NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT OH2003B-CS-N

Port of Marblehead, Ohio

Introduction

Coastal Mapping Program (CMP) Project OH2003B-CS-N provides highly accurate digital shoreline data for key areas of change within the port of Marblehead, Ohio. 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 OH2003B-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 complete. Refer to the change analysis memorandum for OH2003B-CS-N 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 (N68RF) aircraft in September and October 2020 using an Applanix Digital Sensor System (DSS) 580/560 dual camera system at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 0.32 meters for the color (RGB) images used for this project. Near infrared (NIR) imagery was also acquired concurrently but was not used.

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. The kinematic GPS data was processed using Applanix POSPAC (ver. 8.4 & 8.5) software in October and November of 2020, 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 Reports (APOR) that are on file with other project data within the Remote Sensing Division Electronic Data Library.

Aerotriangulation

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 RSD personnel in March 2021 utilizing SOCET SET (ver. 5.6) software on a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components, and other associated peripheral devices. The RGB images were measured and adjusted as a single block using the Multi-Sensor Triangulation (MST) module of SOCET SET. Upon successful completion of this process, MST provided the standard deviations for each aerotriangulated ground point, which were used to compute a predicted horizontal circular error of 0.50 meters based on a 95% confidence level. An Aerotriangulation 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

The data compilation phase of this project was accomplished by a member of AB in March 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.

Spatial data accuracies for Project OH2003B-CS-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.0 meters at the 95% confidence level. This predicted accuracy of compiled well-defined points is derived by doubling the circular error calculated from the aerotriangulation statistics.

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

Date	Time (UTC)	Roll #	Flight Line / Photo #s	Water Level*
25-SEP-2020	17:09 – 17:13	20VC37	62-002 / 15527 – 15541	174.8 m
13-OCT-2020	16:43 – 16:44	20VC44	62-001 / 19277 – 19284	174.8 m

* Lake water levels are given in meters above IGLD 1985 and are based on verified observations at the Marblehead station in Ohio. The Low Water Datum (LWD) value for Lake Erie is 173.5 meters.

Quality Control / Final Review

The final review of the project was completed by a senior member of RSD in March 2021, 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 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)
- Aerotriangulation Report
- Project database
- Project Completion Report (PCR)
- GC11708 in shapefile format
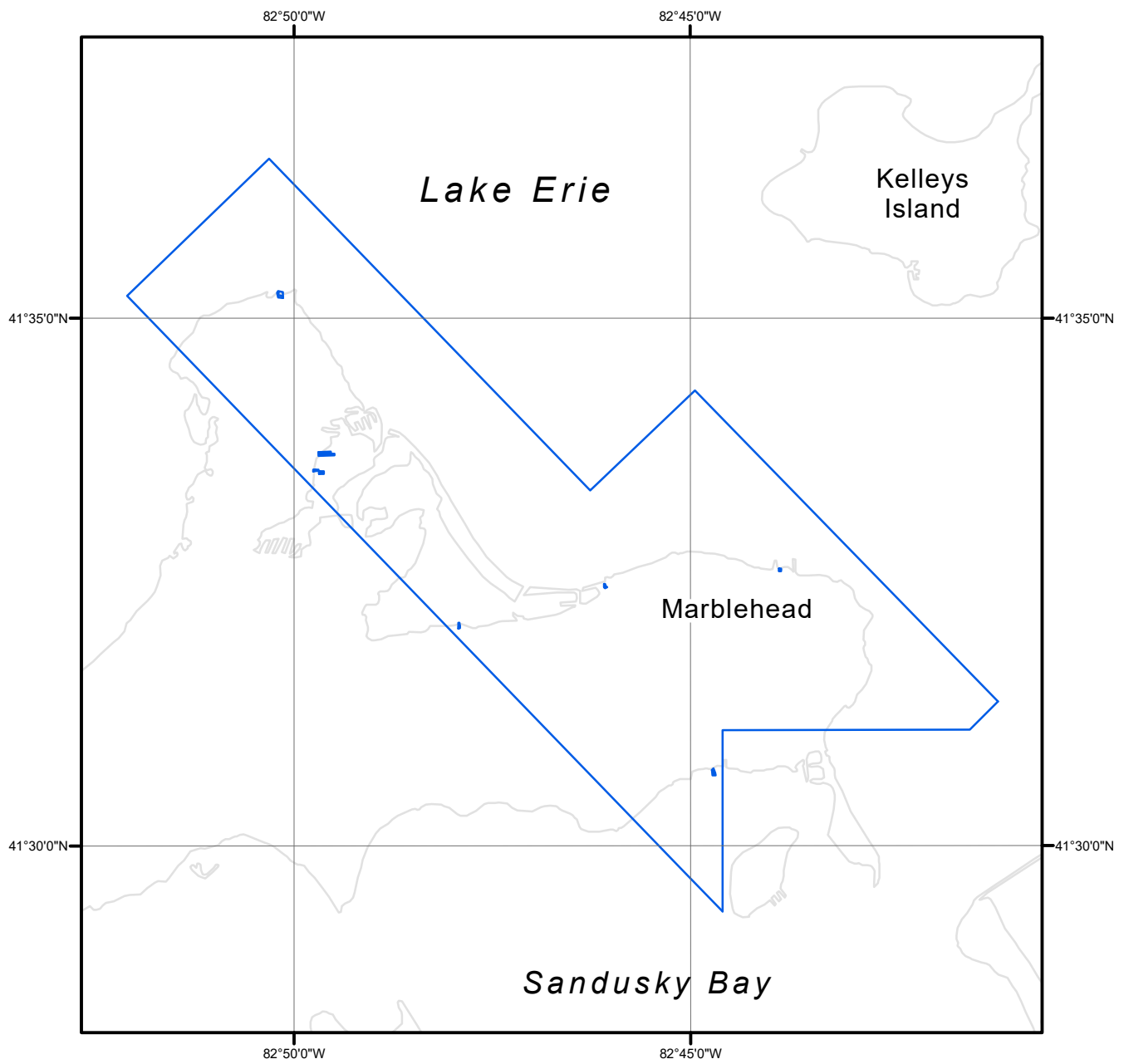- CEF in shapefile format

NOAA Shoreline Data Explorer

- GC11708 in shapefile format
- Metadata file for GC11708
- Digital copy of the PCR

End of Report

PORT OF MARBLEHEAD

OHIO

82°50'0"W 82°45'0"W

Lake Erie

Kelleys
Island

41°35'0"N 41°35'0"N

Marblehead

41°30'0"N 41°30'0"N

Sandusky Bay

82°50'0"W 82°45'0"W

Overview

OH

OH2003B-CS-N

GC11708