

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT FL1503A-CS-N

Port of Tampa, Florida

Introduction

Coastal Mapping Program (CMP) Project FL1503A-CS-N provides highly accurate digital shoreline data for key areas of change within the port of Tampa, Florida. The Geographic Cell (GC) may be used in support of the NOAA Nautical Charting Program (NCP) as well as geographic information systems (GIS) for a variety of coastal zone management applications.

Project Design

The design of Project FL1503A-CS-N was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD) in response to the need for updates to the NOAA Electronic Navigational Chart (ENC) series. Project requirements were initially formulated as a result of analysis conducted within the Coast and Shoreline Change Analysis Program (CSCAP), in which NOAA nautical chart products are compared to contemporary high resolution imagery in order to ascertain the need for more current shoreline data. GeoEye commercial satellite imagery was later obtained to provide completed alignments of features still under construction at the time of acquisition of the CSCAP imagery. A Chart Evaluation File (CEF) was forwarded to the Applications Branch (AB) of RSD once the change analysis was complete. Refer to the RB change analysis memorandum of February 19, 2015 for details of the chart comparison process.

Field Operations

The field operations consisted of the collection of static and kinematic Global Positioning System (GPS) data and Inertial Measurement Unit (IMU) data and the acquisition of aerial imagery. Digital images utilized for this project were acquired with the NOAA King Air aircraft on February 1, 2015 using an Applanix Digital Sensor System (DSS) 539 aerial camera at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 0.36 meters. The collection of these photographs was not tide coordinated.

GPS Data Reduction

The GPS/IMU data were processed by RSD personnel to yield precise camera positions in order to provide a control network necessary for aerotriangulation. The base station's geodetic position was derived using the NGS Online Processing User Service (OPUS), which computed fixed baseline solutions from nearby CORS stations. The kinematic GPS data was processed using Applanix POSPac MMS 7.1 software on February 5, 2015. For further information refer to the Airborne Positioning and Orientation Report (APOR) on file with other project data within the AB Project Archive.

Aerotriangulation/Georeferencing

Routine softcopy aerotriangulation methods were applied to establish a network of precise camera positions and other control for mapping, and to provide model parameters and orientation elements required for digital compilation. This work was performed by AB personnel in April 2015 utilizing SOCET GXP (ver. 4.1) software on a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components, and other associated peripheral devices. The images were measured and adjusted as a single block using the Triangulation module of SOCET GXP. Upon successful completion of this process, the simultaneous solve tool within the Triangulation module provided the standard deviations for each aerotriangulated ground point, which were used to compute a predicted horizontal circular error of 0.33 meters based on a 95% confidence level (CE95). An Aerotriangulation Report was written and is on file with other project data within the RSD Project Archive. Positional data is referenced to the North American Datum of 1983 (NAD83).

The commercial satellite imagery was not included in the block adjustment described above. One orthorectified, pan-sharpened natural color GeoEye-1 satellite image was georeferenced separately using the Georeferencing tool within Esri's ArcGIS® desktop GIS software (ver. 10.2.2). Within ArcGIS, the imagery was re-sampled using the Nearest Neighbor method with a 1st order polynomial model. Check points extracted from previously compiled feature data from Project FL0601F (GC10768) were used to calculate a CE95 for the rectified image.

Compilation

The data compilation phase of this project was accomplished by a member of AB in April and June 2015. Digital feature data was extracted from the aerotriangulated imagery using SOCET GXP, and from the satellite image using Esri's ArcGIS software. Feature attribution was assigned in compliance with the Coastal Cartographic Object Attribute Source Table (C-COAST), which provides the definition and attribution scheme for the full range of cartographic features pertinent to the CMP. Selected features were further modified with additional descriptive information to refine general classification.

Spatial data accuracies for Project FL1503A-CS-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features from the aerial imagery were compiled to meet a horizontal accuracy of 0.7 meters at the 95% confidence level, a predicted accuracy derived by doubling the circular error calculated from the aerotriangulation statistics. Features extracted from the GeoEye image were tested to have a horizontal accuracy of 2.9 meters based on a comparison of at least twenty (20) check points with an independent source of higher accuracy. The following table provides information on all of the images used in the completion of this project:

Aerial Imagery					
Date	Time (UTC)	Roll #	Flight Line / Photo #s	~GSD	Tide Level*
2/1/2015	14:28 – 14:30	15NC10	53-005 / 1088-1101	0.36 m	0.3 m
2/1/2015	14:34 – 14:36	15NC10	53-006 / 1102-1114	0.36 m	0.3 – 0.4 m
2/1/2015	14:41 – 14:43	15NC10	53-007 / 1115-1127	0.36 m	0.4 m

Satellite Imagery				
Date	Time (UTC)	Source File Name	Resolution	Tide Level*
4/22/2015	16:28	20150422_162845_GE1_OR_R1C1.tif	0.5 m	0.5 m

* Tide levels are given in meters above MLLW and are based on verified observations at the McKay Bay Entrance, FL reference station (#8726667). The elevation of MHW in the project area is approximately 0.7 meters above MLLW.

Quality Control / Final Review

The final review of the project was completed by a senior member of RSD in May 2015, and included analysis of aerotriangulation results and assessment of the identification and attribution of digital feature data within the GC according to image analysis and criteria defined in C-COAST. The quality control process concluded with an inspection of topological connectivity within the GC using Esri's ArcGIS (v10.2.2). All project data was evaluated for compliance to CMP requirements.

End Products and Deliverables

The following specifies the location and identification of end products generated during the completion of this project:

RSD Applications Branch Archive

- Hardcopy of the Airborne Positioning and Orientation Report (APOR)
- Hardcopy of the Aerotriangulation Report
- Hardcopy of the Project Completion Report (PCR) w/page-size graphic
- Hardcopy of the CSCAP evaluation memorandum

Remote Sensing Division Electronic Data Library

- GC11151 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- Chart Evaluation File (CEF) in shapefile format

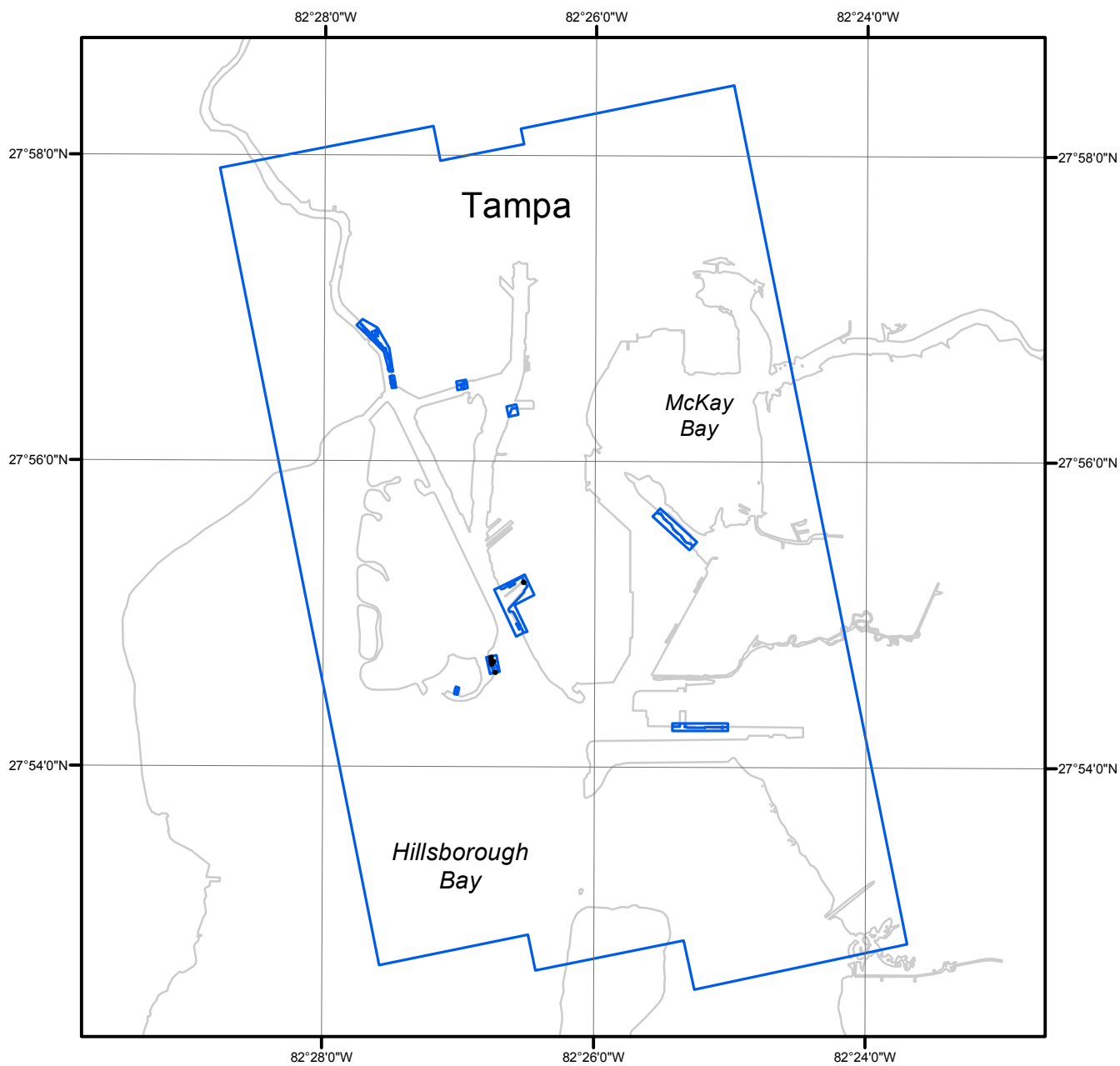
NOAA Shoreline Data Explorer

- GC11151 in shapefile format
- Metadata file for GC11151
- Digital copy of the PCR in Adobe PDF format

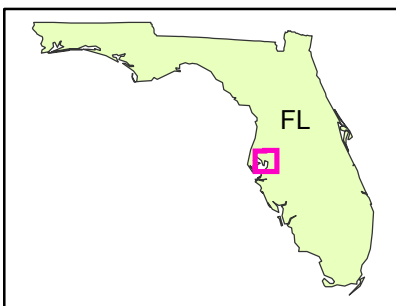
End of Report

PORT OF TAMPA

FLORIDA



Overview



FL1503A-CS-N

GC11151