

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT VA2101B-CS-N

Port of Hopewell, Virginia

Introduction

NOAA Coastal Mapping Program (CMP) Project VA2101B-CS-N provides highly accurate digital shoreline data for key areas of change within the Port of Hopewell, Virginia. 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 VA2101B-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 VA2101B-CS-N 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. Three strips of 4-band digital images (RGB+NIR) utilized for this project were acquired with a NOAA Twin Otter (N48RF) aircraft in April 2021 using a Leica RCD30 aerial camera at a nominal altitude of 8,200 feet, resulting in an approximate ground sample distance (GSD) of 0.25 meters for project imagery. 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 May 2021 using Novatel's Inertial Explorer (ver. 8.90) software, utilizing the PPP-NRT processing mode, which is an implementation of the TerraStar Correction Service. This processing mode uses the HxGN SmartNet reference station network, so it was not necessary to set a local base station. For further information refer to the Airborne Positioning and Orientation Report (APOR) on file with other project data within 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 June 2021 utilizing BAE's SOCET SET (ver. 5.6) 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 SET. Upon successful completion MST provided the standard deviations for each aerotriangulated ground point, which were used to compute a predicted horizontal circular error of 0.41 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 June 2021. Digital feature data was compiled from the aerotriangulated RGB imagery using the Feature Extraction software module of SOCET SET. 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 VA2101B-CS-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 0.8 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)	Flight Line / Image #s	Water Level*
27-APR-2021	14:33 – 14:37	47-001 / 11 – 30	0.0 m
27-APR-2021	14:43 – 14:47	47-002 / 44 – 64	0.0 m
27-APR-2021	14:55 – 14:59	47-003 / 77 – 96	0.1 – 0.0 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 0.74 – 0.78 meters above MLLW.

Quality Control / Final Review

The final review of the project was completed by senior CMP personnel in June 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
- Aerotriangulation Report
- Project Completion Report (PCR)
- GC11729 in shapefile format
- CEF in shapefile format

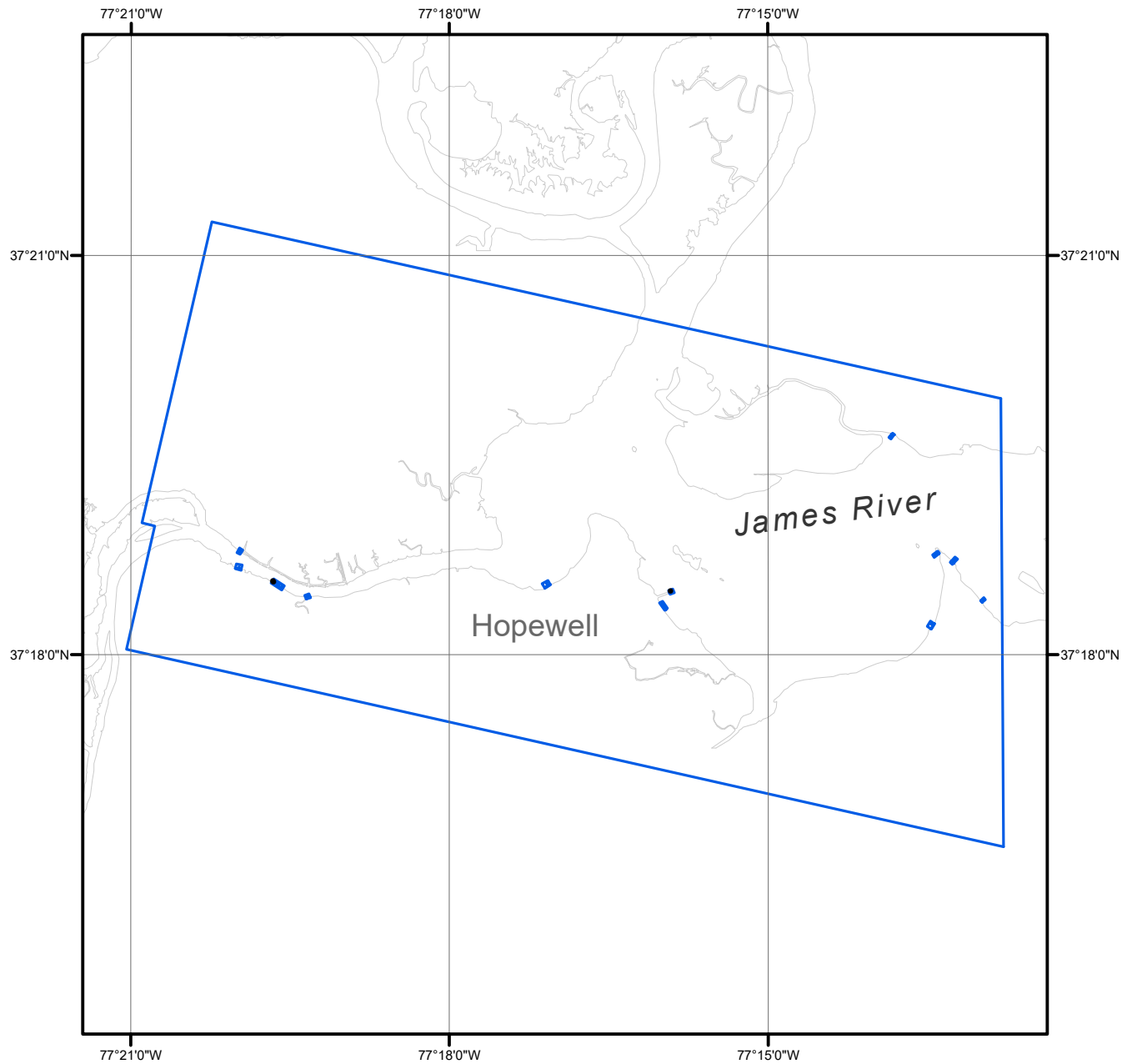
NOAA Shoreline Data Explorer

- GC11729 in shapefile format
- Metadata file for GC11729
- PCR in Adobe PDF format

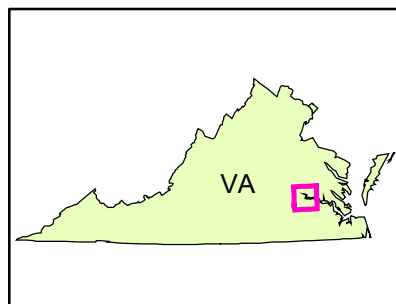
End of Report

PORT OF HOPEWELL

VIRGINIA



Overview



VA2101B-CS-N

GC11729