

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT OH1606-CS-N

Port of Toledo, Ohio

Introduction

NOAA Coastal Mapping Program (CMP) Project OH1606-CS-N provides highly accurate digital shoreline data for key areas of change within the Port of Toledo, 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 OH1606-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 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 CSCAP memorandum of March 14, 2017 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. Color digital images utilized for this project were acquired with the NOAA King Air aircraft on November 12, 2016 with the NOAA King Air 350CER (N68RF) aircraft and an Applanix Digital Sensor System 580/560 (DSS 580/560) camera. The project imagery consisted of three strips of digital aerial imagery flown at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 0.33 meters. Near-infrared (NIR) images were also acquired concurrently with the color images, but were not used for this project.

The project was not planned in coordination with any particular water level, but at the time of acquisition the levels in the project area were near the Low Water Datum (LWD).

GPS Data Reduction

The GPS/IMU data for Project OH1606-CS-N were processed by RSD personnel to yield precise camera positions and orientations. 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. The airborne kinematic data was processed using POSPac MMS 7.1 GPS/IMU software in December 2016. 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

The aerotriangulation (AT) phase of project completion was performed by RSD in November 2017. 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 accomplished by a member of AB utilizing a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components, and other associated peripheral devices. The digital images were measured and adjusted as a single block using BAE Systems SOCET SET (version 5.6.0) software. Upon successful completion of this process, the triangulation software provided the standard deviations for each aerotriangulated ground point, which were used to compute a predicted horizontal circular error of 0.3 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

The data compilation phase of this project was accomplished by a member of RSD in November 2017. Digital feature data was compiled using SOCET SET (version 5.6.0) software. 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.

Spatial data accuracies for Project OH1606-CS-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 0.6 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 imagery used to complete this project:

Date	Time (UTC)	Strip No.	Photo No.	Lake Level*
11-12-2016	15:57 – 16:02	164003	20880 – 20899	174.2 m
11-12-2016	16:06 – 16:09	164002	20900 – 20918	174.3 m
11-12-2016	16:14 – 16:17	164001	20919 – 20936	174.3 m

* Lake water levels are given in meters above IGLD 1985 and are based on verified observations at the NOS water level station at Toledo, Ohio (9063085). The Low Water Datum (LWD) for Lake Erie is 173.5 meters above IGLD 1985.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a senior member of RSD. The final QC review was completed in November 2017. 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 10.5 software. All project data was evaluated for compliance to CMP requirements.

End Products and Deliverables

The following specifies the location and identification of the 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)
- GC11366 in shapefile format
- CEF in shapefile format

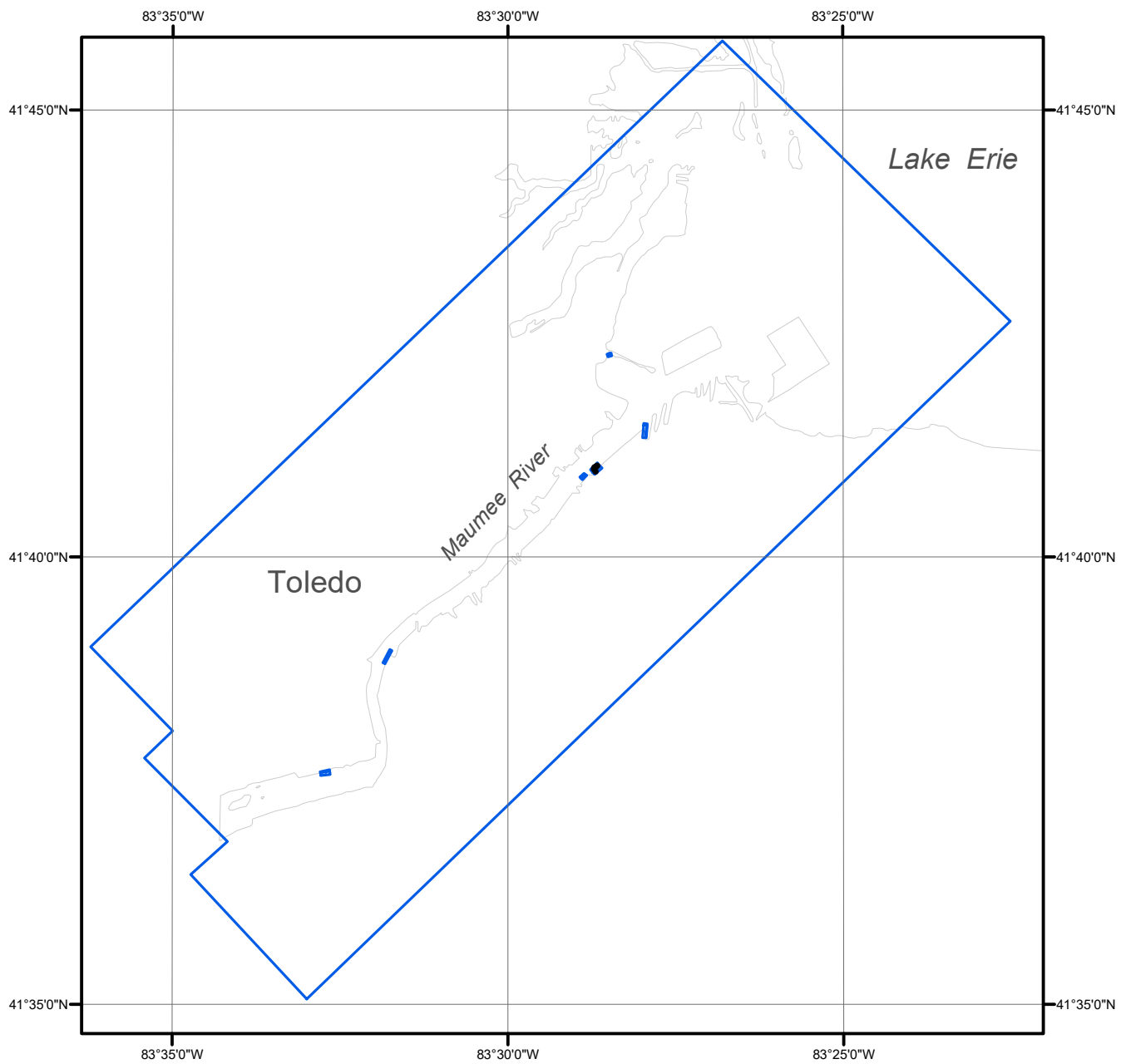
NOAA Shoreline Data Explorer

- GC11366 in shapefile format
- Metadata file for GC11366
- Digital copy of the PCR

End of Report

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Overview



OH1606-CS-N

GC11366