

# **NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT**

## ***PROJECT SC2101-CS-N***

### ***Port of Charleston, South Carolina***

#### **Introduction**

NOAA Coastal Mapping Program (CMP) Project SC2101-CS-N provides highly accurate digital shoreline data for key areas of change within the Port of Charleston, South 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**

The design of Project SC2101-CS-N was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD) in response to the need for timely updates to the NOAA chart suite within key U.S. ports. 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 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 completed. Refer to the CSCAP memorandum for Project SC2102-CS-T for details of the chart comparison process.

#### **Field Operations**

The field operations consisted of collection of static and kinematic Global Positioning System (GPS) data and Inertial Measurement Unit (IMU) data, and the acquisition of aerial imagery. Six strips of RGB (color) digital images utilized for this project were acquired with the NOAA King Air (N68RF) aircraft in September 2021 using an Applanix DSS 6150/6100 dual camera system at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 0.23 meters for project imagery. Near-infrared (NIR) images were also acquired concurrently but were not used. Although imagery was not acquired in strict coordination with local tides, the goal was to collect all imagery below Mean High Water (MHW) tide stage.

#### **GPS Data Processing**

The GPS/IMU data were processed by RSD personnel to yield precise camera positions in order to provide a control network necessary for aerotriangulation (AT). The kinematic GPS data was processed in October 2021 using Applanix POSPac MMS (ver. 8.7) software, utilizing the IN-Fusion PP-RTX processing mode, which is an implementation of Trimble's CenterPoint RTX GNSS correction service. For further information refer to the Airborne Positioning and Orientation Report (APOR) on file with other project data in the RSD Electronic Data Library.

## Aerotriangulation

Routine softcopy AT 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 October 2021 utilizing BAE's SOCET GXP (ver. 4.5) software on a Windows-based photogrammetric workstation. The RGB images were measured and adjusted as a single block using the Multi-Sensor Triangulation (MST) module of SOCET GXP. Upon successful completion MST provided the standard deviations for each aerotriangulated ground point, which were used to compute a predicted horizontal circular error of 0.34 meters based on a 95% confidence level. An AT Report was written and is on file with other project data within the RSD Electronic Data Library. Positional data is referenced to the North American Datum of 1983 (NAD83).

## Compilation

Data compilation was accomplished by a member of AB in November 2021. Digital feature data was compiled from the aerotriangulated RGB imagery using the Feature Extraction software module of SOCET SET (ver. 5.6). 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 SC2101-CS-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 0.7 meters at the 95% confidence level. This predicted accuracy of compiled well-defined points is derived by doubling the circular error calculated from the AT statistics.

The following table provides information on the images used in the project completion:

Date	Time (UTC)	Strip / Images	Tide Level*
23-SEP-2021	17:00 – 17:05	62-001 / 37762 – 37790	1.3 – 1.6 m
23-SEP-2021	17:11 – 17:16	62-004 / 37791 – 37816	1.5 – 1.2 m
23-SEP-2021	17:21 – 17:26	62-002 / 37817 – 37847	1.2 – 1.5 m
23-SEP-2021	17:31 – 17:35	62-005 / 37848 – 37871	1.3 – 1.1 m
23-SEP-2021	17:40 – 17:46	62-003 / 37872 – 37901	1.0 – 1.4 m
23-SEP-2021	17:50 – 17:52	62-006 / 37902 – 37917	1.0 m

\* Tide level is given in meters above MLLW and calculated using the Pydro software tool with a TCARI grid referenced to verified water level observations from various NOS gauges in the vicinity of the project. The elevation of the MHW tidal datum in the project area ranges between 1.39 – 1.79 meters above MLLW.

## **Quality Control / Final Review**

The final review of the project was completed by senior CMP personnel in November 2021 and included analysis of 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 Esri's ArcGIS desktop GIS software (ver. 10.8.1). 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:

### **Remote Sensing Division Electronic Data Library**

- CSCAP evaluation memorandum
- Airborne Positioning and Orientation Report (APOR)
- Project database
- AT Report
- Project Completion Report (PCR)
- GC11744 in shapefile format
- CEF in shapefile format

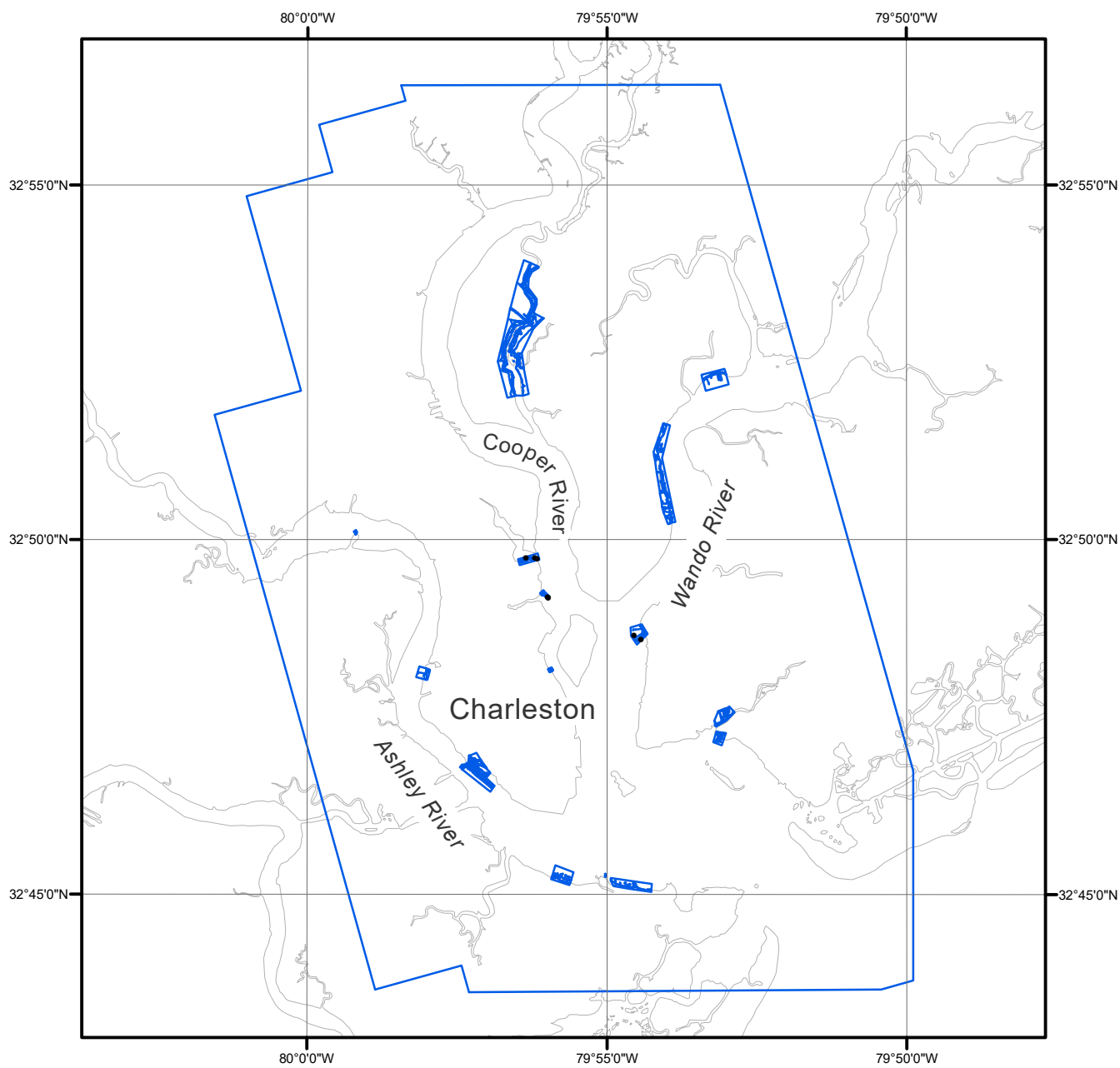
### **NOAA Shoreline Data Explorer**

- GC11744 in shapefile format
- Metadata file for GC11744
- PCR in Adobe PDF format

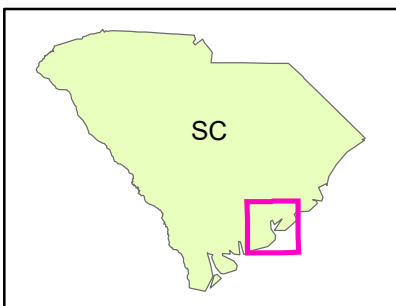
## **End of Report**

# PORT OF CHARLESTON

## SOUTH CAROLINA



Overview



SC2101-CS-N

GC11744