

New Jersey Geospatial Forum Orthoimagery Task Force

Final Report

**Submitted to the Executive Committee
October 17, 2006**

Summary: On February 10, 2006, the Executive Committee of the New Jersey Geospatial Forum established the Orthoimagery Task Force. A group of 48 Forum members from federal, regional, state and local government, academia, non-governmental organizations, and the private sector formed the Orthoimagery Task Force and met in a series of three meetings from April 2006 through July 2006. The Task Force's primary mission was to identify and clarify major issues related to the New Jersey Office of Information Technology's 2007 Statewide Orthoimagery Project.

This report summarizes the findings and recommendations of the Orthoimagery Task Force.

Major Issues

Findings and Recommendations

Imagery Archive

For archiving purposes, the State should obtain the original unrectified imagery. The original imagery should be georeferenced and indexed.

Ortho-grade DEM

A new uniform ortho-grade DEM should be required for the 2007 project. Existing DEM sources (DVRPC 5' contours, LIDAR, etc.) should only be used as collateral data to QC the new DEM.

Control

Both pushbroom and frame-based sensors rely on Airborne GPS (ABGPS) and optionally on Inertial Measurement Units (IMU) for control, but digitally captured imagery necessitates somewhat less control than traditional film-based imagery. The control network density needs to be sufficient to meet horizontal and vertical accuracy requirements, i.e., horizontal accuracy of 4.0 feet or less and a vertical accuracy of 6.0 feet or less at a 95% confidence level consistent with the National Standard for Spatial Data Accuracy (NSSDA).

Sun Angle

The State should require a sun angle threshold of 35 degrees south of US 1 and 40 degrees north of US 1. However, seasonal weather and ground conditions need to be taken into consideration.

Bridge Rectification

The rectification of bridges is managed the same way, regardless of whether the imagery is digital or film-based.

Pilot Areas	For the pilot project, the following land cover types should be included: urban, coastal, suburban, forested, and agricultural. The pilot project should be delivered and approved prior to the production of orthoimagery. Pilot areas should test all processes and end products, particularly image quality, positional accuracy, and mosaicing.
Building Lean	<p>With digital sensors, it is more cost-effective to collect extra imagery over areas that contain tall structures. The State will also derive a better end product by collecting additional imagery over these areas, since building lean will be reduced. However, the additional imagery must still be processed and the orthorectification step may take longer.</p> <p>The State should identify specific urban areas where increased sidelap and forward overlap should be required to reduce building lean and to generally see the streets curb to curb. These areas should include the central business districts of Newark, Jersey City, Atlantic City, and Trenton.</p>
Color balancing	Post-processing will address many of the issues pertaining to radiometric balancing. The goal is to produce digital imagery of consistent tone and contrast. Color balancing parameters should be defined by the State during the pilot project.
8-bit vs.12-bit imagery	Large-format digital sensors collect 12-bit data, as opposed to 8-bit. While more data can be extracted from 12-bit imagery, this imagery is not yet compatible with many GIS software packages. 12-bit data collected from large-format digital sensors provides a greater “dynamic range” than typical 8-bit imagery, allowing for more detail to be discerned in shadow areas. 8-bit imagery processed from 12-bit data is better in this regard as well.
Mosaicing	Pushbroom sensors only require mosaicing between flight lines, whereas frame-based sensors require mosaicing between flight lines and individual frames. Seamlines should be obtained by the State to facilitate the QA/QC process.
QA/QC	Independent Quality Assurance/Quality Control (QA/QC) measures should be implemented for the 2007 project. Interim QA checks are needed at critical steps in the production process, i.e., pre-flight planning, imagery acquisition, and orthoimagery production. Frame-based solutions use standard photogrammetric workflows, while pushbroom projects need special processing tools.

New Jersey Geospatial Forum - Orthoimagery Task Force

Roger Barlow, U.S. Geological Survey
Robert Berardo, RSB Associates
Janel Bisacquino, Stony Brook Millstone-Watershed Association
John Bognar, Rutgers University Center for Remote Sensing and Spatial Analysis
Indrani Bose, City of Newark
Mark Cascella, Busy Exec Tech LLC
Andrew Chapkowski, NJ Department of Agriculture
Bruce Clark, NJ Department of Environmental Protection
David Coleman, CH2M Hill
Dom Elefante, NJ Meadowlands Commission
Joe Fox, City of Newark
Andrew Freckmann, EarthData International
Alan Gould, NJ Department of Environmental Protection
Joshua Greenfeld, NJ Institute of Technology
Mark Gulbinsky, NJ Department of Transportation
Richard Hammond, Woolpert Inc.
Suzy Hess, NJOIT Office of Geographic Information Systems
Bob Hickey, Photo Science Inc.
Elizabeth Johnson, NJ Turnpike Authority
Jason Joubert, P S and S Engineering
Terry Keating, Lucerne International
Jesse Kozlowski, Taylor Wiseman
Richard Lathrop, Rutgers University Center for Remote Sensing and Spatial Analysis
Chris McClain, Brick Township MUA
Glenn McNichol, Delaware Valley Regional Planning Commission
Michael Mills, Rutgers University Center for Remote Sensing and Spatial Analysis
Karen Mitchell, Michael Baker, Jr. Inc.
Kevin Murphy, Michael Baker, Jr. Inc.
Mike Murphy, Sensor Technologies
Glenn Newman, NJ Transit Corporation
Donald Perry, NJ Department of Transportation
Andy Pickford, BAE SYSTEMS ADR
Jason Pierson, East Coast Engineering Inc.
Seth Richter, Rutgers University
Andy Rowan, NJOIT Office of Geographic Information Systems
Mehmet Secilmis, Garfield Environmental Commission
Michael Shillenn, Photo Science Inc.
James Stanmore, Burlington County 4-H
William Stevens, Delaware Valley Regional Planning Commission
Sean Sullivan, GPI
Ron Taylor, Natural Resources Conservation Service
Larry Thornton, NJ Department of Environmental Protection
Tom Tiner, Civil Solutions
John Tyrawski, NJ Department of Environmental Protection
Michael Umansky, Morris County Department of Planning, Development, & Technology
John W. Vona II, City of Newark
Martin Waysome, Fralinger Engineering PA
Gary Zayas, NJ Department of Transportation