

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT NC1002A-CM-N

Coquina Harbor, Intracoastal Waterway, South Carolina

Introduction

NOAA Coastal Mapping Program (CMP) Project NC1002A-CM-N provides a highly accurate dataset of coastal feature data including Coquina Harbor and a portion of the Intracoastal Waterway in the immediate vicinity. Project NC1002A-CM-N is a subproject of a larger project NC1002-CM-N, which covers Long Bay and the Intracoastal Waterway from Bucksport, South Carolina, to Cape Fear River, North Carolina. 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

Project NC1002A-CM-N was designed in response to a request from the Marine Chart Division (MCD) of the Office of Coast Survey, NOAA. Photographic mission instructions for NC1002-CM-N were formulated by the Requirements Branch (RB) of the Remote Sensing Division (RSD) following the guidelines of RSD's Photo Mission Standard Operating Procedures. The instructions discussed the project's purpose, geographic area of coverage, scope and priority, image requirements, Global Positioning System (GPS) data collection procedures and guidelines, instructions for data recording and handling, and mission communication protocols. RB created a Project Layout Diagram, flight maps and input files for the aircraft flight management system.

Field Operations

Field operations for NC1002-CM-N consisted of the collection of static and kinematic GPS data and Inertial Measurement Unit (IMU) data, and the acquisition of digital aerial imagery. Aerial survey operations were conducted on several dates from April 2010 through February 2012 with the NOAA King Air aircraft (N68RF). All project imagery was acquired with an Applanix DSS-439 dual head digital camera system (two 60 mm lenses) in coordination with both MLLW and MHW tide levels. Eleven (11) flight lines of natural color and near-infrared (NIR) imagery were acquired concurrently for NC1002-CM-N, although only three (3) individual color images were used in the completion of subproject NC1002A-CM-N. All imagery was acquired at an altitude of ~10,000 feet, resulting in an approximate ground sample distance (GSD) of 0.35 meters.

Direct Georeferencing Data Processing

The GPS/IMU data for Project NC1002-CM-N were processed by RSD personnel to yield precise camera positions and orientations required for georeferencing of the imagery. GPS base stations were established for use as reference stations for kinematic GPS processing operations. The positions of the base stations were determined using the NGS Online Processing User Service (OPUS), which computed fixed baseline solutions from nearby CORS stations. Final processing of the airborne kinematic data for the photographs used in NC1002A-CM-N was

accomplished in November 2011 using POSPAC 5.4.4 GPS/IMU software. For further information refer to the Airborne Positioning and Orientation Report (APOR) for GPS day 0962010 on file with other project data within the RSD Applications Branch (AB) Project Archive. Positional data for this project is referenced to the North American Datum of 1983 (NAD 83).

Upon completion of the processing of GPS/IMU data, the processed data were used to derive precise exterior orientation (EO) values of the camera centers required for digital feature extraction. A predicted horizontal accuracy of the imagery was determined by propagating sensor EO and image measurement uncertainties through the photogrammetric collinearity equations using an Excel spreadsheet based Exterior Orientation Total Propagated Uncertainty (EO-TPU) tool developed by NGS. Using this tool, the predicted horizontal uncertainty at the 95% confidence level was calculated to be 1.07 meters for the imagery used to compile data for NC1002A-CM-N. Stereo-models were examined for parallax and found to be acceptable.

Compilation

The data compilation phase of this project was accomplished by RSD Applications Branch (AB) personnel in March 2015. Digital mapping was performed using the Feature Extraction software module within SOCET SET (ver. 5.6). Feature identification and attribution within the GC were based on analysis of the aerial imagery and information extracted from the largest scale NOAA nautical chart 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.

Spatial data accuracies for project NC1002A-CM-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 2.1 meters. This predicted accuracy of well-defined points measured during the compilation phase was derived by doubling the imagery accuracy computed from the EO-TPU tool.

The following table provides information on the imagery used to complete this project:

Date	Time (UTC)	Roll #	Flight Line / Photo #s	Tide Level*
4/6/2010	17:07	10NC45	50-011 / 18365 – 18367	0.8 m

* Tide levels are given in meters above MLLW and are based on actual observations at the Charleston reference station with corrections applied to the Little River (town) substation within the project area. The elevation of MHW above MLLW in the project area is approximately 1.4 meters.

Quality Control / Final Review

Quality control tasks were conducted by a senior member of RSD in March 2015. The review process included analysis of the DG 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. Quality control concluded with an inspection of topological connectivity within the GC using ArcGIS 10.2.2 software. All project data was evaluated for compliance to CMP requirements.

A Chart Evaluation File (CEF) resulted from the comparison of source imagery and compiled project data with the largest scale NOAA nautical chart covering the project area:

11534, Intracoastal Waterway- Cape Fear R. to Casino Creek, 1:40,000, 38th Ed., Sep/13

End Products and Deliverables

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

RSD Applications Branch Archive

- Hardcopy of the Data Acquisition Summary for NC1002-CM-N
- Hardcopy of the APOR for data used in NC1002-CM-N
- Hardcopy of the Project Completion Report (PCR)
- Page-size graphic of GC11146 file contents, attached to PCR

Remote Sensing Division Electronic Data Library

- Project database
- GC11146 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- CEF in shapefile format

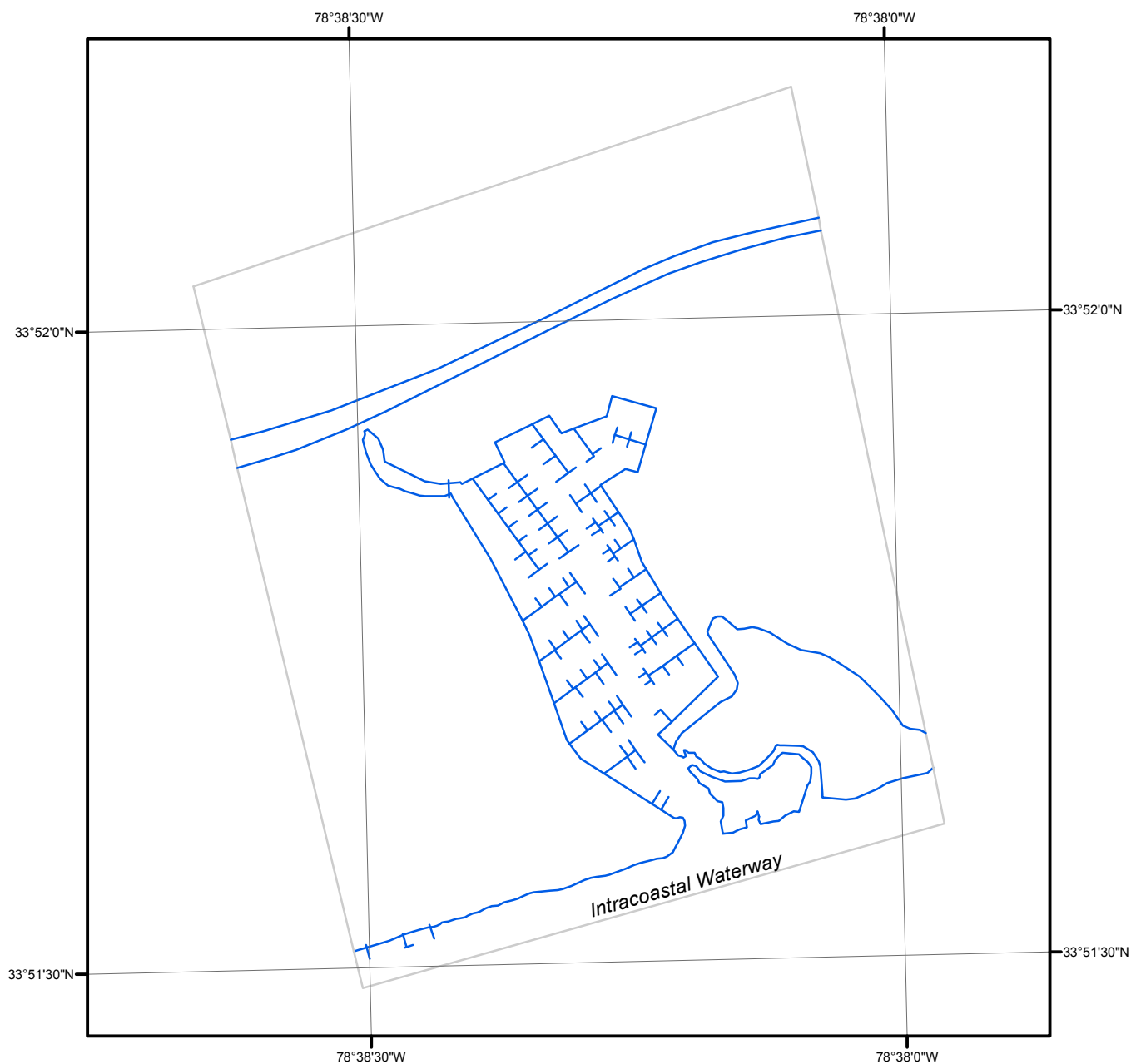
NOAA Shoreline Data Explorer

- GC11146 in shapefile format
- Metadata file for GC11146
- Digital copy of the PCR in Adobe PDF format

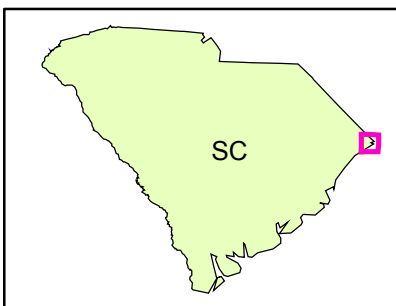
End of Report

COQUINA HARBOR, INTRACOASTAL WATERWAY

SOUTH CAROLINA



Overview



NC1002A-CM-N

GC11146