



NSGIC



DIGITAL Imagery for the Nation

The Vision

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

NSGIC is working with the National Digital Orthophoto Program Committee (NDOP) and the Federal Geographic Data Committee (FGDC) to create a new nationwide aerial imagery program that will collect and disseminate standardized multi-resolution products on “set” schedules. Local, state, regional, tribal, and federal partners will be able to exercise “buy-up” options for enhancements that are required by their organizations. The imagery acquired through this program will remain in the public domain and archived to secure its availability for posterity.

Aerial and satellite imagery, in the form of **digital orthoimagery**, is the foundation for most public and private Geographic Information Systems (GIS). It is an essential commodity that is being developed by hundreds of different entities across the Nation leading to higher costs, varying quality, duplication of effort and a patchwork of products. Large area contracting methods will keep the cost to the taxpayer as low as possible and improve the availability of standardized, high-quality products.

The Program

This is a massive undertaking that will require two separate, but well coordinated programs. The existing National Agricultural Imagery Program (NAIP) administered by the U.S. Department of Agriculture will be enhanced to provide annual 1-meter imagery over all

states except Alaska. This program will typically collect imagery during the growing season (leaf-on) in natural color.

A companion program will be administered by the U.S. Geological Survey (USGS). Under this program, Alaska will receive 1-meter imagery for the entire state once every five years. This program will also produce 1-foot resolution imagery once every three years for all states east of the Mississippi River and for all counties west of the Mississippi River with population densities greater than 25 people per square mile. In addition, 50% matching funds will be available for partnerships to acquire six-inch imagery over urban areas identified by the U.S. Census Bureau that have populations of at least 50,000 and overall population densities of at least 1,000 people per square mile. This program will typically acquire imagery during winter and spring months (leaf-off) in natural color.

Other Details

- Each statewide GIS coordination council will specify its digital orthoimagery requirements in a business plan, including the following information:
 - Required Resolutions
 - NSSDA Accuracy Requirement and Confidence Interval
 - Frequency of Coverage
 - Coverage Footprints
 - Footprints for Areas of Security Concern
 - Image Type (CIR, NC, etc.)
 - Contracting Preferences
 - QA and QC Requirements
 - Funding Methods
 - Development of FGDC Metadata that is discoverable

through the Geospatial One Stop Portal, *The National Map*, and the USDA Resource Data Gateway

- Statement that the data will be made available in the public domain without license or copyright

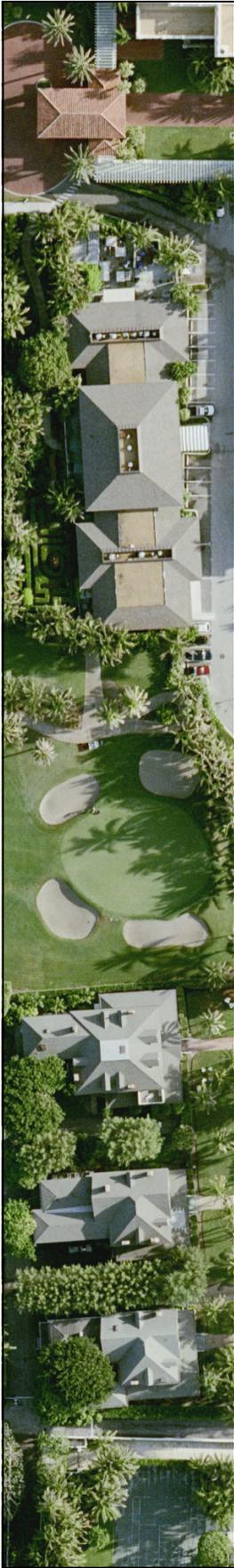
These plans will be filed with the NDOP Committee.

- All imagery will reside in the public domain, remain available on Internet, and use a consistent national approach to address security concerns.
- Appropriate national standards will be applied to all products.
- The Federal government will fund 100% of the production costs for the base products (see Page 2).
- “Buy-up” provisions will allow acquisition of imagery that meets more specific needs (see Page 2).
- States with statewide coordination councils will have the first option for managing their 6-inch and 1-foot imagery programs. Otherwise, program management will be performed by USGS.
- Contract incentives will be used to assure timely product deliveries within 6 to 9 months depending on product.

Program Cost

This program will cost approximately \$111 million per year or \$333 million during the first 3-year cycle. Nationally, it will save about \$160 million per 3-year cycle through contracting for larger areas, reducing the number of duplicate programs, eliminating certain overhead costs, and providing a return on investment that is achieved through the application of uniform standards. See Page 3 for more specific information on costs and benefits.

Program Specifications and Buy-up Options



Ground Resolution	6"	1'	1-meter
Image Type	Natural Color	Natural Color	Natural Color
Leaf On or Off	Off	Off	On
Cloud Cover	0%	0%	10%
Horizontal Accuracy	2.5' @ 95% NSSDA	5' @ 95% NSSDA	25' @ 95% NSSDA
Location and Threshold	Footprints* of U.S. Census Bureau Urbanized Areas defined in state business plans with populations generally >50,000 & >1,000 per square mile	All areas east of Mississippi River and all counties west of the Mississippi River with >25 people per square mile	Entire Nation, including all Insular areas & territories
Frequency	Every 3 Years	Every 3 Years	<ul style="list-style-type: none"> - Every Year in Lower 48 States - Every 5 Years in Alaska - Every 3 Years in Hawaii, Insular Areas, and Territories
Local Cost Share	50%	None	None
Buy-up Options	<p>These are improvements over the standard base products that can be exercised by local, state, regional, tribal and other federal agencies. "Buy-ups" will require the requesting organization to pay the differential costs above the standard base product for each buy-up requested.</p> <ol style="list-style-type: none"> 1) 100% cost for CIR or 4-band digital product 2) 100% cost for increased frequency 3) 100% cost for increased footprint 4) 100% cost for increased horizontal accuracy 5) 100% cost for 3" resolution 6) 100% cost for better elevation data products 7) 100% cost for removal of building lean (true ortho) 	<ol style="list-style-type: none"> 1) 100% cost for CIR or 4-band digital product 2) 100% cost for increased frequency 3) 100% cost for increased footprint 4) 100% cost for increased horizontal accuracy 5) 100% cost for sampling the product to lower resolution 6) 100% cost for 6" resolution 7) 100% cost for better elevation data products 8) 100% of cost for removal of building lean (true ortho) 	<ol style="list-style-type: none"> 1) 100% cost for CIR or 4-band digital product 2) 100% cost for increased horizontal accuracy
Federal Program Steward	U.S. Geological Survey (USGS)	U.S. Geological Survey (USGS)	U.S. Department of Agriculture except Alaska which is USGS



The Business Case for a National Program

Value of Imagery

Orthoimagery provides the visual content of an aerial 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 Directions
- Determine Accurate Coordinates (Locations)
- Determine Land Cover & Use
- Perform Change Detection

Orthoimagery is displayed in E-911 response centers to dispatch first responders to exact locations and for tracking incoming calls from mobile phones. Police in squad cars and rescue workers in fire trucks analyze orthoimagery before responding to emergencies. Digital images are used to collect a wide variety of information, including transportation routes, wetlands, streams, shorelines, building outlines, timber stands, land use patterns, farm fields, and crop types.

Local governments rely on orthoimagery to map land property boundaries and to manage their streets and other infrastructure assets.

Orthoimagery serves as a seamless base map layer to which many other layers are registered. It provides visual

information for the following partial list of applications.

- 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
- Natural Resource Inventories and Assessments

Program Benefits

This program can be operated and managed using federal contracts with multiple professional firms at a lower cost (~25%) than the current independent contracts managed by federal, state, and local governments. It offers outstanding value to local governments and smaller states, because price

breaks are achieved by contracting for larger areas.

The national program cost estimate on Page 1 (\$111 million per year) includes imagery acquisition and processing costs, contract management, quality control, quality assurance, data distribution and archiving. Generally, these costs add approximately 14% to orthoimagery production costs.

A national imagery program lacking the suite of coordination mechanisms outlined here (current state) would cost nearly \$485 million over three years. Cost Savings in four areas can reduce this to ~\$333 million. The first two are the “large area” and “other” cost savings cited above. The third (~25%) comes from reducing duplication of effort and program redundancy. The final factor is a 19% Return on Investment (ROI) value that is achieved through adherence to standards. NSGIC and NDOP estimate the following cost savings for each of these factors during each three-year cycle.

Large Area	\$ 57,717,000
Other Costs	\$ 7,510,000
Duplication	\$ 53,644,000
ROI	\$ <u>40,770,000</u>
Total Savings	\$159,641,000

IMAGE CREDITS (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 bottom is provided by the USDA NAIP Program. It is from York County, Nebraska.
 Page 3 - Image at left is provided by the USDA NAIP Program. It is from Adams County, Nebraska.
 Page 4 - Images at left and top right produced by EarthData and provided by the Maryland Department of Natural Resources. Image at left is a 1-meter false color infrared image and image at top 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 Aerial Imagery and its Uses

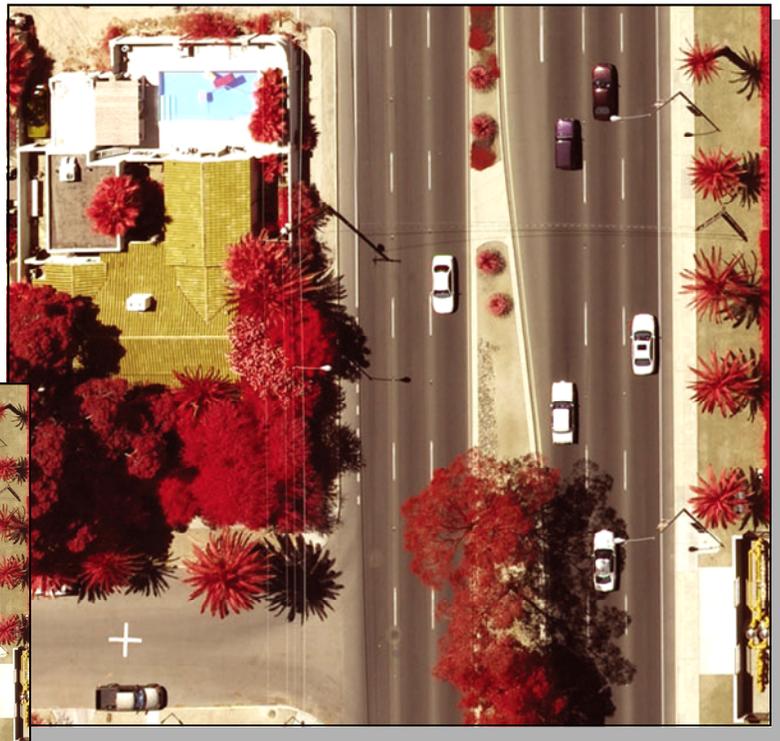


AT RIGHT: This 1-foot resolution image was taken shortly after an F4 Tornado struck Charles County in Southern Maryland. It was used to document damage and help emergency managers during recovery operations. During this event, the water tower (top left) was removed prior to the arrival of the insurance 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.