84	-0.31	Asphalt
O54	790518.96	3429245.98	63.11	790518.96	3429245.98	62.87	-0.24	Asphalt
O55	790517.92	3429240.52	63.03	790517.92	3429240.52	62.82	-0.21	Asphalt
O56	790515.03	3429235.27	63.04	790515.03	3429235.27	62.85	-0.20	Asphalt
O57	790510.64	3429230.62	63.06	790510.64	3429230.62	62.84	-0.21	Asphalt
O58	790504.99	3429226.48	63.07	790504.99	3429226.48	62.85	-0.22	Asphalt
O59	790498.49	3429222.45	63.07	790498.49	3429222.45	62.85	-0.22	Asphalt
O60	790491.38	3429218.23	63.07	790491.38	3429218.23	62.79	-0.29	Asphalt
O61	790483.77	3429213.76	63.09	790483.77	3429213.76	62.80	-0.29	Asphalt
O62	790475.78	3429209.03	63.13	790475.78	3429209.03	62.91	-0.22	Asphalt
O63	790467.56	3429204.03	63.16	790467.56	3429204.03	62.96	-0.19	Asphalt
O64	790459.06	3429198.95	63.18	790459.06	3429198.95	62.93	-0.25	Asphalt
O65	790450.32	3429193.75	63.20	790450.32	3429193.75	62.92	-0.28	Asphalt
O66	790441.43	3429188.33	63.23	790441.43	3429188.33	63.05	-0.18	Asphalt
O67	790432.30	3429182.86	63.30	790432.30	3429182.86	63.04	-0.26	Asphalt
O68	790422.98	3429177.28	63.35	790422.98	3429177.28	63.13	-0.21	Asphalt
O69	790413.52	3429171.53	63.39	790413.52	3429171.53	63.14	-0.26	Asphalt
O70	790403.90	3429165.77	63.47	790403.90	3429165.77	63.20	-0.27	Asphalt
O71	790394.33	3429160.16	63.56	790394.33	3429160.16	63.31	-0.24	Asphalt
N81	775404.74	3418893.42	72.68	775404.74	3418893.42	72.32	-0.36	Asphalt
N82	775400.29	3418884.10	72.30	775400.29	3418884.10	72.07	-0.23	Asphalt
N83	775316.74	3418702.24	68.06	775316.74	3418702.24	67.76	-0.31	Asphalt
N84	775318.98	3418707.05	68.06	775318.98	3418707.05	67.77	-0.29	Asphalt
N85	774822.51	3417896.98	72.36	774822.51	3417896.98	72.32	-0.04	Asphalt

N86	774820.95	3417782.73	71.41	774820.95	3417782.73	71.22	-0.19	Asphalt
N87	774821.02	3417779.81	71.39	774821.02	3417779.81	71.19	-0.19	Asphalt
K1	782370.64	3403004.00	36.41	782370.64	3403004.00	36.06	-0.34	Asphalt
K2	782369.01	3403005.20	36.35	782369.01	3403005.20	36.09	-0.26	Asphalt
K3	782366.94	3403006.83	36.38	782366.94	3403006.83	36.13	-0.26	Asphalt
K4	782364.17	3403009.02	36.36	782364.17	3403009.02	36.13	-0.24	Asphalt
K5	782360.91	3403011.60	36.39	782360.91	3403011.60	36.13	-0.26	Asphalt
K6	782357.16	3403014.55	36.34	782357.16	3403014.55	36.04	-0.30	Asphalt
K7	782352.91	3403017.85	36.38	782352.91	3403017.85	36.00	-0.38	Asphalt
K8	782348.17	3403021.46	36.37	782348.17	3403021.46	36.03	-0.34	Asphalt
K9	782343.03	3403025.43	36.38	782343.03	3403025.43	36.14	-0.25	Asphalt
K10	782337.47	3403029.72	36.38	782337.47	3403029.72	36.12	-0.26	Asphalt
K11	782331.38	3403034.44	36.37	782331.38	3403034.44	36.08	-0.29	Asphalt
K12	782324.87	3403039.47	36.37	782324.87	3403039.47	36.13	-0.24	Asphalt
K13	782317.96	3403044.82	36.33	782317.96	3403044.82	36.03	-0.30	Asphalt
K14	782310.69	3403050.50	36.31	782310.69	3403050.50	35.99	-0.32	Asphalt
K15	782303.05	3403056.40	36.27	782303.05	3403056.40	36.04	-0.24	Asphalt
K16	782295.04	3403062.51	36.24	782295.04	3403062.51	35.98	-0.26	Asphalt
K17	782286.73	3403068.87	36.27	782286.73	3403068.87	35.91	-0.36	Asphalt
K18	782278.12	3403075.46	36.25	782278.12	3403075.46	36.05	-0.21	Asphalt
K19	782269.31	3403082.25	36.23	782269.31	3403082.25	36.00	-0.23	Asphalt
K20	782260.30	3403089.23	36.25	782260.30	3403089.23	36.04	-0.21	Asphalt
K21	782251.12	3403096.36	36.22	782251.12	3403096.36	35.98	-0.24	Asphalt
K22	782241.74	3403103.55	36.24	782241.74	3403103.55	36.08	-0.17	Asphalt
K23	782232.12	3403110.80	36.24	782232.12	3403110.80	35.95	-0.29	Asphalt
K24	782222.27	3403118.16	36.23	782222.27	3403118.16	35.99	-0.24	Asphalt
K25	782212.19	3403125.64	36.22	782212.19	3403125.64	35.90	-0.32	Asphalt
K26	782201.83	3403133.16	36.24	782201.83	3403133.16	35.93	-0.31	Asphalt
K27	782180.32	3403148.04	36.28	782180.32	3403148.04	36.04	-0.24	Asphalt
K28	782169.21	3403155.35	36.29	782169.21	3403155.35	36.00	-0.30	Asphalt
K29	782157.84	3403162.50	36.29	782157.84	3403162.50	36.07	-0.22	Asphalt
K30	782146.26	3403169.29	36.30	782146.26	3403169.29	36.06	-0.25	Asphalt
K31	782122.55	3403181.82	36.29	782122.55	3403181.82	36.08	-0.22	Asphalt
K32	782110.58	3403187.77	36.31	782110.58	3403187.77	36.04	-0.27	Asphalt

K33	782098.64	3403193.44	36.30	782098.64	3403193.44	36.05	-0.25	Asphalt
K34	782053.17	3403209.92	36.21	782053.17	3403209.92	35.88	-0.33	Asphalt
K35	782062.66	3403205.86	36.15	782062.66	3403205.86	35.90	-0.25	Asphalt
K36	782073.57	3403201.03	36.14	782073.57	3403201.03	35.94	-0.20	Asphalt
K37	782084.78	3403196.12	36.13	782084.78	3403196.12	35.99	-0.14	Asphalt
K38	782090.75	3403193.51	36.15	782090.75	3403193.51	35.81	-0.34	Asphalt
K39	782096.82	3403190.79	36.12	782096.82	3403190.79	35.80	-0.32	Asphalt
K40	782102.87	3403187.97	36.11	782102.87	3403187.97	35.95	-0.16	Asphalt
K41	782109.29	3403184.92	36.12	782109.29	3403184.92	35.78	-0.34	Asphalt
K42	782116.10	3403181.60	36.11	782116.10	3403181.60	35.89	-0.22	Asphalt
K43	782130.82	3403173.98	36.13	782130.82	3403173.98	35.81	-0.32	Asphalt
K44	782138.69	3403169.71	36.12	782138.69	3403169.71	35.84	-0.28	Asphalt
K45	782146.83	3403165.07	36.11	782146.83	3403165.07	35.84	-0.28	Asphalt
K46	782155.24	3403160.10	36.13	782155.24	3403160.10	35.92	-0.21	Asphalt
K47	782163.87	3403154.75	36.15	782163.87	3403154.75	35.87	-0.28	Asphalt
K48	782172.67	3403149.09	36.15	782172.67	3403149.09	35.76	-0.40	Asphalt
K49	782181.61	3403143.16	36.17	782181.61	3403143.16	35.97	-0.20	Asphalt
K50	782190.71	3403136.93	36.15	782190.71	3403136.93	35.88	-0.26	Asphalt
K51	782199.99	3403130.35	36.09	782199.99	3403130.35	35.76	-0.33	Asphalt
K52	782209.41	3403123.47	36.08	782209.41	3403123.47	35.74	-0.34	Asphalt
K53	782218.98	3403116.35	36.12	782218.98	3403116.35	35.85	-0.27	Asphalt
K54	782228.72	3403109.04	36.12	782228.72	3403109.04	35.84	-0.28	Asphalt
K55	782238.63	3403101.52	36.12	782238.63	3403101.52	35.86	-0.27	Asphalt
K56	782248.73	3403093.84	36.15	782248.73	3403093.84	35.85	-0.30	Asphalt
K57	782259.02	3403086.02	36.17	782259.02	3403086.02	35.94	-0.24	Asphalt
K58	782269.45	3403078.02	36.17	782269.45	3403078.02	35.92	-0.24	Asphalt
K59	782280.02	3403069.89	36.22	782280.02	3403069.89	35.82	-0.40	Asphalt
K60	782323.05	3403036.69	36.32	782323.05	3403036.69	36.07	-0.25	Asphalt
K61	782334.00	3403028.26	36.37	782334.00	3403028.26	36.01	-0.36	Asphalt
K62	782345.00	3403019.73	36.37	782345.00	3403019.73	36.04	-0.33	Asphalt
K63	782356.08	3403011.16	36.38	782356.08	3403011.16	35.90	-0.48	Asphalt
K64	782367.22	3403002.48	36.36	782367.22	3403002.48	36.00	-0.36	Asphalt
K65	782378.43	3402993.76	36.37	782378.43	3402993.76	36.17	-0.20	Asphalt
K66	782389.73	3402985.03	36.40	782389.73	3402985.03	36.02	-0.37	Asphalt

K67	782401.08	3402976.25	36.46	782401.08	3402976.25	36.21	-0.24	Asphalt
K68	782412.54	3402967.42	36.45	782412.54	3402967.42	36.04	-0.41	Asphalt
K69	782424.10	3402958.58	36.47	782424.10	3402958.58	36.26	-0.22	Asphalt
K70	782435.71	3402949.63	36.51	782435.71	3402949.63	36.24	-0.27	Asphalt
K71	782447.34	3402940.55	36.50	782447.34	3402940.55	36.24	-0.26	Asphalt
K72	782459.06	3402931.44	36.55	782459.06	3402931.44	36.22	-0.33	Asphalt
K73	782470.88	3402922.32	36.57	782470.88	3402922.32	36.19	-0.38	Asphalt
K74	782482.84	3402913.12	36.53	782482.84	3402913.12	36.22	-0.31	Asphalt
K75	782649.36	3402784.25	36.50	782649.36	3402784.25	36.26	-0.24	Asphalt
K76	782657.03	3402778.29	36.51	782657.03	3402778.29	36.18	-0.33	Asphalt
K77	782665.84	3402771.53	36.54	782665.84	3402771.53	36.23	-0.31	Asphalt
K78	782674.70	3402764.72	36.57	782674.70	3402764.72	36.32	-0.26	Asphalt
K79	782683.93	3402757.54	36.59	782683.93	3402757.54	36.25	-0.33	Asphalt
K80	782689.12	3402753.51	36.59	782689.12	3402753.51	36.21	-0.38	Asphalt
K81	782694.62	3402749.23	36.66	782694.62	3402749.23	36.27	-0.39	Asphalt
K82	782700.43	3402744.72	36.67	782700.43	3402744.72	36.33	-0.34	Asphalt
K83	782706.51	3402740.01	36.69	782706.51	3402740.01	36.34	-0.35	Asphalt
K84	782712.87	3402735.05	36.66	782712.87	3402735.05	36.31	-0.36	Asphalt
K85	782719.50	3402729.85	36.61	782719.50	3402729.85	36.30	-0.31	Asphalt
K86	782726.41	3402724.54	36.65	782726.41	3402724.54	36.35	-0.30	Asphalt
K87	782733.57	3402718.98	36.67	782733.57	3402718.98	36.31	-0.36	Asphalt
K88	782748.61	3402707.39	36.69	782748.61	3402707.39	36.36	-0.32	Asphalt
K89	782756.39	3402701.32	36.69	782756.39	3402701.32	36.34	-0.35	Asphalt
K90	782783.96	3402680.99	36.75	782783.96	3402680.99	36.39	-0.36	Asphalt
K91	782783.55	3402682.29	36.75	782783.55	3402682.29	36.39	-0.36	Asphalt
K92	782782.57	3402684.23	36.79	782782.57	3402684.23	36.39	-0.41	Asphalt
K93	782780.73	3402686.34	36.78	782780.73	3402686.34	36.35	-0.43	Asphalt
K94	782777.65	3402688.88	36.74	782777.65	3402688.88	36.32	-0.41	Asphalt
K95	782773.54	3402692.09	36.80	782773.54	3402692.09	36.36	-0.44	Asphalt
K96	782763.09	3402700.15	36.73	782763.09	3402700.15	36.28	-0.45	Asphalt
K97	782757.07	3402704.82	36.73	782757.07	3402704.82	36.34	-0.39	Asphalt
K98	782743.38	3402715.50	36.72	782743.38	3402715.50	36.30	-0.42	Asphalt
K99	782735.80	3402721.44	36.70	782735.80	3402721.44	36.36	-0.34	Asphalt
K100	782727.74	3402727.71	36.74	782727.74	3402727.71	36.29	-0.44	Asphalt

K101	782719.22	3402734.31	36.74	782719.22	3402734.31	36.40	-0.34	Asphalt
K102	782710.35	3402741.14	36.77	782710.35	3402741.14	36.33	-0.44	Asphalt
K103	782701.13	3402748.21	36.76	782701.13	3402748.21	36.37	-0.39	Asphalt
K104	782691.69	3402755.53	36.69	782691.69	3402755.53	36.33	-0.35	Asphalt
K105	782682.02	3402763.07	36.68	782682.02	3402763.07	36.29	-0.39	Asphalt
K106	782672.11	3402770.76	36.68	782672.11	3402770.76	36.27	-0.41	Asphalt
K107	782662.01	3402778.63	36.63	782662.01	3402778.63	36.22	-0.41	Asphalt
K108	782651.68	3402786.62	36.62	782651.68	3402786.62	36.32	-0.30	Asphalt
K109	782641.13	3402794.71	36.67	782641.13	3402794.71	36.28	-0.39	Asphalt
K110	782630.45	3402802.95	36.65	782630.45	3402802.95	36.28	-0.37	Asphalt
K111	782619.57	3402811.32	36.57	782619.57	3402811.32	36.19	-0.38	Asphalt
K112	782608.53	3402819.88	36.56	782608.53	3402819.88	36.13	-0.43	Asphalt
K113	782585.97	3402837.34	36.56	782585.97	3402837.34	36.26	-0.30	Asphalt
K114	782574.45	3402846.23	36.56	782574.45	3402846.23	36.25	-0.30	Asphalt
K115	782562.76	3402855.24	36.56	782562.76	3402855.24	36.17	-0.39	Asphalt
K116	782550.99	3402864.34	36.54	782550.99	3402864.34	36.31	-0.24	Asphalt
K117	782515.14	3402892.00	36.62	782515.14	3402892.00	36.26	-0.35	Asphalt
K118	782490.92	3402910.64	36.56	782490.92	3402910.64	36.28	-0.28	Asphalt
K119	782478.79	3402920.01	36.59	782478.79	3402920.01	36.30	-0.29	Asphalt
K120	782466.64	3402929.46	36.62	782466.64	3402929.46	36.30	-0.32	Asphalt
K121	782454.44	3402938.95	36.62	782454.44	3402938.95	36.26	-0.36	Asphalt
K122	782442.12	3402948.42	36.56	782442.12	3402948.42	36.21	-0.34	Asphalt
K123	782429.85	3402957.84	36.59	782429.85	3402957.84	36.26	-0.34	Asphalt
K124	782417.96	3402967.03	36.57	782417.96	3402967.03	36.12	-0.45	Asphalt
K125	782406.72	3402975.78	36.53	782406.72	3402975.78	36.24	-0.28	Asphalt
K126	782396.53	3402983.71	36.47	782396.53	3402983.71	36.09	-0.39	Asphalt
K127	782387.97	3402990.39	36.44	782387.97	3402990.39	36.12	-0.32	Asphalt
L61	780245.87	3393681.82	55.61	780245.87	3393681.82	55.49	-0.12	Asphalt
L62	780244.66	3393678.36	55.59	780244.66	3393678.36	55.46	-0.13	Asphalt
L63	780244.07	3393674.69	55.55	780244.07	3393674.69	55.44	-0.11	Asphalt
L64	780243.93	3393670.34	55.53	780243.93	3393670.34	55.42	-0.12	Asphalt
L65	780244.00	3393664.90	55.51	780244.00	3393664.90	55.36	-0.14	Asphalt
L66	780244.22	3393658.50	55.49	780244.22	3393658.50	55.38	-0.11	Asphalt
L67	780244.48	3393651.45	55.45	780244.48	3393651.45	55.32	-0.12	Asphalt

L68	780244.75	3393643.90	55.41	780244.75	3393643.90	55.24	-0.16	Asphalt
L69	780245.00	3393635.66	55.37	780245.00	3393635.66	55.26	-0.11	Asphalt
L70	780245.25	3393626.73	55.32	780245.25	3393626.73	55.14	-0.17	Asphalt
L71	780245.55	3393617.20	55.27	780245.55	3393617.20	55.15	-0.12	Asphalt
L72	780246.17	3393596.86	55.23	780246.17	3393596.86	55.10	-0.13	Asphalt
L73	780246.50	3393586.15	55.23	780246.50	3393586.15	55.06	-0.17	Asphalt
L74	780246.81	3393575.11	55.21	780246.81	3393575.11	55.11	-0.10	Asphalt
L75	780247.14	3393563.75	55.17	780247.14	3393563.75	55.01	-0.16	Asphalt
L76	780247.48	3393552.09	55.17	780247.48	3393552.09	55.07	-0.10	Asphalt
L77	780247.89	3393540.11	55.15	780247.89	3393540.11	55.03	-0.12	Asphalt
L78	780248.29	3393527.84	55.12	780248.29	3393527.84	54.99	-0.13	Asphalt
L79	780248.62	3393515.30	55.11	780248.62	3393515.30	54.99	-0.12	Asphalt
L80	780248.96	3393502.47	55.07	780248.96	3393502.47	54.94	-0.12	Asphalt
L81	780249.35	3393489.37	55.08	780249.35	3393489.37	54.93	-0.15	Asphalt
L82	780249.74	3393476.02	55.04	780249.74	3393476.02	54.93	-0.11	Asphalt
L83	780250.16	3393462.42	55.03	780250.16	3393462.42	54.92	-0.11	Asphalt
L84	780250.60	3393448.64	55.01	780250.60	3393448.64	54.86	-0.15	Asphalt
L85	780251.06	3393434.75	55.01	780251.06	3393434.75	54.93	-0.08	Asphalt
L86	780251.49	3393420.78	55.04	780251.49	3393420.78	54.96	-0.08	Asphalt
L87	780251.87	3393406.81	55.03	780251.87	3393406.81	54.92	-0.12	Asphalt
L88	780252.31	3393392.82	55.06	780252.31	3393392.82	54.93	-0.13	Asphalt
L89	780252.70	3393378.85	54.97	780252.70	3393378.85	54.90	-0.07	Asphalt
L90	780253.15	3393364.82	55.01	780253.15	3393364.82	54.95	-0.06	Asphalt
L91	780253.63	3393350.81	55.03	780253.63	3393350.81	54.99	-0.04	Asphalt
L92	780254.09	3393336.81	55.13	780254.09	3393336.81	55.06	-0.07	Asphalt
L93	780254.44	3393322.85	55.19	780254.44	3393322.85	55.08	-0.12	Asphalt
L94	780254.83	3393308.90	55.22	780254.83	3393308.90	55.15	-0.07	Asphalt
L95	780255.24	3393294.95	55.24	780255.24	3393294.95	55.19	-0.05	Asphalt
L96	780255.66	3393280.99	55.26	780255.66	3393280.99	55.17	-0.10	Asphalt
L97	780256.13	3393267.02	55.28	780256.13	3393267.02	55.20	-0.08	Asphalt
L98	780256.60	3393253.05	55.30	780256.60	3393253.05	55.24	-0.06	Asphalt
L99	780257.02	3393239.09	55.31	780257.02	3393239.09	55.26	-0.05	Asphalt
L100	780257.45	3393225.13	55.29	780257.45	3393225.13	55.22	-0.07	Asphalt
L101	780257.88	3393211.19	55.22	780257.88	3393211.19	55.13	-0.09	Asphalt

L102	780258.38	3393197.39	55.16	780258.38	3393197.39	55.05	-0.12	Asphalt
L103	780258.87	3393183.72	55.08	780258.87	3393183.72	54.96	-0.12	Asphalt
L104	780259.34	3393170.19	54.98	780259.34	3393170.19	54.87	-0.12	Asphalt
L105	780259.77	3393156.77	54.86	780259.77	3393156.77	54.74	-0.12	Asphalt
L106	780260.21	3393143.41	54.68	780260.21	3393143.41	54.56	-0.12	Asphalt
L107	780260.67	3393130.04	54.48	780260.67	3393130.04	54.36	-0.12	Asphalt
L108	780261.13	3393116.46	54.22	780261.13	3393116.46	54.07	-0.15	Asphalt
L109	780261.61	3393102.60	53.92	780261.61	3393102.60	53.82	-0.10	Asphalt
L110	780262.10	3393088.51	53.52	780262.10	3393088.51	53.41	-0.11	Asphalt
L111	780262.59	3393074.24	53.13	780262.59	3393074.24	52.97	-0.16	Asphalt
L112	780263.01	3393059.80	52.79	780263.01	3393059.80	52.67	-0.12	Asphalt
L113	780263.99	3393030.43	52.13	780263.99	3393030.43	51.94	-0.19	Asphalt
L114	780264.42	3393015.56	51.88	780264.42	3393015.56	51.75	-0.13	Asphalt
L115	780264.86	3393000.61	51.66	780264.86	3393000.61	51.55	-0.12	Asphalt
L116	780265.37	3392985.62	51.46	780265.37	3392985.62	51.34	-0.12	Asphalt
L117	780265.87	3392970.56	51.28	780265.87	3392970.56	51.21	-0.07	Asphalt
L118	780266.32	3392955.52	51.16	780266.32	3392955.52	50.98	-0.18	Asphalt
L119	780266.75	3392940.48	51.05	780266.75	3392940.48	50.93	-0.12	Asphalt
L120	780267.65	3392910.44	50.86	780267.65	3392910.44	50.74	-0.11	Asphalt
L121	780268.56	3392880.32	50.59	780268.56	3392880.32	50.50	-0.09	Asphalt
L122	780268.99	3392865.26	50.40	780268.99	3392865.26	50.37	-0.04	Asphalt
L123	780269.34	3392850.30	50.21	780269.34	3392850.30	50.16	-0.05	Asphalt
L124	780269.74	3392835.78	50.04	780269.74	3392835.78	50.00	-0.04	Asphalt
L125	780272.91	3392785.14	49.46	780272.91	3392785.14	49.42	-0.04	Asphalt
L126	780273.93	3392787.50	49.49	780273.93	3392787.50	49.41	-0.08	Asphalt
L127	780274.40	3392791.10	49.51	780274.40	3392791.10	49.43	-0.08	Asphalt
L128	780274.38	3392795.50	49.55	780274.38	3392795.50	49.48	-0.07	Asphalt
L129	780274.00	3392807.11	49.67	780274.00	3392807.11	49.67	0.00	Asphalt
L130	780273.69	3392814.51	49.75	780273.69	3392814.51	49.73	-0.02	Asphalt
L131	780273.38	3392822.82	49.88	780273.38	3392822.82	49.83	-0.05	Asphalt
L132	780273.08	3392831.86	50.02	780273.08	3392831.86	49.85	-0.16	Asphalt
L133	780272.80	3392841.79	50.11	780272.80	3392841.79	49.96	-0.15	Asphalt
L134	780272.50	3392852.37	50.25	780272.50	3392852.37	50.26	0.01	Asphalt
L135	780272.18	3392863.57	50.39	780272.18	3392863.57	50.38	-0.01	Asphalt

L136	780271.81	3392875.35	50.52	780271.81	3392875.35	50.52	0.00	Asphalt
L137	780271.41	3392887.68	50.70	780271.41	3392887.68	50.55	-0.15	Asphalt
L138	780271.08	3392900.51	50.78	780271.08	3392900.51	50.83	0.05	Asphalt
L139	780270.68	3392913.80	50.91	780270.68	3392913.80	50.91	0.00	Asphalt
L140	780270.28	3392927.52	51.00	780270.28	3392927.52	50.96	-0.04	Asphalt
L141	780269.88	3392941.61	51.09	780269.88	3392941.61	50.97	-0.12	Asphalt
L142	780269.47	3392956.11	51.18	780269.47	3392956.11	50.93	-0.25	Asphalt
L143	780269.00	3392971.00	51.35	780269.00	3392971.00	51.07	-0.27	Asphalt
L144	780264.98	3393099.66	53.80	780264.98	3393099.66	53.64	-0.16	Asphalt
L145	780264.37	3393116.38	54.22	780264.37	3393116.38	54.03	-0.18	Asphalt
L146	780263.85	3393132.84	54.52	780263.85	3393132.84	54.37	-0.15	Asphalt
L147	780263.34	3393148.96	54.75	780263.34	3393148.96	54.67	-0.08	Asphalt
L148	780262.92	3393164.08	54.95	780262.92	3393164.08	54.81	-0.14	Asphalt
L149	780262.50	3393176.46	55.03	780262.50	3393176.46	54.92	-0.10	Asphalt
L150	780262.11	3393187.20	55.10	780262.11	3393187.20	54.99	-0.11	Asphalt
L151	780261.72	3393197.83	55.19	780261.72	3393197.83	55.05	-0.15	Asphalt
L152	780261.32	3393208.61	55.25	780261.32	3393208.61	55.13	-0.11	Asphalt
L153	780260.96	3393219.58	55.31	780260.96	3393219.58	55.17	-0.14	Asphalt
L154	780260.56	3393230.76	55.34	780260.56	3393230.76	55.20	-0.14	Asphalt
L155	780260.14	3393242.23	55.35	780260.14	3393242.23	55.25	-0.10	Asphalt
L156	780259.30	3393266.07	55.34	780259.30	3393266.07	55.20	-0.14	Asphalt
L157	780258.90	3393278.54	55.33	780258.90	3393278.54	55.16	-0.17	Asphalt
L158	780258.50	3393291.29	55.29	780258.50	3393291.29	55.22	-0.07	Asphalt
L159	780258.05	3393304.23	55.28	780258.05	3393304.23	55.16	-0.12	Asphalt
L160	780257.27	3393330.79	55.22	780257.27	3393330.79	55.07	-0.15	Asphalt
L161	780256.88	3393344.53	55.13	780256.88	3393344.53	55.00	-0.13	Asphalt
L162	780256.43	3393358.57	55.06	780256.43	3393358.57	54.94	-0.13	Asphalt
L163	780256.02	3393372.86	55.04	780256.02	3393372.86	54.93	-0.10	Asphalt
L164	780255.62	3393387.28	55.04	780255.62	3393387.28	54.91	-0.13	Asphalt
L165	780255.20	3393401.84	55.08	780255.20	3393401.84	55.01	-0.07	Asphalt
L166	780254.75	3393416.46	55.07	780254.75	3393416.46	54.84	-0.23	Asphalt
L167	780254.27	3393431.22	55.04	780254.27	3393431.22	54.89	-0.15	Asphalt
L168	780253.85	3393446.15	55.05	780253.85	3393446.15	54.89	-0.16	Asphalt
L169	780253.42	3393461.22	55.06	780253.42	3393461.22	54.94	-0.12	Asphalt

L170	780252.93	3393476.37	55.09	780252.93	3393476.37	54.95	-0.14	Asphalt
L171	780252.41	3393491.63	55.11	780252.41	3393491.63	54.92	-0.18	Asphalt
L172	780251.93	3393507.04	55.10	780251.93	3393507.04	54.96	-0.15	Asphalt
L173	780251.45	3393522.57	55.18	780251.45	3393522.57	55.01	-0.17	Asphalt
L174	780251.02	3393538.13	55.18	780251.02	3393538.13	55.02	-0.16	Asphalt
L175	780250.61	3393553.76	55.21	780250.61	3393553.76	55.01	-0.19	Asphalt
L176	780250.19	3393569.43	55.22	780250.19	3393569.43	55.06	-0.16	Asphalt
L177	780249.74	3393585.17	55.25	780249.74	3393585.17	55.05	-0.20	Asphalt
L178	780249.29	3393600.97	55.25	780249.29	3393600.97	55.12	-0.13	Asphalt
L179	780248.82	3393616.83	55.30	780248.82	3393616.83	55.13	-0.17	Asphalt
L180	780248.34	3393632.74	55.38	780248.34	3393632.74	55.24	-0.13	Asphalt
L181	780247.86	3393648.70	55.46	780247.86	3393648.70	55.31	-0.15	Asphalt
L182	780247.34	3393664.72	55.53	780247.34	3393664.72	55.37	-0.16	Asphalt
L183	780246.77	3393680.74	55.61	780246.77	3393680.74	55.50	-0.11	Asphalt
L184	780246.21	3393696.77	55.63	780246.21	3393696.77	55.51	-0.12	Asphalt
L185	780245.64	3393712.81	55.60	780245.64	3393712.81	55.49	-0.11	Asphalt
L186	780245.01	3393728.93	55.51	780245.01	3393728.93	55.38	-0.12	Asphalt
L187	780244.36	3393745.16	55.33	780244.36	3393745.16	55.19	-0.15	Asphalt
L188	780243.74	3393761.43	55.24	780243.74	3393761.43	55.09	-0.15	Asphalt
L189	780243.21	3393777.71	55.19	780243.21	3393777.71	55.08	-0.11	Asphalt
L190	780242.62	3393793.96	55.15	780242.62	3393793.96	55.00	-0.15	Asphalt
L191	780241.98	3393810.17	55.11	780241.98	3393810.17	54.94	-0.17	Asphalt
L192	780241.31	3393826.35	55.09	780241.31	3393826.35	54.94	-0.15	Asphalt
L193	780240.67	3393842.50	55.03	780240.67	3393842.50	54.90	-0.13	Asphalt
L194	780239.39	3393874.98	54.97	780239.39	3393874.98	54.84	-0.13	Asphalt
L195	780238.76	3393891.33	54.94	780238.76	3393891.33	54.82	-0.12	Asphalt
L196	780238.14	3393907.67	54.85	780238.14	3393907.67	54.74	-0.11	Asphalt
L197	780237.52	3393924.02	54.71	780237.52	3393924.02	54.61	-0.10	Asphalt
L198	780236.88	3393940.34	54.60	780236.88	3393940.34	54.45	-0.15	Asphalt
L199	780236.25	3393956.65	54.45	780236.25	3393956.65	54.31	-0.14	Asphalt
L200	780235.61	3393972.96	54.34	780235.61	3393972.96	54.20	-0.14	Asphalt
L201	780234.94	3393989.24	54.19	780234.94	3393989.24	54.08	-0.11	Asphalt
L202	780234.26	3394005.50	54.09	780234.26	3394005.50	53.92	-0.16	Asphalt
L203	780232.99	3394038.12	54.09	780232.99	3394038.12	53.93	-0.15	Asphalt

L204	780232.42	3394054.48	54.06	780232.42	3394054.48	53.89	-0.16	Asphalt
L205	780231.82	3394070.88	54.10	780231.82	3394070.88	53.94	-0.16	Asphalt
L206	780231.16	3394087.31	54.13	780231.16	3394087.31	54.03	-0.11	Asphalt
L207	780221.10	3394361.29	54.16	780221.10	3394361.29	54.04	-0.11	Asphalt
L208	780220.85	3394366.98	54.16	780220.85	3394366.98	54.06	-0.10	Asphalt
L209	780220.64	3394372.81	54.18	780220.64	3394372.81	54.01	-0.17	Asphalt
L210	780220.19	3394386.08	54.22	780220.19	3394386.08	54.14	-0.08	Asphalt
L211	780215.42	3394451.39	54.50	780215.42	3394451.39	54.45	-0.05	Asphalt
L212	780215.00	3394447.97	54.48	780215.00	3394447.97	54.44	-0.04	Asphalt
L213	780215.07	3394446.54	54.48	780215.07	3394446.54	54.43	-0.05	Asphalt
L214	780215.19	3394443.93	54.47	780215.19	3394443.93	54.43	-0.04	Asphalt
L215	780215.24	3394440.09	54.44	780215.24	3394440.09	54.43	-0.01	Asphalt
L216	780215.33	3394435.21	54.41	780215.33	3394435.21	54.42	0.00	Asphalt
L217	780215.53	3394429.41	54.38	780215.53	3394429.41	54.35	-0.04	Asphalt
L218	780215.78	3394422.72	54.33	780215.78	3394422.72	54.28	-0.04	Asphalt
L219	780216.33	3394406.87	54.24	780216.33	3394406.87	54.15	-0.09	Asphalt
L220	780217.38	3394376.50	54.12	780217.38	3394376.50	54.12	0.00	Asphalt
L221	780217.80	3394364.79	54.12	780217.80	3394364.79	54.11	-0.02	Asphalt
L222	780218.18	3394352.75	54.12	780218.18	3394352.75	54.09	-0.03	Asphalt
L223	780219.13	3394327.76	54.15	780219.13	3394327.76	54.09	-0.05	Asphalt
L224	780219.59	3394314.72	54.14	780219.59	3394314.72	54.00	-0.14	Asphalt
L225	780220.07	3394301.29	54.09	780220.07	3394301.29	53.97	-0.12	Asphalt
L226	780220.60	3394287.51	54.06	780220.60	3394287.51	53.95	-0.11	Asphalt
L227	780221.07	3394273.46	54.09	780221.07	3394273.46	53.97	-0.12	Asphalt
L228	780221.56	3394259.16	54.12	780221.56	3394259.16	54.04	-0.09	Asphalt
L229	780222.06	3394244.64	54.14	780222.06	3394244.64	54.01	-0.12	Asphalt
L230	780222.57	3394229.92	54.08	780222.57	3394229.92	53.87	-0.22	Asphalt
L231	780223.08	3394215.01	54.10	780223.08	3394215.01	53.96	-0.13	Asphalt
L232	780223.64	3394199.88	54.08	780223.64	3394199.88	53.98	-0.10	Asphalt
L233	780224.23	3394184.59	54.10	780224.23	3394184.59	53.99	-0.11	Asphalt
L234	780225.32	3394153.54	54.19	780225.32	3394153.54	54.07	-0.12	Asphalt
L235	780225.94	3394137.77	54.21	780225.94	3394137.77	54.12	-0.09	Asphalt
L236	780226.56	3394121.84	54.17	780226.56	3394121.84	54.15	-0.02	Asphalt
L237	780227.20	3394105.73	54.19	780227.20	3394105.73	54.14	-0.05	Asphalt

L238	780227.83	3394089.46	54.14	780227.83	3394089.46	54.09	-0.05	Asphalt
L239	780228.46	3394073.01	54.17	780228.46	3394073.01	53.93	-0.25	Asphalt
L240	780230.52	3394022.71	54.07	780230.52	3394022.71	53.77	-0.30	Asphalt
L241	780231.16	3394005.67	54.07	780231.16	3394005.67	54.04	-0.03	Asphalt
L242	780231.80	3393988.52	54.16	780231.80	3393988.52	54.17	0.01	Asphalt
L243	780232.49	3393971.31	54.30	780232.49	3393971.31	54.26	-0.04	Asphalt
L244	780233.20	3393954.07	54.44	780233.20	3393954.07	54.41	-0.03	Asphalt
L245	780233.84	3393936.85	54.60	780233.84	3393936.85	54.52	-0.08	Asphalt
L246	780234.48	3393919.62	54.71	780234.48	3393919.62	54.67	-0.04	Asphalt
L247	780235.17	3393902.40	54.86	780235.17	3393902.40	54.76	-0.10	Asphalt
L248	780235.89	3393885.20	54.94	780235.89	3393885.20	54.84	-0.10	Asphalt
L249	780236.55	3393868.00	54.96	780236.55	3393868.00	54.83	-0.14	Asphalt
L250	780237.17	3393850.86	55.02	780237.17	3393850.86	54.96	-0.06	Asphalt
L251	780237.81	3393833.86	55.04	780237.81	3393833.86	54.93	-0.11	Asphalt
L252	780238.48	3393817.08	55.08	780238.48	3393817.08	55.01	-0.07	Asphalt
L253	780239.04	3393800.51	55.11	780239.04	3393800.51	55.01	-0.10	Asphalt
L254	780240.27	3393768.12	55.20	780240.27	3393768.12	55.07	-0.13	Asphalt
L255	780240.86	3393752.32	55.28	780240.86	3393752.32	55.19	-0.08	Asphalt
L256	780241.47	3393736.82	55.40	780241.47	3393736.82	55.26	-0.14	Asphalt
M83	783483.79	3382135.14	23.71	783483.79	3382135.14	23.64	-0.07	Asphalt
M84	783483.93	3382128.83	23.64	783483.93	3382128.83	23.53	-0.11	Asphalt
M85	783483.89	3382121.40	23.63	783483.89	3382121.40	23.54	-0.09	Asphalt
M86	783483.95	3382114.44	23.60	783483.95	3382114.44	23.50	-0.10	Asphalt
M87	783484.04	3382108.05	23.58	783484.04	3382108.05	23.49	-0.09	Asphalt
M88	783484.08	3382101.86	23.55	783484.08	3382101.86	23.45	-0.10	Asphalt
M89	783484.00	3382095.31	23.56	783484.00	3382095.31	23.43	-0.12	Asphalt
M90	783484.10	3382088.51	23.51	783484.10	3382088.51	23.40	-0.11	Asphalt
M91	783484.13	3382081.11	23.52	783484.13	3382081.11	23.43	-0.09	Asphalt
M92	783484.29	3382074.18	23.42	783484.29	3382074.18	23.33	-0.10	Asphalt
M93	783489.21	3382073.89	23.38	783489.21	3382073.89	23.25	-0.13	Asphalt
M94	783489.23	3382080.80	23.43	783489.23	3382080.80	23.35	-0.08	Asphalt
M95	783489.16	3382087.66	23.47	783489.16	3382087.66	23.36	-0.11	Asphalt
M96	783489.01	3382093.87	23.54	783489.01	3382093.87	23.42	-0.12	Asphalt
M97	783489.01	3382100.66	23.55	783489.01	3382100.66	23.47	-0.08	Asphalt

M98	783488.97	3382108.08	23.55	783488.97	3382108.08	23.50	-0.05	Asphalt
M99	783488.94	3382115.07	23.60	783488.94	3382115.07	23.54	-0.05	Asphalt
M100	783488.76	3382121.84	23.61	783488.76	3382121.84	23.63	0.02	Asphalt
M101	783488.65	3382129.22	23.69	783488.65	3382129.22	23.67	-0.02	Asphalt
M102	783488.64	3382136.36	23.72	783488.64	3382136.36	23.59	-0.13	Asphalt
G37	795390.71	3371189.41	13.64	795390.71	3371189.41	13.23	-0.42	Asphalt
G38	795389.67	3371189.60	13.65	795389.67	3371189.60	13.22	-0.43	Asphalt
G39	795388.63	3371189.82	13.65	795388.63	3371189.82	13.21	-0.44	Asphalt
G40	795386.52	3371190.30	13.65	795386.52	3371190.30	13.19	-0.46	Asphalt
G41	795383.25	3371191.09	13.66	795383.25	3371191.09	13.29	-0.37	Asphalt
G42	795378.98	3371192.13	13.65	795378.98	3371192.13	13.22	-0.43	Asphalt
G43	795373.87	3371193.43	13.65	795373.87	3371193.43	13.23	-0.42	Asphalt
G44	795367.99	3371194.90	13.66	795367.99	3371194.90	13.20	-0.46	Asphalt
G45	795361.45	3371196.58	13.67	795361.45	3371196.58	13.30	-0.37	Asphalt
G46	795354.24	3371198.41	13.72	795354.24	3371198.41	13.26	-0.46	Asphalt
G47	795346.27	3371200.43	13.71	795346.27	3371200.43	13.28	-0.43	Asphalt
G48	795337.60	3371202.65	13.70	795337.60	3371202.65	13.28	-0.42	Asphalt
G49	795328.29	3371205.01	13.67	795328.29	3371205.01	13.24	-0.43	Asphalt
G50	795318.40	3371207.59	13.65	795318.40	3371207.59	13.21	-0.44	Asphalt
G51	795307.94	3371210.26	13.63	795307.94	3371210.26	13.26	-0.37	Asphalt
G52	795296.99	3371213.02	13.60	795296.99	3371213.02	13.19	-0.41	Asphalt
G53	795285.55	3371215.87	13.57	795285.55	3371215.87	13.25	-0.32	Asphalt
G54	795273.67	3371218.86	13.54	795273.67	3371218.86	13.15	-0.39	Asphalt
G55	795261.37	3371222.00	13.52	795261.37	3371222.00	13.14	-0.39	Asphalt
G56	795248.70	3371225.27	13.51	795248.70	3371225.27	13.10	-0.42	Asphalt
G57	795235.62	3371228.60	13.49	795235.62	3371228.60	13.10	-0.39	Asphalt
G58	795222.22	3371231.97	13.47	795222.22	3371231.97	13.08	-0.40	Asphalt
G59	795151.51	3371249.81	13.41	795151.51	3371249.81	12.90	-0.51	Asphalt
G60	795136.88	3371253.53	13.39	795136.88	3371253.53	12.89	-0.50	Asphalt
G61	795122.11	3371257.31	13.37	795122.11	3371257.31	12.92	-0.45	Asphalt
G62	795107.17	3371261.15	13.37	795107.17	3371261.15	12.87	-0.50	Asphalt
G63	795092.07	3371264.93	13.33	795092.07	3371264.93	12.88	-0.45	Asphalt
G64	795076.85	3371268.72	13.31	795076.85	3371268.72	12.93	-0.38	Asphalt
G65	795061.51	3371272.67	13.30	795061.51	3371272.67	12.88	-0.42	Asphalt

G66	795046.06	3371276.72	13.33	795046.06	3371276.72	12.97	-0.36	Asphalt
G67	795030.45	3371280.75	13.35	795030.45	3371280.75	12.87	-0.49	Asphalt
G68	795014.70	3371284.80	13.32	795014.70	3371284.80	12.88	-0.44	Asphalt
G69	794998.82	3371288.85	13.35	794998.82	3371288.85	12.92	-0.43	Asphalt
G70	794982.85	3371292.91	13.38	794982.85	3371292.91	12.91	-0.47	Asphalt
G71	794966.77	3371297.01	13.36	794966.77	3371297.01	12.94	-0.42	Asphalt
G72	794752.71	3371351.33	13.40	794752.71	3371351.33	13.00	-0.40	Asphalt
G73	794782.13	3371340.60	13.41	794782.13	3371340.60	12.97	-0.44	Asphalt
G74	794792.61	3371337.93	13.40	794792.61	3371337.93	12.97	-0.43	Asphalt
G75	794803.76	3371335.08	13.39	794803.76	3371335.08	12.98	-0.41	Asphalt
G76	794815.54	3371332.06	13.38	794815.54	3371332.06	12.95	-0.43	Asphalt
G77	794840.58	3371325.63	13.41	794840.58	3371325.63	13.05	-0.36	Asphalt
G78	794956.97	3371295.98	13.35	794956.97	3371295.98	12.94	-0.42	Asphalt
G79	794989.20	3371287.82	13.36	794989.20	3371287.82	12.90	-0.47	Asphalt
G80	795064.82	3371268.69	13.30	795064.82	3371268.69	12.87	-0.43	Asphalt
G81	795076.61	3371265.69	13.31	795076.61	3371265.69	12.92	-0.38	Asphalt
G82	795087.96	3371262.75	13.33	795087.96	3371262.75	12.93	-0.40	Asphalt
G83	795098.17	3371260.10	13.35	795098.17	3371260.10	12.91	-0.44	Asphalt
G84	795107.57	3371257.74	13.36	795107.57	3371257.74	12.89	-0.47	Asphalt
G85	795116.61	3371255.46	13.37	795116.61	3371255.46	12.97	-0.40	Asphalt
G86	795125.55	3371253.19	13.38	795125.55	3371253.19	13.03	-0.35	Asphalt
G87	795134.70	3371250.89	13.39	795134.70	3371250.89	12.98	-0.40	Asphalt
G88	795144.12	3371248.53	13.39	795144.12	3371248.53	12.97	-0.43	Asphalt
G89	795163.79	3371243.51	13.42	795163.79	3371243.51	13.02	-0.40	Asphalt
G90	795174.08	3371240.87	13.44	795174.08	3371240.87	13.05	-0.39	Asphalt
G91	795184.69	3371238.18	13.43	795184.69	3371238.18	12.97	-0.45	Asphalt
G92	795195.63	3371235.39	13.41	795195.63	3371235.39	13.00	-0.41	Asphalt
G93	795206.89	3371232.50	13.44	795206.89	3371232.50	13.00	-0.43	Asphalt
G94	795218.44	3371229.57	13.48	795218.44	3371229.57	13.07	-0.41	Asphalt
G95	795230.23	3371226.59	13.49	795230.23	3371226.59	13.16	-0.33	Asphalt
G96	795266.87	3371217.38	13.54	795266.87	3371217.38	13.14	-0.40	Asphalt
G97	795279.47	3371214.21	13.58	795279.47	3371214.21	13.18	-0.40	Asphalt
G98	795292.27	3371210.99	13.64	795292.27	3371210.99	13.22	-0.42	Asphalt
G99	795305.23	3371207.63	13.62	795305.23	3371207.63	13.22	-0.40	Asphalt

G100	795318.38	3371204.20	13.65	795318.38	3371204.20	13.22	-0.44	Asphalt
G101	795331.73	3371200.73	13.69	795331.73	3371200.73	13.32	-0.37	Asphalt
G102	795345.21	3371197.29	13.70	795345.21	3371197.29	13.34	-0.36	Asphalt
G103	795358.72	3371193.84	13.68	795358.72	3371193.84	13.29	-0.39	Asphalt
G104	795372.24	3371190.34	13.65	795372.24	3371190.34	13.26	-0.39	Asphalt
G105	795385.77	3371186.85	13.64	795385.77	3371186.85	13.19	-0.46	Asphalt
G106	795399.31	3371183.37	13.59	795399.31	3371183.37	13.25	-0.33	Asphalt
G107	795412.91	3371179.89	13.57	795412.91	3371179.89	13.13	-0.43	Asphalt
G108	795426.59	3371176.43	13.58	795426.59	3371176.43	13.16	-0.42	Asphalt
G109	795440.35	3371172.98	13.57	795440.35	3371172.98	13.14	-0.42	Asphalt
G110	795468.04	3371165.88	13.51	795468.04	3371165.88	13.21	-0.29	Asphalt
G111	795482.05	3371162.26	13.47	795482.05	3371162.26	13.09	-0.38	Asphalt
G112	795496.17	3371158.67	13.51	795496.17	3371158.67	13.05	-0.45	Asphalt
G113	795552.93	3371144.16	13.45	795552.93	3371144.16	13.03	-0.43	Asphalt
G114	795567.08	3371140.52	13.44	795567.08	3371140.52	13.02	-0.42	Asphalt
G115	795581.27	3371136.90	13.44	795581.27	3371136.90	12.99	-0.45	Asphalt
G116	795595.54	3371133.28	13.41	795595.54	3371133.28	13.03	-0.39	Asphalt
G117	795609.84	3371129.66	13.38	795609.84	3371129.66	12.96	-0.42	Asphalt
G118	795623.99	3371126.05	13.40	795623.99	3371126.05	12.96	-0.44	Asphalt
G119	795637.89	3371122.46	13.44	795637.89	3371122.46	13.07	-0.37	Asphalt
G120	795651.59	3371119.02	13.49	795651.59	3371119.02	13.08	-0.41	Asphalt
G121	795665.20	3371115.61	13.48	795665.20	3371115.61	13.07	-0.41	Asphalt
G122	795679.06	3371112.16	13.49	795679.06	3371112.16	13.03	-0.47	Asphalt
G123	795824.19	3371075.10	13.38	795824.19	3371075.10	12.95	-0.42	Asphalt
G124	795836.57	3371071.94	13.38	795836.57	3371071.94	12.96	-0.42	Asphalt
G125	795848.02	3371068.97	13.39	795848.02	3371068.97	13.04	-0.35	Asphalt
G126	795858.67	3371066.22	13.43	795858.67	3371066.22	13.06	-0.37	Asphalt
G127	795868.75	3371063.61	13.44	795868.75	3371063.61	13.05	-0.39	Asphalt
G128	795878.35	3371061.17	13.42	795878.35	3371061.17	13.04	-0.38	Asphalt
G129	795887.73	3371058.80	13.41	795887.73	3371058.80	12.97	-0.45	Asphalt
G130	795897.01	3371056.45	13.38	795897.01	3371056.45	12.92	-0.46	Asphalt
G131	795906.30	3371054.10	13.36	795906.30	3371054.10	12.97	-0.39	Asphalt
G132	795915.75	3371051.70	13.37	795915.75	3371051.70	12.99	-0.38	Asphalt
G133	795925.48	3371049.25	13.40	795925.48	3371049.25	12.96	-0.44	Asphalt

G134	795935.44	3371046.69	13.41	795935.44	3371046.69	12.96	-0.45	Asphalt
G135	795945.65	3371044.07	13.42	795945.65	3371044.07	13.02	-0.40	Asphalt
G136	795956.10	3371041.43	13.43	795956.10	3371041.43	12.97	-0.46	Asphalt
G137	795977.26	3371036.02	13.42	795977.26	3371036.02	12.93	-0.49	Asphalt
G138	795987.72	3371033.30	13.42	795987.72	3371033.30	12.92	-0.49	Asphalt
G139	795998.06	3371030.62	13.41	795998.06	3371030.62	12.97	-0.44	Asphalt
G140	796008.34	3371027.98	13.42	796008.34	3371027.98	13.00	-0.41	Asphalt
G141	796029.05	3371022.76	13.46	796029.05	3371022.76	13.01	-0.46	Asphalt
G142	795961.06	3371044.65	13.40	795961.06	3371044.65	12.95	-0.45	Asphalt
G143	795958.23	3371044.91	13.42	795958.23	3371044.91	13.02	-0.40	Asphalt
G144	795954.56	3371045.55	13.45	795954.56	3371045.55	12.93	-0.52	Asphalt
G145	795950.22	3371046.55	13.42	795950.22	3371046.55	12.95	-0.48	Asphalt
G146	795945.30	3371047.77	13.42	795945.30	3371047.77	12.92	-0.50	Asphalt
G147	795939.83	3371049.17	13.42	795939.83	3371049.17	12.97	-0.45	Asphalt
G148	795933.82	3371050.71	13.40	795933.82	3371050.71	12.86	-0.54	Asphalt
G149	795927.29	3371052.38	13.39	795927.29	3371052.38	12.98	-0.42	Asphalt
G150	795912.53	3371056.17	13.36	795912.53	3371056.17	12.94	-0.43	Asphalt
G151	795904.45	3371058.19	13.35	795904.45	3371058.19	12.94	-0.41	Asphalt
G152	795895.93	3371060.35	13.38	795895.93	3371060.35	12.92	-0.46	Asphalt
G153	795886.99	3371062.59	13.41	795886.99	3371062.59	13.01	-0.40	Asphalt
G154	795877.64	3371064.94	13.46	795877.64	3371064.94	13.05	-0.42	Asphalt
G155	795867.90	3371067.42	13.48	795867.90	3371067.42	13.06	-0.42	Asphalt
G156	795857.82	3371070.04	13.46	795857.82	3371070.04	13.05	-0.41	Asphalt
G157	795847.41	3371072.73	13.43	795847.41	3371072.73	12.97	-0.46	Asphalt
G158	795825.68	3371078.23	13.42	795825.68	3371078.23	12.94	-0.47	Asphalt
G159	795814.39	3371081.12	13.44	795814.39	3371081.12	13.00	-0.44	Asphalt
G160	795802.83	3371084.03	13.45	795802.83	3371084.03	12.93	-0.52	Asphalt
G161	795791.04	3371087.01	13.45	795791.04	3371087.01	13.00	-0.45	Asphalt
G162	795779.01	3371090.04	13.43	795779.01	3371090.04	12.98	-0.45	Asphalt
G163	795766.72	3371093.20	13.41	795766.72	3371093.20	12.99	-0.42	Asphalt
G164	795741.37	3371099.61	13.44	795741.37	3371099.61	13.03	-0.41	Asphalt
G165	795715.31	3371106.34	13.44	795715.31	3371106.34	13.04	-0.40	Asphalt
G166	795651.22	3371123.24	13.46	795651.22	3371123.24	13.07	-0.39	Asphalt
G167	795647.84	3371123.59	13.46	795647.84	3371123.59	13.01	-0.45	Asphalt

G168	795643.94	3371124.43	13.46	795643.94	3371124.43	13.02	-0.44	Asphalt
G169	795639.49	3371125.53	13.46	795639.49	3371125.53	13.04	-0.42	Asphalt
G170	795634.49	3371126.83	13.43	795634.49	3371126.83	13.03	-0.41	Asphalt
G171	795628.92	3371128.29	13.40	795628.92	3371128.29	12.99	-0.42	Asphalt
G172	795622.81	3371129.87	13.39	795622.81	3371129.87	13.01	-0.38	Asphalt
G173	795616.20	3371131.59	13.38	795616.20	3371131.59	12.95	-0.43	Asphalt
G174	795608.99	3371133.44	13.37	795608.99	3371133.44	13.04	-0.33	Asphalt
G175	795601.29	3371135.39	13.40	795601.29	3371135.39	12.94	-0.46	Asphalt
G176	795593.12	3371137.46	13.41	795593.12	3371137.46	12.99	-0.42	Asphalt
G177	795584.47	3371139.64	13.42	795584.47	3371139.64	13.01	-0.41	Asphalt
G178	795575.38	3371141.91	13.45	795575.38	3371141.91	13.04	-0.42	Asphalt
G179	795565.88	3371144.36	13.44	795565.88	3371144.36	13.01	-0.43	Asphalt
G180	795556.04	3371146.90	13.46	795556.04	3371146.90	12.98	-0.48	Asphalt
G181	795545.85	3371149.45	13.48	795545.85	3371149.45	13.02	-0.46	Asphalt
D65	805356.09	3360921.80	7.48	805356.09	3360921.80	7.39	-0.09	Asphalt
D66	805357.62	3360926.07	7.47	805357.62	3360926.07	7.11	-0.36	Asphalt
D67	805359.26	3360930.60	7.47	805359.26	3360930.60	7.07	-0.39	Asphalt
D68	805360.96	3360935.37	7.46	805360.96	3360935.37	6.80	-0.66	Asphalt
D69	805362.78	3360940.48	7.45	805362.78	3360940.48	6.84	-0.61	Asphalt
D70	805364.72	3360945.97	7.45	805364.72	3360945.97	6.81	-0.64	Asphalt
D71	805366.82	3360951.82	7.42	805366.82	3360951.82	7.00	-0.42	Asphalt
D72	805368.99	3360958.00	7.40	805368.99	3360958.00	7.07	-0.33	Asphalt
D73	805371.19	3360964.17	7.41	805371.19	3360964.17	6.68	-0.73	Asphalt
D74	805373.37	3360970.25	7.44	805373.37	3360970.25	6.69	-0.75	Asphalt
D75	805375.50	3360976.25	7.40	805375.50	3360976.25	7.02	-0.38	Asphalt
D76	805377.58	3360982.18	7.35	805377.58	3360982.18	7.12	-0.23	Asphalt
D77	805381.52	3360993.70	7.35	805381.52	3360993.70	7.22	-0.13	Asphalt
D78	805383.50	3360999.29	7.37	805383.50	3360999.29	7.01	-0.36	Asphalt
D79	805385.47	3361004.76	7.36	805385.47	3361004.76	6.92	-0.44	Asphalt
D80	805387.36	3361009.95	7.37	805387.36	3361009.95	7.03	-0.34	Asphalt
D81	805390.75	3361019.56	7.40	805390.75	3361019.56	7.28	-0.12	Asphalt
D82	805394.80	3361038.03	7.43	805394.80	3361038.03	7.34	-0.09	Asphalt
D83	805391.93	3361029.29	7.40	805391.93	3361029.29	6.96	-0.45	Asphalt
D84	805387.89	3361018.43	7.41	805387.89	3361018.43	7.12	-0.29	Asphalt

D85	805385.66	3361012.41	7.39	805385.66	3361012.41	7.04	-0.34	Asphalt
D86	805383.33	3361006.00	7.35	805383.33	3361006.00	6.83	-0.52	Asphalt
D87	805380.90	3360999.27	7.37	805380.90	3360999.27	6.97	-0.40	Asphalt
D88	805378.38	3360992.28	7.33	805378.38	3360992.28	7.28	-0.05	Asphalt
D89	805375.77	3360985.05	7.38	805375.77	3360985.05	7.27	-0.11	Asphalt
D90	805373.10	3360977.60	7.38	805373.10	3360977.60	7.05	-0.33	Asphalt
D91	805370.29	3360969.96	7.43	805370.29	3360969.96	6.71	-0.72	Asphalt
D92	805367.48	3360962.15	7.43	805367.48	3360962.15	6.96	-0.47	Asphalt
D93	805364.60	3360954.28	7.48	805364.60	3360954.28	7.18	-0.30	Asphalt
D94	805361.77	3360946.49	7.51	805361.77	3360946.49	6.78	-0.73	Asphalt
D95	805359.01	3360938.77	7.53	805359.01	3360938.77	6.81	-0.73	Asphalt
D96	805353.53	3360923.45	7.50	805353.53	3360923.45	7.36	-0.14	Asphalt
D97	805350.74	3360915.63	7.49	805350.74	3360915.63	7.38	-0.11	Asphalt
D98	805344.99	3360899.48	7.46	805344.99	3360899.48	6.91	-0.55	Asphalt
D99	805342.01	3360891.12	7.44	805342.01	3360891.12	7.17	-0.28	Asphalt
D100	805338.90	3360882.60	7.40	805338.90	3360882.60	7.26	-0.14	Asphalt
D101	805335.75	3360873.89	7.39	805335.75	3360873.89	6.83	-0.56	Asphalt
D102	805332.58	3360864.99	7.35	805332.58	3360864.99	6.88	-0.47	Asphalt
D103	805329.37	3360855.95	7.34	805329.37	3360855.95	6.97	-0.37	Asphalt
D104	805326.16	3360846.92	7.29	805326.16	3360846.92	6.92	-0.38	Asphalt
D105	805322.96	3360837.97	7.29	805322.96	3360837.97	6.67	-0.62	Asphalt
D106	805319.75	3360829.14	7.29	805319.75	3360829.14	6.81	-0.47	Asphalt
D107	805316.62	3360820.38	7.24	805316.62	3360820.38	7.14	-0.10	Asphalt
D108	805313.47	3360811.55	7.26	805313.47	3360811.55	7.17	-0.09	Asphalt
D109	805310.33	3360802.57	7.23	805310.33	3360802.57	7.17	-0.06	Asphalt
D110	805307.15	3360793.59	7.26	805307.15	3360793.59	6.73	-0.53	Asphalt
D111	805282.18	3360716.32	7.19	805282.18	3360716.32	6.65	-0.54	Asphalt
D112	805282.27	3360716.56	7.17	805282.27	3360716.56	6.65	-0.52	Asphalt
D113	805283.73	3360720.35	7.19	805283.73	3360720.35	6.66	-0.54	Asphalt
D114	805285.05	3360723.79	7.20	805285.05	3360723.79	6.68	-0.52	Asphalt
D115	805290.41	3360738.78	7.19	805290.41	3360738.78	6.66	-0.53	Asphalt
D116	805292.67	3360745.09	7.21	805292.67	3360745.09	7.08	-0.14	Asphalt
D117	805295.14	3360751.90	7.22	805295.14	3360751.90	7.05	-0.16	Asphalt
D118	805297.94	3360759.34	7.22	805297.94	3360759.34	7.10	-0.11	Asphalt

D119	805300.89	3360767.35	7.27	805300.89	3360767.35	7.12	-0.15	Asphalt
D120	805351.89	3360909.20	7.46	805351.89	3360909.20	7.27	-0.19	Asphalt
D121	805350.03	3360904.42	7.42	805350.03	3360904.42	6.76	-0.67	Asphalt
D122	805345.47	3360892.27	7.43	805345.47	3360892.27	6.70	-0.73	Asphalt
D123	805342.83	3360885.21	7.42	805342.83	3360885.21	7.32	-0.10	Asphalt
D124	805340.02	3360877.55	7.40	805340.02	3360877.55	7.23	-0.17	Asphalt
D125	805337.07	3360869.47	7.38	805337.07	3360869.47	6.77	-0.62	Asphalt
D126	805330.96	3360852.75	7.31	805330.96	3360852.75	7.01	-0.30	Asphalt
D127	805327.86	3360844.12	7.29	805327.86	3360844.12	6.77	-0.52	Asphalt
D128	805324.76	3360835.38	7.28	805324.76	3360835.38	6.75	-0.53	Asphalt
D129	805321.71	3360826.72	7.27	805321.71	3360826.72	7.02	-0.25	Asphalt
D130	805318.67	3360818.19	7.24	805318.67	3360818.19	7.15	-0.10	Asphalt
C27	819772.84	3348734.56	2.56	819772.84	3348734.56	2.35	-0.21	Asphalt
C28	819776.29	3348737.55	2.59	819776.29	3348737.55	2.34	-0.26	Asphalt
C29	819780.32	3348740.84	2.59	819780.32	3348740.84	2.27	-0.32	Asphalt
C30	819784.68	3348744.45	2.59	819784.68	3348744.45	2.30	-0.29	Asphalt
C31	819789.38	3348748.43	2.59	819789.38	3348748.43	2.29	-0.30	Asphalt
C32	819794.60	3348752.61	2.58	819794.60	3348752.61	2.32	-0.26	Asphalt
C33	819800.21	3348756.95	2.58	819800.21	3348756.95	2.40	-0.19	Asphalt
C34	819806.17	3348761.61	2.56	819806.17	3348761.61	2.35	-0.21	Asphalt
C35	819812.66	3348766.67	2.55	819812.66	3348766.67	2.39	-0.16	Asphalt
C36	819819.69	3348772.18	2.51	819819.69	3348772.18	2.29	-0.23	Asphalt
C37	819827.34	3348777.97	2.48	819827.34	3348777.97	2.18	-0.30	Asphalt
C38	819835.57	3348784.04	2.46	819835.57	3348784.04	2.25	-0.21	Asphalt
C39	819844.14	3348790.31	2.46	819844.14	3348790.31	2.25	-0.21	Asphalt
C40	819862.34	3348803.13	2.41	819862.34	3348803.13	2.20	-0.21	Asphalt
C41	819871.91	3348809.72	2.37	819871.91	3348809.72	2.12	-0.25	Asphalt
C42	819881.79	3348816.42	2.36	819881.79	3348816.42	2.17	-0.20	Asphalt
C43	819891.93	3348823.24	2.39	819891.93	3348823.24	2.13	-0.26	Asphalt
C44	819912.95	3348837.02	2.51	819912.95	3348837.02	2.33	-0.18	Asphalt
C45	819923.84	3348843.96	2.56	819923.84	3348843.96	2.34	-0.23	Asphalt
C46	819935.02	3348850.85	2.58	819935.02	3348850.85	2.37	-0.21	Asphalt
C47	819946.43	3348857.74	2.58	819946.43	3348857.74	2.40	-0.18	Asphalt
C48	819958.02	3348864.71	2.60	819958.02	3348864.71	2.43	-0.17	Asphalt

C49	819969.85	3348871.66	2.61	819969.85	3348871.66	2.45	-0.16	Asphalt
C50	819981.95	3348878.51	2.62	819981.95	3348878.51	2.36	-0.26	Asphalt
C51	819994.21	3348885.42	2.63	819994.21	3348885.42	2.47	-0.16	Asphalt
C52	820006.73	3348892.26	2.68	820006.73	3348892.26	2.47	-0.21	Asphalt
C53	820019.47	3348899.11	2.72	820019.47	3348899.11	2.49	-0.24	Asphalt
C54	820032.41	3348905.99	2.76	820032.41	3348905.99	2.61	-0.15	Asphalt
C55	820045.57	3348912.79	2.79	820045.57	3348912.79	2.59	-0.21	Asphalt
C56	820058.95	3348919.50	2.80	820058.95	3348919.50	2.59	-0.21	Asphalt
C57	820072.54	3348926.20	2.77	820072.54	3348926.20	2.58	-0.20	Asphalt
C58	820086.36	3348932.89	2.77	820086.36	3348932.89	2.54	-0.22	Asphalt
C59	820100.42	3348939.52	2.78	820100.42	3348939.52	2.56	-0.22	Asphalt
C60	820114.68	3348946.06	2.75	820114.68	3348946.06	2.52	-0.23	Asphalt
C61	820129.16	3348952.53	2.70	820129.16	3348952.53	2.51	-0.20	Asphalt
C62	820143.79	3348959.04	2.63	820143.79	3348959.04	2.43	-0.20	Asphalt
C63	820158.64	3348965.52	2.56	820158.64	3348965.52	2.27	-0.29	Asphalt
C64	820173.69	3348971.91	2.53	820173.69	3348971.91	2.35	-0.18	Asphalt
C65	820188.91	3348978.19	2.53	820188.91	3348978.19	2.32	-0.20	Asphalt
C66	820204.24	3348984.40	2.58	820204.24	3348984.40	2.31	-0.27	Asphalt
C67	820219.70	3348990.46	2.66	820219.70	3348990.46	2.45	-0.21	Asphalt
C68	820235.29	3348996.31	2.71	820235.29	3348996.31	2.40	-0.31	Asphalt
C69	820251.01	3349002.03	2.73	820251.01	3349002.03	2.47	-0.26	Asphalt
C70	820266.81	3349007.63	2.73	820266.81	3349007.63	2.58	-0.15	Asphalt
C71	820282.63	3349013.09	2.80	820282.63	3349013.09	2.51	-0.29	Asphalt
C72	820298.31	3349018.34	2.88	820298.31	3349018.34	2.69	-0.19	Asphalt
C73	820313.80	3349023.31	2.93	820313.80	3349023.31	2.71	-0.22	Asphalt
C74	820328.86	3349027.93	2.97	820328.86	3349027.93	2.72	-0.25	Asphalt
C75	820381.01	3349046.56	3.15	820381.01	3349046.56	2.95	-0.19	Asphalt
C76	820379.22	3349046.29	3.14	820379.22	3349046.29	2.95	-0.19	Asphalt
C77	820375.73	3349045.51	3.14	820375.73	3349045.51	2.89	-0.25	Asphalt
C78	820370.88	3349044.30	3.13	820370.88	3349044.30	2.87	-0.26	Asphalt
C79	820365.05	3349042.74	3.12	820365.05	3349042.74	2.84	-0.28	Asphalt
C80	820358.32	3349040.81	3.10	820358.32	3349040.81	2.89	-0.22	Asphalt
C81	820350.71	3349038.55	3.09	820350.71	3349038.55	2.87	-0.22	Asphalt
C82	820342.25	3349036.00	3.06	820342.25	3349036.00	2.86	-0.21	Asphalt

C83	820322.84	3349030.02	2.97	820322.84	3349030.02	2.67	-0.29	Asphalt
C84	820312.20	3349026.66	2.94	820312.20	3349026.66	2.71	-0.23	Asphalt
C85	820301.04	3349023.04	2.92	820301.04	3349023.04	2.70	-0.22	Asphalt
C86	820289.37	3349019.21	2.86	820289.37	3349019.21	2.61	-0.26	Asphalt
C87	820264.88	3349010.88	2.74	820264.88	3349010.88	2.58	-0.16	Asphalt
C88	820252.06	3349006.39	2.72	820252.06	3349006.39	2.43	-0.29	Asphalt
C89	820238.99	3349001.68	2.74	820238.99	3349001.68	2.42	-0.32	Asphalt
C90	820225.64	3348996.76	2.71	820225.64	3348996.76	2.50	-0.21	Asphalt
C91	820211.99	3348991.58	2.66	820211.99	3348991.58	2.39	-0.27	Asphalt
C92	820198.06	3348986.14	2.59	820198.06	3348986.14	2.29	-0.30	Asphalt
C93	820183.89	3348980.45	2.55	820183.89	3348980.45	2.36	-0.19	Asphalt
C94	820169.62	3348974.49	2.56	820169.62	3348974.49	2.30	-0.26	Asphalt
C95	820155.23	3348968.34	2.61	820155.23	3348968.34	2.40	-0.20	Asphalt
C96	820140.81	3348962.06	2.66	820140.81	3348962.06	2.41	-0.26	Asphalt
C97	820126.40	3348955.56	2.72	820126.40	3348955.56	2.49	-0.24	Asphalt
C98	820111.96	3348948.92	2.78	820111.96	3348948.92	2.53	-0.24	Asphalt
C99	820097.51	3348942.19	2.80	820097.51	3348942.19	2.55	-0.25	Asphalt
C100	820083.03	3348935.37	2.79	820083.03	3348935.37	2.57	-0.22	Asphalt
C101	820068.49	3348928.48	2.82	820068.49	3348928.48	2.59	-0.22	Asphalt
C102	820053.98	3348921.42	2.83	820053.98	3348921.42	2.59	-0.24	Asphalt
C103	820039.46	3348914.14	2.82	820039.46	3348914.14	2.61	-0.21	Asphalt
C104	820025.00	3348906.52	2.76	820025.00	3348906.52	2.54	-0.22	Asphalt
C105	820010.53	3348898.68	2.73	820010.53	3348898.68	2.48	-0.25	Asphalt
C106	819996.02	3348890.72	2.67	819996.02	3348890.72	2.51	-0.16	Asphalt
C107	819981.49	3348882.60	2.65	819981.49	3348882.60	2.40	-0.25	Asphalt
C108	819967.01	3348874.24	2.64	819967.01	3348874.24	2.43	-0.21	Asphalt
C109	819952.48	3348865.83	2.62	819952.48	3348865.83	2.46	-0.16	Asphalt
C110	819938.01	3348857.25	2.62	819938.01	3348857.25	2.34	-0.27	Asphalt
C111	819923.66	3348848.39	2.59	819923.66	3348848.39	2.38	-0.20	Asphalt
C112	819909.36	3348839.34	2.52	819909.36	3348839.34	2.32	-0.20	Asphalt
C113	819895.15	3348830.08	2.44	819895.15	3348830.08	2.20	-0.24	Asphalt
C114	819881.03	3348820.61	2.38	819881.03	3348820.61	2.19	-0.19	Asphalt
C115	819867.02	3348811.06	2.41	819867.02	3348811.06	2.16	-0.25	Asphalt
C116	819853.19	3348801.41	2.46	819853.19	3348801.41	2.21	-0.25	Asphalt

C117	819839.62	3348791.56	2.49	819839.62	3348791.56	2.21	-0.28	Asphalt
C118	819826.27	3348781.49	2.50	819826.27	3348781.49	2.20	-0.30	Asphalt
C119	819813.00	3348771.27	2.55	819813.00	3348771.27	2.38	-0.17	Asphalt
C120	819799.76	3348760.95	2.58	819799.76	3348760.95	2.45	-0.13	Asphalt
C121	819773.43	3348740.00	2.60	819773.43	3348740.00	2.31	-0.29	Asphalt
C122	819760.33	3348729.34	2.57	819760.33	3348729.34	2.37	-0.20	Asphalt
C123	819747.33	3348718.50	2.55	819747.33	3348718.50	2.33	-0.23	Asphalt
C124	819734.36	3348707.53	2.52	819734.36	3348707.53	2.34	-0.18	Asphalt
C125	819708.15	3348685.51	2.40	819708.15	3348685.51	2.18	-0.22	Asphalt
C196	819677.98	3348654.68	2.24	819677.98	3348654.68	2.09	-0.15	Asphalt
C197	819688.08	3348663.74	2.27	819688.08	3348663.74	2.10	-0.17	Asphalt
C198	819697.24	3348671.70	2.27	819697.24	3348671.70	2.08	-0.18	Asphalt
C199	819715.10	3348686.97	2.40	819715.10	3348686.97	2.14	-0.27	Asphalt
C200	819724.32	3348694.69	2.44	819724.32	3348694.69	2.28	-0.16	Asphalt
C201	819733.57	3348702.35	2.48	819733.57	3348702.35	2.31	-0.17	Asphalt
C202	819742.67	3348709.83	2.51	819742.67	3348709.83	2.30	-0.21	Asphalt
B1	802527.41	3331335.99	1.16	802527.41	3331335.99	0.84	-0.32	Asphalt
B2	802526.70	3331331.81	1.16	802526.70	3331331.81	0.77	-0.39	Asphalt
B3	802525.96	3331327.53	1.18	802525.96	3331327.53	0.82	-0.36	Asphalt
B4	802525.21	3331323.31	1.16	802525.21	3331323.31	0.78	-0.39	Asphalt
B5	802524.49	3331319.18	1.19	802524.49	3331319.18	0.81	-0.38	Asphalt
B6	802523.81	3331315.09	1.17	802523.81	3331315.09	0.85	-0.32	Asphalt
B7	802523.13	3331311.07	1.15	802523.13	3331311.07	0.86	-0.29	Asphalt
B8	802522.45	3331307.03	1.15	802522.45	3331307.03	0.80	-0.36	Asphalt
B9	802521.71	3331302.66	1.13	802521.71	3331302.66	0.81	-0.32	Asphalt
B10	802520.94	3331297.93	1.13	802520.94	3331297.93	0.78	-0.35	Asphalt
B11	802520.10	3331292.88	1.11	802520.10	3331292.88	0.80	-0.31	Asphalt
B12	802519.19	3331287.55	1.10	802519.19	3331287.55	0.67	-0.42	Asphalt
B13	802518.18	3331281.78	1.08	802518.18	3331281.78	0.67	-0.41	Asphalt
B14	802517.10	3331275.67	1.09	802517.10	3331275.67	0.74	-0.35	Asphalt
B15	802515.97	3331269.43	1.08	802515.97	3331269.43	0.71	-0.37	Asphalt
B16	802514.94	3331263.14	1.08	802514.94	3331263.14	0.71	-0.37	Asphalt
B17	802513.94	3331256.82	1.10	802513.94	3331256.82	0.69	-0.41	Asphalt
B18	802511.78	3331243.69	1.06	802511.78	3331243.69	0.70	-0.36	Asphalt

B19	802510.67	3331236.82	1.07	802510.67	3331236.82	0.68	-0.39	Asphalt
B20	802509.54	3331229.96	1.08	802509.54	3331229.96	0.69	-0.40	Asphalt
B21	802508.38	3331223.28	1.07	802508.38	3331223.28	0.82	-0.24	Asphalt
B22	802507.27	3331217.08	1.02	802507.27	3331217.08	0.66	-0.36	Asphalt
B23	802506.31	3331211.81	1.00	802506.31	3331211.81	0.61	-0.39	Asphalt
B24	802505.52	3331207.46	0.99	802505.52	3331207.46	0.56	-0.43	Asphalt
B25	802504.74	3331203.52	0.97	802504.74	3331203.52	0.52	-0.45	Asphalt
B26	802503.63	3331198.83	0.97	802503.63	3331198.83	0.62	-0.35	Asphalt
B27	802499.93	3331187.25	0.91	802499.93	3331187.25	0.56	-0.34	Asphalt
B28	802497.16	3331180.20	0.95	802497.16	3331180.20	0.63	-0.32	Asphalt
B29	802493.54	3331172.69	1.02	802493.54	3331172.69	0.66	-0.37	Asphalt
B30	802488.98	3331165.10	1.03	802488.98	3331165.10	0.79	-0.25	Asphalt
B31	802483.65	3331157.54	1.05	802483.65	3331157.54	0.73	-0.31	Asphalt
B32	802477.78	3331149.85	1.05	802477.78	3331149.85	0.74	-0.30	Asphalt
B33	802471.66	3331141.85	1.04	802471.66	3331141.85	0.70	-0.35	Asphalt
B34	802459.03	3331125.07	1.04	802459.03	3331125.07	0.75	-0.29	Asphalt
B35	802452.60	3331116.14	1.04	802452.60	3331116.14	0.66	-0.37	Asphalt
B36	802446.13	3331106.89	1.04	802446.13	3331106.89	0.75	-0.29	Asphalt
B37	802439.62	3331097.32	1.03	802439.62	3331097.32	0.73	-0.31	Asphalt
B38	802433.11	3331087.37	1.02	802433.11	3331087.37	0.74	-0.28	Asphalt
B39	802426.69	3331077.13	0.99	802426.69	3331077.13	0.68	-0.31	Asphalt
B40	802420.44	3331066.53	1.00	802420.44	3331066.53	0.65	-0.35	Asphalt
B41	802414.31	3331055.62	1.03	802414.31	3331055.62	0.72	-0.30	Asphalt
B42	802408.29	3331044.43	1.06	802408.29	3331044.43	0.79	-0.27	Asphalt
B43	802402.24	3331033.00	1.06	802402.24	3331033.00	0.76	-0.30	Asphalt
B44	802396.26	3331021.30	1.07	802396.26	3331021.30	0.81	-0.26	Asphalt
B45	802390.34	3331009.33	1.08	802390.34	3331009.33	0.79	-0.29	Asphalt
B46	802384.49	3330997.10	1.09	802384.49	3330997.10	0.74	-0.35	Asphalt
B47	802378.79	3330984.58	1.11	802378.79	3330984.58	0.81	-0.30	Asphalt
B48	802373.30	3330971.78	1.11	802373.30	3330971.78	0.83	-0.28	Asphalt
B49	802368.01	3330958.67	1.11	802368.01	3330958.67	0.76	-0.35	Asphalt
B50	802362.84	3330945.31	1.10	802362.84	3330945.31	0.78	-0.33	Asphalt
B51	802357.80	3330931.71	1.10	802357.80	3330931.71	0.77	-0.33	Asphalt
B52	802352.98	3330917.90	1.09	802352.98	3330917.90	0.80	-0.29	Asphalt

B53	802348.46	3330903.87	1.11	802348.46	3330903.87	0.82	-0.29	Asphalt
B54	802344.23	3330889.63	1.10	802344.23	3330889.63	0.78	-0.32	Asphalt
B55	802340.23	3330875.21	1.09	802340.23	3330875.21	0.78	-0.31	Asphalt
B56	802336.38	3330860.66	1.10	802336.38	3330860.66	0.85	-0.25	Asphalt
B57	802326.53	3330816.63	1.04	802326.53	3330816.63	0.71	-0.33	Asphalt
B58	802323.83	3330802.01	1.06	802323.83	3330802.01	0.78	-0.28	Asphalt
B59	802321.46	3330787.63	1.04	802321.46	3330787.63	0.62	-0.42	Asphalt
B60	802319.48	3330773.33	1.04	802319.48	3330773.33	0.78	-0.26	Asphalt
B61	802317.85	3330759.06	1.04	802317.85	3330759.06	0.71	-0.33	Asphalt
B62	802316.43	3330744.86	1.07	802316.43	3330744.86	0.68	-0.40	Asphalt
B63	802313.60	3330702.86	1.06	802313.60	3330702.86	0.81	-0.25	Asphalt
B64	802312.95	3330689.06	1.05	802312.95	3330689.06	0.70	-0.36	Asphalt
B65	802312.35	3330675.34	1.04	802312.35	3330675.34	0.76	-0.28	Asphalt
B66	802311.65	3330661.48	1.06	802311.65	3330661.48	0.79	-0.27	Asphalt
B67	802309.47	3330618.88	0.93	802309.47	3330618.88	0.77	-0.16	Asphalt
B68	802310.37	3330539.33	1.23	802310.37	3330539.33	0.74	-0.50	Asphalt
B69	802309.96	3330548.86	1.24	802309.96	3330548.86	0.84	-0.40	Asphalt
B70	802310.68	3330570.27	1.25	802310.68	3330570.27	0.82	-0.43	Asphalt
B71	802311.27	3330582.08	1.28	802311.27	3330582.08	0.81	-0.47	Asphalt
B72	802312.40	3330607.53	1.25	802312.40	3330607.53	0.80	-0.45	Asphalt
B73	802313.03	3330621.03	1.25	802313.03	3330621.03	0.79	-0.46	Asphalt
B74	802314.38	3330649.45	1.22	802314.38	3330649.45	0.79	-0.43	Asphalt
B75	802315.89	3330679.41	1.26	802315.89	3330679.41	0.79	-0.47	Asphalt
B76	802316.70	3330694.87	1.25	802316.70	3330694.87	0.73	-0.52	Asphalt
B77	802318.65	3330726.76	1.23	802318.65	3330726.76	0.72	-0.51	Asphalt
B78	802321.52	3330759.74	1.21	802321.52	3330759.74	0.71	-0.49	Asphalt
B79	802326.12	3330793.44	1.19	802326.12	3330793.44	0.67	-0.52	Asphalt
B80	802329.16	3330810.52	1.20	802329.16	3330810.52	0.67	-0.53	Asphalt
B81	802332.58	3330827.62	1.20	802332.58	3330827.62	0.81	-0.39	Asphalt
B82	802339.76	3330859.31	1.22	802339.76	3330859.31	0.68	-0.54	Asphalt
B83	802348.04	3330889.53	1.10	802348.04	3330889.53	0.82	-0.28	Asphalt
B84	802352.72	3330904.78	1.14	802352.72	3330904.78	0.86	-0.28	Asphalt
B85	802363.15	3330935.54	1.11	802363.15	3330935.54	0.82	-0.29	Asphalt
B86	802368.84	3330950.94	1.11	802368.84	3330950.94	0.74	-0.37	Asphalt

B87	802374.94	3330966.33	1.11	802374.94	3330966.33	0.88	-0.23	Asphalt
B88	802381.48	3330981.69	1.11	802381.48	3330981.69	0.79	-0.32	Asphalt
B89	802388.44	3330997.04	1.10	802388.44	3330997.04	0.78	-0.32	Asphalt
B90	802395.83	3331012.31	1.07	802395.83	3331012.31	0.73	-0.34	Asphalt
B91	802403.62	3331027.39	1.05	802403.62	3331027.39	0.70	-0.35	Asphalt
B92	802411.80	3331042.24	1.04	802411.80	3331042.24	0.67	-0.37	Asphalt
B93	802420.44	3331056.84	1.01	802420.44	3331056.84	0.68	-0.33	Asphalt
B94	802429.55	3331071.11	1.00	802429.55	3331071.11	0.67	-0.33	Asphalt
B95	802439.15	3331085.05	0.99	802439.15	3331085.05	0.72	-0.28	Asphalt
B96	802449.13	3331098.67	1.02	802449.13	3331098.67	0.63	-0.40	Asphalt
B97	802459.31	3331112.14	1.01	802459.31	3331112.14	0.67	-0.34	Asphalt
B98	802469.54	3331125.55	0.98	802469.54	3331125.55	0.65	-0.33	Asphalt
B99	802479.92	3331138.87	0.98	802479.92	3331138.87	0.63	-0.34	Asphalt
B100	802490.40	3331152.11	0.97	802490.40	3331152.11	0.65	-0.32	Asphalt
B101	802501.01	3331165.28	1.00	802501.01	3331165.28	0.61	-0.38	Asphalt
B102	802511.75	3331178.33	1.00	802511.75	3331178.33	0.66	-0.34	Asphalt
B103	802522.62	3331191.28	1.00	802522.62	3331191.28	0.64	-0.36	Asphalt
B104	802533.72	3331204.06	1.02	802533.72	3331204.06	0.66	-0.36	Asphalt
B105	802545.07	3331216.61	1.05	802545.07	3331216.61	0.71	-0.34	Asphalt
B106	802556.63	3331229.00	1.04	802556.63	3331229.00	0.67	-0.37	Asphalt
B107	802568.41	3331241.25	1.03	802568.41	3331241.25	0.65	-0.38	Asphalt
B108	802580.52	3331253.23	1.02	802580.52	3331253.23	0.66	-0.36	Asphalt
B109	802593.19	3331264.72	1.02	802593.19	3331264.72	0.70	-0.33	Asphalt
B110	802606.51	3331275.69	1.02	802606.51	3331275.69	0.62	-0.40	Asphalt
B111	802620.32	3331286.27	1.01	802620.32	3331286.27	0.71	-0.30	Asphalt
B112	802634.52	3331296.58	1.03	802634.52	3331296.58	0.63	-0.40	Asphalt
B113	802648.97	3331306.63	0.98	802648.97	3331306.63	0.58	-0.39	Asphalt
B114	802663.60	3331316.47	0.95	802663.60	3331316.47	0.59	-0.37	Asphalt
B115	802678.38	3331326.08	0.96	802678.38	3331326.08	0.63	-0.33	Asphalt
B116	802693.38	3331335.40	0.96	802693.38	3331335.40	0.63	-0.33	Asphalt
B117	802708.61	3331344.39	0.95	802708.61	3331344.39	0.64	-0.31	Asphalt
B118	802724.07	3331353.08	0.95	802724.07	3331353.08	0.62	-0.33	Asphalt
B119	802771.59	3331376.74	0.94	802771.59	3331376.74	0.65	-0.29	Asphalt
B120	802787.82	3331383.74	1.00	802787.82	3331383.74	0.65	-0.36	Asphalt

B121	802804.20	3331390.40	1.00	802804.20	3331390.40	0.69	-0.31	Asphalt
B122	802820.76	3331396.74	0.97	802820.76	3331396.74	0.68	-0.29	Asphalt
B123	802837.52	3331402.76	0.98	802837.52	3331402.76	0.64	-0.34	Asphalt
B124	802854.50	3331408.42	1.00	802854.50	3331408.42	0.65	-0.35	Asphalt
B125	802871.54	3331413.70	1.10	802871.54	3331413.70	0.76	-0.34	Asphalt
B126	802888.56	3331418.65	1.24	802888.56	3331418.65	1.00	-0.24	Asphalt
B127	802922.88	3331427.15	1.71	802922.88	3331427.15	1.30	-0.41	Asphalt
B128	803228.81	3331463.43	1.12	803228.81	3331463.43	0.87	-0.25	Asphalt
B129	803216.47	3331462.56	1.23	803216.47	3331462.56	0.97	-0.26	Asphalt
B130	803191.52	3331460.81	1.53	803191.52	3331460.81	1.32	-0.21	Asphalt
B131	803153.29	3331457.42	2.12	803153.29	3331457.42	1.83	-0.28	Asphalt
B132	803139.69	3331455.53	2.29	803139.69	3331455.53	2.03	-0.25	Asphalt
B133	803125.67	3331453.79	2.44	803125.67	3331453.79	2.13	-0.31	Asphalt
B134	803111.33	3331452.39	2.52	803111.33	3331452.39	2.31	-0.21	Asphalt
B135	803096.76	3331451.33	2.60	803096.76	3331451.33	2.33	-0.27	Asphalt
B136	803082.21	3331450.25	2.64	803082.21	3331450.25	2.38	-0.26	Asphalt
B137	803067.57	3331449.19	2.71	803067.57	3331449.19	2.40	-0.31	Asphalt
B138	803052.73	3331448.18	2.70	803052.73	3331448.18	2.50	-0.20	Asphalt
B139	803037.71	3331447.09	2.63	803037.71	3331447.09	2.38	-0.25	Asphalt
B140	803022.54	3331445.86	2.58	803022.54	3331445.86	2.30	-0.28	Asphalt
B141	803007.21	3331444.43	2.52	803007.21	3331444.43	2.24	-0.28	Asphalt
B142	802991.69	3331442.66	2.44	802991.69	3331442.66	2.24	-0.19	Asphalt
B143	802975.99	3331440.52	2.29	802975.99	3331440.52	2.03	-0.26	Asphalt
B144	802960.10	3331437.93	2.12	802960.10	3331437.93	1.86	-0.26	Asphalt
B145	802943.99	3331434.95	1.93	802943.99	3331434.95	1.73	-0.20	Asphalt
B146	802927.66	3331431.64	1.68	802927.66	3331431.64	1.48	-0.20	Asphalt
B147	802911.25	3331427.92	1.46	802911.25	3331427.92	1.17	-0.29	Asphalt
B148	802894.81	3331423.74	1.29	802894.81	3331423.74	0.99	-0.30	Asphalt
B149	802878.35	3331419.14	1.18	802878.35	3331419.14	0.84	-0.34	Asphalt
B150	802861.89	3331414.23	1.04	802861.89	3331414.23	0.82	-0.22	Asphalt
B151	802845.43	3331409.01	0.98	802845.43	3331409.01	0.72	-0.26	Asphalt
B152	802829.04	3331403.42	1.00	802829.04	3331403.42	0.65	-0.35	Asphalt
B153	802812.76	3331397.44	0.95	802812.76	3331397.44	0.73	-0.22	Asphalt
B154	802796.61	3331391.10	0.94	802796.61	3331391.10	0.66	-0.28	Asphalt

B155	802780.59	3331384.34	0.95	802780.59	3331384.34	0.71	-0.24	Asphalt
B156	802764.71	3331377.09	0.94	802764.71	3331377.09	0.66	-0.29	Asphalt
B157	802748.91	3331369.48	0.93	802748.91	3331369.48	0.63	-0.30	Asphalt
B158	802733.30	3331361.64	0.95	802733.30	3331361.64	0.70	-0.25	Asphalt
B159	802717.89	3331353.51	0.93	802717.89	3331353.51	0.61	-0.32	Asphalt
B160	802702.73	3331344.96	1.07	802702.73	3331344.96	0.67	-0.40	Asphalt
B161	802672.87	3331327.00	0.96	802672.87	3331327.00	0.59	-0.37	Asphalt
B162	802644.07	3331307.77	0.99	802644.07	3331307.77	0.65	-0.35	Asphalt
B163	802630.26	3331298.09	1.00	802630.26	3331298.09	0.69	-0.31	Asphalt
B164	802616.95	3331288.25	1.03	802616.95	3331288.25	0.74	-0.29	Asphalt
B165	802603.96	3331278.11	1.04	802603.96	3331278.11	0.60	-0.44	Asphalt
B166	802565.86	3331245.45	1.05	802565.86	3331245.45	0.75	-0.30	Asphalt
B167	802553.53	3331233.83	1.05	802553.53	3331233.83	0.69	-0.36	Asphalt
B168	802541.48	3331221.90	1.05	802541.48	3331221.90	0.70	-0.36	Asphalt
B169	802502.54	3331177.25	1.07	802502.54	3331177.25	0.70	-0.37	Asphalt
B170	802505.53	3331185.03	1.04	802505.53	3331185.03	0.63	-0.41	Asphalt
B171	802507.38	3331193.44	0.92	802507.38	3331193.44	0.56	-0.36	Asphalt
B172	802508.58	3331202.42	1.00	802508.58	3331202.42	0.69	-0.30	Asphalt
B173	802509.89	3331211.89	1.02	802509.89	3331211.89	0.64	-0.37	Asphalt
B174	802511.35	3331221.84	1.05	802511.35	3331221.84	0.74	-0.31	Asphalt
B175	802512.85	3331232.25	1.09	802512.85	3331232.25	0.67	-0.41	Asphalt
B176	802514.56	3331243.14	1.07	802514.56	3331243.14	0.69	-0.38	Asphalt
B177	802518.44	3331266.05	1.12	802518.44	3331266.05	0.76	-0.36	Asphalt
B178	802520.52	3331277.96	1.10	802520.52	3331277.96	0.68	-0.42	Asphalt
B179	802522.65	3331289.99	1.09	802522.65	3331289.99	0.76	-0.33	Asphalt
B180	802524.82	3331301.98	1.14	802524.82	3331301.98	0.82	-0.33	Asphalt
B181	802526.87	3331313.75	1.18	802526.87	3331313.75	0.86	-0.33	Asphalt
A40	778469.84	3325211.46	2.16	778469.84	3325211.46	2.03	-0.13	Asphalt
A41	778468.78	3325206.83	2.16	778468.78	3325206.83	1.93	-0.23	Asphalt
A42	778466.04	3325202.19	2.16	778466.04	3325202.19	1.86	-0.30	Asphalt
A43	778462.33	3325197.32	2.15	778462.33	3325197.32	1.95	-0.20	Asphalt
A44	778458.03	3325191.84	2.13	778458.03	3325191.84	1.91	-0.22	Asphalt
A45	778453.37	3325185.92	2.08	778453.37	3325185.92	1.87	-0.22	Asphalt
A46	778448.45	3325179.37	2.04	778448.45	3325179.37	1.72	-0.32	Asphalt

A47	778443.44	3325172.18	1.97	778443.44	3325172.18	1.75	-0.21	Asphalt
A48	778438.52	3325164.43	1.90	778438.52	3325164.43	1.68	-0.22	Asphalt
A49	778433.64	3325156.23	1.84	778433.64	3325156.23	1.63	-0.21	Asphalt
A50	778428.89	3325147.51	1.79	778428.89	3325147.51	1.56	-0.23	Asphalt
A51	778424.37	3325138.24	1.71	778424.37	3325138.24	1.48	-0.22	Asphalt
A52	778420.13	3325128.49	1.63	778420.13	3325128.49	1.34	-0.30	Asphalt
A53	778416.22	3325118.30	1.56	778416.22	3325118.30	1.25	-0.31	Asphalt
A54	778412.72	3325107.74	1.55	778412.72	3325107.74	1.36	-0.19	Asphalt
A55	778409.60	3325096.85	1.52	778409.60	3325096.85	1.28	-0.24	Asphalt
A56	778406.90	3325085.63	1.47	778406.90	3325085.63	1.17	-0.30	Asphalt
A57	778404.64	3325074.11	1.47	778404.64	3325074.11	1.17	-0.30	Asphalt
A58	778402.96	3325062.32	1.44	778402.96	3325062.32	1.18	-0.26	Asphalt
A59	778401.81	3325050.28	1.39	778401.81	3325050.28	1.10	-0.29	Asphalt
A60	778400.45	3325026.09	1.39	778400.45	3325026.09	1.13	-0.26	Asphalt
A61	778399.99	3325014.16	1.41	778399.99	3325014.16	1.13	-0.28	Asphalt
A62	778399.52	3325002.21	1.45	778399.52	3325002.21	1.21	-0.24	Asphalt
A63	778398.72	3324978.06	1.38	778398.72	3324978.06	1.21	-0.18	Asphalt
A64	778398.26	3324965.98	1.33	778398.26	3324965.98	1.11	-0.23	Asphalt
A65	778397.40	3324942.05	1.42	778397.40	3324942.05	1.16	-0.26	Asphalt
A66	778396.91	3324930.09	1.47	778396.91	3324930.09	1.19	-0.28	Asphalt
A67	778396.44	3324918.08	1.47	778396.44	3324918.08	1.22	-0.25	Asphalt
A68	778395.92	3324906.07	1.46	778395.92	3324906.07	1.17	-0.29	Asphalt
A69	778395.45	3324894.16	1.46	778395.45	3324894.16	1.23	-0.23	Asphalt
A70	778394.95	3324882.35	1.45	778394.95	3324882.35	1.17	-0.28	Asphalt
A71	778394.44	3324870.61	1.43	778394.44	3324870.61	1.17	-0.27	Asphalt
A72	778394.04	3324858.94	1.35	778394.04	3324858.94	1.03	-0.32	Asphalt
A73	778393.63	3324847.30	1.33	778393.63	3324847.30	1.00	-0.33	Asphalt
A74	778393.12	3324835.57	1.32	778393.12	3324835.57	1.14	-0.18	Asphalt
A75	778392.67	3324823.66	1.30	778392.67	3324823.66	1.06	-0.24	Asphalt
A76	778392.23	3324811.75	1.25	778392.23	3324811.75	1.11	-0.15	Asphalt
A77	778391.72	3324800.03	1.23	778391.72	3324800.03	1.03	-0.20	Asphalt
A78	778391.29	3324789.17	1.17	778391.29	3324789.17	1.05	-0.12	Asphalt
A79	778390.89	3324779.61	1.16	778390.89	3324779.61	0.94	-0.22	Asphalt
A80	778396.44	3324742.64	1.26	778396.44	3324742.64	1.01	-0.26	Asphalt

A81	778396.57	3324743.34	1.28	778396.57	3324743.34	1.00	-0.28	Asphalt
A82	778396.86	3324746.30	1.22	778396.86	3324746.30	1.05	-0.17	Asphalt
A83	778396.49	3324772.61	1.13	778396.49	3324772.61	0.91	-0.22	Asphalt
A84	778395.84	3324781.59	1.17	778395.84	3324781.59	0.96	-0.21	Asphalt
A85	778395.47	3324791.55	1.18	778395.47	3324791.55	1.05	-0.14	Asphalt
A86	778395.54	3324802.29	1.24	778395.54	3324802.29	1.00	-0.24	Asphalt
A87	778395.95	3324813.56	1.24	778395.95	3324813.56	1.07	-0.16	Asphalt
A88	778396.38	3324825.21	1.31	778396.38	3324825.21	1.06	-0.25	Asphalt
A89	778396.88	3324837.11	1.36	778396.88	3324837.11	1.20	-0.17	Asphalt
A90	778397.39	3324849.12	1.38	778397.39	3324849.12	1.07	-0.32	Asphalt
A91	778397.85	3324861.27	1.40	778397.85	3324861.27	1.10	-0.30	Asphalt
A92	778398.68	3324886.42	1.45	778398.68	3324886.42	1.20	-0.26	Asphalt
A93	778399.20	3324899.23	1.50	778399.20	3324899.23	1.17	-0.33	Asphalt
A94	778399.71	3324912.13	1.49	778399.71	3324912.13	1.17	-0.32	Asphalt
A95	778400.22	3324925.15	1.49	778400.22	3324925.15	1.18	-0.30	Asphalt
A96	778400.75	3324938.33	1.44	778400.75	3324938.33	1.20	-0.24	Asphalt
A97	778401.27	3324951.64	1.35	778401.27	3324951.64	1.16	-0.19	Asphalt
A98	778401.80	3324965.07	1.34	778401.80	3324965.07	1.13	-0.21	Asphalt
A99	778402.30	3324978.57	1.39	778402.30	3324978.57	1.20	-0.20	Asphalt
A100	778402.74	3324992.13	1.45	778402.74	3324992.13	1.19	-0.26	Asphalt
A101	778403.27	3325005.72	1.46	778403.27	3325005.72	1.12	-0.34	Asphalt
A102	778403.77	3325019.31	1.43	778403.77	3325019.31	1.17	-0.26	Asphalt
A103	778404.38	3325032.85	1.36	778404.38	3325032.85	1.08	-0.28	Asphalt
A104	778410.66	3325086.06	1.43	778410.66	3325086.06	1.16	-0.27	Asphalt
A105	778413.96	3325099.08	1.46	778413.96	3325099.08	1.27	-0.19	Asphalt
A106	778417.94	3325111.88	1.52	778417.94	3325111.88	1.25	-0.27	Asphalt
A107	778422.61	3325124.50	1.54	778422.61	3325124.50	1.30	-0.24	Asphalt
A108	778427.98	3325136.91	1.66	778427.98	3325136.91	1.48	-0.19	Asphalt
A109	778433.94	3325149.00	1.77	778433.94	3325149.00	1.53	-0.24	Asphalt
A110	778447.87	3325172.13	1.98	778447.87	3325172.13	1.73	-0.25	Asphalt
A111	778455.88	3325183.11	2.07	778455.88	3325183.11	1.83	-0.24	Asphalt
A112	778464.54	3325193.65	2.11	778464.54	3325193.65	1.93	-0.18	Asphalt
A113	778473.80	3325203.75	2.20	778473.80	3325203.75	1.98	-0.21	Asphalt
A114	778483.60	3325213.42	2.29	778483.60	3325213.42	2.00	-0.29	Asphalt

A115	778494.06	3325222.53	2.44	778494.06	3325222.53	2.19	-0.24	Asphalt
A116	778505.06	3325231.14	2.33	778505.06	3325231.14	2.10	-0.23	Asphalt
A117	778516.54	3325239.20	2.23	778516.54	3325239.20	2.03	-0.20	Asphalt
A118	778528.55	3325246.62	2.20	778528.55	3325246.62	1.97	-0.23	Asphalt
A119	778541.05	3325253.37	2.16	778541.05	3325253.37	1.99	-0.17	Asphalt
A120	778553.94	3325259.48	2.14	778553.94	3325259.48	1.89	-0.25	Asphalt
A121	778567.33	3325264.77	2.13	778567.33	3325264.77	1.94	-0.20	Asphalt
A122	778581.07	3325269.64	2.10	778581.07	3325269.64	1.95	-0.15	Asphalt
A123	778595.08	3325274.44	2.06	778595.08	3325274.44	1.87	-0.19	Asphalt
A124	778609.33	3325279.09	2.00	778609.33	3325279.09	1.77	-0.23	Asphalt
A125	778623.66	3325283.81	1.96	778623.66	3325283.81	1.78	-0.19	Asphalt
A126	778638.12	3325288.57	1.94	778638.12	3325288.57	1.73	-0.22	Asphalt
A127	778652.69	3325293.41	1.86	778652.69	3325293.41	1.69	-0.17	Asphalt
A128	778667.41	3325298.28	1.79	778667.41	3325298.28	1.63	-0.17	Asphalt
A129	778682.30	3325303.18	1.74	778682.30	3325303.18	1.54	-0.20	Asphalt
A130	778697.34	3325308.11	1.70	778697.34	3325308.11	1.50	-0.21	Asphalt
A131	778712.48	3325313.03	1.64	778712.48	3325313.03	1.49	-0.15	Asphalt
A132	778727.69	3325317.98	1.60	778727.69	3325317.98	1.36	-0.24	Asphalt
A133	778742.91	3325323.03	1.63	778742.91	3325323.03	1.39	-0.24	Asphalt
A134	778758.13	3325328.17	1.68	778758.13	3325328.17	1.52	-0.15	Asphalt
A135	778773.37	3325333.24	1.71	778773.37	3325333.24	1.55	-0.16	Asphalt
A136	778788.64	3325338.30	1.76	778788.64	3325338.30	1.56	-0.20	Asphalt
A137	778803.95	3325343.20	1.80	778803.95	3325343.20	1.69	-0.12	Asphalt
A138	778819.39	3325347.78	1.81	778819.39	3325347.78	1.62	-0.19	Asphalt
A139	778835.04	3325351.71	1.77	778835.04	3325351.71	1.60	-0.17	Asphalt
A140	778850.95	3325354.93	1.71	778850.95	3325354.93	1.47	-0.25	Asphalt
A141	778867.15	3325357.47	1.65	778867.15	3325357.47	1.47	-0.18	Asphalt
A142	778900.42	3325360.44	1.56	778900.42	3325360.44	1.41	-0.15	Asphalt
A143	778917.38	3325360.71	1.58	778917.38	3325360.71	1.40	-0.18	Asphalt
A144	778934.39	3325360.11	1.65	778934.39	3325360.11	1.48	-0.17	Asphalt
A145	778951.38	3325358.80	1.68	778951.38	3325358.80	1.52	-0.16	Asphalt
A146	778968.31	3325357.17	1.74	778968.31	3325357.17	1.60	-0.14	Asphalt
A147	778985.31	3325355.51	1.80	778985.31	3325355.51	1.64	-0.16	Asphalt
A148	779002.37	3325353.81	1.83	779002.37	3325353.81	1.68	-0.15	Asphalt

A149	779019.51	3325352.21	1.78	779019.51	3325352.21	1.65	-0.13	Asphalt
A150	779036.70	3325350.63	1.73	779036.70	3325350.63	1.65	-0.08	Asphalt
A151	779053.89	3325349.23	1.70	779053.89	3325349.23	1.58	-0.12	Asphalt
A152	779070.92	3325348.02	1.66	779070.92	3325348.02	1.48	-0.17	Asphalt
A153	779087.79	3325347.07	1.60	779087.79	3325347.07	1.48	-0.12	Asphalt
A154	779104.46	3325346.29	1.62	779104.46	3325346.29	1.47	-0.15	Asphalt
A155	779152.94	3325344.66	1.86	779152.94	3325344.66	1.74	-0.12	Asphalt
A156	779254.48	3325345.46	1.59	779254.48	3325345.46	1.42	-0.17	Asphalt
A157	779236.22	3325345.97	1.58	779236.22	3325345.97	1.49	-0.08	Asphalt
A158	779217.89	3325346.45	1.64	779217.89	3325346.45	1.56	-0.08	Asphalt
A159	779199.80	3325346.93	1.72	779199.80	3325346.93	1.61	-0.12	Asphalt
A160	779181.99	3325347.36	1.82	779181.99	3325347.36	1.71	-0.11	Asphalt
A161	779164.43	3325347.81	1.88	779164.43	3325347.81	1.77	-0.11	Asphalt
A162	779147.09	3325348.24	1.83	779147.09	3325348.24	1.68	-0.14	Asphalt
A163	779129.94	3325348.88	1.74	779129.94	3325348.88	1.65	-0.08	Asphalt
A164	779112.86	3325349.59	1.65	779112.86	3325349.59	1.49	-0.16	Asphalt
A165	779095.72	3325350.46	1.60	779095.72	3325350.46	1.47	-0.13	Asphalt
A166	779078.54	3325351.40	1.62	779078.54	3325351.40	1.54	-0.07	Asphalt
A167	779061.34	3325352.52	1.66	779061.34	3325352.52	1.52	-0.14	Asphalt
A168	779026.73	3325355.31	1.75	779026.73	3325355.31	1.56	-0.18	Asphalt
A169	779009.33	3325356.93	1.81	779009.33	3325356.93	1.62	-0.19	Asphalt
A170	778991.91	3325358.64	1.81	778991.91	3325358.64	1.68	-0.13	Asphalt
A171	778974.43	3325360.40	1.76	778974.43	3325360.40	1.58	-0.18	Asphalt
A172	778939.25	3325363.62	1.69	778939.25	3325363.62	1.54	-0.15	Asphalt
A173	778921.57	3325364.44	1.64	778921.57	3325364.44	1.47	-0.17	Asphalt
A174	778903.88	3325364.36	1.58	778903.88	3325364.36	1.42	-0.16	Asphalt
A175	778886.29	3325363.38	1.60	778886.29	3325363.38	1.43	-0.17	Asphalt
A176	778868.83	3325361.56	1.66	778868.83	3325361.56	1.47	-0.19	Asphalt
A177	778851.53	3325358.89	1.70	778851.53	3325358.89	1.59	-0.11	Asphalt
A178	778834.38	3325355.31	1.77	778834.38	3325355.31	1.62	-0.15	Asphalt
A179	778817.43	3325350.95	1.82	778817.43	3325350.95	1.69	-0.13	Asphalt
A180	778800.63	3325345.94	1.80	778800.63	3325345.94	1.66	-0.13	Asphalt
A181	778783.90	3325340.57	1.73	778783.90	3325340.57	1.62	-0.11	Asphalt
A182	778767.34	3325335.09	1.67	778767.34	3325335.09	1.53	-0.14	Asphalt

A183	778750.96	3325329.64	1.64	778750.96	3325329.64	1.51	-0.13	Asphalt
A184	778734.73	3325324.29	1.58	778734.73	3325324.29	1.46	-0.12	Asphalt
A185	778718.68	3325319.08	1.57	778718.68	3325319.08	1.45	-0.12	Asphalt
A186	778702.73	3325313.85	1.65	778702.73	3325313.85	1.51	-0.14	Asphalt
A187	778686.72	3325308.60	1.68	778686.72	3325308.60	1.53	-0.15	Asphalt
A188	778670.64	3325303.35	1.76	778670.64	3325303.35	1.64	-0.12	Asphalt
A189	778654.49	3325298.06	1.82	778654.49	3325298.06	1.65	-0.17	Asphalt
A190	778638.27	3325292.73	1.93	778638.27	3325292.73	1.79	-0.13	Asphalt
A191	778622.06	3325287.47	1.97	778622.06	3325287.47	1.78	-0.19	Asphalt
A192	778606.08	3325282.20	2.03	778606.08	3325282.20	1.88	-0.15	Asphalt
A193	778590.33	3325276.94	2.07	778590.33	3325276.94	1.89	-0.18	Asphalt
A194	778574.85	3325271.64	2.11	778574.85	3325271.64	1.96	-0.16	Asphalt
A195	778559.75	3325266.06	2.18	778559.75	3325266.06	1.92	-0.26	Asphalt
A196	778545.20	3325259.77	2.16	778545.20	3325259.77	1.98	-0.17	Asphalt
A197	778531.28	3325252.65	2.18	778531.28	3325252.65	2.01	-0.17	Asphalt
A198	778518.07	3325244.81	2.25	778518.07	3325244.81	2.03	-0.22	Asphalt
A199	778505.60	3325236.37	2.33	778505.60	3325236.37	2.14	-0.19	Asphalt
A200	778493.99	3325227.43	2.45	778493.99	3325227.43	2.19	-0.26	Asphalt
A201	778483.25	3325218.24	2.34	778483.25	3325218.24	2.05	-0.29	Asphalt
A202	778473.22	3325208.89	2.23	778473.22	3325208.89	2.04	-0.19	Asphalt
C126	819340.14	3348251.14	2.61	819340.14	3348251.14	2.37	-0.25	Concrete
C127	819342.88	3348254.31	2.60	819342.88	3348254.31	2.45	-0.15	Concrete
C128	819346.14	3348258.69	2.60	819346.14	3348258.69	2.44	-0.16	Concrete
C129	819349.92	3348263.99	2.59	819349.92	3348263.99	2.41	-0.18	Concrete
C130	819358.88	3348276.48	2.58	819358.88	3348276.48	2.40	-0.18	Concrete
C131	819363.99	3348283.64	2.58	819363.99	3348283.64	2.47	-0.12	Concrete
C132	819369.46	3348291.36	2.58	819369.46	3348291.36	2.44	-0.14	Concrete
C133	819375.31	3348299.58	2.59	819375.31	3348299.58	2.44	-0.16	Concrete
C134	819388.11	3348317.61	2.57	819388.11	3348317.61	2.38	-0.19	Concrete
C135	819395.06	3348327.30	2.58	819395.06	3348327.30	2.43	-0.15	Concrete
C136	819402.31	3348337.36	2.58	819402.31	3348337.36	2.40	-0.19	Concrete
C137	819409.74	3348347.73	2.57	819409.74	3348347.73	2.36	-0.20	Concrete
C138	819417.39	3348358.43	2.58	819417.39	3348358.43	2.50	-0.08	Concrete
C139	819425.36	3348369.40	2.54	819425.36	3348369.40	2.37	-0.17	Concrete

C140	819433.57	3348380.65	2.57	819433.57	3348380.65	2.41	-0.16	Concrete
C141	819441.94	3348392.17	2.53	819441.94	3348392.17	2.28	-0.24	Concrete
C142	819450.55	3348403.90	2.52	819450.55	3348403.90	2.40	-0.12	Concrete
C143	819459.47	3348415.79	2.48	819459.47	3348415.79	2.41	-0.07	Concrete
C144	819468.64	3348427.78	2.46	819468.64	3348427.78	2.33	-0.13	Concrete
C145	819477.98	3348439.87	2.44	819477.98	3348439.87	2.28	-0.16	Concrete
C146	819487.56	3348451.96	2.45	819487.56	3348451.96	2.23	-0.22	Concrete
C147	819497.37	3348464.15	2.42	819497.37	3348464.15	2.21	-0.21	Concrete
C148	819507.50	3348476.43	2.37	819507.50	3348476.43	2.18	-0.19	Concrete
C149	819517.83	3348488.76	2.37	819517.83	3348488.76	2.24	-0.13	Concrete
C150	819528.50	3348501.13	2.34	819528.50	3348501.13	2.22	-0.12	Concrete
C151	819539.29	3348513.51	2.33	819539.29	3348513.51	2.21	-0.12	Concrete
C152	819550.17	3348525.85	2.36	819550.17	3348525.85	2.23	-0.13	Concrete
C153	819561.15	3348537.91	2.33	819561.15	3348537.91	2.10	-0.23	Concrete
C154	819572.07	3348549.76	2.26	819572.07	3348549.76	2.07	-0.19	Concrete
C155	819582.99	3348561.42	2.30	819582.99	3348561.42	2.20	-0.10	Concrete
C156	819593.93	3348572.90	2.27	819593.93	3348572.90	2.13	-0.14	Concrete
C157	819604.85	3348584.22	2.24	819604.85	3348584.22	1.98	-0.26	Concrete
C158	819615.85	3348595.33	2.26	819615.85	3348595.33	2.15	-0.11	Concrete
C159	819626.87	3348606.25	2.21	819626.87	3348606.25	2.07	-0.14	Concrete
C160	819637.91	3348617.00	2.21	819637.91	3348617.00	1.97	-0.24	Concrete
C161	819649.01	3348627.56	2.21	819649.01	3348627.56	2.09	-0.12	Concrete
C162	819660.01	3348637.82	2.19	819660.01	3348637.82	2.05	-0.14	Concrete
C163	819670.72	3348647.72	2.21	819670.72	3348647.72	1.96	-0.25	Concrete
C164	819704.00	3348682.65	2.38	819704.00	3348682.65	2.11	-0.28	Concrete
C165	819697.08	3348676.72	2.32	819697.08	3348676.72	2.02	-0.30	Concrete
C166	819689.80	3348670.28	2.25	819689.80	3348670.28	2.09	-0.16	Concrete
C167	819681.94	3348663.26	2.25	819681.94	3348663.26	2.05	-0.21	Concrete
C168	819673.50	3348655.66	2.25	819673.50	3348655.66	2.02	-0.23	Concrete
C169	819664.53	3348647.44	2.24	819664.53	3348647.44	2.02	-0.22	Concrete
C170	819655.09	3348638.71	2.20	819655.09	3348638.71	2.04	-0.17	Concrete
C171	819645.28	3348629.42	2.22	819645.28	3348629.42	2.07	-0.15	Concrete
C172	819635.19	3348619.67	2.22	819635.19	3348619.67	2.02	-0.20	Concrete
C173	819624.83	3348609.59	2.25	819624.83	3348609.59	2.07	-0.18	Concrete

C174	819614.33	3348599.25	2.24	819614.33	3348599.25	2.13	-0.11	Concrete
C175	819603.72	3348588.56	2.25	819603.72	3348588.56	2.07	-0.18	Concrete
C176	819592.98	3348577.49	2.31	819592.98	3348577.49	2.11	-0.20	Concrete
C177	819582.12	3348566.10	2.31	819582.12	3348566.10	2.18	-0.12	Concrete
C178	819571.14	3348554.32	2.32	819571.14	3348554.32	2.10	-0.23	Concrete
C179	819559.99	3348542.28	2.36	819559.99	3348542.28	2.13	-0.23	Concrete
C180	819548.79	3348529.99	2.40	819548.79	3348529.99	2.24	-0.16	Concrete
C181	819537.61	3348517.46	2.35	819537.61	3348517.46	2.27	-0.09	Concrete
C182	819526.38	3348504.72	2.41	819526.38	3348504.72	2.34	-0.07	Concrete
C183	819504.10	3348478.58	2.39	819504.10	3348478.58	2.30	-0.09	Concrete
C184	819493.15	3348465.19	2.48	819493.15	3348465.19	2.32	-0.16	Concrete
C185	819482.35	3348451.55	2.50	819482.35	3348451.55	2.27	-0.23	Concrete
C186	819471.55	3348437.79	2.52	819471.55	3348437.79	2.36	-0.16	Concrete
C187	819450.11	3348409.66	2.50	819450.11	3348409.66	2.37	-0.13	Concrete
C188	819439.56	3348395.24	2.55	819439.56	3348395.24	2.37	-0.18	Concrete
C189	819429.15	3348380.89	2.59	819429.15	3348380.89	2.45	-0.14	Concrete
C190	819418.93	3348366.64	2.57	819418.93	3348366.64	2.47	-0.11	Concrete
C191	819408.66	3348352.41	2.60	819408.66	3348352.41	2.47	-0.13	Concrete
C192	819398.39	3348338.20	2.58	819398.39	3348338.20	2.38	-0.20	Concrete
C193	819388.12	3348324.05	2.60	819388.12	3348324.05	2.45	-0.15	Concrete
C194	819378.01	3348310.09	2.59	819378.01	3348310.09	2.42	-0.18	Concrete
C195	819368.19	3348296.58	2.60	819368.19	3348296.58	2.39	-0.22	Concrete
B213	802532.97	3331280.06	1.28	802532.97	3331280.06	1.00	-0.28	Concrete
B214	802538.65	3331277.09	1.32	802538.65	3331277.09	1.05	-0.27	Concrete
B215	802544.62	3331274.01	1.30	802544.62	3331274.01	1.02	-0.29	Concrete
B216	802550.35	3331270.97	1.17	802550.35	3331270.97	0.92	-0.25	Concrete
B217	802556.06	3331268.37	1.19	802556.06	3331268.37	0.99	-0.20	Concrete
B218	802552.74	3331262.84	1.28	802552.74	3331262.84	0.99	-0.29	Concrete
B219	802546.50	3331265.77	1.36	802546.50	3331265.77	1.01	-0.35	Concrete
B220	802540.68	3331268.76	1.31	802540.68	3331268.76	1.06	-0.25	Concrete
B221	802534.68	3331271.71	1.32	802534.68	3331271.71	1.08	-0.24	Concrete
B222	802529.57	3331274.19	1.28	802529.57	3331274.19	0.97	-0.32	Concrete
B223	802532.30	3331267.84	1.31	802532.30	3331267.84	0.97	-0.33	Concrete
B224	802538.23	3331264.75	1.31	802538.23	3331264.75	1.03	-0.28	Concrete

B225	802544.34	3331261.64	1.31	802544.34	3331261.64	1.06	-0.25	Concrete
B226	802550.76	3331258.42	1.31	802550.76	3331258.42	0.95	-0.36	Concrete
K128	782370.13	3403012.91	35.99	782370.13	3403012.91	35.45	-0.54	Tall Grass
K129	782365.91	3403016.29	35.98	782365.91	3403016.29	35.63	-0.36	Tall Grass
K130	782361.47	3403020.00	36.01	782361.47	3403020.00	35.73	-0.28	Tall Grass
K131	782357.51	3403023.10	36.02	782357.51	3403023.10	35.61	-0.41	Tall Grass
K132	782352.70	3403026.81	36.02	782352.70	3403026.81	35.55	-0.46	Tall Grass
K133	782348.46	3403030.38	36.03	782348.46	3403030.38	35.66	-0.37	Tall Grass
K134	782343.82	3403033.98	36.09	782343.82	3403033.98	35.70	-0.38	Tall Grass
K135	782339.27	3403037.73	36.12	782339.27	3403037.73	35.93	-0.19	Tall Grass
K136	782334.44	3403041.30	36.11	782334.44	3403041.30	35.78	-0.33	Tall Grass
K137	782329.54	3403045.29	36.09	782329.54	3403045.29	35.71	-0.38	Tall Grass
K138	782324.83	3403049.39	36.09	782324.83	3403049.39	35.63	-0.46	Tall Grass
K139	782320.12	3403053.08	36.10	782320.12	3403053.08	35.76	-0.34	Tall Grass
K140	782315.01	3403056.66	36.03	782315.01	3403056.66	36.00	-0.03	Tall Grass
K141	782310.45	3403060.90	35.97	782310.45	3403060.90	35.56	-0.41	Tall Grass
K142	782306.00	3403064.63	35.89	782306.00	3403064.63	35.61	-0.28	Tall Grass
K143	782309.41	3403068.72	36.15	782309.41	3403068.72	35.88	-0.27	Tall Grass
K144	782314.00	3403065.61	36.19	782314.00	3403065.61	35.97	-0.23	Tall Grass
K145	782318.68	3403061.69	36.04	782318.68	3403061.69	36.09	0.05	Tall Grass
K146	782323.53	3403057.82	36.19	782323.53	3403057.82	35.94	-0.26	Tall Grass
K147	782328.31	3403054.12	36.19	782328.31	3403054.12	35.90	-0.29	Tall Grass
K148	782333.18	3403049.90	36.12	782333.18	3403049.90	35.93	-0.20	Tall Grass
K149	782338.13	3403046.07	36.16	782338.13	3403046.07	36.00	-0.16	Tall Grass
K150	782342.88	3403042.19	36.18	782342.88	3403042.19	35.96	-0.23	Tall Grass
K151	782347.56	3403038.49	36.15	782347.56	3403038.49	35.78	-0.37	Tall Grass
K152	782352.37	3403034.48	35.99	782352.37	3403034.48	35.76	-0.23	Tall Grass
K153	782357.18	3403030.79	36.01	782357.18	3403030.79	35.70	-0.31	Tall Grass
K154	782361.93	3403026.99	36.12	782361.93	3403026.99	35.79	-0.32	Tall Grass
K155	782366.69	3403023.62	36.04	782366.69	3403023.62	35.74	-0.30	Tall Grass
K156	782372.04	3403020.08	36.12	782372.04	3403020.08	35.76	-0.36	Tall Grass
K157	782375.37	3403024.91	36.21	782375.37	3403024.91	35.89	-0.31	Tall Grass
K158	782370.63	3403028.45	36.22	782370.63	3403028.45	35.86	-0.36	Tall Grass
K159	782365.23	3403032.70	36.24	782365.23	3403032.70	35.70	-0.55	Tall Grass

K160	782360.27	3403036.29	36.10	782360.27	3403036.29	35.85	-0.25	Tall Grass
K161	782355.58	3403039.98	36.02	782355.58	3403039.98	35.79	-0.23	Tall Grass
K162	782350.62	3403043.77	36.03	782350.62	3403043.77	35.77	-0.26	Tall Grass
K163	782345.86	3403047.64	36.06	782345.86	3403047.64	35.95	-0.12	Tall Grass
K164	782341.27	3403051.24	36.15	782341.27	3403051.24	35.97	-0.18	Tall Grass
K165	782336.25	3403055.06	36.23	782336.25	3403055.06	36.02	-0.22	Tall Grass
K166	782331.49	3403058.62	36.13	782331.49	3403058.62	35.87	-0.25	Tall Grass
K167	782326.31	3403062.84	36.17	782326.31	3403062.84	35.88	-0.29	Tall Grass
K168	782321.41	3403066.28	36.16	782321.41	3403066.28	35.91	-0.25	Tall Grass
K169	782316.58	3403070.05	36.13	782316.58	3403070.05	35.86	-0.27	Tall Grass
K170	782312.47	3403073.19	36.04	782312.47	3403073.19	35.93	-0.12	Tall Grass
K171	782315.90	3403077.71	36.19	782315.90	3403077.71	35.93	-0.25	Tall Grass
K172	782320.63	3403074.11	36.21	782320.63	3403074.11	35.91	-0.30	Tall Grass
K173	782325.62	3403070.09	36.19	782325.62	3403070.09	35.91	-0.28	Tall Grass
K174	782330.17	3403066.55	36.20	782330.17	3403066.55	35.90	-0.30	Tall Grass
K175	782334.82	3403063.02	36.24	782334.82	3403063.02	35.97	-0.27	Tall Grass
K176	782340.11	3403058.90	35.62	782340.11	3403058.90	35.83	0.21	Tall Grass
K177	782344.99	3403055.16	35.90	782344.99	3403055.16	35.87	-0.03	Tall Grass
K178	782350.06	3403051.33	35.98	782350.06	3403051.33	35.74	-0.23	Tall Grass
K179	782354.65	3403047.65	35.88	782354.65	3403047.65	35.81	-0.07	Tall Grass
K180	782360.07	3403043.55	36.13	782360.07	3403043.55	35.89	-0.24	Tall Grass
K181	782364.80	3403040.02	36.02	782364.80	3403040.02	35.79	-0.23	Tall Grass
K182	782369.82	3403036.07	36.21	782369.82	3403036.07	35.71	-0.50	Tall Grass
K183	782374.27	3403032.54	36.43	782374.27	3403032.54	36.06	-0.38	Tall Grass
K184	782378.90	3403028.77	36.23	782378.90	3403028.77	36.08	-0.15	Tall Grass
E180	792851.45	3351796.67	0.30	792851.45	3351796.67	0.28	-0.03	Tall Grass
E181	792856.26	3351796.82	0.28	792856.26	3351796.82	0.16	-0.12	Tall Grass
E182	792860.69	3351797.03	0.32	792860.69	3351797.03	0.13	-0.18	Tall Grass
E183	792865.38	3351797.58	0.35	792865.38	3351797.58	0.29	-0.06	Tall Grass
E184	792870.01	3351797.37	0.37	792870.01	3351797.37	0.21	-0.15	Tall Grass
E185	792874.60	3351796.97	0.36	792874.60	3351796.97	0.13	-0.23	Tall Grass
E186	792874.63	3351802.56	0.36	792874.63	3351802.56	0.16	-0.19	Tall Grass
E187	792869.80	3351803.74	0.36	792869.80	3351803.74	0.18	-0.18	Tall Grass
E188	792864.32	3351804.78	0.30	792864.32	3351804.78	0.15	-0.15	Tall Grass

E189	792858.27	3351805.19	0.28	792858.27	3351805.19	0.15	-0.13	Tall Grass
E190	792852.28	3351805.81	0.30	792852.28	3351805.81	0.09	-0.21	Tall Grass
E191	792852.63	3351810.95	0.31	792852.63	3351810.95	0.01	-0.30	Tall Grass
E192	792857.92	3351811.14	0.32	792857.92	3351811.14	0.09	-0.23	Tall Grass
E193	792863.53	3351811.36	0.28	792863.53	3351811.36	0.11	-0.17	Tall Grass
E194	792868.42	3351810.94	0.38	792868.42	3351810.94	0.18	-0.20	Tall Grass
E195	792872.40	3351810.55	0.32	792872.40	3351810.55	0.19	-0.13	Tall Grass
E196	792876.85	3351810.62	0.33	792876.85	3351810.62	0.09	-0.24	Tall Grass
E197	792876.73	3351816.50	0.29	792876.73	3351816.50	0.02	-0.27	Tall Grass
E198	792870.63	3351817.09	0.28	792870.63	3351817.09	0.12	-0.16	Tall Grass
E199	792864.32	3351818.19	0.27	792864.32	3351818.19	0.17	-0.10	Tall Grass
E200	792858.54	3351819.58	0.34	792858.54	3351819.58	0.13	-0.20	Tall Grass
E201	792853.23	3351820.69	0.32	792853.23	3351820.69	0.13	-0.19	Tall Grass
E202	792849.98	3351821.04	0.32	792849.98	3351821.04	0.14	-0.19	Tall Grass
E203	792845.87	3351821.15	0.34	792845.87	3351821.15	0.14	-0.20	Tall Grass
E204	792845.96	3351827.04	0.33	792845.96	3351827.04	0.09	-0.24	Tall Grass
E205	792850.57	3351827.28	0.35	792850.57	3351827.28	0.12	-0.23	Tall Grass
E206	792856.26	3351827.10	0.27	792856.26	3351827.10	0.06	-0.21	Tall Grass
E207	792860.64	3351826.09	0.30	792860.64	3351826.09	0.11	-0.19	Tall Grass
E208	792865.51	3351825.14	0.27	792865.51	3351825.14	0.07	-0.20	Tall Grass
E209	792870.23	3351824.40	0.27	792870.23	3351824.40	-0.02	-0.29	Tall Grass
E210	792874.92	3351823.86	0.30	792874.92	3351823.86	0.03	-0.27	Tall Grass
j1	799968.70	3413703.79	35.55	799968.70	3413703.79	35.42	-0.13	Mowed Grass
j2	799968.52	3413697.65	35.55	799968.52	3413697.65	35.42	-0.13	Mowed Grass
j3	799968.51	3413690.99	35.52	799968.51	3413690.99	35.38	-0.14	Mowed Grass
j4	799968.31	3413684.70	35.50	799968.31	3413684.70	35.35	-0.15	Mowed Grass
j5	799968.13	3413678.02	35.51	799968.13	3413678.02	35.33	-0.18	Mowed Grass
j6	799968.14	3413671.17	35.47	799968.14	3413671.17	35.34	-0.13	Mowed Grass
j7	799968.15	3413664.39	35.44	799968.15	3413664.39	35.27	-0.18	Mowed Grass
j8	799967.87	3413657.67	35.44	799967.87	3413657.67	35.29	-0.15	Mowed Grass
j9	799967.80	3413651.15	35.44	799967.80	3413651.15	35.28	-0.16	Mowed Grass
j10	799967.76	3413644.72	35.39	799967.76	3413644.72	35.30	-0.10	Mowed Grass
j11	799974.42	3413644.69	35.33	799974.42	3413644.69	35.12	-0.21	Mowed Grass
j12	799975.05	3413650.94	35.31	799975.05	3413650.94	35.10	-0.21	Mowed Grass

j13	799975.89	3413657.38	35.28	799975.89	3413657.38	35.09	-0.19	Mowed Grass
j14	799976.35	3413664.01	35.27	799976.35	3413664.01	35.12	-0.15	Mowed Grass
j15	799976.72	3413670.42	35.30	799976.72	3413670.42	35.12	-0.18	Mowed Grass
j16	799976.93	3413676.81	35.34	799976.93	3413676.81	35.15	-0.19	Mowed Grass
j17	799977.31	3413683.07	35.31	799977.31	3413683.07	35.13	-0.18	Mowed Grass
j18	799977.54	3413689.70	35.33	799977.54	3413689.70	35.09	-0.24	Mowed Grass
j19	799978.04	3413696.35	35.29	799978.04	3413696.35	35.08	-0.21	Mowed Grass
j20	799978.11	3413703.79	35.33	799978.11	3413703.79	35.19	-0.14	Mowed Grass
j21	799984.96	3413703.76	35.22	799984.96	3413703.76	34.97	-0.26	Mowed Grass
j22	799984.90	3413697.17	35.22	799984.90	3413697.17	34.96	-0.26	Mowed Grass
j23	799984.77	3413690.39	35.16	799984.77	3413690.39	34.93	-0.23	Mowed Grass
j24	799984.56	3413683.81	35.20	799984.56	3413683.81	35.00	-0.21	Mowed Grass
j25	799984.69	3413677.52	35.26	799984.69	3413677.52	35.04	-0.22	Mowed Grass
j26	799984.92	3413670.82	35.27	799984.92	3413670.82	35.11	-0.15	Mowed Grass
j27	799984.92	3413664.61	35.24	799984.92	3413664.61	35.07	-0.16	Mowed Grass
j28	799985.01	3413658.40	35.27	799985.01	3413658.40	35.12	-0.15	Mowed Grass
j29	799985.01	3413652.23	35.19	799985.01	3413652.23	34.98	-0.20	Mowed Grass
j30	799985.01	3413645.82	35.19	799985.01	3413645.82	35.00	-0.19	Mowed Grass
j31	799992.13	3413646.14	35.12	799992.13	3413646.14	34.92	-0.20	Mowed Grass
j32	799992.26	3413652.54	35.13	799992.26	3413652.54	34.97	-0.16	Mowed Grass
j33	799992.38	3413658.97	35.14	799992.38	3413658.97	34.96	-0.18	Mowed Grass
j34	799992.46	3413665.72	35.19	799992.46	3413665.72	34.99	-0.20	Mowed Grass
j35	799992.56	3413672.34	35.23	799992.56	3413672.34	35.05	-0.18	Mowed Grass
j36	799992.80	3413679.25	35.18	799992.80	3413679.25	34.97	-0.22	Mowed Grass
j37	799992.82	3413685.97	35.10	799992.82	3413685.97	34.86	-0.24	Mowed Grass
j38	799992.94	3413692.79	35.04	799992.94	3413692.79	34.80	-0.24	Mowed Grass
j39	799993.19	3413699.14	35.06	799993.19	3413699.14	34.83	-0.23	Mowed Grass
j40	799993.58	3413705.20	35.07	799993.58	3413705.20	34.82	-0.25	Mowed Grass
j41	800000.21	3413705.31	34.93	800000.21	3413705.31	34.75	-0.18	Mowed Grass
j42	799999.95	3413698.27	34.89	799999.95	3413698.27	34.76	-0.13	Mowed Grass
j43	799999.25	3413691.35	34.95	799999.25	3413691.35	34.76	-0.19	Mowed Grass
j44	799998.97	3413684.32	35.03	799998.97	3413684.32	34.81	-0.23	Mowed Grass
j45	799998.83	3413677.72	35.13	799998.83	3413677.72	34.89	-0.24	Mowed Grass
j46	799998.45	3413671.10	35.15	799998.45	3413671.10	34.95	-0.21	Mowed Grass

j47	799998.29	3413664.67	35.12	799998.29	3413664.67	34.90	-0.22	Mowed Grass
j48	799997.84	3413658.37	35.10	799997.84	3413658.37	34.94	-0.16	Mowed Grass
j49	799997.48	3413652.87	35.10	799997.48	3413652.87	34.89	-0.20	Mowed Grass
j50	799997.19	3413646.63	35.07	799997.19	3413646.63	34.86	-0.22	Mowed Grass
j51	800004.44	3413646.55	35.03	800004.44	3413646.55	34.81	-0.22	Mowed Grass
j52	800005.30	3413653.13	35.06	800005.30	3413653.13	34.80	-0.26	Mowed Grass
j53	800006.26	3413659.74	35.09	800006.26	3413659.74	34.87	-0.22	Mowed Grass
j54	800007.01	3413666.43	35.15	800007.01	3413666.43	34.89	-0.26	Mowed Grass
j55	800007.42	3413673.29	35.15	800007.42	3413673.29	34.94	-0.21	Mowed Grass
j56	800007.61	3413680.05	35.18	800007.61	3413680.05	34.95	-0.23	Mowed Grass
j57	800008.08	3413687.02	35.22	800008.08	3413687.02	34.98	-0.23	Mowed Grass
j58	800008.89	3413693.62	35.30	800008.89	3413693.62	35.13	-0.17	Mowed Grass
j59	800009.79	3413700.04	35.29	800009.79	3413700.04	35.15	-0.14	Mowed Grass
j60	800010.33	3413705.64	35.26	800010.33	3413705.64	34.98	-0.28	Mowed Grass
j61	800017.26	3413704.80	35.35	800017.26	3413704.80	35.17	-0.18	Mowed Grass
j62	800016.64	3413698.57	35.42	800016.64	3413698.57	35.27	-0.15	Mowed Grass
j63	800016.24	3413691.75	35.46	800016.24	3413691.75	35.23	-0.23	Mowed Grass
j64	800015.90	3413685.06	35.44	800015.90	3413685.06	35.22	-0.21	Mowed Grass
j65	800015.54	3413678.26	35.39	800015.54	3413678.26	35.20	-0.19	Mowed Grass
j66	800015.05	3413671.88	35.35	800015.05	3413671.88	35.16	-0.19	Mowed Grass
j67	800014.39	3413665.26	35.31	800014.39	3413665.26	35.04	-0.27	Mowed Grass
j68	800014.27	3413658.53	35.23	800014.27	3413658.53	35.04	-0.18	Mowed Grass
j69	800013.89	3413652.27	35.17	800013.89	3413652.27	34.95	-0.22	Mowed Grass
j70	800013.59	3413645.32	35.10	800013.59	3413645.32	34.88	-0.21	Mowed Grass
j71	800020.95	3413645.34	35.10	800020.95	3413645.34	34.95	-0.14	Mowed Grass
j72	800021.43	3413651.91	35.16	800021.43	3413651.91	34.95	-0.20	Mowed Grass
j73	800021.79	3413658.13	35.27	800021.79	3413658.13	35.18	-0.09	Mowed Grass
j74	800022.05	3413664.34	35.38	800022.05	3413664.34	35.21	-0.17	Mowed Grass
j75	800022.31	3413670.54	35.41	800022.31	3413670.54	35.24	-0.17	Mowed Grass
j76	800022.55	3413677.54	35.45	800022.55	3413677.54	35.24	-0.21	Mowed Grass
j77	800023.00	3413684.03	35.45	800023.00	3413684.03	35.25	-0.21	Mowed Grass
j78	800023.51	3413690.27	35.48	800023.51	3413690.27	35.24	-0.24	Mowed Grass
j79	800023.94	3413696.69	35.46	800023.94	3413696.69	35.28	-0.19	Mowed Grass
j80	800024.74	3413702.72	35.41	800024.74	3413702.72	35.25	-0.16	Mowed Grass

j81	800031.75	3413701.17	35.46	800031.75	3413701.17	35.38	-0.07	Mowed Grass
j82	800030.16	3413694.77	35.47	800030.16	3413694.77	35.28	-0.19	Mowed Grass
j83	800029.00	3413688.28	35.48	800029.00	3413688.28	35.27	-0.21	Mowed Grass
j84	800027.59	3413681.68	35.46	800027.59	3413681.68	35.28	-0.18	Mowed Grass
j85	800026.66	3413675.58	35.45	800026.66	3413675.58	35.24	-0.21	Mowed Grass
j86	800025.59	3413669.14	35.39	800025.59	3413669.14	35.24	-0.15	Mowed Grass
j87	800024.56	3413662.41	35.35	800024.56	3413662.41	35.15	-0.20	Mowed Grass
j88	800023.70	3413655.92	35.27	800023.70	3413655.92	35.07	-0.20	Mowed Grass
j89	800022.26	3413649.66	35.16	800022.26	3413649.66	34.91	-0.25	Mowed Grass
j90	800021.09	3413643.30	35.08	800021.09	3413643.30	34.90	-0.18	Mowed Grass
j91	800028.35	3413642.29	35.18	800028.35	3413642.29	35.00	-0.17	Mowed Grass
j92	800028.53	3413648.88	35.24	800028.53	3413648.88	35.01	-0.23	Mowed Grass
j93	800028.50	3413655.51	35.27	800028.50	3413655.51	35.05	-0.21	Mowed Grass
j94	800028.74	3413662.28	35.33	800028.74	3413662.28	35.13	-0.20	Mowed Grass
j95	800029.00	3413669.06	35.39	800029.00	3413669.06	35.17	-0.22	Mowed Grass
j96	800029.36	3413675.68	35.42	800029.36	3413675.68	35.29	-0.14	Mowed Grass
j97	800029.97	3413681.91	35.45	800029.97	3413681.91	35.29	-0.16	Mowed Grass
j98	800030.63	3413688.27	35.47	800030.63	3413688.27	35.28	-0.20	Mowed Grass
j99	800031.11	3413694.76	35.46	800031.11	3413694.76	35.31	-0.15	Mowed Grass
j100	800031.24	3413701.33	35.47	800031.24	3413701.33	35.37	-0.11	Mowed Grass
P1	809453.89	3431550.29	33.76	809453.89	3431550.29	33.53	-0.23	Mowed Grass
P2	809453.28	3431556.28	33.81	809453.28	3431556.28	33.47	-0.34	Mowed Grass
P3	809452.49	3431562.50	33.79	809452.49	3431562.50	33.58	-0.21	Mowed Grass
P4	809451.78	3431568.61	33.72	809451.78	3431568.61	33.57	-0.15	Mowed Grass
P5	809450.82	3431574.89	33.83	809450.82	3431574.89	33.64	-0.19	Mowed Grass
P6	809450.04	3431581.39	33.80	809450.04	3431581.39	33.58	-0.22	Mowed Grass
P7	809449.16	3431588.08	33.82	809449.16	3431588.08	33.69	-0.13	Mowed Grass
P8	809448.45	3431594.41	33.79	809448.45	3431594.41	33.59	-0.20	Mowed Grass
P9	809447.55	3431600.92	33.83	809447.55	3431600.92	33.67	-0.16	Mowed Grass
P10	809446.90	3431606.92	33.84	809446.90	3431606.92	33.63	-0.22	Mowed Grass
P11	809453.37	3431607.32	33.70	809453.37	3431607.32	33.52	-0.18	Mowed Grass
P12	809454.38	3431600.89	33.73	809454.38	3431600.89	33.48	-0.25	Mowed Grass
P13	809455.08	3431594.25	33.72	809455.08	3431594.25	33.54	-0.18	Mowed Grass
P14	809456.19	3431587.63	33.70	809456.19	3431587.63	33.47	-0.23	Mowed Grass

P15	809457.00	3431580.75	33.66	809457.00	3431580.75	33.47	-0.18	Mowed Grass
P16	809457.93	3431574.08	33.67	809457.93	3431574.08	33.49	-0.18	Mowed Grass
P17	809458.16	3431571.96	33.81	809458.16	3431571.96	33.49	-0.32	Mowed Grass
P18	809460.18	3431561.07	33.59	809460.18	3431561.07	33.32	-0.27	Mowed Grass
P19	809461.41	3431553.74	33.73	809461.41	3431553.74	33.49	-0.24	Mowed Grass
P20	809468.00	3431553.87	33.71	809468.00	3431553.87	33.44	-0.28	Mowed Grass
P21	809468.08	3431560.52	33.66	809468.08	3431560.52	33.44	-0.22	Mowed Grass
P22	809468.29	3431567.18	33.74	809468.29	3431567.18	33.55	-0.19	Mowed Grass
P23	809468.47	3431574.43	33.72	809468.47	3431574.43	33.51	-0.21	Mowed Grass
P24	809468.37	3431580.82	33.66	809468.37	3431580.82	33.47	-0.19	Mowed Grass
P25	809467.91	3431587.99	33.70	809467.91	3431587.99	33.48	-0.22	Mowed Grass
P26	809467.45	3431594.86	33.68	809467.45	3431594.86	33.49	-0.19	Mowed Grass
P27	809467.13	3431602.24	33.69	809467.13	3431602.24	33.51	-0.18	Mowed Grass
P28	809466.89	3431609.18	33.75	809466.89	3431609.18	33.54	-0.21	Mowed Grass
P29	809473.25	3431608.90	33.76	809473.25	3431608.90	33.54	-0.22	Mowed Grass
P30	809473.95	3431601.71	33.67	809473.95	3431601.71	33.48	-0.19	Mowed Grass
P31	809474.69	3431594.79	33.67	809474.69	3431594.79	33.48	-0.19	Mowed Grass
P32	809475.32	3431587.87	33.73	809475.32	3431587.87	33.50	-0.23	Mowed Grass
P33	809476.36	3431580.83	33.70	809476.36	3431580.83	33.47	-0.23	Mowed Grass
P34	809477.42	3431573.68	33.66	809477.42	3431573.68	33.46	-0.20	Mowed Grass
P35	809478.35	3431566.48	33.70	809478.35	3431566.48	33.48	-0.21	Mowed Grass
P36	809479.51	3431559.47	33.71	809479.51	3431559.47	33.48	-0.23	Mowed Grass
P37	809481.23	3431553.54	33.70	809481.23	3431553.54	33.47	-0.23	Mowed Grass
P38	809487.89	3431553.94	33.69	809487.89	3431553.94	33.50	-0.19	Mowed Grass
P39	809487.91	3431560.79	33.67	809487.91	3431560.79	33.51	-0.16	Mowed Grass
P40	809487.59	3431567.89	33.73	809487.59	3431567.89	33.54	-0.18	Mowed Grass
P41	809487.41	3431574.80	33.65	809487.41	3431574.80	33.46	-0.19	Mowed Grass
P42	809487.26	3431582.03	33.65	809487.26	3431582.03	33.50	-0.15	Mowed Grass
P43	809487.14	3431589.55	33.67	809487.14	3431589.55	33.46	-0.22	Mowed Grass
P44	809487.01	3431596.59	33.68	809487.01	3431596.59	33.49	-0.19	Mowed Grass
P45	809486.79	3431604.12	33.71	809486.79	3431604.12	33.50	-0.21	Mowed Grass
P46	809486.93	3431610.47	33.72	809486.93	3431610.47	33.51	-0.21	Mowed Grass
P47	809493.64	3431610.23	33.75	809493.64	3431610.23	33.57	-0.19	Mowed Grass
P48	809493.67	3431604.63	33.73	809493.67	3431604.63	33.56	-0.17	Mowed Grass

P49	809494.14	3431598.40	33.71	809494.14	3431598.40	33.49	-0.23	Mowed Grass
P50	809494.34	3431592.21	33.71	809494.34	3431592.21	33.52	-0.19	Mowed Grass
P51	809494.56	3431586.18	33.62	809494.56	3431586.18	33.48	-0.14	Mowed Grass
P52	809495.21	3431580.15	33.68	809495.21	3431580.15	33.49	-0.19	Mowed Grass
P53	809495.94	3431574.18	33.71	809495.94	3431574.18	33.54	-0.17	Mowed Grass
P54	809496.61	3431568.10	33.62	809496.61	3431568.10	33.45	-0.17	Mowed Grass
P55	809497.30	3431562.23	33.71	809497.30	3431562.23	33.45	-0.27	Mowed Grass
P56	809498.08	3431555.99	33.73	809498.08	3431555.99	33.45	-0.28	Mowed Grass
P57	809503.57	3431555.71	33.73	809503.57	3431555.71	33.46	-0.26	Mowed Grass
P58	809503.46	3431561.82	33.70	809503.46	3431561.82	33.47	-0.22	Mowed Grass
P59	809503.64	3431567.78	33.65	809503.64	3431567.78	33.45	-0.19	Mowed Grass
P60	809503.89	3431573.53	33.71	809503.89	3431573.53	33.47	-0.25	Mowed Grass
P61	809503.95	3431579.45	33.67	809503.95	3431579.45	33.45	-0.22	Mowed Grass
P62	809504.04	3431585.66	33.68	809504.04	3431585.66	33.44	-0.24	Mowed Grass
P63	809504.51	3431591.83	33.66	809504.51	3431591.83	33.45	-0.21	Mowed Grass
P64	809504.78	3431597.53	33.66	809504.78	3431597.53	33.47	-0.19	Mowed Grass
P65	809504.82	3431603.11	33.69	809504.82	3431603.11	33.49	-0.20	Mowed Grass
P66	809504.86	3431609.24	33.76	809504.86	3431609.24	33.57	-0.20	Mowed Grass
P67	809504.64	3431614.89	33.79	809504.64	3431614.89	33.63	-0.16	Mowed Grass
D1	805343.41	3360909.88	7.26	805343.41	3360909.88	7.10	-0.16	Mowed Grass
D2	805345.32	3360915.90	7.28	805345.32	3360915.90	7.08	-0.21	Mowed Grass
D3	805347.56	3360921.25	7.34	805347.56	3360921.25	7.18	-0.16	Mowed Grass
D4	805349.68	3360927.08	7.31	805349.68	3360927.08	6.93	-0.38	Mowed Grass
D5	805351.67	3360932.55	7.35	805351.67	3360932.55	7.25	-0.09	Mowed Grass
D6	805353.70	3360938.30	7.29	805353.70	3360938.30	7.22	-0.06	Mowed Grass
D7	805355.76	3360943.79	7.31	805355.76	3360943.79	6.96	-0.36	Mowed Grass
D8	805357.82	3360949.43	7.25	805357.82	3360949.43	6.95	-0.30	Mowed Grass
D9	805359.74	3360955.01	7.33	805359.74	3360955.01	7.22	-0.11	Mowed Grass
D10	805361.85	3360960.70	7.33	805361.85	3360960.70	7.04	-0.29	Mowed Grass
D11	805356.26	3360962.43	7.18	805356.26	3360962.43	7.14	-0.04	Mowed Grass
D12	805354.09	3360956.64	7.16	805354.09	3360956.64	7.11	-0.05	Mowed Grass
D13	805351.96	3360951.00	7.22	805351.96	3360951.00	7.11	-0.11	Mowed Grass
D14	805350.00	3360945.54	7.21	805350.00	3360945.54	7.15	-0.06	Mowed Grass
D15	805347.82	3360939.96	7.29	805347.82	3360939.96	7.22	-0.08	Mowed Grass

D16	805345.76	3360934.45	7.28	805345.76	3360934.45	7.21	-0.06	Mowed Grass
D17	805343.81	3360928.86	7.28	805343.81	3360928.86	7.25	-0.02	Mowed Grass
D18	805341.79	3360923.37	7.33	805341.79	3360923.37	7.30	-0.02	Mowed Grass
D19	805339.42	3360916.98	7.30	805339.42	3360916.98	7.25	-0.05	Mowed Grass
D20	805337.28	3360911.75	7.28	805337.28	3360911.75	7.26	-0.02	Mowed Grass
D21	805331.94	3360913.84	7.25	805331.94	3360913.84	7.23	-0.03	Mowed Grass
D22	805334.14	3360919.59	7.30	805334.14	3360919.59	7.27	-0.03	Mowed Grass
D23	805336.32	3360925.22	7.32	805336.32	3360925.22	7.24	-0.08	Mowed Grass
D24	805338.57	3360930.95	7.28	805338.57	3360930.95	7.24	-0.05	Mowed Grass
D25	805340.66	3360936.48	7.29	805340.66	3360936.48	7.21	-0.09	Mowed Grass
D26	805342.93	3360941.94	7.24	805342.93	3360941.94	7.23	-0.01	Mowed Grass
D27	805345.02	3360947.44	7.26	805345.02	3360947.44	7.18	-0.07	Mowed Grass
D28	805347.58	3360953.08	7.20	805347.58	3360953.08	7.14	-0.06	Mowed Grass
D29	805349.71	3360958.60	7.19	805349.71	3360958.60	7.12	-0.08	Mowed Grass
D30	805351.63	3360963.97	7.16	805351.63	3360963.97	7.08	-0.08	Mowed Grass
D31	805353.46	3360968.75	7.14	805353.46	3360968.75	7.08	-0.06	Mowed Grass
D32	805348.05	3360970.75	7.18	805348.05	3360970.75	7.09	-0.09	Mowed Grass
D33	805345.93	3360965.43	7.15	805345.93	3360965.43	7.08	-0.08	Mowed Grass
D34	805343.64	3360959.86	7.16	805343.64	3360959.86	7.11	-0.05	Mowed Grass
D35	805341.54	3360954.02	7.20	805341.54	3360954.02	7.18	-0.02	Mowed Grass
D36	805339.15	3360948.29	7.26	805339.15	3360948.29	7.23	-0.03	Mowed Grass
D37	805337.10	3360942.56	7.25	805337.10	3360942.56	7.19	-0.06	Mowed Grass
D38	805335.05	3360937.20	7.23	805335.05	3360937.20	7.23	0.00	Mowed Grass
D39	805333.02	3360931.75	7.21	805333.02	3360931.75	7.19	-0.02	Mowed Grass
D40	805331.06	3360925.88	7.29	805331.06	3360925.88	7.20	-0.08	Mowed Grass
D41	805329.02	3360920.00	7.30	805329.02	3360920.00	7.22	-0.08	Mowed Grass
D42	805327.15	3360915.08	7.30	805327.15	3360915.08	7.16	-0.14	Mowed Grass
D43	805321.46	3360917.25	7.30	805321.46	3360917.25	7.19	-0.11	Mowed Grass
D44	805323.63	3360922.91	7.32	805323.63	3360922.91	7.25	-0.07	Mowed Grass
D45	805325.68	3360928.56	7.37	805325.68	3360928.56	7.29	-0.08	Mowed Grass
D46	805327.83	3360934.25	7.30	805327.83	3360934.25	7.13	-0.18	Mowed Grass
D47	805329.69	3360939.82	7.31	805329.69	3360939.82	7.17	-0.14	Mowed Grass
D48	805331.78	3360945.96	7.25	805331.78	3360945.96	7.20	-0.05	Mowed Grass
D49	805333.69	3360951.52	7.21	805333.69	3360951.52	7.18	-0.02	Mowed Grass

D50	805335.89	3360956.91	7.12	805335.89	3360956.91	7.07	-0.05	Mowed Grass
D51	805338.08	3360962.31	7.17	805338.08	3360962.31	7.11	-0.06	Mowed Grass
D52	805339.95	3360967.65	7.11	805339.95	3360967.65	7.09	-0.03	Mowed Grass
D53	805341.76	3360972.59	7.09	805341.76	3360972.59	7.09	0.00	Mowed Grass
D54	805334.94	3360974.82	7.08	805334.94	3360974.82	7.06	-0.02	Mowed Grass
D55	805333.13	3360969.44	7.11	805333.13	3360969.44	7.10	-0.01	Mowed Grass
D56	805331.29	3360963.99	7.12	805331.29	3360963.99	7.08	-0.04	Mowed Grass
D57	805329.47	3360958.18	7.11	805329.47	3360958.18	7.09	-0.01	Mowed Grass
D58	805327.73	3360952.67	7.19	805327.73	3360952.67	7.14	-0.05	Mowed Grass
D59	805325.91	3360946.95	7.22	805325.91	3360946.95	7.20	-0.02	Mowed Grass
D60	805324.06	3360941.16	7.23	805324.06	3360941.16	7.24	0.01	Mowed Grass
D61	805322.22	3360935.55	7.25	805322.22	3360935.55	7.25	0.00	Mowed Grass
D62	805320.35	3360929.82	7.29	805320.35	3360929.82	7.29	-0.01	Mowed Grass
D63	805318.45	3360924.07	7.25	805318.45	3360924.07	7.28	0.02	Mowed Grass
D64	805317.10	3360917.14	7.30	805317.10	3360917.14	7.20	-0.10	Mowed Grass
C1	819773.29	3348709.83	1.48	819773.29	3348709.83	1.66	0.18	Mowed Grass
C2	819773.35	3348711.20	1.79	819773.35	3348711.20	1.71	-0.08	Mowed Grass
C3	819778.63	3348715.37	1.91	819778.63	3348715.37	1.77	-0.14	Mowed Grass
C4	819783.74	3348718.91	2.01	819783.74	3348718.91	1.85	-0.16	Mowed Grass
C5	819788.91	3348723.49	2.02	819788.91	3348723.49	1.84	-0.18	Mowed Grass
C6	819792.88	3348726.78	2.11	819792.88	3348726.78	1.90	-0.21	Mowed Grass
C7	819797.03	3348721.84	1.95	819797.03	3348721.84	1.81	-0.15	Mowed Grass
C8	819792.13	3348717.42	1.94	819792.13	3348717.42	1.74	-0.20	Mowed Grass
C9	819786.63	3348713.13	1.87	819786.63	3348713.13	1.73	-0.14	Mowed Grass
C10	819781.39	3348709.03	1.79	819781.39	3348709.03	1.63	-0.16	Mowed Grass
C11	819776.73	3348705.51	1.76	819776.73	3348705.51	1.58	-0.18	Mowed Grass
C12	819781.19	3348700.68	1.77	819781.19	3348700.68	1.45	-0.32	Mowed Grass
C13	819786.34	3348704.54	1.73	819786.34	3348704.54	1.58	-0.15	Mowed Grass
C14	819791.48	3348708.31	1.81	819791.48	3348708.31	1.61	-0.20	Mowed Grass
C15	819796.69	3348712.26	1.81	819796.69	3348712.26	1.68	-0.13	Mowed Grass
C16	819800.86	3348716.00	1.96	819800.86	3348716.00	1.77	-0.20	Mowed Grass
C17	819804.58	3348711.57	1.81	819804.58	3348711.57	1.74	-0.07	Mowed Grass
C18	819799.83	3348708.27	1.77	819799.83	3348708.27	1.57	-0.20	Mowed Grass
C19	819794.72	3348704.26	1.74	819794.72	3348704.26	1.49	-0.26	Mowed Grass

C20	819789.71	3348700.70	1.64	819789.71	3348700.70	1.45	-0.19	Mowed Grass
C21	819784.64	3348697.26	1.67	819784.64	3348697.26	1.44	-0.22	Mowed Grass
C22	819788.77	3348692.95	1.66	819788.77	3348692.95	1.48	-0.18	Mowed Grass
C23	819793.20	3348696.30	1.67	819793.20	3348696.30	1.46	-0.21	Mowed Grass
C24	819798.36	3348700.18	1.71	819798.36	3348700.18	1.51	-0.20	Mowed Grass
C25	819803.00	3348703.67	1.68	819803.00	3348703.67	1.53	-0.16	Mowed Grass
C26	819806.76	3348707.05	1.75	819806.76	3348707.05	1.60	-0.15	Mowed Grass
A1	778478.64	3325273.16	2.03	778478.64	3325273.16	1.97	-0.06	Mowed Grass
A2	778485.24	3325274.60	2.03	778485.24	3325274.60	1.97	-0.06	Mowed Grass
A3	778492.36	3325276.25	2.03	778492.36	3325276.25	1.99	-0.03	Mowed Grass
A4	778498.21	3325277.51	2.07	778498.21	3325277.51	2.01	-0.06	Mowed Grass
A5	778504.11	3325278.91	2.09	778504.11	3325278.91	2.12	0.04	Mowed Grass
A6	778509.95	3325280.05	2.10	778509.95	3325280.05	2.06	-0.05	Mowed Grass
A7	778515.30	3325281.25	2.09	778515.30	3325281.25	2.02	-0.07	Mowed Grass
A8	778516.16	3325275.52	2.12	778516.16	3325275.52	2.16	0.05	Mowed Grass
A9	778510.64	3325273.58	2.12	778510.64	3325273.58	2.06	-0.06	Mowed Grass
A10	778504.91	3325271.71	2.09	778504.91	3325271.71	2.06	-0.04	Mowed Grass
A11	778499.12	3325269.71	2.02	778499.12	3325269.71	2.05	0.04	Mowed Grass
A12	778493.43	3325268.10	2.07	778493.43	3325268.10	2.05	-0.02	Mowed Grass
A13	778487.63	3325266.53	2.04	778487.63	3325266.53	2.00	-0.04	Mowed Grass
A14	778483.12	3325264.81	2.06	778483.12	3325264.81	2.01	-0.05	Mowed Grass
A15	778484.81	3325259.56	2.09	778484.81	3325259.56	2.09	0.00	Mowed Grass
A16	778490.52	3325261.20	2.11	778490.52	3325261.20	2.11	0.00	Mowed Grass
A17	778496.06	3325262.94	2.12	778496.06	3325262.94	2.09	-0.03	Mowed Grass
A18	778501.50	3325264.56	2.09	778501.50	3325264.56	2.09	0.01	Mowed Grass
A19	778507.12	3325266.23	2.09	778507.12	3325266.23	2.07	-0.02	Mowed Grass
A20	778512.76	3325267.91	2.16	778512.76	3325267.91	2.12	-0.04	Mowed Grass
A21	778516.39	3325268.73	2.16	778516.39	3325268.73	2.16	-0.01	Mowed Grass
A22	778517.90	3325263.57	2.25	778517.90	3325263.57	2.25	0.00	Mowed Grass
A23	778512.21	3325261.33	2.23	778512.21	3325261.33	2.15	-0.08	Mowed Grass
A24	778506.86	3325259.03	2.22	778506.86	3325259.03	2.17	-0.05	Mowed Grass
A25	778501.49	3325256.76	2.28	778501.49	3325256.76	2.29	0.02	Mowed Grass
A26	778495.98	3325254.25	2.28	778495.98	3325254.25	2.23	-0.06	Mowed Grass
A27	778491.44	3325251.97	2.25	778491.44	3325251.97	2.17	-0.08	Mowed Grass

A28	778488.21	3325249.74	2.31	778488.21	3325249.74	2.22	-0.09	Mowed Grass
A29	778491.19	3325245.80	2.35	778491.19	3325245.80	2.28	-0.07	Mowed Grass
A30	778496.34	3325248.35	2.28	778496.34	3325248.35	2.19	-0.09	Mowed Grass
A31	778501.41	3325250.97	2.28	778501.41	3325250.97	2.30	0.03	Mowed Grass
A32	778506.49	3325253.92	2.28	778506.49	3325253.92	2.27	-0.02	Mowed Grass
A33	778511.23	3325256.72	2.28	778511.23	3325256.72	2.18	-0.11	Mowed Grass
A34	778516.08	3325259.75	2.31	778516.08	3325259.75	2.16	-0.14	Mowed Grass
A35	778517.70	3325255.78	2.33	778517.70	3325255.78	2.03	-0.31	Mowed Grass
A36	778513.04	3325252.70	2.39	778513.04	3325252.70	2.12	-0.27	Mowed Grass
A37	778508.33	3325249.59	2.40	778508.33	3325249.59	2.20	-0.20	Mowed Grass
A38	778503.60	3325246.40	2.46	778503.60	3325246.40	2.29	-0.16	Mowed Grass
A39	778498.51	3325242.86	2.42	778498.51	3325242.86	2.26	-0.16	Mowed Grass
G182	795549.51	3371161.17	12.97	795549.51	3371161.17	12.52	-0.45	Trees and Brush
G183	795544.49	3371162.41	12.96	795544.49	3371162.41	12.61	-0.35	Trees and Brush
G184	795540.29	3371163.10	12.97	795540.29	3371163.10	12.51	-0.46	Trees and Brush
G185	795534.85	3371163.76	13.05	795534.85	3371163.76	12.51	-0.54	Trees and Brush
G186	795529.78	3371164.75	13.05	795529.78	3371164.75	12.53	-0.52	Trees and Brush
G187	795525.24	3371166.57	13.02	795525.24	3371166.57	12.79	-0.23	Trees and Brush
G188	795524.92	3371171.13	13.08	795524.92	3371171.13	12.97	-0.12	Trees and Brush
G189	795530.48	3371171.73	13.06	795530.48	3371171.73	12.98	-0.09	Trees and Brush
G190	795535.22	3371170.97	13.09	795535.22	3371170.97	12.91	-0.18	Trees and Brush
G191	795541.76	3371170.48	12.96	795541.76	3371170.48	12.76	-0.19	Trees and Brush
G192	795546.38	3371167.60	12.91	795546.38	3371167.60	12.64	-0.27	Trees and Brush
G193	795549.85	3371166.07	12.88	795549.85	3371166.07	12.66	-0.22	Trees and Brush
G194	795551.56	3371171.23	12.99	795551.56	3371171.23	12.56	-0.43	Trees and Brush
G195	795546.56	3371173.67	12.97	795546.56	3371173.67	12.60	-0.37	Trees and Brush
G196	795542.76	3371175.44	13.04	795542.76	3371175.44	12.65	-0.39	Trees and Brush
G197	795535.58	3371176.29	13.08	795535.58	3371176.29	12.84	-0.24	Trees and Brush
G198	795528.73	3371179.53	13.01	795528.73	3371179.53	12.84	-0.17	Trees and Brush
G199	795524.62	3371179.94	13.04	795524.62	3371179.94	12.87	-0.17	Trees and Brush
G200	795525.53	3371185.13	13.06	795525.53	3371185.13	12.77	-0.29	Trees and Brush
G201	795531.46	3371183.45	13.03	795531.46	3371183.45	12.77	-0.26	Trees and Brush
G202	795535.39	3371181.83	13.01	795535.39	3371181.83	12.81	-0.20	Trees and Brush
G203	795541.96	3371180.34	12.97	795541.96	3371180.34	12.67	-0.30	Trees and Brush

G204	795547.59	3371177.77	13.00	795547.59	3371177.77	12.66	-0.34	Trees and Brush
G205	795551.93	3371175.71	13.01	795551.93	3371175.71	12.56	-0.44	Trees and Brush
G206	795554.09	3371179.76	13.16	795554.09	3371179.76	12.64	-0.51	Trees and Brush
G207	795548.81	3371181.76	12.99	795548.81	3371181.76	12.67	-0.32	Trees and Brush
G208	795543.27	3371184.32	12.98	795543.27	3371184.32	12.76	-0.22	Trees and Brush
G209	795533.16	3371187.10	13.07	795533.16	3371187.10	12.80	-0.27	Trees and Brush
G210	795529.23	3371188.15	12.96	795529.23	3371188.15	12.83	-0.14	Trees and Brush
O122	790485.33	3429255.20	62.39	790485.33	3429255.20	62.18	-0.20	Trees and Brush
O123	790480.48	3429251.75	62.37	790480.48	3429251.75	62.12	-0.25	Trees and Brush
O124	790475.30	3429248.42	62.34	790475.30	3429248.42	62.00	-0.34	Trees and Brush
O125	790471.65	3429244.69	62.14	790471.65	3429244.69	62.06	-0.08	Trees and Brush
O126	790469.64	3429250.01	62.11	790469.64	3429250.01	61.91	-0.20	Trees and Brush
O127	790473.12	3429252.40	62.19	790473.12	3429252.40	61.91	-0.28	Trees and Brush
O128	790475.54	3429254.39	62.27	790475.54	3429254.39	61.98	-0.29	Trees and Brush
O129	790479.65	3429258.25	62.44	790479.65	3429258.25	62.09	-0.36	Trees and Brush
O130	790483.53	3429261.27	62.60	790483.53	3429261.27	62.08	-0.52	Trees and Brush
O131	790480.93	3429266.02	62.46	790480.93	3429266.02	62.01	-0.45	Trees and Brush
O132	790476.15	3429262.87	62.26	790476.15	3429262.87	61.96	-0.30	Trees and Brush
O133	790471.31	3429258.97	62.17	790471.31	3429258.97	61.90	-0.27	Trees and Brush
O134	790466.69	3429257.06	62.12	790466.69	3429257.06	61.73	-0.39	Trees and Brush
O135	790462.43	3429260.65	62.09	790462.43	3429260.65	61.73	-0.36	Trees and Brush
O136	790467.48	3429263.32	62.22	790467.48	3429263.32	62.00	-0.22	Trees and Brush
O137	790471.70	3429267.47	62.25	790471.70	3429267.47	61.99	-0.26	Trees and Brush
O138	790474.57	3429272.06	62.28	790474.57	3429272.06	62.07	-0.21	Trees and Brush
O139	790470.76	3429276.56	62.30	790470.76	3429276.56	62.12	-0.19	Trees and Brush
O140	790468.76	3429271.75	62.22	790468.76	3429271.75	61.98	-0.24	Trees and Brush
O141	790464.81	3429266.12	62.15	790464.81	3429266.12	61.86	-0.29	Trees and Brush
O142	790459.92	3429263.26	62.07	790459.92	3429263.26	61.71	-0.36	Trees and Brush
O143	790457.18	3429260.56	61.99	790457.18	3429260.56	61.68	-0.31	Trees and Brush
O144	790452.77	3429263.77	62.01	790452.77	3429263.77	61.75	-0.26	Trees and Brush
O145	790456.00	3429267.12	62.07	790456.00	3429267.12	61.77	-0.30	Trees and Brush
O146	790459.68	3429272.31	62.18	790459.68	3429272.31	61.89	-0.29	Trees and Brush
O147	790464.06	3429278.63	62.33	790464.06	3429278.63	62.01	-0.31	Trees and Brush
O148	790465.99	3429282.95	62.29	790465.99	3429282.95	61.94	-0.34	Trees and Brush

H144	817889.51	3375645.40	14.19	817889.51	3375645.40	14.20	0.01	Trees and Brush
H145	817892.41	3375643.01	14.12	817892.41	3375643.01	14.04	-0.08	Trees and Brush
H146	817895.02	3375635.75	13.91	817895.02	3375635.75	14.00	0.09	Trees and Brush
H147	817898.40	3375630.08	13.80	817898.40	3375630.08	13.75	-0.05	Trees and Brush
H148	817901.57	3375623.94	13.61	817901.57	3375623.94	13.39	-0.22	Trees and Brush
H149	817902.37	3375618.04	13.32	817902.37	3375618.04	13.32	0.00	Trees and Brush
H150	817896.67	3375622.44	13.45	817896.67	3375622.44	13.46	0.01	Trees and Brush
H151	817893.35	3375625.79	13.56	817893.35	3375625.79	13.49	-0.07	Trees and Brush
H152	817891.58	3375629.41	13.73	817891.58	3375629.41	13.66	-0.07	Trees and Brush
H153	817887.92	3375635.93	13.97	817887.92	3375635.93	14.12	0.14	Trees and Brush
H154	817884.40	3375638.97	14.10	817884.40	3375638.97	14.28	0.18	Trees and Brush
H155	817887.15	3375641.92	14.12	817887.15	3375641.92	14.32	0.20	Trees and Brush
H156	817883.63	3375646.30	14.27	817883.63	3375646.30	14.11	-0.16	Trees and Brush
H157	817879.33	3375642.97	14.06	817879.33	3375642.97	14.15	0.09	Trees and Brush
B228	802559.10	3331314.59	1.01	802559.10	3331314.59	0.76	-0.25	Trees and Brush
B229	802559.15	3331319.96	1.03	802559.15	3331319.96	0.87	-0.16	Trees and Brush
B230	802560.23	3331325.32	1.06	802560.23	3331325.32	0.82	-0.24	Trees and Brush
B231	802565.14	3331324.89	1.01	802565.14	3331324.89	0.93	-0.08	Trees and Brush
B232	802564.25	3331319.64	0.94	802564.25	3331319.64	0.87	-0.06	Trees and Brush
B233	802564.32	3331314.88	0.84	802564.32	3331314.88	0.79	-0.06	Trees and Brush
B234	802569.97	3331313.90	0.83	802569.97	3331313.90	0.80	-0.03	Trees and Brush
B235	802571.15	3331319.11	0.88	802571.15	3331319.11	0.84	-0.04	Trees and Brush
B236	802572.66	3331323.89	0.93	802572.66	3331323.89	0.88	-0.04	Trees and Brush
B237	802578.15	3331323.12	0.94	802578.15	3331323.12	0.84	-0.10	Trees and Brush
B238	802577.87	3331317.97	0.83	802577.87	3331317.97	0.85	0.02	Trees and Brush
B239	802576.70	3331311.55	0.80	802576.70	3331311.55	0.81	0.01	Trees and Brush
B240	802581.92	3331309.77	0.89	802581.92	3331309.77	0.82	-0.07	Trees and Brush
B241	802583.44	3331315.99	0.91	802583.44	3331315.99	0.69	-0.22	Trees and Brush
B242	802584.89	3331320.08	0.96	802584.89	3331320.08	0.87	-0.09	Trees and Brush
B243	802590.61	3331318.80	0.98	802590.61	3331318.80	0.80	-0.18	Trees and Brush
B244	802589.64	3331314.69	0.84	802589.64	3331314.69	0.54	-0.30	Trees and Brush
B245	802589.09	3331310.06	0.79	802589.09	3331310.06	0.65	-0.15	Trees and Brush
B246	802594.56	3331308.64	0.87	802594.56	3331308.64	0.78	-0.10	Trees and Brush
B247	802595.85	3331313.34	0.84	802595.85	3331313.34	0.60	-0.24	Trees and Brush

B248	802596.69	3331316.42	0.84	802596.69	3331316.42	0.67	-0.18	Trees and Brush
K185	782373.55	3403063.79	35.92	782373.55	3403063.79	36.03	0.11	Trees and Brush
K186	782370.17	3403066.93	35.95	782370.17	3403066.93	35.97	0.02	Trees and Brush
K187	782363.74	3403071.17	35.90	782363.74	3403071.17	35.96	0.06	Trees and Brush
K188	782358.89	3403074.14	35.91	782358.89	3403074.14	36.18	0.27	Trees and Brush
K189	782365.26	3403077.54	35.79	782365.26	3403077.54	35.91	0.13	Trees and Brush
K190	782371.15	3403072.86	35.97	782371.15	3403072.86	35.87	-0.10	Trees and Brush
K191	782375.52	3403070.10	35.93	782375.52	3403070.10	35.84	-0.09	Trees and Brush
K192	782379.33	3403075.45	36.11	782379.33	3403075.45	35.97	-0.14	Trees and Brush
K193	782374.92	3403078.50	36.07	782374.92	3403078.50	35.90	-0.17	Trees and Brush
K194	782368.93	3403082.30	35.98	782368.93	3403082.30	35.91	-0.07	Trees and Brush
K195	782367.61	3403083.20	35.85	782367.61	3403083.20	35.93	0.08	Trees and Brush
K196	782371.19	3403088.18	36.10	782371.19	3403088.18	35.95	-0.14	Trees and Brush
K197	782376.57	3403081.65	36.21	782376.57	3403081.65	36.00	-0.21	Trees and Brush
K198	782380.97	3403076.89	36.07	782380.97	3403076.89	35.99	-0.08	Trees and Brush
H1	817893.64	3375680.24	14.32	817893.64	3375680.24	14.13	-0.19	Limestone
H2	817892.55	3375681.65	14.31	817892.55	3375681.65	14.14	-0.17	Limestone
H3	817891.35	3375683.21	14.27	817891.35	3375683.21	14.20	-0.07	Limestone
H4	817889.95	3375685.08	14.27	817889.95	3375685.08	14.20	-0.07	Limestone
H5	817886.17	3375690.04	14.22	817886.17	3375690.04	14.06	-0.16	Limestone
H6	817883.97	3375692.97	14.20	817883.97	3375692.97	14.05	-0.15	Limestone
H7	817881.55	3375696.24	14.17	817881.55	3375696.24	13.97	-0.19	Limestone
H8	817878.86	3375699.83	14.15	817878.86	3375699.83	14.00	-0.15	Limestone
H9	817872.69	3375708.07	14.12	817872.69	3375708.07	14.03	-0.09	Limestone
H10	817869.19	3375712.70	14.13	817869.19	3375712.70	13.98	-0.15	Limestone
H11	817865.42	3375717.84	14.16	817865.42	3375717.84	14.00	-0.16	Limestone
H12	817861.38	3375723.40	14.20	817861.38	3375723.40	14.12	-0.08	Limestone
H13	817857.14	3375729.35	14.19	817857.14	3375729.35	14.03	-0.16	Limestone
H14	817852.63	3375735.54	14.21	817852.63	3375735.54	14.04	-0.17	Limestone
H15	817847.90	3375741.99	14.22	817847.90	3375741.99	13.96	-0.26	Limestone
H16	817843.03	3375748.56	14.24	817843.03	3375748.56	14.13	-0.11	Limestone
H17	817838.16	3375755.25	14.26	817838.16	3375755.25	14.18	-0.08	Limestone
H18	817833.22	3375762.03	14.30	817833.22	3375762.03	14.09	-0.21	Limestone
H19	817828.18	3375768.93	14.32	817828.18	3375768.93	14.09	-0.23	Limestone

H20	817823.06	3375775.91	14.35	817823.06	3375775.91	14.15	-0.20	Limestone
H21	817817.86	3375783.03	14.36	817817.86	3375783.03	14.16	-0.20	Limestone
H22	817839.44	3375745.54	14.22	817839.44	3375745.54	14.05	-0.17	Limestone
H23	817841.89	3375743.50	14.21	817841.89	3375743.50	14.13	-0.08	Limestone
H24	817844.52	3375740.54	14.18	817844.52	3375740.54	13.95	-0.23	Limestone
H25	817847.38	3375736.98	14.19	817847.38	3375736.98	14.00	-0.20	Limestone
H26	817850.57	3375732.80	14.20	817850.57	3375732.80	13.90	-0.30	Limestone
H27	817854.11	3375727.97	14.19	817854.11	3375727.97	13.98	-0.21	Limestone
H28	817858.02	3375722.59	14.17	817858.02	3375722.59	14.04	-0.12	Limestone
H29	817862.26	3375716.70	14.16	817862.26	3375716.70	13.89	-0.27	Limestone
H30	817866.96	3375710.29	14.11	817866.96	3375710.29	13.85	-0.26	Limestone
H31	817872.02	3375703.46	14.12	817872.02	3375703.46	13.96	-0.15	Limestone
H32	817877.31	3375696.27	14.15	817877.31	3375696.27	14.00	-0.15	Limestone
H33	817882.78	3375688.77	14.21	817882.78	3375688.77	14.05	-0.16	Limestone
H34	817888.52	3375681.00	14.29	817888.52	3375681.00	14.16	-0.12	Limestone
H35	817894.45	3375672.89	14.37	817894.45	3375672.89	14.26	-0.11	Limestone
H36	817900.59	3375664.49	14.49	817900.59	3375664.49	14.30	-0.19	Limestone
H37	817913.37	3375647.07	14.80	817913.37	3375647.07	14.65	-0.15	Limestone
H38	817919.97	3375638.11	15.02	817919.97	3375638.11	14.73	-0.30	Limestone
H39	817926.72	3375629.02	15.24	817926.72	3375629.02	15.07	-0.16	Limestone
H40	817933.56	3375619.78	15.50	817933.56	3375619.78	15.34	-0.16	Limestone
H41	817940.47	3375610.40	15.77	817940.47	3375610.40	15.61	-0.16	Limestone
H42	817947.47	3375600.90	16.05	817947.47	3375600.90	15.88	-0.17	Limestone
H43	817954.57	3375591.31	16.35	817954.57	3375591.31	16.11	-0.24	Limestone
H44	817961.74	3375581.52	16.60	817961.74	3375581.52	16.40	-0.19	Limestone
H45	817969.07	3375571.56	16.80	817969.07	3375571.56	16.66	-0.14	Limestone
H46	818038.93	3375476.80	17.30	818038.93	3375476.80	14.44	-2.86	Limestone
H47	818047.05	3375465.90	17.20	818047.05	3375465.90	17.08	-0.13	Limestone
H48	818055.06	3375455.03	17.06	818055.06	3375455.03	16.86	-0.20	Limestone
H49	818063.00	3375444.15	16.91	818063.00	3375444.15	16.77	-0.14	Limestone
H50	818070.94	3375433.31	16.71	818070.94	3375433.31	16.58	-0.13	Limestone
H51	818078.87	3375422.44	16.44	818078.87	3375422.44	16.30	-0.14	Limestone
H52	818094.94	3375400.41	15.74	818094.94	3375400.41	15.62	-0.12	Limestone
H53	818103.22	3375389.06	15.38	818103.22	3375389.06	15.22	-0.17	Limestone

H54	818111.64	3375377.46	15.03	818111.64	3375377.46	14.88	-0.15	Limestone
H55	818120.24	3375365.67	14.72	818120.24	3375365.67	14.52	-0.21	Limestone
H56	818129.04	3375353.70	14.41	818129.04	3375353.70	14.24	-0.17	Limestone
H57	818137.92	3375341.51	14.16	818137.92	3375341.51	13.98	-0.17	Limestone
H58	818146.91	3375329.13	13.91	818146.91	3375329.13	13.76	-0.15	Limestone
H59	818156.00	3375316.62	13.73	818156.00	3375316.62	13.53	-0.20	Limestone
H60	818165.24	3375303.99	13.57	818165.24	3375303.99	13.36	-0.22	Limestone
H61	818174.60	3375291.22	13.52	818174.60	3375291.22	13.40	-0.12	Limestone
H62	818184.02	3375278.35	13.48	818184.02	3375278.35	13.30	-0.17	Limestone
H63	818193.55	3375265.38	13.43	818193.55	3375265.38	13.22	-0.20	Limestone
H64	818203.12	3375252.30	13.28	818203.12	3375252.30	13.11	-0.17	Limestone
H65	818212.61	3375239.23	13.17	818212.61	3375239.23	12.94	-0.23	Limestone
H66	818221.97	3375226.25	13.05	818221.97	3375226.25	12.91	-0.14	Limestone
H67	818263.02	3375178.82	12.82	818263.02	3375178.82	12.60	-0.22	Limestone
H68	818260.01	3375181.31	12.86	818260.01	3375181.31	12.62	-0.23	Limestone
H69	818256.67	3375185.11	12.85	818256.67	3375185.11	12.63	-0.23	Limestone
H70	818252.94	3375190.07	12.88	818252.94	3375190.07	12.68	-0.20	Limestone
H71	818248.58	3375195.99	12.92	818248.58	3375195.99	12.68	-0.24	Limestone
H72	818243.58	3375202.82	12.94	818243.58	3375202.82	12.74	-0.20	Limestone
H73	818238.08	3375210.40	12.96	818238.08	3375210.40	12.78	-0.18	Limestone
H74	818232.08	3375218.70	13.01	818232.08	3375218.70	12.77	-0.24	Limestone
H75	818225.61	3375227.59	13.04	818225.61	3375227.59	12.89	-0.16	Limestone
H76	818218.77	3375236.99	13.12	818218.77	3375236.99	12.95	-0.18	Limestone
H77	818211.69	3375246.81	13.21	818211.69	3375246.81	13.02	-0.19	Limestone
H78	818204.35	3375256.98	13.32	818204.35	3375256.98	13.14	-0.19	Limestone
H79	818196.75	3375267.47	13.43	818196.75	3375267.47	13.20	-0.23	Limestone
H80	818188.86	3375278.30	13.50	818188.86	3375278.30	13.31	-0.20	Limestone
H81	818180.74	3375289.51	13.52	818180.74	3375289.51	13.29	-0.23	Limestone
H82	818172.27	3375301.02	13.53	818172.27	3375301.02	13.35	-0.19	Limestone
H83	818163.47	3375312.83	13.65	818163.47	3375312.83	13.44	-0.22	Limestone
H84	818154.51	3375324.94	13.81	818154.51	3375324.94	13.64	-0.17	Limestone
H85	818145.43	3375337.29	14.03	818145.43	3375337.29	13.89	-0.14	Limestone
H86	818136.21	3375349.82	14.29	818136.21	3375349.82	14.15	-0.14	Limestone
H87	818126.82	3375362.64	14.60	818126.82	3375362.64	14.44	-0.16	Limestone

H88	818077.84	3375429.71	16.61	818077.84	3375429.71	16.43	-0.18	Limestone
H89	818012.02	3375518.99	17.47	818012.02	3375518.99	10.99	-6.48	Limestone
H90	818002.71	3375531.83	17.39	818002.71	3375531.83	11.67	-5.72	Limestone
H91	817993.40	3375544.57	17.31	817993.40	3375544.57	17.08	-0.22	Limestone
H92	817984.07	3375557.23	17.14	817984.07	3375557.23	16.84	-0.30	Limestone
C203	819766.20	3348758.07	2.47	819766.20	3348758.07	2.28	-0.18	Trees and Grass
C204	819761.54	3348754.76	2.45	819761.54	3348754.76	2.27	-0.18	Trees and Grass
C205	819756.65	3348751.18	2.40	819756.65	3348751.18	2.18	-0.22	Trees and Grass
C206	819751.36	3348748.10	2.35	819751.36	3348748.10	2.27	-0.09	Trees and Grass
C207	819746.28	3348744.64	2.43	819746.28	3348744.64	2.18	-0.26	Trees and Grass
C208	819740.96	3348741.24	2.35	819740.96	3348741.24	2.09	-0.26	Trees and Grass
C209	819735.99	3348737.39	2.34	819735.99	3348737.39	2.12	-0.22	Trees and Grass
C210	819732.18	3348741.43	2.32	819732.18	3348741.43	2.17	-0.15	Trees and Grass
C211	819736.83	3348745.13	2.33	819736.83	3348745.13	2.09	-0.25	Trees and Grass
C212	819741.13	3348747.92	2.34	819741.13	3348747.92	2.09	-0.24	Trees and Grass
C213	819746.35	3348751.61	2.37	819746.35	3348751.61	2.21	-0.16	Trees and Grass
C214	819751.88	3348755.26	2.38	819751.88	3348755.26	2.08	-0.30	Trees and Grass
C215	819756.78	3348758.64	2.36	819756.78	3348758.64	2.21	-0.15	Trees and Grass
C216	819762.19	3348762.92	2.35	819762.19	3348762.92	2.18	-0.17	Trees and Grass
C217	819759.23	3348768.43	2.20	819759.23	3348768.43	2.08	-0.12	Trees and Grass
C218	819753.98	3348765.07	2.29	819753.98	3348765.07	2.09	-0.20	Trees and Grass
C219	819748.55	3348762.16	2.35	819748.55	3348762.16	2.13	-0.22	Trees and Grass
C220	819743.09	3348759.17	2.36	819743.09	3348759.17	2.13	-0.23	Trees and Grass
C221	819738.51	3348757.73	2.45	819738.51	3348757.73	2.19	-0.27	Trees and Grass
C222	819732.75	3348756.31	2.43	819732.75	3348756.31	2.31	-0.12	Trees and Grass
C223	819728.57	3348753.83	2.51	819728.57	3348753.83	2.37	-0.15	Trees and Grass
C224	819723.21	3348751.38	2.54	819723.21	3348751.38	2.36	-0.18	Trees and Grass
C225	819720.06	3348756.38	2.51	819720.06	3348756.38	2.32	-0.19	Trees and Grass
C226	819725.73	3348758.83	2.50	819725.73	3348758.83	2.37	-0.12	Trees and Grass
C227	819730.46	3348760.83	2.46	819730.46	3348760.83	2.36	-0.10	Trees and Grass
C228	819735.72	3348762.94	2.36	819735.72	3348762.94	2.19	-0.17	Trees and Grass
C229	819741.66	3348765.18	2.31	819741.66	3348765.18	2.13	-0.18	Trees and Grass
C230	819747.45	3348767.01	2.29	819747.45	3348767.01	2.08	-0.22	Trees and Grass
C231	819753.43	3348769.03	2.19	819753.43	3348769.03	2.05	-0.14	Trees and Grass

C232	819759.54	3348771.47	2.13	819759.54	3348771.47	2.02	-0.11	Trees and Grass
C233	819757.13	3348776.99	1.97	819757.13	3348776.99	1.77	-0.20	Trees and Grass
C234	819751.46	3348774.08	2.04	819751.46	3348774.08	1.91	-0.14	Trees and Grass
C235	819745.78	3348772.14	2.18	819745.78	3348772.14	2.03	-0.15	Trees and Grass
C236	819739.97	3348770.44	2.23	819739.97	3348770.44	2.01	-0.22	Trees and Grass
C237	819734.43	3348768.66	2.33	819734.43	3348768.66	2.06	-0.27	Trees and Grass
C238	819728.96	3348767.14	2.47	819728.96	3348767.14	2.21	-0.26	Trees and Grass
C239	819723.03	3348764.19	2.49	819723.03	3348764.19	2.34	-0.15	Trees and Grass
C240	819717.61	3348761.24	2.51	819717.61	3348761.24	2.33	-0.19	Trees and Grass
C241	819711.62	3348760.38	2.49	819711.62	3348760.38	2.27	-0.22	Trees and Grass
O103	790404.15	3429168.06	63.46	790404.15	3429168.06	63.20	-0.26	Gravel
O104	790403.10	3429173.39	63.29	790403.10	3429173.39	63.00	-0.29	Gravel
O105	790403.22	3429178.73	62.80	790403.22	3429178.73	62.52	-0.27	Gravel
O106	790405.24	3429184.25	62.49	790405.24	3429184.25	62.27	-0.22	Gravel
O107	790407.76	3429189.23	62.41	790407.76	3429189.23	62.33	-0.08	Gravel
O108	790411.64	3429192.94	62.44	790411.64	3429192.94	62.22	-0.22	Gravel
O109	790416.16	3429196.74	62.41	790416.16	3429196.74	62.26	-0.16	Gravel
O110	790421.01	3429200.75	62.39	790421.01	3429200.75	62.22	-0.17	Gravel
O111	790425.91	3429204.41	62.37	790425.91	3429204.41	62.14	-0.23	Gravel
O112	790430.58	3429208.14	62.37	790430.58	3429208.14	62.09	-0.27	Gravel
O113	790434.80	3429211.52	62.35	790434.80	3429211.52	62.12	-0.23	Gravel
O114	790459.61	3429231.19	62.21	790459.61	3429231.19	62.11	-0.10	Gravel
O115	790464.21	3429234.45	62.19	790464.21	3429234.45	62.04	-0.15	Gravel
O116	790469.13	3429237.81	62.22	790469.13	3429237.81	62.03	-0.19	Gravel
O117	790474.05	3429240.97	62.21	790474.05	3429240.97	62.05	-0.17	Gravel
O118	790478.82	3429244.42	62.21	790478.82	3429244.42	62.03	-0.19	Gravel
O119	790483.98	3429247.84	62.25	790483.98	3429247.84	62.05	-0.20	Gravel
O120	790488.95	3429251.23	62.31	790488.95	3429251.23	62.00	-0.31	Gravel
O121	790493.98	3429255.49	62.39	790493.98	3429255.49	62.06	-0.33	Gravel
E1	792835.32	3351746.83	0.41	792835.32	3351746.83	0.11	-0.30	Gravel
E2	792835.44	3351746.09	0.42	792835.44	3351746.09	0.13	-0.28	Gravel
E3	792835.67	3351744.64	0.42	792835.67	3351744.64	0.17	-0.25	Gravel
E4	792836.17	3351742.44	0.45	792836.17	3351742.44	0.22	-0.23	Gravel
E5	792837.67	3351740.41	0.49	792837.67	3351740.41	0.26	-0.24	Gravel

E6	792839.85	3351739.42	0.53	792839.85	3351739.42	0.24	-0.29	Gravel
E7	792842.17	3351739.37	0.52	792842.17	3351739.37	0.22	-0.30	Gravel
E8	792844.22	3351740.21	0.52	792844.22	3351740.21	0.21	-0.31	Gravel
E9	792846.64	3351744.22	0.58	792846.64	3351744.22	0.25	-0.33	Gravel
E10	792846.80	3351747.09	0.62	792846.80	3351747.09	0.31	-0.31	Gravel
E11	792846.53	3351750.31	0.67	792846.53	3351750.31	0.36	-0.31	Gravel
E12	792845.89	3351753.74	0.73	792845.89	3351753.74	0.40	-0.33	Gravel
E13	792844.95	3351757.38	0.76	792844.95	3351757.38	0.51	-0.25	Gravel
E14	792843.88	3351761.29	0.79	792843.88	3351761.29	0.55	-0.24	Gravel
E15	792842.88	3351765.56	0.82	792842.88	3351765.56	0.54	-0.29	Gravel
E16	792842.06	3351770.14	0.81	792842.06	3351770.14	0.52	-0.29	Gravel
E17	792841.47	3351775.02	0.78	792841.47	3351775.02	0.54	-0.24	Gravel
E18	792841.02	3351780.18	0.78	792841.02	3351780.18	0.51	-0.27	Gravel
E19	792840.56	3351785.72	0.76	792840.56	3351785.72	0.49	-0.28	Gravel
E20	792840.12	3351791.59	0.77	792840.12	3351791.59	0.48	-0.29	Gravel
E21	792839.70	3351797.75	0.78	792839.70	3351797.75	0.48	-0.30	Gravel
E22	792839.27	3351804.17	0.77	792839.27	3351804.17	0.56	-0.21	Gravel
E23	792838.87	3351810.85	0.79	792838.87	3351810.85	0.51	-0.27	Gravel
E24	792838.43	3351817.72	0.79	792838.43	3351817.72	0.48	-0.30	Gravel
E25	792837.95	3351824.80	0.77	792837.95	3351824.80	0.55	-0.22	Gravel
E26	792837.43	3351832.03	0.76	792837.43	3351832.03	0.50	-0.26	Gravel
E27	792836.96	3351839.41	0.78	792836.96	3351839.41	0.51	-0.27	Gravel
E28	792836.43	3351846.94	0.77	792836.43	3351846.94	0.43	-0.34	Gravel
E29	792835.87	3351854.61	0.74	792835.87	3351854.61	0.50	-0.24	Gravel
E30	792835.30	3351862.25	0.74	792835.30	3351862.25	0.58	-0.16	Gravel
E31	792834.73	3351869.71	0.76	792834.73	3351869.71	0.55	-0.20	Gravel
E32	792834.17	3351877.03	0.77	792834.17	3351877.03	0.51	-0.25	Gravel
E33	792833.64	3351884.45	0.78	792833.64	3351884.45	0.52	-0.26	Gravel
E34	792833.05	3351891.95	0.76	792833.05	3351891.95	0.46	-0.29	Gravel
E35	792832.50	3351899.54	0.76	792832.50	3351899.54	0.53	-0.23	Gravel
E36	792831.99	3351907.19	0.75	792831.99	3351907.19	0.53	-0.22	Gravel
E37	792831.42	3351914.90	0.76	792831.42	3351914.90	0.52	-0.24	Gravel
E38	792830.78	3351922.57	0.74	792830.78	3351922.57	0.44	-0.29	Gravel
E39	792830.14	3351930.18	0.74	792830.14	3351930.18	0.29	-0.45	Gravel

E40	792829.51	3351937.72	0.72	792829.51	3351937.72	0.30	-0.43	Gravel
E41	792828.86	3351945.27	0.73	792828.86	3351945.27	0.43	-0.30	Gravel
E42	792828.21	3351952.92	0.72	792828.21	3351952.92	0.44	-0.28	Gravel
E43	792827.57	3351960.63	0.70	792827.57	3351960.63	0.37	-0.33	Gravel
E44	792826.95	3351968.44	0.67	792826.95	3351968.44	0.38	-0.29	Gravel
E45	792826.33	3351976.32	0.64	792826.33	3351976.32	0.37	-0.27	Gravel
E46	792825.70	3351984.26	0.64	792825.70	3351984.26	0.40	-0.24	Gravel
E47	792825.02	3351992.32	0.63	792825.02	3351992.32	0.30	-0.34	Gravel
E48	792824.30	3352000.45	0.64	792824.30	3352000.45	0.33	-0.31	Gravel
E49	792823.60	3352008.57	0.65	792823.60	3352008.57	0.36	-0.29	Gravel
E50	792822.97	3352016.52	0.65	792822.97	3352016.52	0.36	-0.29	Gravel
E51	792822.44	3352024.34	0.67	792822.44	3352024.34	0.42	-0.24	Gravel
E52	792821.77	3352032.12	0.66	792821.77	3352032.12	0.36	-0.30	Gravel
E53	792821.03	3352039.82	0.66	792821.03	3352039.82	0.34	-0.32	Gravel
E54	792820.19	3352047.37	0.67	792820.19	3352047.37	0.20	-0.47	Gravel
E55	792819.28	3352054.79	0.70	792819.28	3352054.79	0.45	-0.25	Gravel
E56	792818.29	3352062.07	0.74	792818.29	3352062.07	0.52	-0.22	Gravel
E57	792817.27	3352069.27	0.78	792817.27	3352069.27	0.48	-0.31	Gravel
E58	792815.03	3352083.76	0.84	792815.03	3352083.76	0.65	-0.20	Gravel
E59	792813.87	3352090.93	0.87	792813.87	3352090.93	0.46	-0.41	Gravel
E60	792812.76	3352098.08	0.89	792812.76	3352098.08	0.57	-0.32	Gravel
E61	792810.50	3352112.75	0.90	792810.50	3352112.75	0.65	-0.26	Gravel
E62	792809.44	3352120.26	0.90	792809.44	3352120.26	0.73	-0.18	Gravel
E63	792808.37	3352127.90	0.90	792808.37	3352127.90	0.69	-0.21	Gravel
E64	792807.29	3352135.65	0.90	792807.29	3352135.65	0.66	-0.24	Gravel
E65	792806.19	3352143.36	0.90	792806.19	3352143.36	0.64	-0.26	Gravel
E66	792805.11	3352150.94	0.89	792805.11	3352150.94	0.68	-0.21	Gravel
E67	792804.07	3352158.37	0.88	792804.07	3352158.37	0.66	-0.22	Gravel
E68	792803.07	3352165.63	0.87	792803.07	3352165.63	0.65	-0.23	Gravel
E69	792802.15	3352172.76	0.87	792802.15	3352172.76	0.67	-0.20	Gravel
E70	792801.28	3352179.72	0.86	792801.28	3352179.72	0.69	-0.17	Gravel
E71	792800.47	3352186.52	0.86	792800.47	3352186.52	0.70	-0.16	Gravel
E72	792799.44	3352193.10	0.87	792799.44	3352193.10	0.71	-0.16	Gravel
E73	792798.33	3352199.53	0.87	792798.33	3352199.53	0.74	-0.13	Gravel

E74	792797.65	3352206.14	0.85	792797.65	3352206.14	0.69	-0.16	Gravel
E75	792797.56	3352213.23	0.88	792797.56	3352213.23	0.73	-0.15	Gravel
E76	792797.95	3352220.56	0.87	792797.95	3352220.56	0.76	-0.11	Gravel
E77	792798.70	3352228.03	0.88	792798.70	3352228.03	0.77	-0.11	Gravel
E78	792799.71	3352235.59	0.88	792799.71	3352235.59	0.70	-0.18	Gravel
E79	792800.63	3352243.30	0.88	792800.63	3352243.30	0.72	-0.16	Gravel
E80	792801.60	3352251.04	0.86	792801.60	3352251.04	0.67	-0.19	Gravel
E81	792802.69	3352258.63	0.84	792802.69	3352258.63	0.68	-0.16	Gravel
E82	792803.86	3352266.05	0.82	792803.86	3352266.05	0.63	-0.19	Gravel
E83	792805.06	3352272.79	0.79	792805.06	3352272.79	0.64	-0.15	Gravel
E84	792806.11	3352278.66	0.78	792806.11	3352278.66	0.60	-0.18	Gravel
E85	792806.98	3352283.86	0.75	792806.98	3352283.86	0.56	-0.18	Gravel
E86	792807.66	3352288.93	0.74	792807.66	3352288.93	0.57	-0.17	Gravel
E87	792808.15	3352294.01	0.70	792808.15	3352294.01	0.52	-0.18	Gravel
E88	792808.66	3352299.35	0.70	792808.66	3352299.35	0.46	-0.24	Gravel
E89	792809.41	3352305.11	0.66	792809.41	3352305.11	0.45	-0.21	Gravel
E90	792810.38	3352311.22	0.62	792810.38	3352311.22	0.44	-0.18	Gravel
E91	792812.84	3352323.54	0.55	792812.84	3352323.54	0.16	-0.39	Gravel
E92	792814.29	3352329.52	0.56	792814.29	3352329.52	0.24	-0.31	Gravel
E93	792815.61	3352335.70	0.55	792815.61	3352335.70	0.31	-0.23	Gravel
E94	792816.80	3352342.20	0.53	792816.80	3352342.20	0.28	-0.25	Gravel
E95	792819.09	3352355.73	0.50	792819.09	3352355.73	0.26	-0.24	Gravel
E96	792820.13	3352362.69	0.52	792820.13	3352362.69	0.33	-0.19	Gravel
E97	792821.13	3352369.74	0.54	792821.13	3352369.74	0.33	-0.20	Gravel
E98	792822.11	3352376.87	0.55	792822.11	3352376.87	0.30	-0.25	Gravel
E99	792824.21	3352411.67	1.19	792824.21	3352411.67	0.88	-0.31	Gravel
E100	792822.59	3352400.04	0.75	792822.59	3352400.04	0.53	-0.22	Gravel
E101	792821.96	3352393.98	0.65	792821.96	3352393.98	0.42	-0.24	Gravel
E102	792821.33	3352387.94	0.61	792821.33	3352387.94	0.38	-0.23	Gravel
E103	792820.60	3352381.76	0.57	792820.60	3352381.76	0.33	-0.25	Gravel
E104	792819.75	3352375.37	0.53	792819.75	3352375.37	0.29	-0.24	Gravel
E105	792816.76	3352355.74	0.47	792816.76	3352355.74	0.23	-0.24	Gravel
E106	792815.68	3352349.15	0.47	792815.68	3352349.15	0.19	-0.29	Gravel
E107	792814.65	3352342.56	0.48	792814.65	3352342.56	0.20	-0.28	Gravel

E108	792813.61	3352335.99	0.47	792813.61	3352335.99	0.17	-0.30	Gravel
E109	792812.59	3352329.41	0.49	792812.59	3352329.41	0.10	-0.39	Gravel
E110	792811.57	3352322.87	0.53	792811.57	3352322.87	0.16	-0.37	Gravel
E111	792810.52	3352316.38	0.58	792810.52	3352316.38	0.36	-0.22	Gravel
E112	792809.37	3352309.92	0.63	792809.37	3352309.92	0.44	-0.19	Gravel
E113	792808.18	3352303.46	0.66	792808.18	3352303.46	0.42	-0.23	Gravel
E114	792806.96	3352296.98	0.67	792806.96	3352296.98	0.48	-0.19	Gravel
E115	792805.69	3352290.38	0.69	792805.69	3352290.38	0.48	-0.21	Gravel
E116	792804.43	3352283.59	0.73	792804.43	3352283.59	0.52	-0.21	Gravel
E117	792803.16	3352276.76	0.76	792803.16	3352276.76	0.61	-0.16	Gravel
E118	792801.96	3352269.92	0.79	792801.96	3352269.92	0.61	-0.18	Gravel
E119	792800.84	3352263.07	0.83	792800.84	3352263.07	0.69	-0.14	Gravel
E120	792799.90	3352256.19	0.85	792799.90	3352256.19	0.66	-0.19	Gravel
E121	792799.14	3352249.24	0.88	792799.14	3352249.24	0.72	-0.17	Gravel
E122	792798.47	3352242.19	0.89	792798.47	3352242.19	0.73	-0.16	Gravel
E123	792797.92	3352235.05	0.89	792797.92	3352235.05	0.72	-0.18	Gravel
E124	792797.63	3352227.88	0.87	792797.63	3352227.88	0.75	-0.12	Gravel
E125	792797.57	3352220.73	0.88	792797.57	3352220.73	0.72	-0.16	Gravel
E126	792797.67	3352213.58	0.88	792797.67	3352213.58	0.73	-0.15	Gravel
E127	792797.74	3352206.43	0.87	792797.74	3352206.43	0.71	-0.16	Gravel
E128	792797.90	3352199.28	0.88	792797.90	3352199.28	0.74	-0.14	Gravel
E129	792798.87	3352184.74	0.87	792798.87	3352184.74	0.71	-0.16	Gravel
E130	792799.68	3352177.33	0.88	792799.68	3352177.33	0.71	-0.17	Gravel
E131	792800.56	3352169.84	0.90	792800.56	3352169.84	0.66	-0.23	Gravel
E132	792801.55	3352162.30	0.88	792801.55	3352162.30	0.69	-0.19	Gravel
E133	792802.62	3352154.66	0.90	792802.62	3352154.66	0.65	-0.25	Gravel
E134	792803.75	3352146.89	0.89	792803.75	3352146.89	0.67	-0.22	Gravel
E135	792804.87	3352139.01	0.88	792804.87	3352139.01	0.63	-0.25	Gravel
E136	792806.07	3352131.24	0.90	792806.07	3352131.24	0.66	-0.24	Gravel
E137	792807.25	3352123.62	0.91	792807.25	3352123.62	0.64	-0.27	Gravel
E138	792809.64	3352108.63	0.91	792809.64	3352108.63	0.66	-0.25	Gravel
E139	792810.70	3352101.07	0.88	792810.70	3352101.07	0.61	-0.27	Gravel
E140	792811.72	3352093.44	0.85	792811.72	3352093.44	0.41	-0.45	Gravel
E141	792812.76	3352085.77	0.84	792812.76	3352085.77	0.53	-0.30	Gravel

E142	792814.83	3352070.19	0.77	792814.83	3352070.19	0.47	-0.30	Gravel
E143	792815.75	3352062.28	0.71	792815.75	3352062.28	0.44	-0.28	Gravel
E144	792816.61	3352054.24	0.67	792816.61	3352054.24	0.37	-0.30	Gravel
E145	792817.46	3352046.11	0.65	792817.46	3352046.11	0.12	-0.53	Gravel
E146	792818.38	3352037.96	0.65	792818.38	3352037.96	0.29	-0.36	Gravel
E147	792819.30	3352029.81	0.66	792819.30	3352029.81	0.39	-0.28	Gravel
E148	792820.26	3352021.64	0.67	792820.26	3352021.64	0.39	-0.28	Gravel
E149	792821.10	3352013.44	0.67	792821.10	3352013.44	0.33	-0.34	Gravel
E150	792821.95	3352005.23	0.65	792821.95	3352005.23	0.37	-0.28	Gravel
E151	792822.70	3351997.00	0.66	792822.70	3351997.00	0.33	-0.34	Gravel
E152	792823.38	3351988.79	0.67	792823.38	3351988.79	0.36	-0.31	Gravel
E153	792824.05	3351980.58	0.67	792824.05	3351980.58	0.36	-0.31	Gravel
E154	792824.69	3351972.40	0.69	792824.69	3351972.40	0.36	-0.33	Gravel
E155	792825.31	3351964.25	0.70	792825.31	3351964.25	0.40	-0.30	Gravel
E156	792825.99	3351956.13	0.72	792825.99	3351956.13	0.43	-0.29	Gravel
E157	792826.72	3351948.04	0.75	792826.72	3351948.04	0.44	-0.31	Gravel
E158	792827.45	3351939.99	0.79	792827.45	3351939.99	0.36	-0.42	Gravel
E159	792828.23	3351931.94	0.79	792828.23	3351931.94	0.22	-0.58	Gravel
E160	792828.91	3351923.84	0.80	792828.91	3351923.84	0.20	-0.60	Gravel
E161	792829.45	3351915.69	0.80	792829.45	3351915.69	0.56	-0.24	Gravel
E162	792829.93	3351907.49	0.78	792829.93	3351907.49	0.52	-0.26	Gravel
E163	792830.41	3351899.29	0.80	792830.41	3351899.29	0.54	-0.27	Gravel
E164	792831.00	3351891.05	0.80	792831.00	3351891.05	0.45	-0.35	Gravel
E165	792831.58	3351882.74	0.78	792831.58	3351882.74	0.50	-0.28	Gravel
E166	792832.20	3351874.38	0.78	792832.20	3351874.38	0.49	-0.29	Gravel
E167	792832.84	3351865.95	0.76	792832.84	3351865.95	0.52	-0.24	Gravel
E168	792833.55	3351857.61	0.76	792833.55	3351857.61	0.49	-0.28	Gravel
E169	792834.29	3351849.37	0.77	792834.29	3351849.37	0.44	-0.33	Gravel
E170	792835.02	3351841.23	0.80	792835.02	3351841.23	0.47	-0.33	Gravel
E171	792835.65	3351833.16	0.83	792835.65	3351833.16	0.49	-0.33	Gravel
E172	792836.20	3351824.92	0.80	792836.20	3351824.92	0.45	-0.35	Gravel
E173	792836.73	3351816.56	0.82	792836.73	3351816.56	0.59	-0.22	Gravel
E174	792837.17	3351808.22	0.80	792837.17	3351808.22	0.49	-0.31	Gravel
E175	792837.57	3351800.02	0.78	792837.57	3351800.02	0.53	-0.25	Gravel

E176	792838.35	3351784.78	0.79	792838.35	3351784.78	0.52	-0.27	Gravel
E177	792838.93	3351777.87	0.82	792838.93	3351777.87	0.49	-0.33	Gravel
E178	792839.47	3351771.60	0.85	792839.47	3351771.60	0.54	-0.31	Gravel
E179	792839.26	3351765.73	0.82	792839.26	3351765.73	0.53	-0.29	Gravel
B182	802537.21	3331330.45	1.10	802537.21	3331330.45	0.83	-0.27	Gravel
B183	802538.42	3331336.60	1.09	802538.42	3331336.60	0.84	-0.25	Gravel
B184	802539.50	3331343.07	1.07	802539.50	3331343.07	0.82	-0.25	Gravel
B185	802540.67	3331349.33	1.05	802540.67	3331349.33	0.83	-0.22	Gravel
B186	802541.65	3331355.13	0.99	802541.65	3331355.13	0.74	-0.26	Gravel
B187	802547.92	3331353.63	1.05	802547.92	3331353.63	0.83	-0.22	Gravel
B188	802546.51	3331347.29	1.09	802546.51	3331347.29	0.85	-0.24	Gravel
B189	802544.97	3331341.18	1.10	802544.97	3331341.18	0.85	-0.25	Gravel
B190	802543.59	3331335.18	1.11	802543.59	3331335.18	0.86	-0.25	Gravel
B191	802542.32	3331328.77	1.12	802542.32	3331328.77	0.83	-0.29	Gravel
B192	802548.89	3331327.32	1.11	802548.89	3331327.32	0.90	-0.21	Gravel
B193	802550.19	3331333.81	1.12	802550.19	3331333.81	0.86	-0.26	Gravel
B194	802551.75	3331340.31	1.10	802551.75	3331340.31	0.91	-0.19	Gravel
B195	802553.49	3331346.88	1.12	802553.49	3331346.88	0.81	-0.31	Gravel
B196	802554.94	3331353.98	1.07	802554.94	3331353.98	0.87	-0.20	Gravel
B197	802561.09	3331353.00	1.11	802561.09	3331353.00	0.90	-0.21	Gravel
B198	802559.46	3331346.24	1.06	802559.46	3331346.24	0.89	-0.18	Gravel
B199	802558.03	3331339.66	1.04	802558.03	3331339.66	0.89	-0.15	Gravel
B200	802556.52	3331333.33	0.99	802556.52	3331333.33	0.79	-0.20	Gravel
B201	802554.61	3331327.45	1.08	802554.61	3331327.45	0.85	-0.23	Gravel
B202	802553.15	3331323.33	1.08	802553.15	3331323.33	0.74	-0.34	Gravel
B203	802555.23	3331320.91	1.03	802555.23	3331320.91	0.78	-0.25	Gravel
B204	802549.05	3331321.95	1.10	802549.05	3331321.95	0.88	-0.21	Gravel
B205	802542.64	3331322.70	1.11	802542.64	3331322.70	0.81	-0.30	Gravel
B206	802536.28	3331323.83	1.14	802536.28	3331323.83	0.83	-0.31	Gravel
B207	802531.03	3331324.98	1.14	802531.03	3331324.98	0.87	-0.27	Gravel
B208	802530.23	3331318.60	1.14	802530.23	3331318.60	0.91	-0.23	Gravel
B209	802536.44	3331317.39	1.10	802536.44	3331317.39	0.86	-0.24	Gravel
B210	802543.08	3331316.41	1.08	802543.08	3331316.41	0.85	-0.24	Gravel
B211	802549.77	3331316.08	1.08	802549.77	3331316.08	0.86	-0.21	Gravel

B212	802555.86	3331315.72	1.03	802555.86	3331315.72	0.79	-0.24	Gravel
I1	800140.34	3386806.51	20.62	800140.34	3386806.51	20.47	-0.15	Brush and Grass
I2	800138.13	3386800.38	20.59	800138.13	3386800.38	20.55	-0.04	Brush and Grass
I3	800137.17	3386794.04	20.67	800137.17	3386794.04	20.55	-0.12	Brush and Grass
I4	800136.65	3386787.94	20.72	800136.65	3386787.94	20.45	-0.27	Brush and Grass
I5	800135.89	3386781.91	20.64	800135.89	3386781.91	20.44	-0.20	Brush and Grass
I6	800135.45	3386775.83	20.57	800135.45	3386775.83	20.49	-0.08	Brush and Grass
I7	800143.03	3386774.01	20.67	800143.03	3386774.01	20.51	-0.16	Brush and Grass
I8	800143.90	3386780.06	20.69	800143.90	3386780.06	20.45	-0.24	Brush and Grass
I9	800145.17	3386786.30	20.65	800145.17	3386786.30	20.58	-0.06	Brush and Grass
I10	800146.16	3386792.76	20.62	800146.16	3386792.76	20.47	-0.16	Brush and Grass
I11	800148.18	3386799.82	20.52	800148.18	3386799.82	20.46	-0.06	Brush and Grass
I12	800148.77	3386805.33	20.57	800148.77	3386805.33	20.42	-0.15	Brush and Grass
I13	800156.21	3386804.65	20.69	800156.21	3386804.65	20.55	-0.14	Brush and Grass
I14	800155.26	3386798.45	20.50	800155.26	3386798.45	20.52	0.01	Brush and Grass
I15	800154.15	3386793.19	20.80	800154.15	3386793.19	20.58	-0.22	Brush and Grass
I16	800153.64	3386787.70	20.89	800153.64	3386787.70	20.63	-0.26	Brush and Grass
I17	800152.21	3386782.45	20.75	800152.21	3386782.45	20.57	-0.18	Brush and Grass
I18	800150.89	3386778.13	20.93	800150.89	3386778.13	20.64	-0.29	Brush and Grass
I19	800156.55	3386775.43	20.73	800156.55	3386775.43	20.78	0.05	Brush and Grass
I20	800156.62	3386781.88	20.71	800156.62	3386781.88	20.66	-0.05	Brush and Grass
I21	800156.87	3386788.90	20.88	800156.87	3386788.90	20.72	-0.17	Brush and Grass
I22	800156.54	3386795.45	20.71	800156.54	3386795.45	20.47	-0.24	Brush and Grass
I23	800155.95	3386801.95	20.55	800155.95	3386801.95	20.54	-0.01	Brush and Grass
I24	800161.39	3386802.72	20.57	800161.39	3386802.72	20.51	-0.05	Brush and Grass
I25	800161.18	3386796.31	20.71	800161.18	3386796.31	20.51	-0.20	Brush and Grass
I26	800161.80	3386789.59	20.79	800161.80	3386789.59	20.88	0.08	Brush and Grass
I27	800163.06	3386783.23	20.84	800163.06	3386783.23	20.92	0.09	Brush and Grass
I28	800169.09	3386777.68	20.92	800169.09	3386777.68	20.84	-0.08	Brush and Grass
I29	800169.00	3386784.05	20.81	800169.00	3386784.05	20.98	0.17	Brush and Grass
I30	800167.77	3386789.62	20.83	800167.77	3386789.62	20.72	-0.11	Brush and Grass
I31	800167.04	3386795.79	20.77	800167.04	3386795.79	20.58	-0.19	Brush and Grass
I32	800166.18	3386803.34	20.70	800166.18	3386803.34	20.44	-0.25	Brush and Grass

CONTROL MARK DATA SHEETS

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AF9574 ***********************************************************************
AF9574 CORS - This is a GPS Continuously Operating Reference Station.
AF9574 DESIGNATION - STENNIS CORS ARP
AF9574 CORS_ID - NDBC
AF9574 PID - AF9574
AF9574 STATE/COUNTY- MS/HANCOCK
AF9574 USGS QUAD - LOGTOWN (1993)
AF9574
AF9574 *CURRENT SURVEY CONTROL
AF9574 ___________________________________________________________________
AF9574* NAD 83(CORS)- 30 21 22.59138(N) 089 36 36.97621(W) ADJUSTED
AF9574* NAVD 88 - 16.91 (meters) 55.5 (feet) GPS OBS
AF9574 ___________________________________________________________________
AF9574 EPOCH DATE - 2002.00
AF9574 X - 37,468.090 (meters) COMP
AF9574 Y - -5,508,266.605 (meters) COMP
AF9574 Z - 3,204,510.665 (meters) COMP
AF9574 ELLIP HEIGHT- -10.26 (meters) GPS OBS
AF9574 GEOID HEIGHT- -27.15 (meters) GEOID99
AF9574
AF9574 HORZ ORDER - SPECIAL (CORS)
AF9574 ELLP ORDER - SPECIAL (CORS)
AF9574
AF9574.ITRF positions are available for this station.
AF9574.The coordinates were established by GPS observations
AF9574.and adjusted by the National Geodetic Survey in March 2002.
AF9574.The coordinates are valid at the epoch date displayed above.
AF9574.The epoch date for horizontal control is a decimal equivalence
AF9574.of Year/Month/Day.
AF9574
AF9574.The orthometric height was determined by GPS observations and a
AF9574.high-resolution geoid model using precise GPS observation and
AF9574.processing techniques.
AF9574
AF9574.The PID for the CORS L1 Phase Center is AB8531.
AF9574
AF9574.The XYZ, and position/ellipsoidal ht. are equivalent.
AF9574
AF9574.The ellipsoidal height was determined by GPS observations
AF9574.and is referenced to NAD 83.
AF9574
AF9574.The geoid height was determined by GEOID99.
AF9574
AF9574; North East Units Scale Converg.
AF9574;SPC MS E - 95,170.385 225,307.984 MT 1.00001880 -0 23 33.6
AF9574
AF9574 SUPERSEDED SURVEY CONTROL
AF9574
AF9574 NAD 83(CORS)- 30 21 22.59167(N) 089 36 36.97624(W) AD(1997.00) c
AF9574 ELLIP HT - -10.27 (m) GP(1997.00) c c
AF9574 NAD 83(CORS)- 30 21 22.59171(N) 089 36 36.97633(W) AD(1996.00) c
AF9574 ELLIP HT - -10.21 (m) GP(1996.00) c c
AF9574
AF9574.Superseded values are not recommended for survey control.
AF9574.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AF9574.See file dsdata.txt to determine how the superseded data were derived.
AF9574
AF9574_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RBU4910761154(NAD 83)
AF9574_MARKER: STATION IS THE ANTENNA REFERENCE POINT OF THE GPS ANTENNA
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NGS Data Sheet for ENG1

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AB3307 ********************************************************************
AB3307  DESIGNATION -  ENGLISH TURN
AB3307  PID         -  AB3307
AB3307  STATE/COUNTY-  LA/PLAQUEMINES
AB3307  USGS QUAD   -  CHALMETTE (1994)
AB3307
AB3307                        *CURRENT SURVEY CONTROL
AB3307  ___________________________________________________________________
AB3307* NAD 83(1992)-  29 52 44.34547(N)    089 56 30.92380(W)     ADJUSTED
AB3307* NAVD 88     -         2.146  (meters)       7.04   (feet)  ADJUSTED
AB3307  ___________________________________________________________________
AB3307  X           -       5,610.371 (meters)                     COMP
AB3307  Y           -  -5,534,928.228 (meters)                     COMP
AB3307  Z           -   3,158,737.327 (meters)                     COMP
AB3307  LAPLACE CORR-           0.22  (seconds)                    DEFLEC99
AB3307  ELLIP HEIGHT-         -23.81  (meters)          (02/12/02) GPS OBS
AB3307  GEOID HEIGHT-         -26.02  (meters)                     GEOID03
AB3307  DYNAMIC HT  -           2.143 (meters)       7.03  (feet)  COMP
AB3307  MODELED GRAV-     979,309.8   (mgal)                       NAVD 88
AB3307
AB3307  HORZ ORDER  -  A
AB3307  VERT ORDER  -  FIRST     CLASS II
AB3307  ELLP ORDER  -  FOURTH    CLASS II
AB3307
AB3307.This is a reference station for the ENGLISH TURN 1
AB3307.National Continuously Operating Reference Station (ENG1).
AB3307
AB3307.The horizontal coordinates were established by GPS observations
AB3307.and adjusted by the National Geodetic Survey in May 1996.
AB3307
AB3307.The orthometric height was determined by differential leveling
AB3307.and adjusted by the National Geodetic Survey in July 2002.
AB3307.WARNING-GPS observations at this control monument resulted in a GPS
AB3307.derived orthometric height which differed from the leveled height by
AB3307.more than one decimeter (0.1 meter).
AB3307
AB3307.The X, Y, and Z were computed from the position and the ellipsoidal ht.
AB3307
AB3307.The Laplace correction was computed from DEFLEC99 derived deflections.
AB3307
AB3307.The ellipsoidal height was determined by GPS observations
AB3307.and is referenced to NAD 83.
AB3307
AB3307.The geoid height was determined by GEOID03.
AB3307
AB3307.The dynamic height is computed by dividing the NAVD 88
AB3307.geopotential number by the normal gravity value computed on the
AB3307.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
AB3307.degrees latitude (g = 980.6199 gals.).
AB3307
AB3307.The modeled gravity was interpolated from observed gravity values.
AB3307
AB3307;                    North         East     Units   Scale      Converg.
AB3307;SPC LA S     -   153,668.703 1,134,401.587   MT  0.99992799 +0 41 44.6
AB3307;UTM  16      - 3,309,012.179   215,851.341   MT  1.00059630 -1 27 59.6
AB3307;UTM  15      - 3,309,305.221   795,372.759   MT  1.00067658 +1 31 28.4
AB3307
AB3307                          SUPERSEDED SURVEY CONTROL
AB3307
AB3307  ELLIP H (05/17/96)  -23.70   (m)                        GP(       ) 1 2
AB3307  NAVD 88 (08/30/96)    2.15   (m)            7.1    (f) LEVELING    3
AB3307
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AB3307.Superseded values are not recommended for survey control.
AB3307.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AB3307.See file dsdata.txt to determine how the superseded data were derived.
AB3307
AB3307_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RBU1585109012(NAD 83)
AB3307_MARKER: I = METAL ROD
AB3307_SETTING: 59 = STAINLESS STEEL ROD IN SLEEVE (10 FT.+)
AB3307_STAMPING: ENGLISH TURN 1994
AB3307_MARK LOGO: NGS
AB3307_PROJECTION: RECESSED 3 CENTIMETERS
AB3307_MAGNETIC: I = MARKER IS A STEEL ROD
AB3307_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
AB3307+STABILITY: POSITION/ELEVATION WELL
AB3307_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AB3307+SATELLITE: SATELLITE OBSERVATIONS - February 05, 1996
AB3307_ROD/PIPE-DEPTH: 34.2 meters
AB3307_SLEEVE-DEPTH  : .91 meters
AB3307
AB3307  HISTORY     - Date     Condition        Report By
AB3307  HISTORY     - 1994     MONUMENTED       LADTD
AB3307  HISTORY     - 19960205 GOOD             NGS
AB3307
AB3307                          STATION DESCRIPTION
AB3307
AB3307'DESCRIBED BY LA TRANSP AND DEV 1994 (SLC)
AB3307'THE STATION IS LOCATED ABOUT 16.1 KM (10.00 MI) EAST-SOUTHEAST OF
AB3307'DOWNTOWN NEW ORLEANS AND 8.0 KM (4.95 MI) NORTH OF BELLE CHASSE AT THE
AB3307'UNITED STATES COAST GUARD COMMUNICATION STATION, NEW ORLEANS, SET IN
AB3307'AN ANTENNA FARM. OWNERSHIP--U. S. COAST GUARD, FOR ENTRANCE INTO THE
AB3307'STATION CONTACT CWO GEORGE SANDERS, USGS SUPPORT CENTER, NEW ORLEANS,
AB3307'4640 URQUHART STREET, NEW ORLEANS, LOUISIANA 70117, PHONE
AB3307'504-942-3056.$TO REACH THE STATION FROM THE JUNCTION OF STATE HIGHWAYS
AB3307'406 AND 407 ON THE SOUTH SIDE OF THE INTERCOSTAL WATERWAY, GO WEST FOR
AB3307'0.8 KM (0.50 MI) ON HIGHWAY 406 TO THE JUNCTION WITH F. EDWARD HEBERT
AB3307'BLVD, TURN LEFT AND GO SOUTHEAST FOR 2.3 KM (1.40 MI) ON F. EDWARD
AB3307'HEBERT BLVD TO THE MISSISSIPPI RIVER LEVEE AND A T-ROAD, TURN LEFT AND
AB3307'GO EASTERLY PASSING THROUGH A GATE INTO THE TULANE UNIVERISTY F.
AB3307'EDWARD HEBERT RESEARCH CENTER FOR 3.5 KM (2.15 MI) ON A PAVED ROAD TO
AB3307'A STOP SIGN, CONTINUE STRAIGHT AHEAD AND EASTERLY FOR 0.7 KM (0.45 MI)
AB3307'ON THE PAVED ROAD TO THE GATES INTO THE U. S. COAST GUARD
AB3307'COMMUNICATION STATION, CONTIUNE STRAIGHT AHEAD AND EASTERLY THROUGH
AB3307'THE GATES FOR 0.4 KM (0.25 MI) ON THE PAVED ROAD TO A CROSSROADS,
AB3307'CONTIUNE STRAIGHT AHEAD FOR 0.7 KM (0.45 MI) ON THE PAVED ROAD TO THE
AB3307'STATION SET ON THE RIGHT AT A GRAVEL DRIVE LEADING INTO THE DGPS
AB3307'TRANSMITTING TOWER.$THE STATION IS 29.5 M (96.8 FT) SOUTHWEST FROM THE
AB3307'CENTER OF THE PAVED ROAD, 17.9 M (58.7 FT) EAST-NORTHEAST FROM STATION
AB3307'ROWL 1993, 3.2 M (10.5 FT) NORTHWEST FROM THE CENTER OF THE GRAVEL
AB3307'DRIVE, 0.6 M (2.0 FT) NORTWEST FROM A FIBERGLASS WITNESS POST, ACCESS
AB3307'IS HAD BY AN 12.7 CM LOGO CAP ABOUT LEVEL WITH THE ROAD.
AB3307
AB3307                          STATION RECOVERY (1996)
AB3307
AB3307'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1996 (ALG)
AB3307'THE STATION WAS RECOVERED AS DESCRIBED.  THE POINT OF CONTACT IS CWO
AB3307'RON BRAHM, 504-393-6145, OR ETC FORTE, 504-393-6130.
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AB3308 ********************************************************************
AB3308  DESIGNATION -  TOLAND
AB3308  PID         -  AB3308
AB3308  STATE/COUNTY-  LA/PLAQUEMINES
AB3308  USGS QUAD   -  CHALMETTE (1994)
AB3308
AB3308                        *CURRENT SURVEY CONTROL
AB3308  ___________________________________________________________________
AB3308* NAD 83(1992)-  29 52 58.54472(N)    089 56 48.48925(W)     ADJUSTED
AB3308* NAVD 88     -         1.927  (meters)       6.32   (feet)  ADJUSTED
AB3308  ___________________________________________________________________
AB3308  X           -       5,138.816 (meters)                     COMP
AB3308  Y           -  -5,534,710.664 (meters)                     COMP
AB3308  Z           -   3,159,116.308 (meters)                     COMP
AB3308  LAPLACE CORR-           0.22  (seconds)                    DEFLEC99
AB3308  ELLIP HEIGHT-         -24.04  (meters)          (02/12/02) GPS OBS
AB3308  GEOID HEIGHT-         -26.03  (meters)                     GEOID03
AB3308  DYNAMIC HT  -           1.924 (meters)       6.31  (feet)  COMP
AB3308  MODELED GRAV-     979,309.9   (mgal)                       NAVD 88
AB3308
AB3308  HORZ ORDER  -  A
AB3308  VERT ORDER  -  FIRST     CLASS II
AB3308  ELLP ORDER  -  FOURTH    CLASS II
AB3308
AB3308.This is a reference station for the ENGLISH TURN 1
AB3308.National Continuously Operating Reference Station (ENG1).
AB3308
AB3308.The horizontal coordinates were established by GPS observations
AB3308.and adjusted by the National Geodetic Survey in May 1996.
AB3308
AB3308.The orthometric height was determined by differential leveling
AB3308.and adjusted by the National Geodetic Survey in July 2002.
AB3308
AB3308.The X, Y, and Z were computed from the position and the ellipsoidal ht.
AB3308
AB3308.The Laplace correction was computed from DEFLEC99 derived deflections.
AB3308
AB3308.The ellipsoidal height was determined by GPS observations
AB3308.and is referenced to NAD 83.
AB3308
AB3308.The geoid height was determined by GEOID03.
AB3308
AB3308.The dynamic height is computed by dividing the NAVD 88
AB3308.geopotential number by the normal gravity value computed on the
AB3308.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
AB3308.degrees latitude (g = 980.6199 gals.).
AB3308
AB3308.The modeled gravity was interpolated from observed gravity values.
AB3308
AB3308;                    North         East     Units   Scale      Converg.
AB3308;SPC LA S     -   154,100.147 1,133,925.011   MT  0.99992785 +0 41 35.8
AB3308;UTM  16      - 3,309,461.598   215,391.075   MT  1.00059953 -1 28 09.0
AB3308;UTM  15      - 3,309,730.042   794,889.631   MT  1.00067306 +1 31 20.3
AB3308
AB3308                          SUPERSEDED SURVEY CONTROL
AB3308
AB3308  ELLIP H (05/17/96)  -23.93   (m)                       GP(       ) 1 2
AB3308  NAVD 88 (08/30/96)    1.93   (m)            6.3    (f) LEVELING    3
AB3308
AB3308.Superseded values are not recommended for survey control.
AB3308.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AB3308.See file dsdata.txt to determine how the superseded data were derived.
AB3308
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AB3308_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RBU1539109462(NAD 83)
AB3308_MARKER: I = METAL ROD
AB3308_SETTING: 59 = STAINLESS STEEL ROD IN SLEEVE (10 FT.+)
AB3308_STAMPING: TOLAND 1994
AB3308_MARK LOGO: NGS
AB3308_MAGNETIC: I = MARKER IS A STEEL ROD
AB3308_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
AB3308+STABILITY: POSITION/ELEVATION WELL
AB3308_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AB3308+SATELLITE: SATELLITE OBSERVATIONS - February 05, 1996
AB3308
AB3308  HISTORY     - Date     Condition        Report By
AB3308  HISTORY     - 1994     MONUMENTED       LADTD
AB3308  HISTORY     - 19960205 GOOD             NGS
AB3308
AB3308                          STATION DESCRIPTION
AB3308
AB3308'DESCRIBED BY LA TRANSP AND DEV 1994 (SLC)
AB3308'THE STATION IS LOCATED ABOUT 16.1 KM (10.00 MI) EAST-SOUTHEAST OF
AB3308'DOWNTOWN NEW ORLEANS AND 8.0 KM (4.95 MI) NORTH OF BELLE CHASSE AT THE
AB3308'UNITED STATES COAST GUARD COMMUNICATION STATION, NEW ORLEANS.
AB3308'OWNERSHIP--U. S. COAST GUARD, FOR ENTRANCE INTO THE STATION CONTACT
AB3308'CWO GEORGE SANDERS, USGS SUPPORT CENTER, NEW ORLEANS, 4640 URQUHART
AB3308'STREET, NEW ORLEANS, LOUISIANA 70117, PHONE 504-942-3056.$TO REACH THE
AB3308'STATION FROM THE JUNCTION OF STATE HIGHWAYS 406 AND 407 ON THE SOUTH
AB3308'SIDE OF THE INTERCOSTAL WATERWAY, GO WEST FOR 0.8 KM (0.50 MI) ON
AB3308'HIGHWAY 406 TO THE JUNCTION WITH F. EDWARD HEBERT BLVD, TURN LEFT AND
AB3308'GO SOUTHEAST FOR 2.3 KM (1.40 MI) ON F. EDWARD HEBERT BLVD TO THE
AB3308'MISSISSIPPI RIVER LEVEE AND A T-ROAD, TURN LEFT AND GO EASTERLY
AB3308'PASSING THROUGH A GATE INTO THE TULANE UNIVERSITY F. EDWARD HEBERT
AB3308'RESEARCH CENTER FOR 3.5 KM (2.15 MI) ON A PAVED ROAD TO A STOP SIGN,
AB3308'CONTINUE STRAIGHT AHEAD AND EASTERLY FOR 0.7 KM (0.45 MI) ON THE PAVED
AB3308'ROAD TO THE GATES INTO THE U. S. COAST GUARD COMMUNICATION STATION,
AB3308'CONTINUE STRAIGHT AHEAD AND EASTERLY THROUGH THE GATES FOR 0.4 KM
AB3308'(0.25 MI) ON THE PAVED ROAD TO A CROSSROADS, CONTINUE STRAIGHT AHEAD
AB3308'FOR 0.08 KM (0.05 MI) ON THE PAVED ROAD TO THE STATION SET ON THE
AB3308'RIGHT AT A CONCRETE DRIVE LEADING INTO A SEWAGE TREATMENT PLANT.$THE
AB3308'STATION IS 12.6 M (41.3 FT) NORTH FROM THE NORTEAST CORNER OF A CHAIN
AB3308'LINK FENCE AROUND THE SEWAGE TREATMENT PLANT, 12.1 M (39.7 FT)
AB3308'SOUTH-SOUTHWEST FROM THE CENTER OF THE PAVED ROAD, 8.4 M (27.6 FT)
AB3308'SOUTH FROM THE EAST END OF A CONCRETE CULVERT UNDER THE DRIVE, 6.2 M
AB3308'(20.3 FT) EAST-SOUTHEAST FROM THE CENTER OF THE CONCRETE DRIVE, ACCESS
AB3308'IS HAD BY A 12.7 CM LOGO CAP ABOUT LEVEL WITH THE ROAD.
AB3308
AB3308                          STATION RECOVERY (1996)
AB3308
AB3308'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1996 (ALG)
AB3308'STATION WAS RECOVERED AS DESCRIBED.  POINT OF CONTACT IS CWO RON
AB3308'BRAHAM, 504-393-6145, OR ETC FORTE, 504-393-6130.
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AF9544 ***********************************************************************
AF9544  CORS        -  This is a GPS Continuously Operating Reference Station.
AF9544  DESIGNATION -  ENGLISH TURN 1 CORS ARP
AF9544  CORS_ID     -  ENG1
AF9544  PID         -  AF9544
AF9544  STATE/COUNTY-  LA/PLAQUEMINES
AF9544  USGS QUAD   -  CHALMETTE (1994)
AF9544
AF9544                       *CURRENT SURVEY CONTROL
AF9544  ___________________________________________________________________
AF9544* NAD 83(CORS)-  29 52 44.24585(N)    089 56 30.19768(W)     ADJUSTED
AF9544* NAVD 88     -         8.78   (meters)      28.8    (feet)  GPS OBS
AF9544  ___________________________________________________________________
AF9544  EPOCH DATE  -        2002.00
AF9544  X           -       5,629.864 (meters)                     COMP
AF9544  Y           -  -5,534,935.493 (meters)                     COMP
AF9544  Z           -   3,158,737.975 (meters)                     COMP
AF9544  ELLIP HEIGHT-         -17.17  (meters)          (03/??/02) GPS OBS
AF9544  GEOID HEIGHT-         -26.02  (meters)                     GEOID03
AF9544
AF9544  HORZ ORDER  -  SPECIAL (CORS)
AF9544  ELLP ORDER  -  SPECIAL (CORS)
AF9544
AF9544.ITRF positions are available for this station.
AF9544.The coordinates were established by GPS observations
AF9544.and adjusted by the National Geodetic Survey in March 2002.
AF9544.The coordinates are valid at the epoch date displayed above.
AF9544.The epoch date for horizontal control is a decimal equivalence
AF9544.of Year/Month/Day.
AF9544
AF9544.The orthometric height was determined by GPS observations and a
AF9544.high-resolution geoid model using precise GPS observation and
AF9544.processing techniques.
AF9544
AF9544.The PID for the CORS L1 Phase Center is AJ7883.
AF9544
AF9544.The XYZ, and position/ellipsoidal ht. are equivalent.
AF9544
AF9544.The ellipsoidal height was determined by GPS observations
AF9544.and is referenced to NAD 83.
AF9544
AF9544.The geoid height was determined by GEOID03.
AF9544
AF9544;                    North         East     Units   Scale      Converg.
AF9544;SPC LA S     -   153,665.873 1,134,421.106   MT  0.99992799 +0 41 45.0
AF9544
AF9544                         SUPERSEDED SURVEY CONTROL
AF9544
AF9544  NAD 83(CORS)-  29 52 44.24594(N)    089 56 30.19744(W) AD(1997.00) c
AF9544  NAD 83(CORS)-  29 52 44.24594(N)    089 56 30.19744(W) AD(1996.00) c
AF9544  ELLIP H (04/??/96)  -17.18   (m)                       GP(1997.00) c c
AF9544  ELLIP H (04/??/96)  -17.18   (m)                       GP(1996.00) c c
AF9544
AF9544.Superseded values are not recommended for survey control.
AF9544.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AF9544.See file dsdata.txt to determine how the superseded data were derived.
AF9544
AF9544_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RBU1587109009(NAD 83)
AF9544_MARKER: STATION IS THE ANTENNA REFERENCE POINT OF THE GPS ANTENNA
AF9544
AF9544                         STATION DESCRIPTION
AF9544
AF9544'DESCRIBED BY NATIONAL GEODETIC SURVEY 2002
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AF9544'STATION IS A GPS CORS.  LATEST INFORMATION INCLUDING POSITIONS AND
AF9544'VELOCITIES ARE AVAILABLE IN THE COORDINATE AND LOG FILES ACCESSIBLE
AF9544'BY ANONYMOUS FTP OR THE WORLDWIDE WEB.
AF9544'   FTP CORS.NGS.NOAA.GOV: CORS/COORD  AND  CORS/STATION_LOG
AF9544'   HTTP://WWW.NGS.NOAA.GOV  UNDER PRODUCTS AND SERVICES.
AJ7883 ***********************************************************************
AJ7883  CORS        -  This is a GPS Continuously Operating Reference Station.
AJ7883  DESIGNATION -  ENGLISH TURN 1 CORS L1 PHASE CENTER
AJ7883  CORS_ID     -  ENG1
AJ7883  PID         -  AJ7883
AJ7883  STATE/COUNTY-  LA/PLAQUEMINES
AJ7883  USGS QUAD   -  CHALMETTE (1994)
AJ7883
AJ7883                        *CURRENT SURVEY CONTROL
AJ7883  ___________________________________________________________________
AJ7883* NAD 83(CORS)-  29 52 44.24581(N)    089 56 30.19771(W)     ADJUSTED
AJ7883* NAVD 88     -
AJ7883  ___________________________________________________________________
AJ7883  EPOCH DATE  -        2002.00
AJ7883  X           -       5,629.863 (meters)                     COMP
AJ7883  Y           -  -5,534,935.572 (meters)                     COMP
AJ7883  Z           -   3,158,738.019 (meters)                     COMP
AJ7883  ELLIP HEIGHT-         -17.08  (meters)          (03/??/02) GPS OBS
AJ7883  GEOID HEIGHT-         -26.02  (meters)                     GEOID03
AJ7883
AJ7883  HORZ ORDER  -  SPECIAL (CORS)
AJ7883  ELLP ORDER  -  SPECIAL (CORS)
AJ7883
AJ7883.ITRF positions are available for this station.
AJ7883.The coordinates were established by GPS observations
AJ7883.and adjusted by the National Geodetic Survey in March 2002.
AJ7883.The coordinates are valid at the epoch date displayed above.
AJ7883.The epoch date for horizontal control is a decimal equivalence
AJ7883.of Year/Month/Day.
AJ7883
AJ7883
AJ7883.The PID for the CORS ARP is AF9544.
AJ7883
AJ7883.The XYZ, and position/ellipsoidal ht. are equivalent.
AJ7883
AJ7883.The ellipsoidal height was determined by GPS observations
AJ7883.and is referenced to NAD 83.
AJ7883
AJ7883.The geoid height was determined by GEOID03.
AJ7883
AJ7883;                   North         East     Units   Scale      Converg.
AJ7883;SPC LA S     -   153,665.871 1,134,421.105   MT  0.99992799 +0 41 45.0
AJ7883
AJ7883                          SUPERSEDED SURVEY CONTROL
AJ7883
AJ7883  NAD 83(CORS)-  29 52 44.24590(N)    089 56 30.19747(W) AD(1996.00) c
AJ7883  NAD 83(CORS)-  29 52 44.24590(N)    089 56 30.19747(W) AD(1997.00) c
AJ7883  ELLIP H (04/??/96)  -17.09   (m)                       GP(1997.00) c c
AJ7883  ELLIP H (04/??/96)  -17.09   (m)                       GP(1996.00) c c
AJ7883
AJ7883.Superseded values are not recommended for survey control.
AJ7883.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AJ7883.See file dsdata.txt to determine how the superseded data were derived.
AJ7883
AJ7883_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RBU1587109009(NAD 83)
AJ7883_MARKER: STATION IS THE L1 PHASE CENTER OF THE GPS ANTENNA
AJ7883
AJ7883                          STATION DESCRIPTION
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 AJ7883
 AJ7883'DESCRIBED BY NATIONAL GEODETIC SURVEY
 AJ7883'STATION IS A GPS CORS.  LATEST INFORMATION INCLUDING POSITIONS AND
 AJ7883'VELOCITIES ARE AVAILABLE IN THE COORDINATE AND LOG FILES ACCESSIBLE
 AJ7883'BY ANONYMOUS FTP OR THE WORLDWIDE WEB.
 AJ7883'   FTP CORS.NGS.NOAA.GOV: CORS/COORD  AND  CORS/STATION_LOG
 AJ7883'   HTTP://WWW.NGS.NOAA.GOV  UNDER PRODUCTS AND SERVICES.

1        National Geodetic Survey,   Retrieval Date = DECEMBER 12, 2002
 BJ1342 ***********************************************************************
 BJ1342  FBN         -  This is a Federal Base Network Control Station.
 BJ1342  TIDAL BM    -  This is a Tidal Bench Mark.
 BJ1342  DESIGNATION -  ALCO
 BJ1342  PID         -  BJ1342
 BJ1342  STATE/COUNTY-  LA/ORLEANS
 BJ1342  USGS QUAD   -  SPANISH FORT (1992)
 BJ1342
 BJ1342                        *CURRENT SURVEY CONTROL
 BJ1342  ___________________________________________________________________
 BJ1342* NAD 83(1992)-  30 01 36.52269(N)    090 06 46.20939(W)     ADJUSTED
 BJ1342* NAVD 88     -         2.008  (meters)       6.59   (feet)  ADJUSTED
 BJ1342  ___________________________________________________________________
 BJ1342  X           -     -10,884.144 (meters)                     COMP
 BJ1342  Y           -  -5,526,738.146 (meters)                     COMP
 BJ1342  Z           -   3,172,935.169 (meters)                     COMP
 BJ1342  LAPLACE CORR-          -0.05  (seconds)                    DEFLEC99
 BJ1342  ELLIP HEIGHT-         -24.36  (meters)                     GPS OBS
 BJ1342  GEOID HEIGHT-         -26.32  (meters)                     GEOID99
 BJ1342  DYNAMIC HT  -           2.005 (meters)       6.58   (feet)  COMP
 BJ1342  MODELED GRAV-     979,318.9   (mgal)                       NAVD 88
 BJ1342
 BJ1342  HORZ ORDER  -  A
 BJ1342  VERT ORDER  -  FIRST     CLASS II
 BJ1342  ELLP ORDER  -  THIRD     CLASS I
 BJ1342
 BJ1342.The horizontal coordinates were established by GPS observations
 BJ1342.and adjusted by the National Geodetic Survey in September 1992.
 BJ1342
 BJ1342.The orthometric height was determined by differential leveling
 BJ1342.and adjusted by the National Geodetic Survey in December 1996.
 BJ1342
 BJ1342.This Tidal Bench Mark is designated as VM 832
 BJ1342.by the Center for Operational Oceanographic Products and Services.
 BJ1342
 BJ1342.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 BJ1342
 BJ1342.The Laplace correction was computed from DEFLEC99 derived deflections.
 BJ1342
 BJ1342.The ellipsoidal height was determined by GPS observations
 BJ1342.and is referenced to NAD 83.
 BJ1342
 BJ1342.The geoid height was determined by GEOID99.
 BJ1342
 BJ1342.The dynamic height is computed by dividing the NAVD 88
 BJ1342.geopotential number by the normal gravity value computed on the
 BJ1342.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 BJ1342.degrees latitude (g = 980.6199 gals.).
 BJ1342
 BJ1342.The modeled gravity was interpolated from observed gravity values.
 BJ1342
 BJ1342;                   North         East     Units   Scale      Converg.
 BJ1342;SPC LA S     -   169,865.282 1,117,718.629   MT  0.99992585 +0 36 37.0
 BJ1342;UTM  15      - 3,325,268.793   778,444.656   MT  1.00055667 +1 26 44.5
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BJ1342
BJ1342:                Primary Azimuth Mark                     Grid Az
BJ1342:SPC LA S     -  BUICK                                    082 43 23.8
BJ1342:UTM  15      -  BUICK                                    081 53 16.3
BJ1342
BJ1342|---------------------------------------------------------------------|
BJ1342| PID    Reference Object                     Distance      Geod. Az  |
BJ1342|                                                           dddmmss.s |
BJ1342| BJ1346 BUICK                              APPROX. 0.7 KM 0832000.8 |
BJ1342| BJ4248 MT CARMEL CONVENT CROSS            APPROX. 0.9 KM 1600332.4 |
BJ1342| BJ1344 ALCO RM                                            25738     |
BJ1342|---------------------------------------------------------------------|
BJ1342
BJ1342                         SUPERSEDED SURVEY CONTROL
BJ1342
BJ1342  ELLIP HT    -         -24.33  (m)                      GP(       ) 4 2
BJ1342  ELLIP HT    -         -24.33  (m)                      GP(       ) 3 1
BJ1342  NAD 83(1986)-  30 01 36.53967(N)    090 06 46.20687(W) AD(       ) 1
BJ1342  NAD 83(1986)-  30 01 36.54071(N)    090 06 46.20093(W) AD(       ) 3
BJ1342  NAD 27      -  30 01 35.81240(N)    090 06 45.94411(W) AD(       ) 3
BJ1342  NGVD 29     -         2.061  (m)            6.76   (f) ADJUSTED    1 2
BJ1342
BJ1342.Superseded values are not recommended for survey control.
BJ1342.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
BJ1342.See file dsdata.txt to determine how the superseded data were derived.
BJ1342
BJ1342_U.S. NATIONAL GRID SPATIAL ADDRESS: 15RYP7844525269(NAD 83)
BJ1342_MARKER: DS = TRIANGULATION STATION DISK
BJ1342_SETTING: 37 = SET IN SEA WALL
BJ1342_STAMPING: ALCO 1931
BJ1342_MARK LOGO: CGS
BJ1342_PROJECTION: FLUSH
BJ1342_MAGNETIC: N = NO MAGNETIC MATERIAL
BJ1342_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
BJ1342_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BJ1342+SATELLITE: SATELLITE OBSERVATIONS - May 05, 2001
BJ1342
BJ1342  HISTORY     - Date     Condition        Report By
BJ1342  HISTORY     - 1931     MONUMENTED       CGS
BJ1342  HISTORY     - 1935     GOOD             LAGS
BJ1342  HISTORY     - 1942     GOOD             CGS
BJ1342  HISTORY     - 1953     GOOD             CGS
BJ1342  HISTORY     - 1954     GOOD             CGS
BJ1342  HISTORY     - 1963     GOOD             CGS
BJ1342  HISTORY     - 1964     GOOD             CGS
BJ1342  HISTORY     - 1981     MARK NOT FOUND   USGS
BJ1342  HISTORY     - 1985     GOOD             USPSQD
BJ1342  HISTORY     - 1985     GOOD             NGS
BJ1342  HISTORY     - 1987     GOOD             LADTD
BJ1342  HISTORY     - 1988     GOOD             USPSQD
BJ1342  HISTORY     - 19880920 GOOD             LADTD
BJ1342  HISTORY     - 19890117 GOOD
BJ1342  HISTORY     - 19901108 GOOD             NGS
BJ1342  HISTORY     - 19911016 GOOD             LADTD
BJ1342  HISTORY     - 19921124 GOOD             NOS
BJ1342  HISTORY     - 19930303 GOOD             NOS
BJ1342  HISTORY     - 19941117 GOOD             NGS
BJ1342  HISTORY     - 19960130 GOOD             NGS
BJ1342  HISTORY     - 19960218 GOOD             NGS
BJ1342  HISTORY     - 19980213 GOOD             NGS
BJ1342  HISTORY     - 19980309 GOOD             NGS
BJ1342  HISTORY     - 20010505 GOOD             NGS
BJ1342
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BJ1342                          STATION DESCRIPTION
BJ1342
BJ1342'DESCRIBED BY COAST AND GEODETIC SURVEY 1931 (RLS)
BJ1342'NEAR THE WEST END LIGHTHOUSE, ON THE LAKE PONTCHARTRAIN
BJ1342'SEA-WALL IN ZONE 1, WHICH LIES BETWEEN THE ORLEANS CANAL AND THE
BJ1342'NEW BASIN CANAL, AND IN THE 132ND BAY COUNTING FROM THE ORLEANS
BJ1342'CANAL.
BJ1342'
BJ1342'THE STATION IS MARKED BY A STANDARD BRONZE DISK WHICH IS SET
BJ1342'FLUSH WITH THE TOP SURFACE OF THE TOP COPING.
BJ1342'
BJ1342'THE REFERENCE MARK, A STANDARD BRONZE DISK, IS
BJ1342'S 77 DEG 38 MIN E.
BJ1342'
BJ1342'THE CROSS ON THE MOUNT CARMEL CONVENT IS S 19 DEG 56 MIN E.
BJ1342
BJ1342                          STATION RECOVERY (1935)
BJ1342
BJ1342'RECOVERY NOTE BY LOUISIANA GEODETIC SURVEY 1935
BJ1342'STATION RECOVERED AS DESCRIBED.
BJ1342
BJ1342                          STATION RECOVERY (1942)
BJ1342
BJ1342'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1942 (HCW)
BJ1342'STATION WAS RECOVERED AS DESCRIBED IN EVERY DETAIL.  THE
BJ1342'DISTANCES AND DIRECTIONS TO AZIMUTH MARKS WERE NOT CHECKED.
BJ1342'
BJ1342'NEAR THE WEST END LIGHTHOUSE, ON THE LAKE PONTCHARTRAIN
BJ1342'SEA-WALL IN ZONE 1, WHICH LIES BETWEEN THE ORLEANS CANAL AND
BJ1342'THE NEW BASIN CANAL, AND IN THE 132ND BAY COUNTING FROM THE
BJ1342'ORLEANS CANAL.
BJ1342'
BJ1342'THE STATION IS MARKED BY A STANDARD BRONZE DISK WHICH IS SET
BJ1342'FLUSH WITH THE TOP FURFACE OF THE TOP COPING.
BJ1342'
BJ1342'THE REFERENCE MARK, A STANDARD BRONZE DISK, IS
BJ1342'S 77 DEG 38 MIN E.
BJ1342'
BJ1342'THE CROSS ON THE MOUNT CARMEL CONVENT IS S 19 DEG 56 MIN E.
BJ1342
BJ1342                          STATION RECOVERY (1953)
BJ1342
BJ1342'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1953 (RLE)
BJ1342'STATION AND REFERENCE MARK WERE RECOVERED IN GOOD CONDITION.
BJ1342'A NEW DESCRIPTION FOLLOWS--
BJ1342'
BJ1342'STATION IS LOCATED ON THE LAKE PONTCHARTRAIN SEAWALL, JUST E
BJ1342'OF A U.S. COAST GUARD STATION.  IT IS A STANDARD BRONZE DISK,
BJ1342'STAMPED ALCO 1931 AND CEMENTED IN A DRILL HOLE IN THE TOP OF A
BJ1342'CONCRETE SEAWALL.
BJ1342'
BJ1342'THE REFERENCE MARK IS A STANDARD BRONZE DISK, STAMPED ALCO 1931
BJ1342'AND CEMENTED IN A DRILL HOLE IN THE TOP OF A CONCRETE SEAWALL.
BJ1342'
BJ1342'TO REACH THE STATION FROM THE INTERSECTION OF LAKESHORE DRIVE
BJ1342'AND CANAL BOULEVARD, GO W ON LAKESHORE DRIVE ALONG THE SEAWALL
BJ1342'FOR 0.4 MI. TO THE STATION ON THE RIGHT AS DESCRIBED JUST E OF
BJ1342'THE COAST GUARD STATION.
BJ1342
BJ1342                          STATION RECOVERY (1954)
BJ1342
BJ1342'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1954 (RAE)
BJ1342'THE STATION IS LOCATED IN THE NW SECTION OF NEW ORLEANS, NEAR THE
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BJ1342'MOUTH OF NEW CANAL, 150 FT. SE OF NEW CANAL LIGHTHOUSE, AND ON
BJ1342'THE S SHORE OF LAKE PONCHARTRAIN.  IT IS 46 PACES E OF THE W END
BJ1342'OF THE SEAWALL, AND 132 BAYS W OF ORLEANS CANAL.  IT IS A
BJ1342'STANDARD DISK, SET IN A DRILL HOLE IN THE TOP OF THE SEAWALL.  IT
BJ1342'IS STAMPED ALCO 1931.
BJ1342'
BJ1342'THE REFERENCE MARK IS W OF THE STATION S 77 DEG 38 MIN W.
BJ1342'IT IS 13 PACES E OF THE W END OF THE SEAWALL.  IT IS A STANDARD
BJ1342'DISK, SET IN A DRILL HOLE IN THE TOP OF THE SEAWALL, AND STAMPED
BJ1342'ALCO 1931.
BJ1342
BJ1342                          STATION RECOVERY (1963)
BJ1342
BJ1342'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1963
BJ1342'IN NEW ORLEANS.
BJ1342'AT NEW ORLEANS, AT WEST END, NEAR THE NORTH END OF WEST END BOULEVARD,
BJ1342'NEAR THE COAST GUARD STATION, SET IN THE TOP OF THE SEA WALL ALONG
BJ1342'SHORE OF LAKE PONTCHARTRAIN, 112 FEET NORTHWEST OF THE CENTER LINE OF
BJ1342'LAKESHORE DRIVE, 115 FEET EAST OF THE WEST END OF THE SEA WALL, 70
BJ1342'FEET EAST OF A STEEL FENCE CORNER POST ON TOP OF THE SEA WALL AND IS
BJ1342'ABOUT 2 FEET ABOVE THE DRIVE.
BJ1342
BJ1342                          STATION RECOVERY (1964)
BJ1342
BJ1342'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1964 (RRG)
BJ1342'THE STATION AND ONE REFERENCE MARK WAS FOUND AND IN GOOD
BJ1342'CONDITION.
BJ1342'
BJ1342'THE STATION IS LOCATED ALONG THE SEA WALL ALONG THE SHORE OF LAKE
BJ1342'PONTCHARTRAIN, NEAR THE COAST GUARD STATION, 112 FEET NORTHWEST
BJ1342'OF THE CENTER LINE OF LAKESHORE DRIVE, 115 FEET EAST OF THE WEST
BJ1342'END OF THE SEA WALL, 70 FEET EAST OF A STEEL FENCE POST IN
BJ1342'SEA WALL AND ABOUT 2 FEET ABOVE THE LEVEL OF THE DRIVE.
BJ1342'
BJ1342'THE REFERENCE MARK IS 87 FEET WEST OF THE STATION AND SET ON
BJ1342'TOP OF THE SEA WALL.  23 FEET EAST OF THE WEST END OF THE WALL
BJ1342'AND 2 FEET ABOVE THE LEVEL OF THE DRIVE,
BJ1342
BJ1342                          STATION RECOVERY (1981)
BJ1342
BJ1342'RECOVERY NOTE BY US GEOLOGICAL SURVEY 1981
BJ1342'MARK NOT FOUND.
BJ1342
BJ1342                          STATION RECOVERY (1985)
BJ1342
BJ1342'RECOVERY NOTE BY US POWER SQUADRON 1985 (JCM)
BJ1342'ALCO--1931 FOUND GOOD.
BJ1342'
BJ1342'DESCRIPTION ADEQUATE.
BJ1342'
BJ1342'REFERENCE MARK FOUND GOOD.
BJ1342'LOCATED ON TOP SURFACE OF SEA WALL 87 FEET WEST OF STATION, APPROX.
BJ1342'TWO FEET WEST OF US COAST GUARD DRIVEWAY GATE, UNDER CYCLONE FENCE.
BJ1342
BJ1342                          STATION RECOVERY (1985)
BJ1342
BJ1342'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1985
BJ1342'RECOVERED IN GOOD CONDITION, THE 1963 RECOVERY IS ADEQUATE WITH THE
BJ1342'FOLLOWING ADDITION, ADD--7.07 METERS (23.2 FT) NORTH-NORTHEAST OF
BJ1342'STEEL LAMP POST 500.
BJ1342
BJ1342                          STATION RECOVERY (1987)
BJ1342
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BJ1342'RECOVERY NOTE BY LA TRANSP AND DEV 1987 (TLH)
BJ1342'THE DESIGNATED MARK WAS RECOVERED WITH CHANGES NOTED BELOW--
BJ1342'A COMPLETE NEW DESCRIPTION WAS MADE THIS DATE.
BJ1342'
BJ1342'THE STATION IS LOCATED ABOUT 7 KM (4.4 MI) NORTH OF INTERSTATE
BJ1342'HIGHWAY 10, NEAR THE U.S. COAST GUARD STATION AT LAKE PONCHATRAIN.
BJ1342'OWNERSHIP--ORLEANS PARISH LEVEE BOARD, SUITE 202, ADMINISTRATION
BJ1342'BUILDING, LAKEFRONT AIRPORT, NEW ORLEANS, LA. PHONE 504-246-4000.
BJ1342'
BJ1342'TO REACH THE STATION FROM THE JUNCTION OF INTERSTATE HIGHWAY 10 AND
BJ1342'CAUSEWAY BOULEVARD, GO NORTH FOR 0.55 KM (0.35 MI) ON CAUSEWAY
BJ1342'BOULEVARD TO VETERANS MEMORIAL HIGHWAY.
BJ1342'TURN RIGHT AND GO EAST FOR 3.89 KM (2.4 MI) ON VETERANS MEMORIAL
BJ1342'BOULEVARD TO PONCHATRAIN BOULEVARD.
BJ1342'TURN LEFT AND GO NORTH FOR 1.85 KM (1.15 MI) ON PONCHATRAIN
BJ1342'BOULEVARD TO ROBERT E LEE BOULEVARD.
BJ1342'CONTINUE STRAIGHT AHEAD AND GO NORTH FOR 0.72 KM (0.45 MI) ON
BJ1342'ROBERT E LEE BOULEVARD TO THE COAST GUARD STATION ENTRANCE ON THE
BJ1342'LEFT AT THE EAST END OF A CURVE IN THE ROAD.  TURN LEFT ONTO A
BJ1342'NARROW LANE FOR 30 METERS (100 FT) TO THE STATION ON THE RIGHT.
BJ1342'
BJ1342'THE STATION IS A STANDARD CGS DISK
BJ1342'STAMPED---ALCO 1931---,
BJ1342'SET INTO A DRILL HOLE IN THE TOP STEP OF THE SEAWALL.
BJ1342'21.2 METERS (69.5 FT) EAST FROM THE EAST GATE POST AT THE ENTRANCE
BJ1342'TO THE COAST GUARD STATION,
BJ1342'7.2 METERS (23.6 FT) NORTHEAST FROM A METAL LIGHT POLE, AND
BJ1342'4.6 METERS (15.1 FT) WEST FROM A SEAM IN THE SEAWALL.
BJ1342
BJ1342                          STATION RECOVERY (1988)
BJ1342
BJ1342'RECOVERY NOTE BY US POWER SQUADRON 1988 (WFT)
BJ1342'RECOVERED IN GOOD CONDITION.
BJ1342
BJ1342                          STATION RECOVERY (1988)
BJ1342
BJ1342'RECOVERY NOTE BY LA TRANSP AND DEV 1988
BJ1342'THE STATION IS LOCATED ABOUT 7 KM (4.35 MI) NORTH OF INTERSTATE
BJ1342'HIGHWAY 10, NEAR THE U.S. COAST GUARD STATION AT LAKE PONTCHATRAIN.
BJ1342'OWNERSHIP--ORLEANS PARISH LEVEE BOARD, SUITE 202, ADMINISTRATION
BJ1342'BUILDING, LAKEFRONT AIRPORT, NEW ORLEANS, LA.  PHONE 504-246-4000.
BJ1342'TO REACH THE STATION FROM THE JUNCTION OF INTERSTATE HIGHWAY 10 AND
BJ1342'CAUSEWAY BOULEVARD, GO NORTH FOR 0.55 KM (0.35 MI) ON CAUSEWAY
BJ1342'BOULEVARD TO VETERANS MEMORIAL HIGHWAY, TURN RIGHT AND GO EAST FOR
BJ1342'3.89 KM (2.40 MI) ON VETERANS MEMORIAL BOULEVARD TO WEST END BLVD,
BJ1342'TURN LEFT AND GO NORTH ON WEST END BLVD FOR 2.57 KM (1.60 MI) TO THE
BJ1342'COAST GUARD STATION ENTRANCE ON THE LEFT AT THE EAST END OF A CURVE IN
BJ1342'THE ROAD.  TURN LEFT ONTO A NARROW LANE FOR 30 METERS (98.4 FT) TO THE
BJ1342'STATION ON THE RIGHT, 21.2 M (69.6 FT) EAST FROM THE EAST GATE POST AT
BJ1342'THE ENTRANCE TO THE COAST GUARD STATION, 7.2 M (23.6 FT) NORTHEAST
BJ1342'FROM A METAL LIGHT POLE, AND 4.6 M (15.1 FT) WEST FROM A SEAM IN THE
BJ1342'SEAWALL.
BJ1342
BJ1342                          STATION RECOVERY (1989)
BJ1342
BJ1342'RECOVERED 1989
BJ1342'RECOVERED IN GOOD CONDITION.
BJ1342
BJ1342                          STATION RECOVERY (1990)
BJ1342
BJ1342'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1990
BJ1342'IN NEW ORLEANS, AT 800 LAKESHORE DRIVE, IN A CONCRETE RETAINING WALL
BJ1342'ALONG THE SOUTH SHORE OF LAKE PONTCHARTRAIN, 38.8 M (127.3 FT)
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BJ1342'EAST-SOUTHEAST OF THE SOUTHEAST CORNER OF A LIGHTHOUSE AT 800
BJ1342'LAKESHORE DRIVE, 35.0 M (114.8 FT) EAST OF THE WEST END OF THE
BJ1342'RETAINING WALL, 34.1 M (111.9 FT) NORTHWEST OF THE CENTERLINE OF THE
BJ1342'DRIVE, 23.9 M (78.4 FT) EAST OF THE CENTER OF A DRIVEWAY, 21.3 M
BJ1342'(69.9 FT) EAST OF A STEEL FENCE CORNER POST ON TOP OF THE SEA WALL,
BJ1342'7.1 M (23.3 FT) NORTH-NORTHEAST OF UTILITY LIGHT POLE NUMBER 500, AND
BJ1342'0.6 M (2.0 FT) ABOVE THE LEVEL OF THE DRIVE.
BJ1342
BJ1342                          STATION RECOVERY (1991)
BJ1342
BJ1342'RECOVERY NOTE BY LA TRANSP AND DEV 1991
BJ1342'THE STATION IS LOCATED IN NORTHWEST NEW ORLEANS, NEAR THE U.S. COAST
BJ1342'GUARD STATION ON THE SOUTH SHORE OF LAKE PONCHATRAIN.
BJ1342'OWNERSHIP--ORLEANS PARISH LEVEE BOARD, SUITE 202, ADMINISTRATION
BJ1342'BUILDING, LAKEFRONT AIRPORT, NEW ORLEANS, LA. PHONE 504-246-4000.
BJ1342'TO REACH THE STATION FROM THE JUNCTION OF INTERSTATE HIGHWAY 10 AND
BJ1342'CAUSEWAY BOULEVARD, GO NORTH FOR 0.35 MI (0.56 KM) ON CAUSEWAY
BJ1342'BOULEVARD TO THE JUNCTION WITH VETERANS MEMORIAL BOULVARD, TURN RIGHT
BJ1342'AND GO EAST FOR 2.4 MI (3.9 KM) ON VETERANS BOULEVARD TO THE JUNCTION
BJ1342'WITH WEST END BOULEVARD, TURN LEFT AND GO NORTH FOR 1.6 MI (2.6 KM)
BJ1342'ON WEST END BOULEVARD WHICH TURNS INTO LAKESHORE DRIVE TO THE COAST
BJ1342'GUARD STATION ON THE LEFT AND STATION MARK ON THE LEFT SET IN THE
BJ1342'SEAWALL.
BJ1342'THE STATION IS 123.0 FT (37.5 M) NORTH-NORTHWEST FROM THE CENTER OF
BJ1342'LAKESHORE DRIVE,  69.5 FT (21.2 M) EAST-NORTHEAST FROM THE EAST GATE
BJ1342'POST AT THE ENTRANCE OF THE COAST GUARD STATION, 23.5 FT (7.2 M)
BJ1342'NORTHEAST FROM A METAL LIGHT POLE, 32.5 FT (9.9 M) NORTH FROM THE
BJ1342'CENTER OF THE DRIVE INTO THE COAST GUARD STATION, 15.0 FT (4.6 M)
BJ1342'WEST-SOUTHWEST FROM A SEAM IN THE SEA WALL, FLUSH WITH THE TOP OF THE
BJ1342'SEAWALL AND ABOUT LEVEL WITH THE ROAD.
BJ1342
BJ1342                          STATION RECOVERY (1992)
BJ1342
BJ1342'RECOVERY NOTE BY NATIONAL OCEAN SERVICE 1992
BJ1342'RECOVERED IN GOOD CONDITION.
BJ1342
BJ1342                          STATION RECOVERY (1993)
BJ1342
BJ1342'RECOVERY NOTE BY NATIONAL OCEAN SERVICE 1993
BJ1342'RECOVERED IN GOOD CONDITION.
BJ1342
BJ1342                          STATION RECOVERY (1994)
BJ1342
BJ1342'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1994 (GAS)
BJ1342'IN NEW ORLEANS, AT 8001 LAKESHORE DRIVE, IN A CONCRETE RETAINING WALL
BJ1342'ALONG THE SOUTH SHORE OF LAKE PONTCHARTRAIN, 36.7 M (120.4 FT)
BJ1342'SOUTHEAST OF THE SOUTHEAST CORNER OF THE U.S. COAST GUARD LIGHT HOUSE
BJ1342'AT 8001 LAKESHORE DRIVE, 27.3 M (89.6 FT) EAST OF ALCO REFERENCE MARK,
BJ1342'9.9 M (32.5 FT) NORTH-NORTHEAST OF AND LEVEL WITH THE CENTER OF THE
BJ1342'LIGHTHOUSE ENTRANCE DRIVE, AND 7.2 M (23.6 FT) NORTHEAST OF A UTILITY
BJ1342'LIGHT POLE.
BJ1342
BJ1342                          STATION RECOVERY (1996)
BJ1342
BJ1342'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1996 (RPB)
BJ1342'RECOVERED AS DESCRIBED.
BJ1342
BJ1342                          STATION RECOVERY (1996)
BJ1342
BJ1342'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1996 (RPB)
BJ1342'RECOVERED AS DESCRIBED.
BJ1342
BJ1342                          STATION RECOVERY (1998)
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BJ1342
BJ1342'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1998 (CSM)
BJ1342'RECOVERED AS DESCRIBED.
BJ1342
BJ1342                          STATION RECOVERY (1998)
BJ1342
BJ1342'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1998 (CSM)
BJ1342'RECOVERED AS DESCRIBED.
BJ1342
BJ1342                          STATION RECOVERY (2001)
BJ1342
BJ1342'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 2001 (RTN)
BJ1342'THIS STATION IS LOCATED IN NORTH NEW ORLEANS, LOUISIANA.  IN A
BJ1342'CONCRETE
BJ1342'RETAINING WALL ALONG THE SOUTH SHORE OF LAKE PONTCHARTRAIN.
BJ1342'OWNERSHIP IS THE ORLEANS PARISH LEVEE BOARD, SUITE 202, ADMINISTRATION
BJ1342'BUILDING, LAKEFRONT AIRPORT, STARS AND STRIPES BOULEVARD, NEW ORLEANS,
BJ1342'LA. PHONE  504 246-4000.
BJ1342'
BJ1342'TO REACH THIS STATION FROM THE JUNCTION OF INTERSTATE 10 AND CAUSEWAY
BJ1342'BOULEVARD, GO NORTH FOR 0.35 MILES ON CAUSEWAY BOULEVARD TO THE
BJ1342'JUNCTION WITH VETERANS BOULEVARD.  RIGHT AND GO EAST FOR 2.4 MILES ON
BJ1342'VETERANS BOULEVARD TO THE JUNCTION WITH WEST END BOULEVARD, TURN
BJ1342'LEFT AND GO NORTH FOR 1.6 MILES ON WEST END BOULEVARD WHICH TURNS INTO
BJ1342'LAKESHORE DRIVE TO THE COAST GUARD
BJ1342'
BJ1342'STATION ON LEFT AND STATION ON THE LEFT. .   STATION IS SET IN THE
BJ1342'SEAWALL.  IT
BJ1342'IS 217.0 FEET NORTH-NORTHWEST FROM THE CENTER OF LAKESHORE DRIVE, 69.5
BJ1342'FEET EAST-NORTHEAST FROM TH EAST GATE POST AT THE ENTRANCE OF THE
BJ1342'COAST GUARD STATION, 23.5 FEET NORTH FROM THE CENTER OF THE DRIVE INTO
BJ1342'COAST GUARD STATION, 15.0 FEET WEST-SOUTHWEST FROM THE SEAM IN THE SEA
BJ1342'WALL, 89.6 FEET EAST OF ALCO REFERENCE MARK, 23.6 FEET NORTHEAST OF A
BJ1342'UTILITY LIGHT POLE, AND FLUSH WITH TOP OF THE SEAWALL AND ABOUT LEVEL
BJ1342'WITH ROAD.
BJ1342'
BJ1342'
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1        National Geodetic Survey,   Retrieval Date = FEBRUARY  5, 2004
 BH1870 ***********************************************************************
 BH1870  CBN         -  This is a Cooperative Base Network Control Station.
 BH1870  DESIGNATION -  NICOLE
 BH1870  PID         -  BH1870
 BH1870  STATE/COUNTY-  LA/ST TAMMANY
 BH1870  USGS QUAD   -  SLIDELL (1994)
 BH1870
 BH1870                        *CURRENT SURVEY CONTROL
 BH1870  ___________________________________________________________________
 BH1870* NAD 83(1992)-  30 20 26.61112(N)    089 49 16.23775(W)     ADJUSTED
 BH1870* NAVD 88     -         7.600  (meters)      24.93   (feet)  ADJUSTED
 BH1870  ___________________________________________________________________
 BH1870  X           -      17,194.625 (meters)                     COMP
 BH1870  Y           -  -5,509,230.366 (meters)                     COMP
 BH1870  Z           -   3,203,018.454 (meters)                     COMP
 BH1870  LAPLACE CORR-          -0.88  (seconds)                    DEFLEC99
 BH1870  ELLIP HEIGHT-         -19.33  (meters)          (02/12/02) GPS OBS
 BH1870  GEOID HEIGHT-         -26.94  (meters)                     GEOID03
 BH1870  DYNAMIC HT  -           7.590 (meters)      24.90  (feet)  COMP
 BH1870  MODELED GRAV-     979,347.4   (mgal)                       NAVD 88
 BH1870
 BH1870  HORZ ORDER  -  B
 BH1870  VERT ORDER  -  FIRST     CLASS II
 BH1870  ELLP ORDER  -  FOURTH    CLASS II
 BH1870
 BH1870.This mark is at Slidell Airport (6R0)
 BH1870
 BH1870.The horizontal coordinates were established by GPS observations
 BH1870.and adjusted by the National Geodetic Survey in September 1992.
 BH1870
 BH1870.The orthometric height was determined by differential leveling
 BH1870.and adjusted by the National Geodetic Survey in February 1994.
 BH1870.WARNING-GPS observations at this control monument resulted in a GPS
 BH1870.derived orthometric height which differed from the leveled height by
 BH1870.more than one decimeter (0.1 meter).
 BH1870
 BH1870.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 BH1870
 BH1870.The Laplace correction was computed from DEFLEC99 derived deflections.
 BH1870
 BH1870.The ellipsoidal height was determined by GPS observations
 BH1870.and is referenced to NAD 83.
 BH1870
 BH1870.The geoid height was determined by GEOID03.
 BH1870
 BH1870.The dynamic height is computed by dividing the NAVD 88
 BH1870.geopotential number by the normal gravity value computed on the
 BH1870.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 BH1870.degrees latitude (g = 980.6199 gals.).
 BH1870
 BH1870.The modeled gravity was interpolated from observed gravity values.
 BH1870
 BH1870;                    North         East     Units   Scale      Converg.
 BH1870;SPC LA S     -   204,994.359 1,145,388.862   MT  0.99994327 +0 45 22.0
 BH1870;UTM  16      - 3,359,916.088   228,784.253   MT  1.00050757 -1 25 33.5
 BH1870
 BH1870:                Primary Azimuth Mark                     Grid Az
 BH1870:SPC LA S     -  NICOLE AZ MK                             359 06 24.6
 BH1870:UTM  16      -  NICOLE AZ MK                             001 17 20.1
 BH1870
 BH1870|---------------------------------------------------------------------|
 BH1870| PID    Reference Object                     Distance      Geod. Az  |
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BH1870|                                                          dddmmss.s |
BH1870| BH1871 NICOLE AZ MK                        APPROX. 0.7 KM 3595146.6 |
BH1870|-------------------------------------------------------------------|
BH1870
BH1870                          SUPERSEDED SURVEY CONTROL
BH1870
BH1870  ELLIP H (08/18/00)  -19.34   (m)                        GP(       ) 4 1
BH1870  ELLIP H (01/21/93)  -19.27   (m)                        GP(       ) 4 2
BH1870  ELLIP H (09/10/92)  -19.27   (m)                        GP(       ) 4 1
BH1870  NAD 83(1986)-  30 20 26.62387(N)    089 49 16.23592(W) AD(       ) 3
BH1870  NAD 27      -  30 20 25.92779(N)    089 49 15.98997(W) AD(       ) 3
BH1870  NAVD 88 (08/12/94)    7.60   (m)           24.9    (f) LEVELING    3
BH1870  NGVD 29 (11/20/87)    7.75   (m)           25.4    (f) LEVELING    3
BH1870
BH1870.Superseded values are not recommended for survey control.
BH1870.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
BH1870.See file dsdata.txt to determine how the superseded data were derived.
BH1870
BH1870_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RBU2878459916(NAD 83)
BH1870_MARKER: DH = HORIZONTAL CONTROL DISK
BH1870_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
BH1870_STAMPING: NICOLE 1986
BH1870_MARK LOGO: NGS
BH1870_PROJECTION: FLUSH
BH1870_MAGNETIC: N = NO MAGNETIC MATERIAL
BH1870_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
BH1870+STABILITY: SURFACE MOTION
BH1870_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BH1870+SATELLITE: SATELLITE OBSERVATIONS - February 15, 2000
BH1870
BH1870  HISTORY     - Date     Condition        Report By
BH1870  HISTORY     - 1986     MONUMENTED       NGS
BH1870  HISTORY     - 1986     GOOD             NGS
BH1870  HISTORY     - 19870319 GOOD
BH1870  HISTORY     - 19870615 GOOD             NGS
BH1870  HISTORY     - 19910904 GOOD             LADTD
BH1870  HISTORY     - 19920330 GOOD
BH1870  HISTORY     - 19930506 GOOD
BH1870  HISTORY     - 19950905 GOOD             LADTD
BH1870  HISTORY     - 20000215 GOOD             NASA
BH1870
BH1870                          STATION DESCRIPTION
BH1870
BH1870'DESCRIBED BY NATIONAL GEODETIC SURVEY 1986 (SLC)
BH1870'THE STATION IS LOCATED ABOUT 8 KM (5 MI) NORTHWEST OF SLIDELL AND
BH1870'AT THE SOUTH END OF THE SLIDELL AIRPORT.
BH1870'OWNERSHIP--ST TAMMANY PARISH, FOR ENTRANCE INTO THE AIRFIELD,
BH1870'CONTACT MR. JOHN REEVES, 232 AIRPORT DR., SLIDELL, LA 70458, PHONE
BH1870'504-641-2439.
BH1870'
BH1870'TO REACH THE STATION FROM THE JUNCTION OF INTERSTATE 12 AND AIRPORT
BH1870'ROAD, EXIT 80,IN SLIDELL, GO LEFT, NORTH FOR 3.2 KM (2 MI) TO THE
BH1870'AIRPORT ENTRANCE GATE, GO EAST FOR 0.2 KM (0.15 MI) TO THE TAXIWAY,
BH1870'THEN RIGHT, SOUTH ON THE TAXIWAY FOR 0.2 KM (0.1 MI) TO THE STATION
BH1870'ON THE LEFT, BETWEEN THE RUNWAY AND TAXIWAY.
BH1870'
BH1870'THE STATION IS A STANDARD NGS DISK
BH1870'STAMPED---NICOLE 1986---,
BH1870'SET INTO THE TOP OF A ROUND CONCRETE MONUMENT
BH1870'30 CM IN DIAMETER FLUSH WITH GROUND.  LOCATED
BH1870'82.9 METERS (272 FT) SOUTH-SOUTHWEST FROM A GLIDE LIGHT VASI,
BH1870'69.5 METERS (228 FT) NORTH-NORTHWEST FROM A GLIDE LIGHT VASI,
BH1870'32 METERS (105 FT) SOUTHWEST FROM A RUNWAY LIGHT,
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BH1870'26.4 METERS (86.5 FT) WEST FROM THE WEST EDGE OF THE RUNWAY AND
BH1870'0.5 METER (1.5 FT) EAST FROM A WITNESS POST.
BH1870'THE UNDERGROUND MARK IS A STANDARD NGS DISK
BH1870'STAMPED---NICOLE 1986---,
BH1870'SET INTO AN IRREGULAR MASS OF CONCRETE 1.1 METERS BELOW THE SURFACE.
BH1870'
BH1870'DESCRIBED S.L. CRAIN, TYPED BY DEW.
BH1870
BH1870                          STATION RECOVERY (1986)
BH1870
BH1870'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1986
BH1870'9.3 KM (5.75 MI) NW FROM SLIDELL.
BH1870'THE MARK IS ABOVE LEVEL WITH GROUND.
BH1870'4.8 KM (3.0 MILES) WEST ALONG U.S. HIGHWAY 190 FROM THE JUNCTION OF
BH1870'U.S. HIGHWAY 11 IN SLIDELL, THENCE 4.3 KM (2.75 MILES) NORTH ALONG
BH1870'AIRPORT ROAD TO THE AIRPORT OFFICE, THENCE 0.2 KM (0.1 MILES) EAST TO
BH1870'TAXIWAY, THENCE 0.1 KM (0.05 MILES) SOUTH ALONG TAXIWAY TO THE MARK ON
BH1870'THE LEFT.  IT IS 26.5 METERS (87.0 FT) WEST OF THE WEST EDGE OF
BH1870'RUNWAY, 127.7 METERS (419.0 FT) NORTH OF THE NORTH EDGE OF THE SOUTH
BH1870'APPROACH TO RUNWAY AND 31.8 METERS (104.5 FT) SOUTHEAST OF A RUNWAY
BH1870'LIGHT.
BH1870'THE MARK IS 0.36 METERS  S FROM  A WITNESS POST
BH1870
BH1870                          STATION RECOVERY (1987)
BH1870
BH1870'RECOVERED 1987
BH1870'RECOVERED IN GOOD CONDITION.
BH1870
BH1870                          STATION RECOVERY (1987)
BH1870
BH1870'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1987
BH1870'THE STATION IS LOCATED IN THE SOUTH PART OF THE AIRPORT NEAR RUNWAY
BH1870'END 35.  IT IS 478.5 FT (145.8 M) NNW OF THE CENTERLINE END OF RWY 35,
BH1870'272 FT (82.9 M) SSW OF THE NORTHERLY VASI (35), 228 FT (69.5 M) NNW OF
BH1870'THE SOUTHERLY VASI (35), 105 FT (32.0 M) SOUTHWEST OF THE THIRD RUNWAY
BH1870'LIGHT NORTH OF THE END, AND 86.5 FT (26.4 M) WEST OF THE WEST EDGE OF
BH1870'THE RUNWAY.  IT IS AN NGS HORIZONTAL CONTROL MARK DISK STAMPED NICOLE
BH1870'1986, AND SET IN THE TOP OF A 12 INCH ROUND CONCRETE POST FLUSH WITH
BH1870'THE GROUND.
BH1870
BH1870                          STATION RECOVERY (1991)
BH1870
BH1870'RECOVERY NOTE BY LA TRANSP AND DEV 1991
BH1870'THE STATION IS LOCATED ABOUT 5.5 MI (8.9 KM) NORTHEAST OF LACOMBE, 5.0
BH1870'MI (8.0 KM) SOUTHWEST OF HICKORY AND 5.0 MI (8.0 KM) NORTHWEST OF
BH1870'SLIDELL, AT THE SOUTH END OF THE SLIDELL AIRPORT.  OWNERSHIP--ST
BH1870'TAMMANY PARISH, FOR ENTRANCE INTO THE AIRPORT, CONTACT MR. THOMAS
BH1870'WATKINS, AIRPORT MANAGER, 62512 AIRPORT RD, SUITE 2, SLIDELL, LA
BH1870'70460, TELEPHONE 504-641-7590.
BH1870'TO REACH THE STATION FROM THE JUNCTION OF INTERSTATE HIGHWAY 12 AND
BH1870'AIRPORT RD (EXIT 80), IN WEST SLIDELL, GO NORTH FOR 2.0 MI (3.2 KM)
BH1870'ON AIRPORT RD TO THE AIRPORT ENTRANCE GATE, THEN GO EAST FOR 0.15 MI
BH1870'(0.24 KM) THROUGH THE GATE TO THE TAXIWAY, TURN RIGHT AND GO SOUTH
BH1870'FOR 0.1 MI (0.2 KM) ON THE TAXIWAY TO THE STATION ON THE LEFT, SET
BH1870'BETWEEN THE RUNWAY AND TAXIWAY.
BH1870'THE STATION IS 272.0 FT (82.9 M) SOUTH-SOUTHWEST FROM A GLIDE LIGHT
BH1870'VASI, 228.0 FT (69.5 M) NORTH-NORTHWEST FROM A GLIDE LIGHT VASI,
BH1870'105.0 FT (32.0 M) SOUTHWEST FROM A RUNWAY LIGHT, 86.5 FT (26.4 M)
BH1870'WEST FROM THE WEST EDGE OF THE RUNWAY, 1.0 FT (0.3 M) EAST FROM A
BH1870'FIBERGLASS WITNESS POST, FLUSH WITH THE GROUND SURFACE AND ABOUT
BH1870'LEVEL WITH THE RUNWAY.
BH1870
BH1870                          STATION RECOVERY (1992)
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BH1870
BH1870'RECOVERED 1992
BH1870'RECOVERED IN GOOD CONDITION.
BH1870
BH1870                          STATION RECOVERY (1993)
BH1870
BH1870'RECOVERED 1993
BH1870'RECOVERED IN GOOD CONDITION.
BH1870
BH1870                          STATION RECOVERY (1995)
BH1870
BH1870'RECOVERY NOTE BY LA TRANSP AND DEV 1995 (SLC)
BH1870'THE STATION IS LOCATED ABOUT 5.5 MI (8.9 KM) NORTHEAST OF LACOMBE, 5.0
BH1870'MI (8.0 KM) SOUTHWEST OF HICKORY AND 5.0 MI (8.0 KM) NORTHWEST OF
BH1870'DOWNTOWN SLIDELL, AT THE SLIDELL AIRPORT.  OWNERSHIP--CITY OF SLIDELL,
BH1870'FOR ENTRANCE INTO THE AIRPORT CONTACT MS LAURA M.  ZAIDAIN, AIRPORT
BH1870'MANAGER, 62512 AIRPORT ROAD, SUITE 2, SLIDELL, LA.  70460, TELEPHONE
BH1870'504-641-7590. TO REACH THE STATION FROM THE JUNCTION OF INTERSTATE
BH1870'HIGHWAY 12 AND AIRPORT ROAD (EXIT 80) , IN WEST SLIDELL, GO NORTH FOR
BH1870'2.0 MI (3.2 KM) ON AIRPORT ROAD TO THE AIRPORT ENTRANCE, TURN RIGHT
BH1870'AND GO EAST FOR 0.15 MI (0.24 KM) THROUGH A GATE ACROSS A PARKING AREA
BH1870'TO THE TAXIWAY, TURN RIGHT AND GO SOUTH FOR 0.1 MI (0.2 KM) ON THE
BH1870'TAXIWAY TO THE STATION ON THE LEFT, SET BETWEEN THE RUNWAY AND
BH1870'TAXIWAY, 272.0 FT (82.9 M) SOUTH-SOUTHWEST FROM A VASI GLIDE LIGHT,
BH1870'264.5 FT (80.6 M) EAST FROM THE CENTER OF THE TAXIWAY, 228.0 FT (69.5
BH1870'M) NORTH-NORTHWEST FROM A VASI GLIDE LIGHT, 105.0 FT (32.0 M)
BH1870'SOUTHWEST FROM A RUNWAY LIGHT, 5.0 FT (1.5 M) NORTH FROM THE EXTENDED
BH1870'CENTER OF A TAXIWAY APPROACH LEADING TO THE NORTHSHORE AVIATION
BH1870'HANGER, 1.0 FT (0.3 M) EAST FROM A FIBERGLASS WITNESS POST, FLUSH WITH
BH1870'THE GROUND SURFACE AND ABOUT LEVEL WITH THE RUNWAY.
BH1870
BH1870                          STATION RECOVERY (2000)
BH1870
BH1870'RECOVERY NOTE BY NAT AERO SPACE ADMIN 2000 (RBS)
BH1870'RECOVERED IN GOOD CONDITION.

*** retrieval complete.
Elapsed Time = 00:00:01
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1        National Geodetic Survey,   Retrieval Date = FEBRUARY  5, 2004
 BH2981 ***********************************************************************
 BH2981  CBN         -  This is a Cooperative Base Network Control Station.
 BH2981  DESIGNATION -  CARR
 BH2981  PID         -  BH2981
 BH2981  STATE/COUNTY-  LA/WASHINGTON
 BH2981  USGS QUAD   -  BOGALUSA EAST (1997)
 BH2981
 BH2981                        *CURRENT SURVEY CONTROL
 BH2981  ___________________________________________________________________
 BH2981* NAD 83(1992)-  30 49 08.63709(N)    089 51 51.56192(W)     ADJUSTED
 BH2981* NAVD 88     -        35.8    (meters)     117.     (feet)  GPS OBS
 BH2981  ___________________________________________________________________
 BH2981  X           -      12,982.160 (meters)                     COMP
 BH2981  Y           -  -5,482,286.979 (meters)                     COMP
 BH2981  Z           -   3,248,686.694 (meters)                     COMP
 BH2981  LAPLACE CORR-          -1.62  (seconds)                    DEFLEC99
 BH2981  ELLIP HEIGHT-           7.92  (meters)          (02/15/02) GPS OBS
 BH2981  GEOID HEIGHT-         -27.83  (meters)                     GEOID03
 BH2981
 BH2981  HORZ ORDER  -  B
 BH2981  ELLP ORDER  -  FOURTH    CLASS I
 BH2981
 BH2981.This mark is at George R Carr Mem Air Fld Airport (BXA)
 BH2981
 BH2981.The horizontal coordinates were established by GPS observations
 BH2981.and adjusted by the National Geodetic Survey in September 1992.
 BH2981
 BH2981.The orthometric height was determined by GPS observations and a
 BH2981.high-resolution geoid model.
 BH2981
 BH2981.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 BH2981
 BH2981.The Laplace correction was computed from DEFLEC99 derived deflections.
 BH2981
 BH2981.The ellipsoidal height was determined by GPS observations
 BH2981.and is referenced to NAD 83.
 BH2981
 BH2981.The geoid height was determined by GEOID03.
 BH2981
 BH2981;                    North         East     Units   Scale      Converg.
 BH2981;SPC LA S     -   257,964.878 1,140,560.980   MT  1.00002749 +0 44 04.3
 BH2981;UTM  16      - 3,413,061.070   225,984.844   MT  1.00052632 -1 28 06.2
 BH2981
 BH2981                          SUPERSEDED SURVEY CONTROL
 BH2981
 BH2981  ELLIP H (02/12/02)    7.87   (m)                       GP(       ) 4 2
 BH2981  ELLIP H (01/21/93)    7.94   (m)                       GP(       ) 4 2
 BH2981  ELLIP H (09/10/92)    7.94   (m)                       GP(       ) 4 1
 BH2981  NAD 83(1986)-  30 49 08.65147(N)    089 51 51.55884(W) AD(       ) 3
 BH2981  NAD 27      -  30 49 07.98485(N)    089 51 51.29042(W) AD(       ) 3
 BH2981  NGVD 29 (11/20/87)   35.6    (m)          117.     (f) GPS OBS
 BH2981
 BH2981.Superseded values are not recommended for survey control.
 BH2981.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
 BH2981.See file dsdata.txt to determine how the superseded data were derived.
 BH2981
 BH2981_U.S. NATIONAL GRID SPATIAL ADDRESS: 16RBV2598513061(NAD 83)
 BH2981_MARKER: DH = HORIZONTAL CONTROL DISK
 BH2981_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 BH2981_STAMPING: CARR 1986
 BH2981_MARK LOGO: NGS
 BH2981_MAGNETIC: N = NO MAGNETIC MATERIAL
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BH2981_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
BH2981+STABILITY: SURFACE MOTION
BH2981_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BH2981+SATELLITE: SATELLITE OBSERVATIONS - October 06, 2000
BH2981
BH2981  HISTORY     - Date     Condition        Report By
BH2981  HISTORY     - 1986     MONUMENTED       LADTD
BH2981  HISTORY     - 1986     SEE DESCRIPTION  LADTD
BH2981  HISTORY     - 1986     GOOD             LADTD
BH2981  HISTORY     - 19861231 GOOD             LADTD
BH2981  HISTORY     - 19870317 GOOD
BH2981  HISTORY     - 19870615 GOOD             NGS
BH2981  HISTORY     - 19910914 GOOD             LADTD
BH2981  HISTORY     - 19920302 GOOD
BH2981  HISTORY     - 19930506 GOOD
BH2981  HISTORY     - 20001006 GOOD             MSHD
BH2981
BH2981                          STATION DESCRIPTION
BH2981
BH2981'DESCRIBED BY LA TRANSP AND DEV 1986 (SLC)
BH2981'THE STATION IS LOCATED ABOUT 3.2 KM (2 MI) NORTH OF BOGALUSA, AT
BH2981'THE CARR MEMORIAL AIRPORT, AT
BH2981'THE NORTH END OF THE RUNWAY AT THE SECOND VASI FROM THE NORTH END.
BH2981'OWNERSHIP--FOR ENTRANCE INTO THE AIRPORT CONTACT, MR. FARLEY
BH2981'GRANTHAM, 401 WALKER ST, BOGALUSA, LA. 70427, PHONE 504-732-4521.
BH2981'
BH2981'TO REACH THE STATION FROM THE JUNCTION OF STATE HIGHWAYS 10 AND 21
BH2981'IN NORTHEAST BOGALUS, GO WEST ON HIGHWAY 10 FOR 1.1 KM (0.7 MI) TO
BH2981'THE JUNCTION WITH AUSTIN STREET.  TURN RIGHT ON AUSTIN STREET FOR 1
BH2981'KM (0.6 MI) TO DERBIGNEY STREET. TURN LEFT, WEST, ON DERBIGNEY
BH2981'STREET CROSSING THE RAILROAD TRACKS FOR 0.1 KM (0.05 MI) TO
BH2981'WASHINGTON STREET.  TURN RIGHT ON WASHINGTON STREET FOR 0.4 KM
BH2981'(0.25 MI) TO WALKER STREET.  TURN LEFT, WEST, ON WALKER STREET FOR
BH2981'0.5 KM (0.3 MI) TO THE AIRPORT ENTRANCE GATE. TURN RIGHT, NORTH,
BH2981'ACROSS AN AIRPLANE PARKING AREA TO A TAXIWAY, GO WEST ON THE TAXWAY
BH2981'FOR 0.5 KM (0.3 MI) TO THE SOUTH END OF THE RUNWAY. TURN NORTH ON
BH2981'THE RUNWAY FOR 1.4 KM (0.85 MI) TO THE MARK ON THE RIGHT AT A VASI
BH2981'LIGHT.
BH2981'
BH2981'THE STATION IS A STANDARD NGS DISK
BH2981'STAMPED---CARR 1986---,
BH2981'SET INTO THE TOP OF A ROUND CONCRETE MONUMENT
BH2981'30 CM IN DIAMETER FLUSH WITH GROUND.  LOCATED
BH2981'33.5 METERS (110 FT) NORTHEAST FROM A RUNWAY LIGHT,
BH2981'33.1 METERS (102 FT) SOUTHEAST FROM A RUNWAY LIGHT,
BH2981'19.5 METERS (64 FT) WEST FROM A DRAINAGE DITCH,
BH2981'16.5 METERS (54 FT) EAST FROM THE EAST EDGE OF THE RUNWAY AND
BH2981'1.5 METERS (5 FT) EAST FROM THE CENTER OF A GLIDE VASI.
BH2981'THE UNDERGROUND MARK IS A STANDARD NGS DISK
BH2981'STAMPED---CARR 1986---,
BH2981'SET INTO AN IRREGULAR MASS OF CONCRETE 1.1 METERS BELOW THE SURFACE.
BH2981'
BH2981'DESCRIBED STANLEY L. CRAIN.
BH2981
BH2981                          STATION RECOVERY (1986)
BH2981
BH2981'RECOVERY NOTE BY LA TRANSP AND DEV 1986
BH2981'RECOVERED IN GOOD CONDITION.
BH2981
BH2981                          STATION RECOVERY (1986)
BH2981
BH2981'RECOVERY NOTE BY LA TRANSP AND DEV 1986 (SLC)
BH2981'RECOVERED AS DESCRIBED.
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BH2981
BH2981                          STATION RECOVERY (1987)
BH2981
BH2981'RECOVERED 1987
BH2981'RECOVERED IN GOOD CONDITION.
BH2981
BH2981                          STATION RECOVERY (1987)
BH2981
BH2981'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1987
BH2981'THE STATION IS LOCATED IN THE NORTH PART OF THE AIRPORT NEAR RUNWAY
BH2981'END 18.  IT IS 549.1 FT (167.4 M) SOUTH OF THE CENTERLINE END OF RWY
BH2981'18 AND 104.9 FT (32.0 M) EAST OF THE CENTERLINE.  IT IS 109.4 FT (33.3
BH2981'M) NORTHEAST OF THE 3RD RUNWAY LIGHT SOUTH OF THE END, 101.2 FT (30.8
BH2981'M) SOUTHEAST OF THE 2ND RUNWAY LIGHT AND 4.7 FT (1.4 M) EAST OF THE
BH2981'CENTER OF THE S VASI (18) (A SINGLE HORIZONTAL CYLINDER).  IT IS AN
BH2981'NGS HORIZONTAL CONTROL MARK DISK STAMPED CARR 1986, AND SET IN THE TOP
BH2981'OF A ROUND CONCRETE MONUMENT FLUSH WITH THE GROUND.  GPS POSITION BY
BH2981'PERSONNEL OF THE NGS ADAM PROGRAM.
BH2981
BH2981                          STATION RECOVERY (1991)
BH2981
BH2981'RECOVERY NOTE BY LA TRANSP AND DEV 1991
BH2981'THE STATION IS LOCATED IN THE NORTHERN PART OF BOGALUSA, AT THE CARR
BH2981'MEMORIAL AIRPORT.  OWNERSHIP--CITY OF BOGALUSA.  FOR ENTRANCE INTO
BH2981'THE AIRPORT, CONTACT MR. FARLEY GRANTHAM, 401 WALKER ST., BOGALUSA,
BH2981'LA.  70427  PHONE 504)732-4521.
BH2981'TO REACH THE STATION FROM THE JUNCTION OF STATE HIGHWAYS 10 AND 21 IN
BH2981'NORTHEAST BOGALUSA, GO WEST FOR 0.7 MI (1.1 KM) ON HIGHWAY 10 TO THE
BH2981'JUNCTION OF AUSTIN STREET.  TURN RIGHT AND GO NORTH ON AUSTIN STREET
BH2981'FOR 0.6 MI (1.0 KM) TO THE JUNCTION OF DERBIGNEY STREET. TURN LEFT
BH2981'AND GO WEST, ACROSS THE RAILROAD TRACKS, ON DERBIGNEY STREET FOR 0.05
BH2981'MI (0.08 KM) TO THE JUNCTION OF WASHINGTON STREET. TURN RIGHT AND GO
BH2981'NORTH ON WASHINGTON STREET FOR 0.25 MI (0.40 KM) TO THE JUNCTION OF
BH2981'WALKER STREET.  TURN LEFT AND GO WEST ON WALKER STREET FOR 0.3 MI
BH2981'(0.5 KM) TO THE AIRPORT ENTRANCE AND A GATE ON THE RIGHT, TURN RIGHT
BH2981'PASSING THROUGH LOCKED GATE (COMBINATION SHOULD BE 1776) AND GO NORTH
BH2981'ACROSS AN AIRPLANE PARKING AREA TO A TAXIWAY.  TURN LEFT AND GO WEST
BH2981'ON THE TAXIWAY FOR 0.3 MI (0.5 KM) TO THE RUNWAY.  TURN RIGHT AND GO
BH2981'NORTH ON THE RUNWAY FOR 0.85 MI (1.37 KM) TO THE STATION ON THE RIGHT
BH2981'NEAR THE SECOND VASI FROM THE NORTH END OF THE RUNWAY.
BH2981'THE STATION IS 110.0 FT (33.5 M) NORTHEAST FROM A RUNWAY LIGHT, 102.0
BH2981'FT (31.1 M) SOUTHEAST FROM A RUNWAY LIGHT, 64.0 FT (19.5 M) WEST FROM
BH2981'A DRAINAGE DITCH, 54.0 FT (16.5 M) EAST FROM THE EAST EDGE OF THE
BH2981'RUNWAY, 5.0 FT (1.5 M) EAST FROM THE CENTER OF THE VASI, 1.0 FT
BH2981'(0.3 M) SOUTH FROM A FIBERGLASS WITNESS POST, FLUSH WITH THE GROUND
BH2981'SURFACE AND ABOUT LEVEL WITH THE RUNWAY.
BH2981
BH2981                          STATION RECOVERY (1992)
BH2981
BH2981'RECOVERED 1992
BH2981'RECOVERED IN GOOD CONDITION.
BH2981
BH2981                          STATION RECOVERY (1993)
BH2981
BH2981'RECOVERED 1993
BH2981'RECOVERED IN GOOD CONDITION.
BH2981
BH2981                          STATION RECOVERY (2000)
BH2981
BH2981'RECOVERY NOTE BY MISSISSIPPI STATE HIGHWAY DEPARTMENT 2000
BH2981'RECOVERED AS DESCRIBED.

*** retrieval complete.
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Elapsed Time = 00:00:01


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-   This listing contains control for which complete digital                -
-   data sheets where not provided.  The complete data sheets were          -
-   not provided for the reason listed below.  The reason below is          -
-   associated with a horizontal control Nonpub code shown under            -
-   the heading 'H' and/or a vertical control Nonpub code shown under       -
-   the heading 'v'                                                         -
-                                                                           -
-   The format of the records are as follows:                               -
-       Pid  = Station Permanent Identifier)                                -
-       Name = Station Designation                                          -
-       Lat  = Approx. Latitude (Degrees, Minutes, truncated Seconds)       -
-       Lon  = Approx. Longitude (Degrees, Minutes, truncated Seconds)      -
-       O    = Horizontal Order                                             -
-       o    = Vertical Order                                               -
-       H    = Horizontal Nonpub Code                                       -
-       v    = Vertical Nonpub Code                                         -
-                                                                           -
-       H Nonpub HORIZONTAL CONTROL NONPUB REASON                           -
-       -------- --------------------------------                           -
-       X        Surface Mark Reported Destroyed                            -
-       Y        Surface and underground mark reported destroyed            -
-       A        A-Order Horizontal mark not tied to an adjusted HARN       -
-       C        C-Nonoperational CORS Station                              -
-       W        Weakly determined position.                                -
-       P        Purpose of position is not for network control             -
-       D        No Descriptive Text available                              -
-       R        Restricted position                                        -
-       O        Outside NGS Publication Area                               -
-                                                                           -
-       v Nonpub VERTICAL CONTROL NONPUB REASON                             -
-       -------- ------------------------------                             -
-       X        Surface Mark Reported Destroyed                            -
-       Y        Surface and underground mark reported destroyed            -
-       F        Bench Mark not yet adjusted.                               -
-       D        No Descriptive Text available                              -
-       Z        Presumed destroyed                                         -
-       R        Restricted elevation                                       -
-       O        Outside NGS Publication Area                               -
-
-   NOTE - Stations found in this listing may still have a valid            -
-          datasheet produced by use of other publishable values.           -
-          For example, an ADJUSTED height may be non-publishable           -
-          but a good GPS height might be found on the datasheet.           -
-          This listing does not imply that values found on the datasheet   -
-          are restricted.  If it's on the datasheet, use it.               -
-                                                                           -
-----------------------------------------------------------------------------
 Pid    Name                           Lat        Lon         Elev     O o Hv
 ------ ------------------------------ ---------- ----------- -------- - - --
>BH2981 CARR                           30 49 08.6/089 51 51.5  35.79   B    F
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DATABASE = Sybase ,PROGRAM = datasheet, VERSION = 6.97
1        National Geodetic Survey,   Retrieval Date = FEBRUARY  5, 2004
 BJ3353 ***********************************************************************
 BJ3353  FBN         -  This is a Federal Base Network Control Station.
 BJ3353  DESIGNATION -  SMITH AZ MK
 BJ3353  PID         -  BJ3353
 BJ3353  STATE/COUNTY-  LA/WASHINGTON
 BJ3353  USGS QUAD   -  FRANKLINTON (1983)
 BJ3353
 BJ3353                        *CURRENT SURVEY CONTROL
 BJ3353  ___________________________________________________________________
 BJ3353* NAD 83(1992)-  30 47 07.16331(N)    090 12 42.87833(W)     ADJUSTED
 BJ3353* NAVD 88     -        71.750  (meters)     235.40   (feet)  ADJUSTED
 BJ3353  ___________________________________________________________________
 BJ3353  X           -     -20,283.661 (meters)                     COMP
 BJ3353  Y           -  -5,484,211.758 (meters)                     COMP
 BJ3353  Z           -   3,245,492.096 (meters)                     COMP
 BJ3353  LAPLACE CORR-          -1.33  (seconds)                    DEFLEC99
 BJ3353  ELLIP HEIGHT-          44.33  (meters)          (06/20/00) GPS OBS
 BJ3353  GEOID HEIGHT-         -27.41  (meters)                     GEOID03
 BJ3353  DYNAMIC HT  -          71.656 (meters)     235.09  (feet)  COMP
 BJ3353  MODELED GRAV-     979,342.4   (mgal)                       NAVD 88
 BJ3353
 BJ3353  HORZ ORDER  -  B
 BJ3353  VERT ORDER  -  SECOND    CLASS I
 BJ3353  ELLP ORDER  -  THIRD     CLASS I
 BJ3353
 BJ3353.The horizontal coordinates were established by GPS observations
 BJ3353.and adjusted by the National Geodetic Survey in September 1992.
 BJ3353
 BJ3353.The orthometric height was determined by differential leveling
 BJ3353.and adjusted by the National Geodetic Survey in February 1994.
 BJ3353.WARNING-GPS observations at this control monument resulted in a GPS
 BJ3353.derived orthometric height which differed from the leveled height by
 BJ3353.more than one decimeter (0.1 meter).
 BJ3353
 BJ3353.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 BJ3353
 BJ3353.The Laplace correction was computed from DEFLEC99 derived deflections.
 BJ3353
 BJ3353.The ellipsoidal height was determined by GPS observations
 BJ3353.and is referenced to NAD 83.
 BJ3353
 BJ3353.The geoid height was determined by GEOID03.
 BJ3353
 BJ3353.The dynamic height is computed by dividing the NAVD 88
 BJ3353.geopotential number by the normal gravity value computed on the
 BJ3353.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 BJ3353.degrees latitude (g = 980.6199 gals.).
 BJ3353
 BJ3353.The modeled gravity was interpolated from observed gravity values.
 BJ3353
 BJ3353;                    North         East     Units   Scale      Converg.
 BJ3353;SPC LA S     -   253,848.117 1,107,340.177   MT  1.00001926 +0 33 38.6
 BJ3353;UTM  15      - 3,409,135.000   766,812.811   MT  1.00047826 +1 25 40.3
 BJ3353
 BJ3353                         SUPERSEDED SURVEY CONTROL
 BJ3353
 BJ3353  ELLIP H (09/10/92)   44.44   (m)                       GP(       ) 4 1
 BJ3353  NAD 83(1986)-  30 47 07.18020(N)    090 12 42.87423(W) AD(       ) 2
 BJ3353  NAVD 88 (08/12/94)   71.75   (m)          235.4    (f) LEVELING    3
 BJ3353  NGVD 29 (09/03/91)   71.77   (m)          235.5    (f) LEVELING    3
 BJ3353
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BJ3353.Superseded values are not recommended for survey control.
BJ3353.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
BJ3353.See file dsdata.txt to determine how the superseded data were derived.
BJ3353
BJ3353_U.S. NATIONAL GRID SPATIAL ADDRESS: 15RYQ6681309135(NAD 83)
BJ3353_MARKER: DD = SURVEY DISK
BJ3353_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
BJ3353_STAMPING: SMITH. AZ. MK. 197O
BJ3353_MARK LOGO: CGS+SS
BJ3353_PROJECTION: FLUSH
BJ3353_MAGNETIC: N = NO MAGNETIC MATERIAL
BJ3353_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
BJ3353+STABILITY: SURFACE MOTION
BJ3353_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
BJ3353+SATELLITE: SATELLITE OBSERVATIONS - March 05, 1998
BJ3353
BJ3353  HISTORY     - Date     Condition        Report By
BJ3353  HISTORY     - 1970     MONUMENTED       LADH
BJ3353  HISTORY     - 1970     SEE DESCRIPTION  LADH
BJ3353  HISTORY     - 1979     GOOD             LADTD
BJ3353  HISTORY     - 1982     GOOD             LADTD
BJ3353  HISTORY     - 19900409 GOOD             LADTD
BJ3353  HISTORY     - 19910829 GOOD             LADTD
BJ3353  HISTORY     - 19920302 GOOD
BJ3353  HISTORY     - 19930506 GOOD
BJ3353  HISTORY     - 19980213 GOOD             NGS
BJ3353  HISTORY     - 19980305 GOOD             NGS
BJ3353
BJ3353                         STATION DESCRIPTION
BJ3353
BJ3353'DESCRIBED BY LA TRANSP AND DEV 1979 (TLH)
BJ3353'THE STATION IS LOCATED IN THE SOUTHEAST QUARTER OF SECTION 17, T3S,
BJ3353'R10E, OWNERSHIP---THE LOUISIANA DEPARTMENT OF TRANSPORTATION AND
BJ3353'DEVELOPMENT.
BJ3353'
BJ3353'TO REACH THE STATION FROM THE JUNCTION OF STATE HIGHWAYS 16 AND 25
BJ3353'ABOUT 3.2 KM (2 MILES) SOUTH OF FRANKLINTON, GO WEST ALONG HIGHWAY 16
BJ3353'FOR 5.8 KM (3.6 MILES) TO THE STATION ON THE LEFT NEAR THE
BJ3353'RIGHT-OF-WAY FENCE AND NEAR THE SOUTHEASTERN LOUISIANA AGRICULTURE
BJ3353'EXPERIMENT STATION.
BJ3353'
BJ3353'THE STATION IS A STANDARD LOUISIANA DEPARTMENT OF HIGHWAYS (NOW
BJ3353'LADTD) DISK STAMPED---SMITH AZ MK 1970--- SET INTO THE TOP OF A
BJ3353'ROUND CONCRETE MONUMENT 30 CM IN DIAMETER PROJECTING 10 CM ABOVE THE
BJ3353'GROUND LOCATED 19.8 METERS SE FROM THE CENTER OF HIGHWAY 16, 4 METERS
BJ3353'W FROM THE CENTER OF A DRIVE INTO A FIELD, 0.6 METERS NW FROM THE
BJ3353'RIGHT OF WAY FENCE, AND 0.5 METERS SE FROM A METAL WITNESS POST WITH
BJ3353'SIGN ATTACHED.
BJ3353
BJ3353                         STATION RECOVERY (1982)
BJ3353
BJ3353'RECOVERY NOTE BY LA TRANSP AND DEV 1982
BJ3353'9.5 KM (5.9 MI) SW FROM FRANKLINTON.
BJ3353'THE MARK IS 0.46 M ABOVE LA 16.
BJ3353'FROM THE INTERSECTION OF STATE HIGHWAY 25 AND STATE HIGHWAY 16 SOUTH
BJ3353'OF FRANKLINTON, GO WEST ON STATE HIGHWAY 16 FOR 5.6 KM (3.5 MI) TO THE
BJ3353'STATION ON THE LEFT ON A HILL, 19.8 METERS (65 FT) SOUTHEAST OF THE
BJ3353'CENTER OF STATE HIGHWAY 16, 4 METERS (13 FT) WEST OF THE CENTER OF A
BJ3353'FIELD ROAD, 0.5 METER (1.8 FT) NORTHWEST OF A FENCE, MARK IS WEST OF
BJ3353'SOUTHEAST LOUISIANA AGRICULTURE EXPERIMENT STATION.
BJ3353'THE MARK IS 0.50 METERS  SE FROM A WITNESS POST.
BJ3353
BJ3353                         STATION RECOVERY (1990)
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BJ3353
BJ3353'RECOVERY NOTE BY LA TRANSP AND DEV 1990 (SLC)
BJ3353'THE STATION IS LOCATED ABOUT 13.7 KM (8.50 MI) NORTHWEST OF ENON AND
BJ3353'8.7 KM (5.40 MI) SOUTHWEST OF FRANKLINTON, IN THE SOUTHEAST QUARTER OF
BJ3353'SECTION 17, T 3 S, R 10 E. OWNERSHIP--LOUISIANA DEPARTMENT OF
BJ3353'TRANSPORTATION AND DEVELOPMENT. TO REACH THE STATION FROM THE JUNCTION
BJ3353'OF STATE HIGHWAYS 16 AND 25, ABOUT 3.2 KM (2.00 MI) SOUTH OF
BJ3353'FRANKLINTON, GO WEST FOR 5.8 KM (3.60 MI) ON HIGHWAY 16 TO THE MARK ON
BJ3353'THE LEFT NEAR THE RIGHT-OF-WAY FENCE AND NEAR THE SOUTHEASTERN
BJ3353'LOUISIANA AGRICULTURE EXPERIMENT STATION, 19.8 M (65.0 FT) SOUTHEAST
BJ3353'FROM THE CENTER OF THE HIGHWAY, 4.0 M (13.1 FT) WEST FROM THE CENTER
BJ3353'OF A DRIVE INTO A FIELD, 0.6 M (2.0 FT) NORTHWEST FROM THE
BJ3353'RIGHT-OF-WAY FENCE AND 0.5 M (1.6 FT) SOUTHEAST FROM A METAL WITNESS
BJ3353'POST WITH SIGN ATTACHED. THE MARK IS PROJECTING 5 CM (2 IN) ABOVE THE
BJ3353'GROUND SURFACE AND ABOUT 0.3 M (1.0 FT) ABOVE THE LEVEL OF THE
BJ3353'HIGHWAY.
BJ3353
BJ3353 STATION RECOVERY (1991)
BJ3353
BJ3353'RECOVERY NOTE BY LA TRANSP AND DEV 1991
BJ3353'THE STATION IS LOCATED ABOUT 8.5 MI (13.7 KM) NORTHWEST OF ENON AND
BJ3353'5.4 MI (8.7 KM) SOUTHWEST OF FRANKLINTON. OWNERSHIP--LOUISIANA
BJ3353'DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT.
BJ3353'TO REACH THE STATION FROM THE JUNCTION OF STATE HIGHWAYS 16 AND 25,
BJ3353'ABOUT 2.0 MI (3.2 KM) SOUTH OF FRANKLINTON, GO WEST FOR 3.5 MI
BJ3353'(5.6 KM) ON HIGHWAY 16 TO THE STATION ON THE LEFT NEAR THE
BJ3353'RIGHT-OF-WAY FENCE AND NEAR THE SOUTHEASTERN LOUISIANA AGRICULTURE
BJ3353'EXPERIMENT STATION.
BJ3353'THE STATION IS 65.0 FT (19.8 M) SOUTHEAST FROM THE CENTER OF THE
BJ3353'HIGHWAY, 13.0 FT (4.0 M) SOUTHWEST FROM THE CENTER OF A DRIVE INTO A
BJ3353'FIELD, 2.0 FT (0.6 M) NORTHWEST FROM THE RIGHT-OF-WAY FENCE, 1.5 FT
BJ3353'(0.5 M) NORTHWEST FROM A METAL WITNESS POST WITH A METAL SIGN
BJ3353'ATTACHED, 1.5 FT (0.5 M) NORTHWEST FROM A FIBERGLASS WITNESS POST,
BJ3353'PROJECTING 2 INCHES AND 1.0 FT (0.3 M) ABOVE THE LEVEL OF THE
BJ3353'HIGHWAY.
BJ3353
BJ3353 STATION RECOVERY (1992)
BJ3353
BJ3353'RECOVERED 1992
BJ3353'RECOVERED IN GOOD CONDITION.
BJ3353
BJ3353 STATION RECOVERY (1993)
BJ3353
BJ3353'RECOVERED 1993
BJ3353'RECOVERED IN GOOD CONDITION.
BJ3353
BJ3353 STATION RECOVERY (1998)
BJ3353
BJ3353'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1998 (CSM)
BJ3353'THE STATION IS LOCATED ABOUT 8.5 MI (13.7 KM) NORTHWEST OF ENON AND
BJ3353'5.4 MI (8.7 KM) SOUTHWEST OF FRANKLINTON. OWNERSHIP--LOUISIANA
BJ3353'DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT. TO REACH THE STATION
BJ3353'FROM THE JUNCTION OF STATE HIGHWAYS 16 AND 25, ABOUT 2 MI (3.2 KM)
BJ3353'SOUTH OF FRANKLINTON, GO WEST FOR 3.35 MI (5.39 KM) ON HIGHWAY 16 TO
BJ3353'THE STATION ON LEFT, NEAR THE SOUTHEASTERN LOUISIANA AGRICULTURE
BJ3353'EXPERIMENT STATION. THE STATION IS 19.8 M (65.0 FT) SOUTHEAST FROM
BJ3353'THE CENTER OF HIGHWAY, 3.35 M (10.99 FT) SOUTHWEST FROM THE CENTER OF
BJ3353'FIELD ENTRANCE, 0.6 M (2.0 FT) NORTHWEST FROM THE RIGHT-OF-WAY FENCE,
BJ3353'0.5 M (1.6 FT) NORTHWEST FROM A METAL WITNESS POST, 0.5 M (1.6 FT)
BJ3353'NORTHWEST FROM A FIBERGLASS WITNESS POST, ABOUT 0.3 M (1.0 FT) ABOVE
BJ3353'THE HIGHWAY AND PROJECTING 3 CM ABOVE GROUND.
BJ3353
BJ3353 STATION RECOVERY (1998)

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BJ3353
BJ3353'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1998 (CSM)
BJ3353'RECOVERED AS DESCRIBED.

*** retrieval complete.
Elapsed Time = 00:00:01
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