NOAA COASTAL MAPPING PROGRAM
PROJECT COMPLETION REPORT

PROJECT NY9904B

NEW YORK HARBOR
NEW YORK and NEW JERSEY

Introduction

Project NY9904B provides highly accurate digital shoreline data for New York Harbor, in the states of New York and New Jersey. NY9904B is a sub-project of a larger Coastal Mapping Program (CMP) project, NY9904, which covers New York Harbor and Port areas from Lower Bay to Troy.

Successful completion of this project resulted in a densification of the National Spatial Reference System (NSRS), a set of controlled metric quality aerial photographs and companion high resolution digital scans, and digital cartographic feature files of the coastal zone to complement the NOAA's Nautical Charting Program (NCP) and other geographic information systems.

The project database consists of information measured and extracted from aerial photographs and metadata related to photogrammetric compilation. Base mapping was conducted in a fully digital environment using softcopy stereo photogrammetry and associated cartographic practices. Positional data is referenced to the North American Datum 1983 (NAD83).

Project Design

The design of Project NY9904B was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD). Project requirements were formulated in the planning phase and issued in the General Information / Instructions. These instructions discuss in detail the photographic requirements, flight lines, tide coordination, Global Positioning System (GPS) control requirements, guidelines for static and kinematic data collection and handling, project priority and communication guidelines.

Field Operations

Field operations consisted of the collection of static and kinematic GPS data and the acquisition of aerial photographs. Static GPS data was collected prior to the photo missions and applied as local reference points. Kinematic GPS data was collected during the ensuing photo missions, rendering precise camera positions as a means of controlling the photographs. Aerial photographic survey operations were conducted during June and September of 1999 by the Cessna Citation II (N52RF) aircraft. Photographic requirements consisted of 1:30,000 scale photography, utilizing natural color film. There was no attempt to acquire tide coordinated black and white infrared photographs. All photos were taken using a Wild RC-30 camera with the NOS "A" lens cone.

GPS Data Reduction

The acquisition of GPS data sets was executed in compliance with GPS Controlled Photogrammetry Field Operations Manual, a RSD operational manual. GPS data was processed as a means of photogrammetric control for use in the aerotriangulation phase of project completion. Static GPS data of the airport reference station, static GPS data from two CORS

stations, and the kinematic GPS data set were processed using Trimble GPSurvey™ (version 2.30) software. The NGS-computed precise satellite ephemeris and standard meteorologic data were applied during the data reduction process. GPS data reduction was completed by the Applications Branch (AB), RSD, in March 2001, and a GPS Processing Report has been filed in the RSD AB Project Archive.

Aerotriangulation

Softcopy aerotriangulation methods were applied to establish the network of horizontal and vertical control for mapping and to provide model parameter and orientation elements required for digital compilation. The aerotriangulation phase of the project was accomplished using digital images of the aerial photography, scanned at 25 micron resolution in tiled TIFF format, in conjunction with SOCET SET (version 4.3.1.1a) software in a Windows NT environment on a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components and other associated peripheral devices. Three strips of photos were measured and adjusted as a block using the ORIMA aerotriangulation module within SOCET SET. ORIMA provided the RMS of the standard deviations of the residuals for each aerotriangulated ground point which were used to compute a predicted horizontal circular error (CE) of 0.9 meters based on a 95% confidence level. This CE value is doubled to yield a conservative predictor of the accuracy of well defined points measured during the compilation phase. The aerotriangulation task was completed by the RSD AB in April 2001 and an Aerotriangulation Report has been filed in the RSD archive.

Compilation

The compilation phase of the project was carried out by the RSD AB using the Feature Extraction software module within SOCET SET (version 4.3.1.1a) on a DPW. Feature identification and the assignment of cartographic codes were based on image analysis of the 1:30,000 scale natural color photographs and information extracted from corresponding NOAA Nautical Charts and the US Coast Guard Light List Publication, 2000 (Vol. I). The following is a description of the source photographs used to compile cartographic features:

DATE	TIME (GMT)	FILM ROLL	PHOTOS	SCALE	TIDE LEVEL*
06-11-99	1926-1929	99 ACN-15	#2502-2509	1:30,000	0.88
09-18-99	1803-1808	99 ACN-27	#4954-4964	1:30,000	1.19
09-18-99	1815-1817	99 ACN-27	#4965-4974	1:30,000	1.19

* Tide levels are given in meters above MLLW and are based on actual observations recorded by the NOS gauge at The Battery, NY, at the time of photography. The elevation of the MHW tidal datum at The Battery Tide Gauge is equal to 1.46 meters above MLLW.

Digital compilation was completed in September 2001. Features were compiled to meet 1.8 meters horizontal accuracy at a 95% confidence level. This predicted accuracy of compiled well-defined points is a deductive estimate based on triangulation statistics. Cartographic feature attribution was employed in compliance with the Coastal Cartographic Object Attribute Source Table (C-COAST). Nomenclature was assigned to selected cartographic features to refine general classification.

Final Review

As a means of assuring the quality of compiled digital data, the cartographic feature file was evaluated by a senior AB CMP team member for completeness and adherence to CMP requirements and accuracy standards. The digital data was reviewed on a model by model basis, utilizing SOCET SET on a DPW, insuring that all significant coastal features captured in the photography are accurately represented in the digital compilation. Offline data review included a comparison between hard copy plots of project data and largest scale current editions of NOAA nautical charts. Differences found in these comparisons are reflected on Chart Maintenance Prints, copies of the nautical charts annotated with comments to advise the nautical chart compiler. The following charts were used in the comparison process:

12327, New York Harbor, 1:40,000 scale, 94th ed.
12333, Kill Van Kull and Northern Part of Arthur Kill, 1:15,000 scale, 31st ed.
12334, New York Harbor, Upper Bay and Narrows, 1:10,00 scale, 64th ed.
12335, Hudson and East Rivers, 1:10,000 scale, 38th ed.
12338, Newtown Creek, 1:5,000 scale, 8th ed.
12339, East River, Tallman Island to Queensboro Bridge, 1:10,000 scale, 43rd ed.
12341, Hudson River, Days Point to George Washington Bridge, 1:10,000 scale, 24th ed.
12342, Harlem River, 1:10,000 scale, 22nd ed.

Project Final Data and Products

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

RSD Applications Branch Project Archive
- Hard copy of GPS Processing Report
- Hard copy of Aerotriangulation Report
- Page size graphic plot of DCFF contents
- Hard copy of the Project Completion Report (PCR)

RSD Electronic Data Library:
- Project Database
- Original DCFF for GC-10512
- Processed DCFF in ESRI Shapefile format
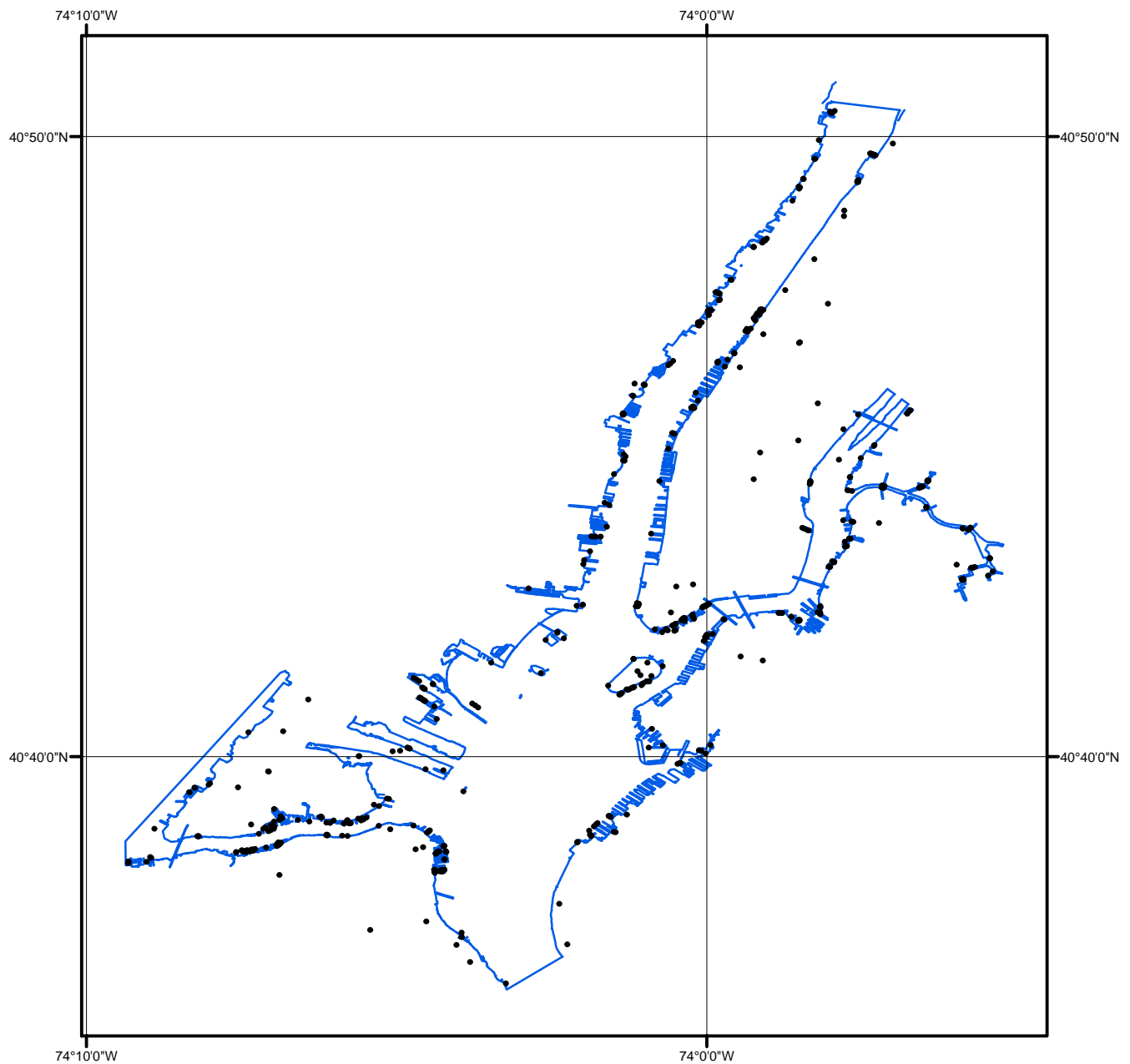- Digital Copy of the PCR in Adobe Acrobat (.pdf) format

NOAA Shoreline Data Explorer
- DCFF for GC-10512
- Metadata file for GC-10512
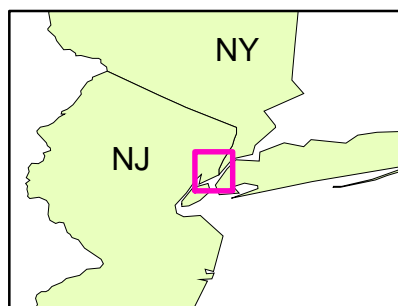- Digital Copy of the PCR in Adobe Acrobat (.pdf) format

End of report

NEW YORK HARBOR

NEW YORK / NEW JERSEY

74°10'0"W 74°0'0"W

40°50'0"N 40°50'0"N

40°40'0"N 40°40'0"N

74°10'0"W 74°0'0"W

Overview

NY

NJ

NY9904B

GC10512