

# Creating the Navigation & Coastal Data Bank A District Perspective

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## Introduction

The Navigation & Coastal Data Bank (NCDB) project was a unique one-year program initiative funded by American Recovery and Reinvestment Act (ARRA) to develop a geospatial data retrieval system from the U. S. Army Corps of Engineers (USACE) District project files. The program was implemented by the Mobile District Spatial Data Branch of the USACE. The ARRA funds allowed the program to effectively create jobs across the nation. Teams of Northrop Grumman Company (NGC) contractors were placed in 21 USACE sites around the country. For the North Atlantic Norfolk District, two GIS Analysts were placed within the Geospatial Services Section, Operations Branch. The job of the collecting, processing, and creating the NCDB was made much easier by being placed among other GIS professional. However, there were some initial questions about the program including, the work plan, how the data would be made available, and where it would be eventually housed.

In the beginning, the GIS analysts investigated the data holdings of the Norfolk district, cataloging the Current Computer-Aided Design and Drafting (CAD) project files, estimating the size and volume of X,Y, and Z hydro data, utilizing the map library, and discovering other archive data sources. To better understand the districts data holdings, various USACE programs were examined, and contacts were made all in an effort to benefit the completion of the Data Bank. Members from the Technical Support, and Design Sections provided invaluable insight into the CAD file structure while the Navigation and Survey section provided field survey details with in depth details on benthic surveys, and insight into USACE internal software programs. The Geospatial Services Section manager offered some program relevancy by illustrated potential applications of the NCDB data, and his section provided server space, regional files including, 2006, 2007 and 2009 Virginia imagery, and day-to-day assistance with any technical difficulties encountered while working with the district's computer systems.

Early on, it was requested by Mobile's Spatial Data Branch that several priority dataset be generated for addition into the NCDB including, Channel Framework, XYZ Hydro Surveys, National Coastal Mapping Project, Disposal Sites, Structures-As-Builts, Legacy Dredging Data, Tide Gage Data, and Wave and Water Level Data. It was requested by the Norfolk District's Geospatial Services Section that priority be given to the current CAD data holdings with relevance to on-going USACE Norfolk projects for any data collection efforts. The GIS data holdings were often

compromised with files generated for “time specific” reports and overviews that were not always current to project accuracy, but were found to be a valuable resource.

### Extracting Data

A shoreline observation plan was developed to gather several of these priority datasets. Additional site information was also used from the CAD and GIS cataloging effort. Virginia 2006 and 2007 imagery was used to visually inspect the Atlantic Ocean channels, Chesapeake Bay, and river shorelines for placement sites, and structures-as-builts. To help in the location effort, line work was extracted from relevant district CAD project files, and placed onto the imagery for site identification. As the structures and placement sites were identified, these areas of interest needed to be evaluated before they could be included into the NCDB. This information came from the CAD project files, reports, permits, or was visually evaluated in terms of being a navigational hazard or built or maintained by the USACE. To assist with the description process, additional surrounding information was gathered from the NGS Topo US 2D reference map.

The CAD files were found to be a very important source of spatial data, and the current CAD data structure for the Norfolk district was logical, and modeled after on-going projects. The district used AutoCAD 2010 3D to create, manipulate and view CAD files. AutoCAD 2010 and ArcMap 9.3 were developed around the same time frame, and unfortunately 2010 CAD files did not import into ArcMap 9.3. A simple export of CAD data to earlier versions (2007) fixed this issue. Several simple AutoCAD commands allowed extraction of line work from the overall drawing, and these data could be reprojected on-the-fly in ArcMap. The AutoCAD extracted line work was predominantly used as background files while shapefiles were generated to depict the areas of interest. These shapefiles were eventually projected into World Geodetic System (WGS) 84 for final upload into the Spatial Data Standards for Facilities, Infrastructure and Environment (SDSFIE) a Department of Defense standard. An extensive list of attributes was requested by the SDSFIE, and some of the attributes for placement sites included, area size, X and Y centered coordinates, project name, type of placement site and a unique project ID. The generated SDSFIE geodatabase was transferred by FTP to the NGC Mobile Quality Control (QC) center and after it passed QC it was returned to the district to be housed locally.

### Hydro Survey Data

To assist in the collection of X, Y and Z Hydro Survey Data a special USACE tool named USACE-CE-Dredge Tool or SUDS was adapted and refined for the NCDB collection effort. The SUDS tool was designed by staff in the Mobile District Spatial Data Branch office. The SUDS tool uploaded the X, Y, Z data, metadata, and external files to the NGC Mobile office for quality control. However, before the data could be input into the SUDS tool, the data needed to be reformatted and the file names cleaned of any spaces. Throughout the project, these and other technical issues were resolved through the expertise found in other GIS analysts within the

program, and the Data and Quality Manager located in Mobile. A member of the NGS team created several python scripts to perform these scrubbing functions on the files. A unique X, Y, Z to point file was created and could be brought into ArcMap using the Tools drop-down list of "Add XY data". The file generated a center point for the complete hydro survey extent, and created values for the North, South, East and West extents. The extent information was posted into metadata portion of the SUDS tool.

The SUDS tool was comprised of a series of screens used to input files, and accompanying metadata. The metadata included what type of survey, which was typically bathymetric, single, or multi-beam collection unit, and spatial reference information. The Norfolk office predominantly used North American Datum (NAD) 83, Virginia State Plane Coordinate System (SPCS) South Feet, and vertical reference datum of Mean Lower Low Water (MLLW). Accompanying documentation included .dxf files created from the X, Y, and Z data, and after the final loading the X, Y, and Z file, the data was transmitted to the District's Mobile office.

## Conclusion

The NCDB collection effort and project as a whole was very rewarding. In a very short time frame, two GIS Analyst were successfully accommodated within the Norfolk office, given access to project servers, provided software, obtained advice and insight from various individuals all while being contractors administered from the Mobile District office. The returned compliant SDSFIE data was posted on-site, at the district where managers who were most familiar with the projects could perform data checks. Some changes were made in the attribute fields to create better uniformity with other Norfolk datasets.

As visitors to the district, we were very mindful of any time constraints we put on staff members when we requested assistance or information, and tried to keep this to a minimum. Instead, we utilized the other NGC analysts found around the country, the Forum Internet site, and the technical expertise in the NGC Mobile office. In the end, the project progressed, data was mined, production advanced with datasets being placed into a SDSFIE. Data has been made available to District project managers, and will be eventually accessible by the Department of Defense, Federal users, and commercial operators.