

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT TX1402-CS-N

Port of Victoria, Texas

Introduction

Coastal Mapping Program (CMP) Project TX1402-CS-N provides highly accurate digital shoreline data for key areas of change in the port of Victoria, Texas and vicinity. 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 TX1402-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 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 digital imagery in order to ascertain the need for more current shoreline data. A Chart Evaluation File (CEF) was forwarded to the Applications Branch (AB) of RSD once the change analysis was complete. Refer to the RB CSCAP Memorandum of July 28, 2014 for details of the chart comparison process.

Subsequent to completion of initial compilation tasks, an uncharted spoil island was observed which was only partially covered by the project photography. Therefore commercial satellite imagery was obtained in order to extend the project. Two orthorectified pan-sharpened natural color WorldView-2 image tiles from DigitalGlobe, Inc. were obtained for this purpose.

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 digital aerial imagery. Aerial survey operations were conducted on January 14, 2014 with the NOAA King Air aircraft (N68RF). Nine strips (50-001 through 50-009) of natural color photographs were acquired with an Applanix DSS 439 digital camera at a nominal altitude of 10,000 feet. Tide coordination was not required, however all imagery was acquired at a water level below the Mean High Water (MHW) tide stage.

GPS Data Reduction

GPS and IMU data was collected and processed to yield precise positions and orientations of camera centers for use in the aerotriangulation phase. The airborne kinematic data were collected using an Applanix POS/AV510 GPS/IMU System. This data was processed on January 31, 2014 using POSpac MMS (ver. 6.2) GPS/IMU software. 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 the 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 initiated by AB in November 2014. The aerial images were measured and adjusted as one block using BAE Systems Socet GXP® v.4.1 digital photogrammetric workstation (DPW). The DPW consisted of a high-end Dell Precision™ Workstation with stereo viewing capability. The Triangulation module within SOCET GXP, was used for the AT portion of the project. Upon successful completion of the aerotriangulation process, the Triangulation module within SOCET GXP software provided the RMS of the standard deviations of the residuals for each aerotriangulated ground point which were used to compute a predicted horizontal circular error of 0.4 meters for the block based on a 95% confidence level (CE95). An Aerotriangulation Report was written and is on file with other project data within the AB Project Archive. All positional data for this project is referenced to the North American Datum of 1983 (NAD83).

The WorldView imagery was assessed for positional accuracy and determined to be suitable for feature compilation without the need for further image georeferencing tasks. Additionally the image vendor provided a suitable accuracy assessment. The vendor reported an RMSE of 3.9 meters, which was used to calculate a horizontal accuracy of 6.8 meters CE95 in order to predict the accuracy of well-defined points measured in the satellite imagery during feature compilation.

Compilation

The data compilation phase of this project was accomplished by AB in December 2014. Digital mapping was performed using a DPW in conjunction with the SOCET GXP (version 4.1) Feature Database. Feature identification and attribution within the GC were based on image analysis of the digital photographs and information extracted from the appropriate NOAA nautical charts and other ancillary sources. 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 TX1402-CS-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features extracted from aerial imagery were compiled to meet a horizontal accuracy of 0.8 meters CE95. This value was derived by doubling the circular error computed from the AT statistics in order to conservatively predict the accuracy of compiled well-defined points. Features extracted from satellite imagery were compiled to meet an accuracy of 6.8 meters CE95 as indicated in the previous section. The following table provides information on the imagery used to complete this project:

Aerial Photography					
Date	Time (UTC)	Roll #	Photo Numbers	GSD	Tide Level*
1/14/2014	16:13 – 16:15	14NC06	2735 – 2745	0.35 m	N/A
1/14/2014	16:23 – 16:25	14NC06	2746 – 2752	0.35 m	N/A
1/14/2014	16:34 – 16:36	14NC06	2753 – 2763	0.35 m	N/A
1/14/2014	16:46 – 16:49	14NC06	2764 – 2780	0.35 m	-0.1 m

1/14/2014	16:54 – 16:56	14NC06	2781 – 2793	0.35 m	-0.1 m
1/14/2014	17:03 – 17:08	14NC06	2794 – 2817	0.35 m	-0.1 m
1/14/2014	17:16 – 17:19	14NC06	2818 – 2835	0.35 m	-0.1 m
1/14/2014	17:26 – 17:29	14NC06	2836 – 2852	0.35 m	N/A
1/14/2014	17:37 – 17:42	14NC06	2853 – 2880	0.35 m	N/A
Satellite Imagery					
Date	Time (UTC)	Source ID (Tile)		Resolution	Tide Level*
12/16/2013	17:31	20131216_1731_wv2_ori_R1C1.tif		0.5 m	-0.1 m
5/14/2014	17:42	20140514_1742_wv2_ori_R1C1.tif		0.5 m	0.1 m

* Tide levels are given in meters above MLLW and are based on actual observations recorded by the TCOON gauge at Seadrift, TX at the time of photography. The elevation of the MHW tidal datum at the gauge is equal to 0.1 m above MLLW. Due to insufficient water level data, the tide levels for the imagery covering the upper Victoria Barge Canal could not be determined.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a senior member of AB. The final QC review was completed in January 2015. The review process included analysis of the AT 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 ArcGIS 10.2.1. The entire suite of project products 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)
- Page size graphic plot of GC11109 file contents, attached to PCR
- Hardcopy of the CSCAP evaluation memorandum

Remote Sensing Division Electronic Data Library

- GC11109 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

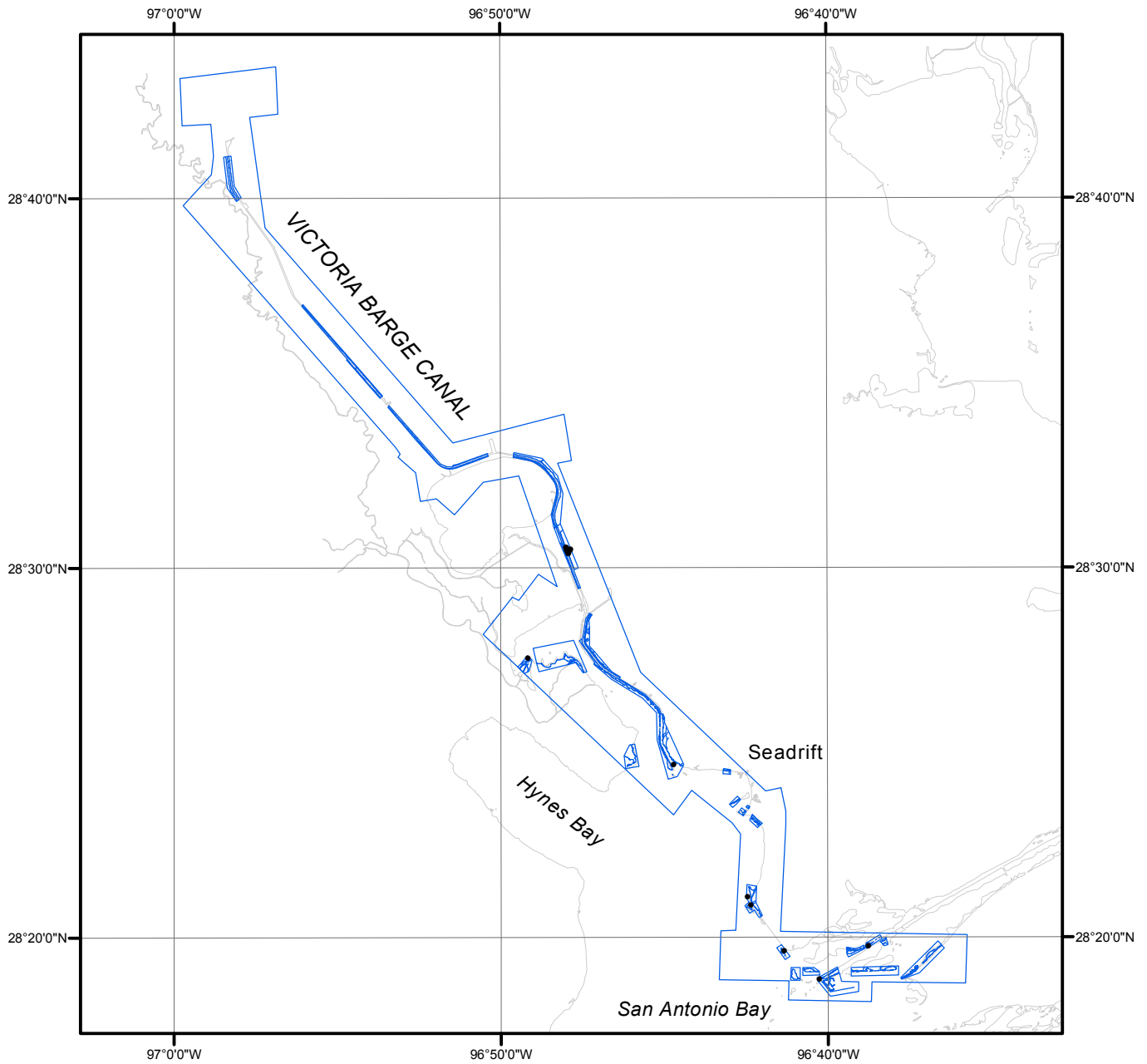
NOAA Shoreline Data Explorer

- GC11109 in shapefile format
- Metadata file for GC11109
- Digital copy of the PCR in Adobe PDF format

End of Report

PORT OF VICTORIA

TEXAS



Overview



TX1402-CS-N

GC11109