

DIGITAL AERIAL Imagery for the Nation



NSGIC's Vision

The nation will have a sustainable and flexible digital aerial imagery program that meets the needs of local, state, regional, tribal, federal and private partners.

Federal funding should support nationwide production of standardized multi-resolution products every three years. Local, state, regional, tribal, and private partners could pay to enhance those products in specific areas based on their needs. Aerial imagery should remain in the public domain and be archived to secure its availability for future scientific, legal, and historical purposes.

In spite of the need for these products and their proven value for scores of applications, our nation currently has no strategy or program to sufficiently fund, collect, manage, archive or distribute aerial imagery.

Aerial imagery, in the form of **digital orthophotos**, is the foundation for most public and private GIS (Geographic Information Systems) operations, yet it is being developed by hundreds of different entities across this country in an uncoordinated fashion. There are holes in the coverage, and we are plagued by duplication of effort; higher costs; varying quality, accuracy and currency; and restrictions on its access and use.

As a nation, we must effectively coordinate the imagery requirements for the National Spatial Data Infrastructure (NSDI). This will assure that our investment in all aerial imagery is wise and efficient.

Proposal Details

- Each statewide coordination council will specify its digital orthorectified imagery requirements in its business plan (resolution, frequency and image type).
- Ground pixel resolutions will include 6-inch, 1-foot, and 1-meter.
- Image types will include black & white, natural color, and false color infrared.
- Nationally, a 3-year acquisition cycle is required.
- The Federal government will fund 100% of the production costs for the following products:
 - 1-meter resolution in counties with population densities less than 25 people per square mile
 - 1-foot resolution in counties with population densities greater than 25 people per square mile
 - 6-inch resolution for defined urban areas
- Image acquisition will be accomplished during “leaf-off” conditions unless otherwise agreed to by statewide coordination councils and federal program managers.
- Appropriate national standards will be applied to all products.
- Participants can “buy-up” to acquire imagery at higher resolutions or faster intervals.
- States with statewide coordination councils will have the first option for management of their programs. Otherwise, program management will be performed by the federal government.
- Contract incentives will be used to assure timely delivery.
- All imagery will remain freely available on the Internet.
- A consistent national approach

will be used to address security concerns over identified facilities and sites.

- The federal government will provide expert technical support, permanent archives, and product distribution.

Cost of the Proposal

NSGIC estimates the cost of this program at approximately \$255 million per three-year cycle or \$85 million per year. Nationally, this program will save over \$60 million per 3-year cycle by taking advantage of the cost efficiencies realized when contracting for very large areas and even more by eliminating duplicate programs.

Cost variations will occur due to the difficulty and risk associated with imagery acquisition such as climatic conditions, terrain variations, and air traffic control restrictions over urban and other areas. Therefore, an additional \$10 million per year is included in the above cost estimates to pay for these contingencies and to help fund the imagery requirements for national emergencies such as September 11, 2001 and Hurricane Katrina.

What Can You Do?

Organizations interested in the availability and use of up-to-date and accurate aerial imagery can help NSGIC make this program a reality by:

- Endorsing the concept and offering advice to strengthen the proposal, and
- Joining efforts with NSGIC to present the merits of this proposal to the federal government and Congress.

Federal Law & Policy Affecting Imagery

The following federal declarations speak to improving coordination, effectively sharing data, and preparing the nation to prevent and respond to terrorist attacks, major disasters and other emergencies. When implemented, the **Imagery for the Nation** program will be a vital component of each program.

Homeland Security Presidential Directive 7 - *Critical Infrastructure Identification, Prioritization, and Protection*

- Establishes policy directing the Department of Homeland Security (DHS) to coordinate with Federal agencies to geospatially map, image, analyze, and sort critical infrastructure and key resources by utilizing commercial satellite and airborne systems, and existing capabilities within other agencies.

Homeland Security Presidential Directive 8 - *National Preparedness*

- Establishes policies to strengthen the preparedness of the United States to prevent and respond to threatened or actual domestic terrorist attacks, major disasters, and other emergencies by requiring a national domestic all-hazards preparedness goal, establishing mechanisms for improved delivery of Federal preparedness assistance to State and local governments, and outlining actions to strengthen preparedness capabilities of Federal, State, and local entities.

E-Government Act of 2002

- Requires the development of common protocols for the development, acquisition, maintenance, distribution, and application of geographic information.
- The common protocols shall be

designed to;

- Maximize the degree to which unclassified geographic information from various sources can be made electronically compatible and accessible, and
- Promote the development of interoperable geographic information systems technologies

Section 216 of the E-Government Act - *Common Protocols for GIS*

- Establishes in law the authorities and responsibilities of the Federal Geographic Data Committee (FGDC).
- The law defines geographic information as: information systems that involve locational data, such as maps or other geospatial information resources.

OMB Circular A-16:

- Establishes a coordinated approach to electronically develop the National Spatial Data Infrastructure.

Purpose of the NSDI:

- To encourage the collection, processing, archiving, integration, and sharing of geospatial data and information using common standards and interoperable systems and techniques.
- Provides direction for federal agencies that produce, maintain or use spatial data either directly or indirectly.
- Directs such agencies, both internally and through their activities involving partners, grants, and contracts to:
 - * Prepare, maintain, publish, and implement a strategy for advancing geographic information and related spatial data activities appro-

priate to their mission, in support of the NSDI Strategy, and

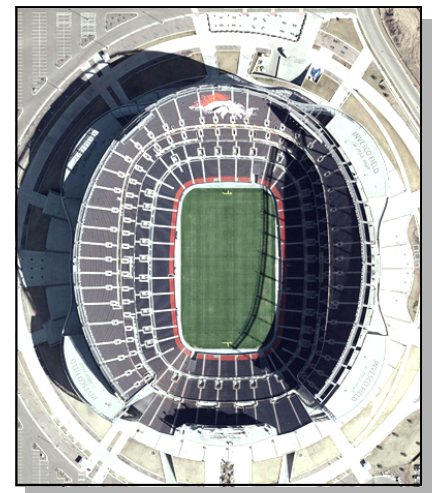
- * Collect, maintain, disseminate, and preserve spatial information such that the resulting data, information, or products can be readily shared with other federal agencies and non-federal users, and promote data integration between all sources.

Executive Order 12906/13286 - *Coordinating Geographic Data Acquisition and Access*

- The executive order requires the Secretary of Interior to develop strategies for maximizing cooperative participatory efforts with state, local, and tribal governments, the private sector, and other nonfederal organizations to share costs and improve efficiencies of acquiring geospatial data.

1996 Nunn-Lugar-Domenici Defense Against Weapons of Mass Destruction Act

- The Department of Defense (DOD) is tasked with enhancing domestic preparedness for responding to terrorist use of weapons of mass destruction in the Nation's urban centers.



The Business Case for a National Program

The Value of Imagery

Aerial imagery provides the visual content of a photograph while being as accurate as a map for measurements. These qualities allow users to easily:

- Measure Distance
- Calculate Areas
- Determine Shapes of Features
- Calculate Direction
- Determine Accurate Coordinates (Locations)

Aerial imagery is displayed in E-911 response centers to dispatch first responders to the right location and for tracking reports coming from mobile phones. Police in squad cars and rescue workers in fire trucks analyze aerial imagery before responding to emergencies. Digital images are used to collect a wide variety of information, including transportation routes, streams, shorelines, building outlines, timber stands, land use patterns, and farm fields.

Local governments rely on digital aerial imagery to map property boundaries and manage their streets and other infrastructure assets.

Digital imagery serves as a seamless base map layer to which many other layers are registered. It also provides visual information that is useful

for the following partial list of activities.

- Homeland Security, Homeland Defense & Emergency Management
- Public Safety Planning, Response & Mitigation
- Tax Parcel Mapping
- Transportation Management, Operations & Planning
- Economic Development
- Utilities Management, Operations & Planning
- Land Planning and Zoning
- Drainage Planning & Management
- Code & Permit Enforcement
- Agriculture
- Insurance
- Surveying & Mapping
- Environmental Management, Planning & Regulation
- Education

Economy of Scale

The Imagery for the Nation program can be managed through a federal contract with multiple professional firms for far less money than federal, state and local governments spend when they issue independent contracts. This program will offer outstanding value to local governments and smaller states in particular,

because price breaks are achieved by contracting for increasingly large areas.

NSGIC estimates that a national program will cost approximately \$255 million every three years based on average industry pricing. This figure was calculated by applying these estimated costs to the area in each state identified as urban, suburban and rural as determined by population densities from the U.S. Census Bureau. The cost was also affected by applying multiple resolutions from 6-inch to 1-meter as required in each of these settings. When going from local programs to larger multi-state or national programs, additional cost efficiencies may be achieved.

The Next Steps

The following activities are scheduled to occur over the next six to eight months.

- Demonstrate the need for sustainable federal funding to support this program.
- Identify a lead federal agency to administer program funding, establish contracting guidelines, and pre-qualify professional firms.
- Advocate that the Office of Management and Budget include a line item in the proposed 2008 Federal Budget.

IMAGE CREDITS— Please Note: All images are adjusted to fit available space and do not accurately represent their true scale.

Page 1 - Image provided by SURDEX. It is 6-inch resolution natural color image from Palm Beach, Florida.

Page 2 - Image at left is a full resolution sample of the image on Page 1. Image at lower right provided by SANBORN. It is a natural color 1-foot ground resolution image of Invesco Field at Mile High in Denver Colorado.

Page 3 - Image provided by SURDEX. It is a 6-inch resolution natural color image from Lucas County, Ohio.

Page 4 - Images at left and top right produced by EarthData and provided by the Maryland Department of Natural Resources. Image at left is 1-meter false color infrared and image at right is a 1-foot natural color image. Images at bottom and bottom right, provided by SANBORN. They are 3-inch and 6-inch resolution false color infrared images from Miami, Florida.



Examples of *DIGITAL AERIAL* Imagery and its Uses



AT RIGHT: This 1-foot resolution image was taken shortly after an F4 Tornado struck Charles County in Southern Maryland. It was used to document damage and help emergency managers during recovery operations. During this event, the water tower (top left) was removed prior to the arrival of the insurance adjuster. The adjuster was hesitant to settle the claim until presented with this image (shown at reduced resolution), that clearly showed the type of construction and damage sustained by the water tower.



AT LEFT: This is a 1-meter resolution false color infrared image of the type that is often used to identify natural features (e.g. forests & wetlands).

AT RIGHT and BELOW: This false color infrared digital imagery demonstrates the effect that pixel resolution has on the usefulness of imagery. The image below was sampled to a 6-inch resolution while the image at right was produced with a 3-inch pixel resolution. Both images are of the same area. A minimum of 6-inch resolution is required for detailed mapping in urban areas.



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ABOUT NSGIC — The National States Geographic Information Council (NSGIC) is an organization of States committed to efficient and effective government through the prudent adoption of geospatial information technologies. Members of NSGIC include delegations of state GIS coordinators and senior state GIS managers from across the United States. Other members include representatives from Federal agencies, local government, the private sector, academia and other professional organizations. A rich and diverse group, the NSGIC membership includes nationally and internationally recognized experts in GIS, geospatial data production and management, and information technology policy.