

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

## ***PROJECT TX0603***

### ***Port of Brownsville, Texas***

#### **Introduction**

NOAA Coastal Mapping Program (CMP) Project TX0603 provides a highly accurate database of new digital shoreline data for the port of Brownsville Texas, and the surrounding area. The project extends from the city of Brownsville, northeastwards along the Brownsville Ship Channel, stretching over Bahia Grande, the city of Port Isabel, the water body of Laguna Madre, to end up over the southern tip of South Padre Island. 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 TX0603 was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD) in response to the need for timely updates to the NOAA Electronic Navigational Chart (ENC) series. 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 satellite imagery in order to ascertain the need for more current shoreline data. Refer to the RB Memorandum of December 4, 2006, "Results of CSCAP Change Analysis for Brownsville, Texas (TX0603)" 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 the acquisition of aerial imagery. The photographic mission operations were conducted on September 21, 2006, with the NOAA Cessna Citation II aircraft. Two strips (30-1 and 30-2) of natural color photographs were acquired through use of a Wild RC-30 camera with the NOS "A" lens cone at the nominal scale of 1:30,000. The collection of these photographs was not coordinated with local tides.

A base station was established at South Padre Island International Airport, Brownsville, using static GPS. Airborne kinematic GPS data was collected in conjunction with Inertial Measurement Unit (IMU) data to determine precise camera positions and orientations.

#### **Aerotriangulation**

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 initiated by RSD personnel in March 2007 utilizing a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components and other associated

peripheral devices. The color photographs were measured and adjusted as two separate blocks using BAE Systems' SOCET SET (version 5.3) photogrammetric software in conjunction with the Multi-Sensor Triangulation Package (MST) aerotriangulation software. Upon successful completion of the aerotriangulation process, the MST software provided the RMS of the standard deviations of the residuals for each aerotriangulated ground point which were used to compute a and overall predicted horizontal circular error of 1.0 meters based on a 95% confidence level. An Aerotriangulation Report was written and is on file with other project data within the RSD Project Archive.

The project database consists of project parameters and options, camera calibration data, interior orientation parameters, ground control parameters, adjusted exterior orientation parameters, and positional listing of all measured points. Positional data is based on the UTM Coordinate System (Zone 14 North) and is referenced to the North American Datum of 1983 (NAD 83).

## Compilation

The data compilation phase of this project was initiated by RSD personnel in April 2007. The work was accomplished using a Digital Photogrammetric Workstation (DPW), in conjunction with the SOCET SET Feature Extraction software module. Feature identification and the attribution within the Geographic Cell (GC) were based on image analysis of 1:30,000 scale photographs and information extracted from the appropriate NOAA nautical charts, US Coast Guard Light List 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. Selected features were further modified with additional descriptive information to refine general classification.

Spatial data accuracies for Project TX0603 were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 2.0 meters at the 95% confidence level. The predicted accuracy of compiled, well defined points is derived by doubling the circular error derived from aerotriangulation statistics.

The following table provides information on aerial photographs used in the completion of this project:

Date	Time (UTC)	Roll Number	Photo Numbers	Scale	Tide Level*
09-21-06	20:51 - 21:12	06ACN12	1856 - 1866	1:30,000	0.5

\*Tide level is given in meters above MLLW, and is based on actual observations at the Port Isabel tide station at the time of the survey. It is presumed that the water level at the Port of Brownsville was approximately the same, since when a tide gauge was temporarily operating at Brownsville in 2002, its water level measurements closely correlated in both time and height with the water level at Port Isabel. The mean tide range in the project area is about 0.4 m.

## **Quality Control / Final Review**

Quality control tasks were conducted during all phases of project completion by a senior member of AB. The final QC review was completed in April 2007. The review process included analysis of aerotriangulation results, and assessment of the identification and attribution of cartographic features 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 9.1 software. All project data was evaluated for compliance to CMP requirements.

Comparisons of the largest scale NOAA nautical charts with digital color photographs and compiled project data resulted in creation of the Chart Evaluation File (CEF). The following nautical chart was used in the comparison process:

11302 Stover Point to Port Brownsville, TX, 1:40,000, 30<sup>th</sup> Edition

## **End Products and Deliverables**

The following specifies the location and identification of the products generated during the completion of this project:

### **RSD Applications Branch Archive**

- Hardcopy of the GPS-IMU Processing Report
- Hardcopy of the Accuracy Assessment
- Hardcopy of the Project Completion Report (PCR)
- Page-size graphic plot of GC10660 file contents, attached to PCR

### **Remote Sensing Division Electronic Data Library**

- Project Database
- GC10660 in ESRI shapefile format
- Digital copy of the PCR in Adobe PDF format
- Chart Evaluation File (CEF) in shapefile format

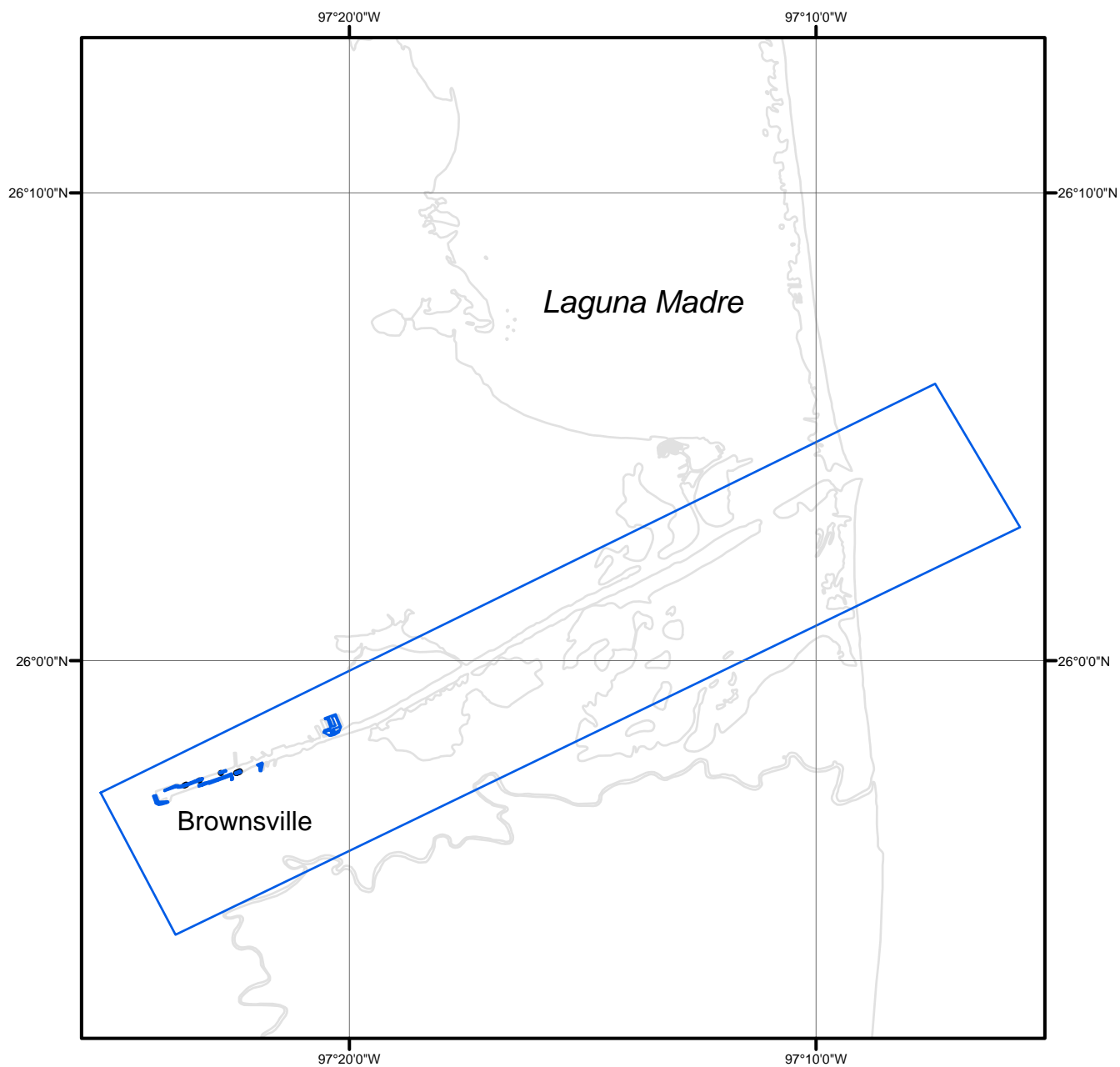
### **NOAA Shoreline Data Explorer**

- GC10660 in shapefile format
- Metadata file for GC10660
- Digital copy of the PCR in Adobe PDF format

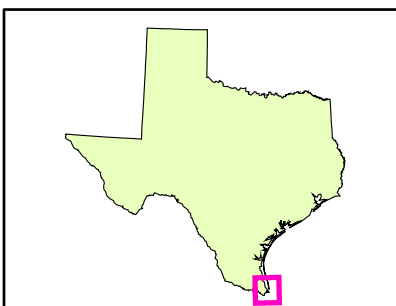
## **End of Report**

# PORT OF BROWNSVILLE

## TEXAS



Overview



TX0603

GC10660