NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT AK1611-CS-N

Port of Anchorage, Alaska

Introduction

Coastal Mapping Program (CMP) Project AK1611-CS-N provides highly accurate digital data for notable areas of change within the port of Anchorage, Alaska. 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 AK1611-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 to ascertain the need for more current shoreline data. A Chart Evaluation File (CEF) was created and forwarded to the Applications Branch (AB) of RSD once a change analysis was completed. Refer to the RB CSCAP memorandum of August 18, 2016 for details of the chart comparison process.

Field Operations

The field operations consisted of the collection of static and kinematic GPS data and Inertial Measurement Unit (IMU) data, and the acquisition of digital aerial imagery. Aerial survey operations were conducted on May 25, 2016 with the NOAA King Air aircraft (N68RF). Project imagery included two flight lines of natural color and near-infrared (NIR) imagery acquired concurrently using an Applanix DSS 580/560 dual lens camera. The NIR imagery was not used for this project. All imagery was acquired at a nominal altitude of 7,500 feet, resulting in an approximate ground sample distance (GSD) of 0.24 meters. Although imagery was not acquired in strict coordination with local tides, the goal was to collect all imagery below Mean High Water (MHW).

Direct Georeferencing Data Processing

The GPS/IMU data were processed by RSD personnel to yield precise camera positions and orientations for direct geo-referencing (DG) of the imagery. A local GPS base station was established for use as a reference station for kinematic GPS processing operations. The position of the base station was determined using the NGS Online Processing User Service (OPUS), which computed fixed baseline solutions from nearby CORS stations. Airborne kinematic data was processed using Applanix POSPac (ver. 7.1) software on July 29, 2016. For further information refer to the Airborne Positioning and Orientation Reports (APOR) on file with other project data within the RSD Electronic Data Library.

The processed GPS/IMU data were used to derive precise exterior orientation (EO) values of the camera centers required for digital feature extraction. The predicted horizontal accuracy of the imagery was determined by propagating sensor EO and image measurement uncertainties through the photogrammetric collinearity equations using the Exterior Orientation Total Propagated Uncertainty (EO-TPU) tool developed by NGS. Using this tool, the predicted horizontal uncertainty at the 95% confidence level for all project imagery was calculated to be 0.59 meters. NGS third order geodetic control was used to verify the horizontal integrity of the directly georeferenced (DG) data. Stereo-models to be used for compilation were examined and found to have acceptable levels of parallax for mapping purposes.

Compilation

The data compilation phase of this project was accomplished by RSD AB personnel in January 2017. Digital mapping was performed using the Feature Extraction software module of SOCET SET. Feature identification and attribution within the GC were based on image analysis of the aerial imagery and information extracted from the largest scale NOAA nautical chart 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 AK1611-CS-N were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 1.2 meters at the 95% confidence level. This predicted accuracy of well-defined points measured during the compilation phase was derived by doubling the imagery accuracy computed from the EO-TPU tool.

The following table provides information on the imagery used to complete this project:

Date	Time (UTC)	Roll #	Strip / Photo #s	Tide Level*
5/25/2016	19:03 – 19:06	16VC64	45-002 / 14861 – 14879	7.8 – 7.7 m
5/25/2016	19:10 – 19:12	16VC64	45-001 / 14880 – 14899	7.6 m

* Tide levels are given in meters above MLLW and are based on verified observations recorded by the NOS tide station at Anchorage, AK at the time of photography. The MHW tidal datum is 8.7 meters above MLLW within the project area.

Quality Control / Final Review

The final review of the project was completed by a senior member of RSD in January 2017, 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 10.3.1 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
- Project database
- Project Completion Report (PCR)
- GC11305 in shapefile format
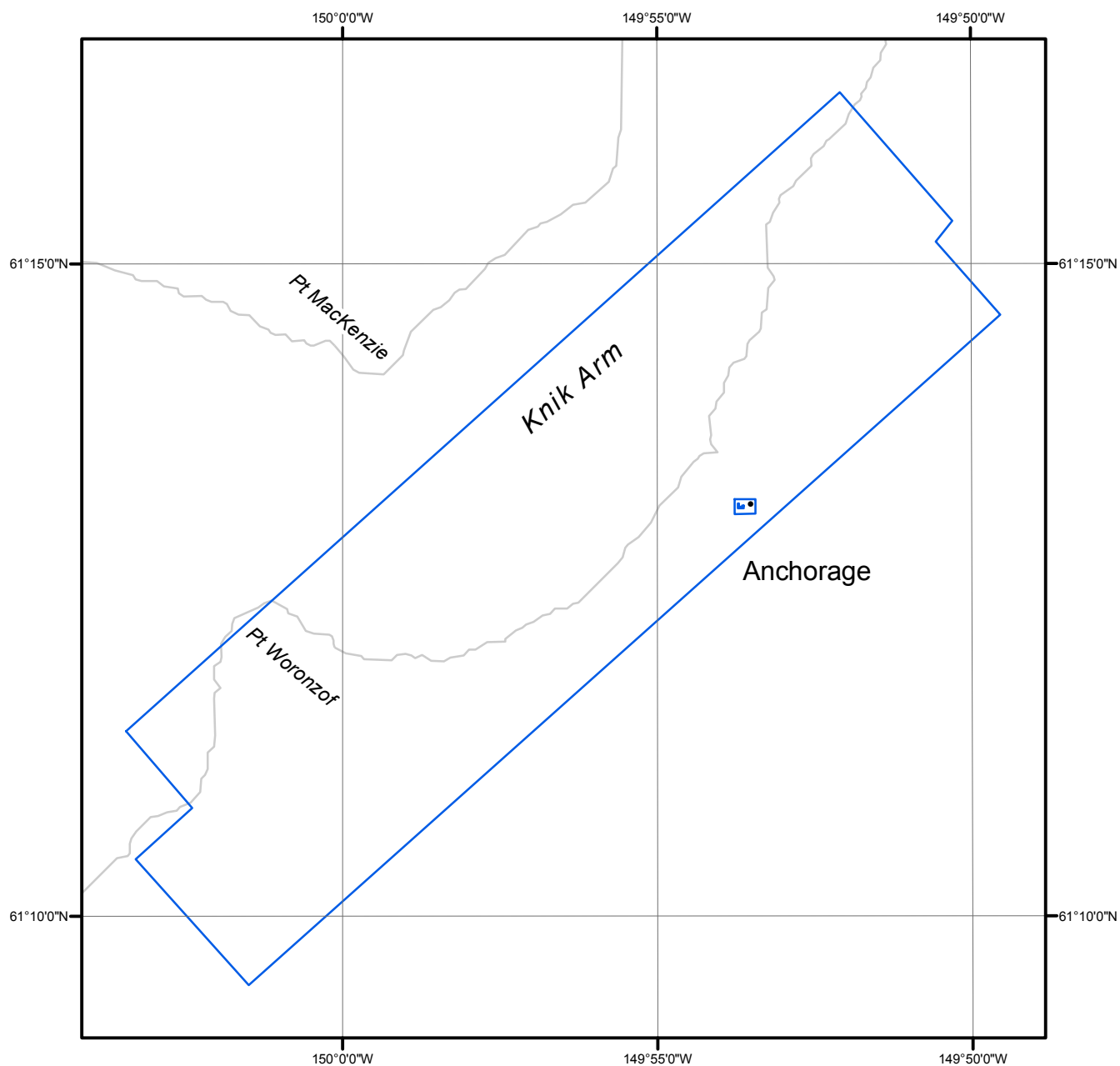- Chart Evaluation File in shapefile format

NOAA Shoreline Data Explorer
- GC11305 in shapefile format
- Metadata file for GC11305
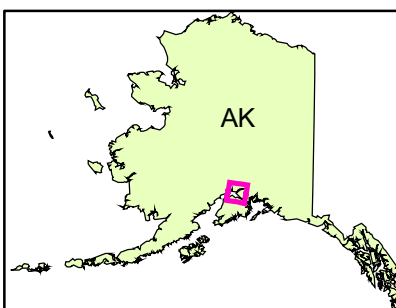- Digital copy of the PCR

End of Report

PORT OF ANCHORAGE

ALASKA

150°0'0"W 149°55'0"W 149°50'0"W

61°15'0"N

Pt Mackenzie

Knik Arm

Anchorage

Pt Woronzof

61°15'0"N

61°10'0"N

61°10'0"N

150°0'0"W 149°55'0"W 149°50'0"W

Overview

AK

AK1611-CS-N

GC11305