

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

## ***PROJECT CA1502-CS-N***

### ***Ports of Los Angeles and Long Beach, California***

#### **Introduction**

Coastal Mapping Program (CMP) Project CA1502-CS-N provides highly accurate digital shoreline data for key areas of change in the ports of Los Angeles and Long Beach, California. 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 CA1502-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 RB Memorandum of July 24, 2015, "Results of CSCAP Change Analysis for Los Angeles & Long Beach, California," 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, Inertial Measurement Unit (IMU) data and the acquisition of aerial imagery. The photographic mission operations were conducted on April 18, 2015 with the NOAA King Air (N68RF) aircraft. Six strips of color (RGB) digital images were acquired with an Applanix Digital Sensor System (DSS) 539 aerial camera at a nominal altitude of 10,500 feet, resulting in an approximate ground sample distance (GSD) of 0.37 meters. Although imagery was not acquired in strict coordination with local tides, the goal was to collect all imagery below Mean High Water (MHW).

#### **GPS Data Reduction**

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 base station's geodetic position was derived using the NGS Online Processing User Service (OPUS), which computed fixed baseline solutions from nearby CORS stations. The kinematic GPS data was processed using Applanix POSPac MMS (ver. 7.1) software in May 2015. For further information refer to the Airborne Positioning and Orientation Reports (APOR) on file with other project data within the RSD 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 April 2016 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 the triangulation software module of BAE Systems SOCET GXP (v4.1.0) 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 0.47 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 RSD in April 2016. Digital feature data was compiled using SOCET GXP v4.1.0 software. 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 CA1502-CS-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 0.9 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 imagery used to complete this project:

<b>Date</b>	<b>Time (UTC)</b>	<b>Roll Number</b>	<b>Photo Numbers</b>	<b>GSD (nominal)</b>	<b>Tide Level*</b>
18-APR-2015	18:43 – 18:47	15NC30	4833 - 4855	0.37 m	1.2
18-APR-2015	18:53 – 18:58	15NC30	4856 - 4885	0.37 m	1.1
18-APR-2015	19:10 – 19:15	15NC30	4886 - 4916	0.37 m	1.0
18-APR-2015	19:21 – 19:25	15NC30	4917 - 4943	0.37 m	0.9
18-APR-2015	19:30 – 19:34	15NC30	4944 - 4969	0.37 m	0.9
18-APR-2015	19:39 – 19:43	15NC30	4970 - 4998	0.37 m	0.8

\* Tide levels are given in meters above MLLW and were calculated using the Pydro software tool with a TCARI grid referenced to verified water level observations at the time of photography from various NOS gauges in the vicinity of the project. The elevation of the MHW tidal datum in the project area varies between 1.35 – 1.38 meters above MLLW.

## **Quality Control / Final Review**

The final review of the project was completed by a member of RSD in May 2016, 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 ArcGIS 10.2.2 software. 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**

- Airborne Positioning and Orientation Report (APOR)
- CSCAP evaluation memorandum
- Project database
- Aerotriangulation Report
- Project Completion Report (PCR)
- GC11221 in shapefile format
- Chart Evaluation File in shapefile format

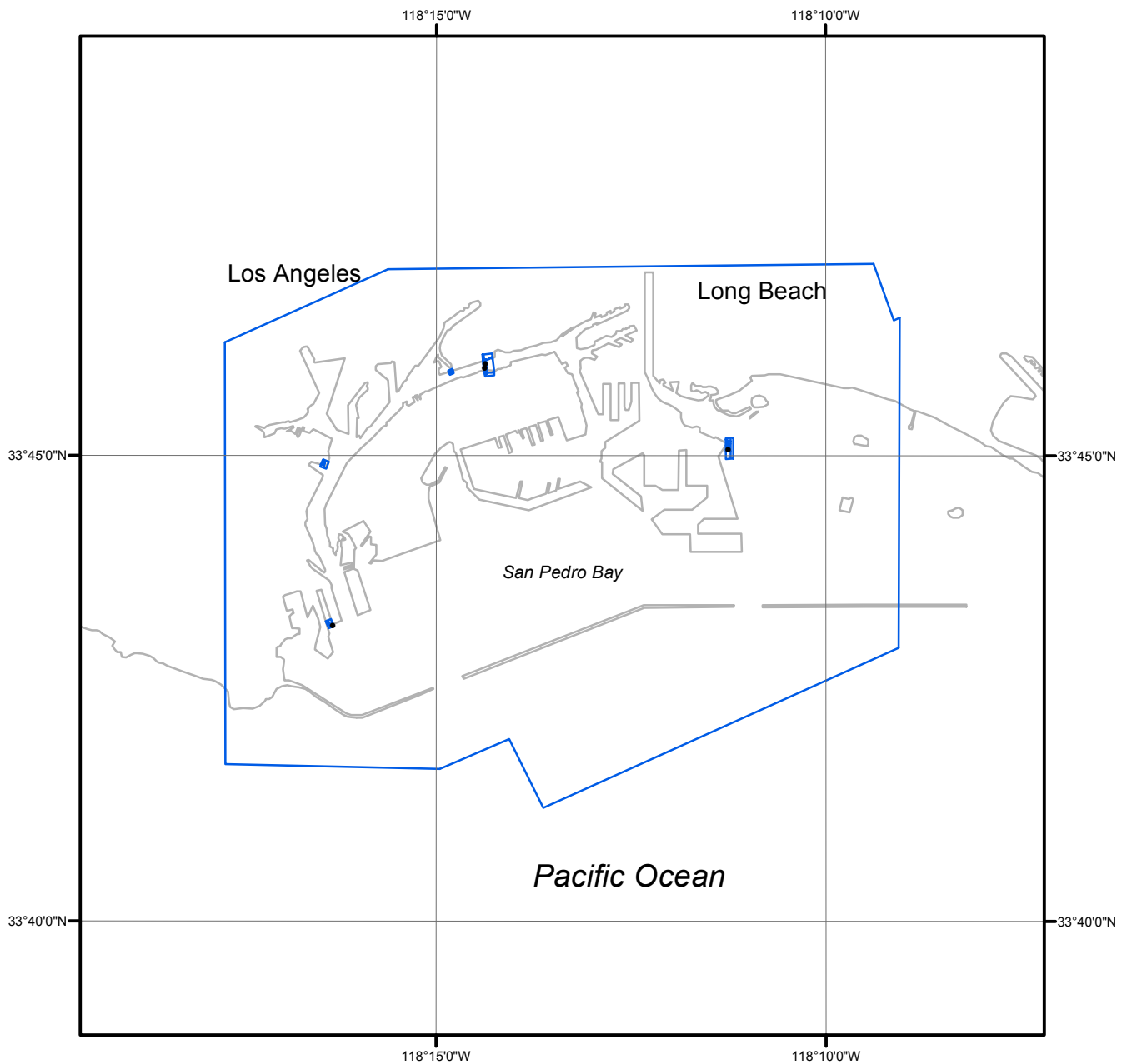
### **NOAA Shoreline Data Explorer**

- GC11221 in shapefile format
- Metadata file for GC11221
- Digital copy of the PCR

## **End of Report**

# PORTS OF LOS ANGELES AND LONG BEACH

## CALIFORNIA



Overview



CA1502-CS-N

GC11221