NCGICC

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Submitted to:

Governor Roy Cooper

and

The Joint Legislative Commission on Governmental Operations

NC Nothing Compares

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Introducing the Challenges for 2016-2017 and Beyond

Two separate events with major implications for North Carolina are on the calendar:

- Transition to the Next Generation 9-1-1 system
- The 2020 Decennial Census and its impact on all of North Carolina

Each event presents challenges. Success in each instance will ensure benefits to the State, units of local government, and all citizens.

Transitioning from Enhanced 9-1-1 to Next Generation 9-1-1

Imagine someone calling 9-1-1 from a cellphone to report a crashed, burning vehicle, or a loved one collapsed on the floor, or a child suffering from a severe asthma attack. Unlike a call placed from a landline, in every instance, the cellphone call will connect to the nearest cell tower to begin transmission of the call to a Public Safety Answering Point (PSAP).

So far so good, but what if a county boundary is located between the point of the call origin and the cell tower receiving the call. As shown in the following example, a caller is in County B and the nearest cell tower is in the adjoining County A. The PSAP associated with that particular cell tower (County A) will receive the call. County A's computer-aided dispatch system contains address data for its jurisdiction but may not include address data for an adjacent county as shown in Figure 1. Identifying the location of the call and dispatching responders may be delayed.

Seconds matter! The public expects a quick emergency response; lives may be at stake.

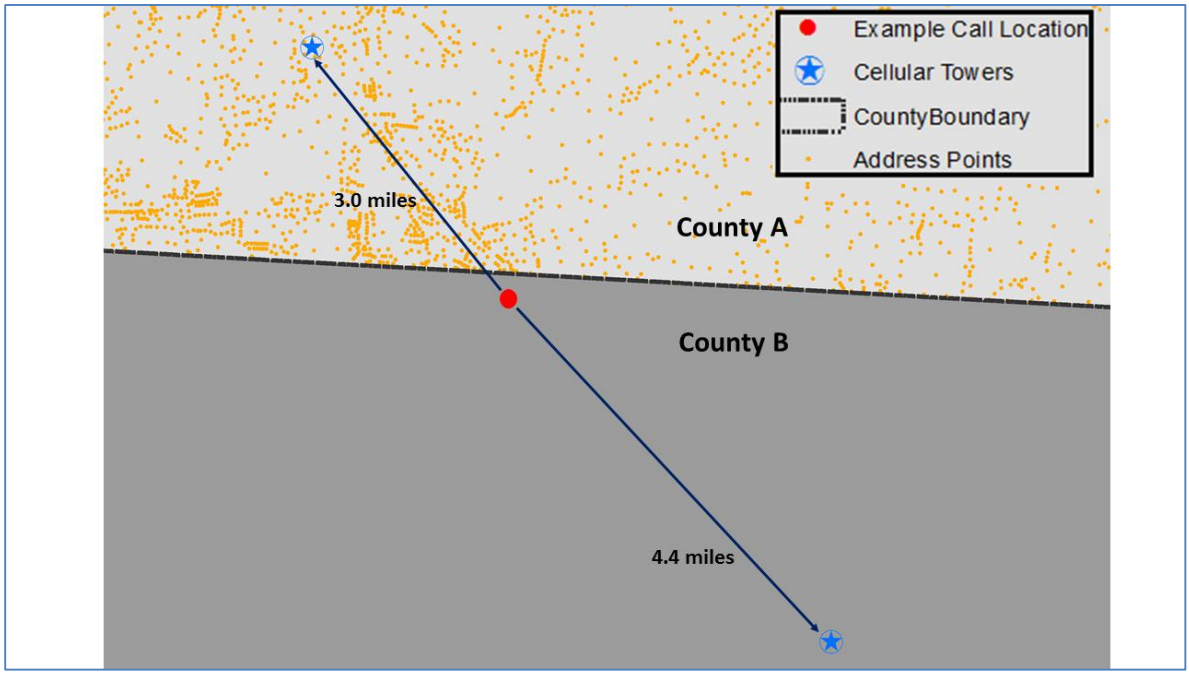


Figure 1: Example of an emergency cellphone call location in County B that is nearest a cell tower located in County A. Address data from County B where the call originated may not be accessible from County A's emergency communications center.

Now suppose County A's computer-aided dispatch system had access to address points for County B as shown in Figure 2. This provides data for emergency communicators to resolve the address of a cellphone call beyond their respective jurisdictional boundaries and makes them better able to quickly transfer a call to a neighboring county or municipality.

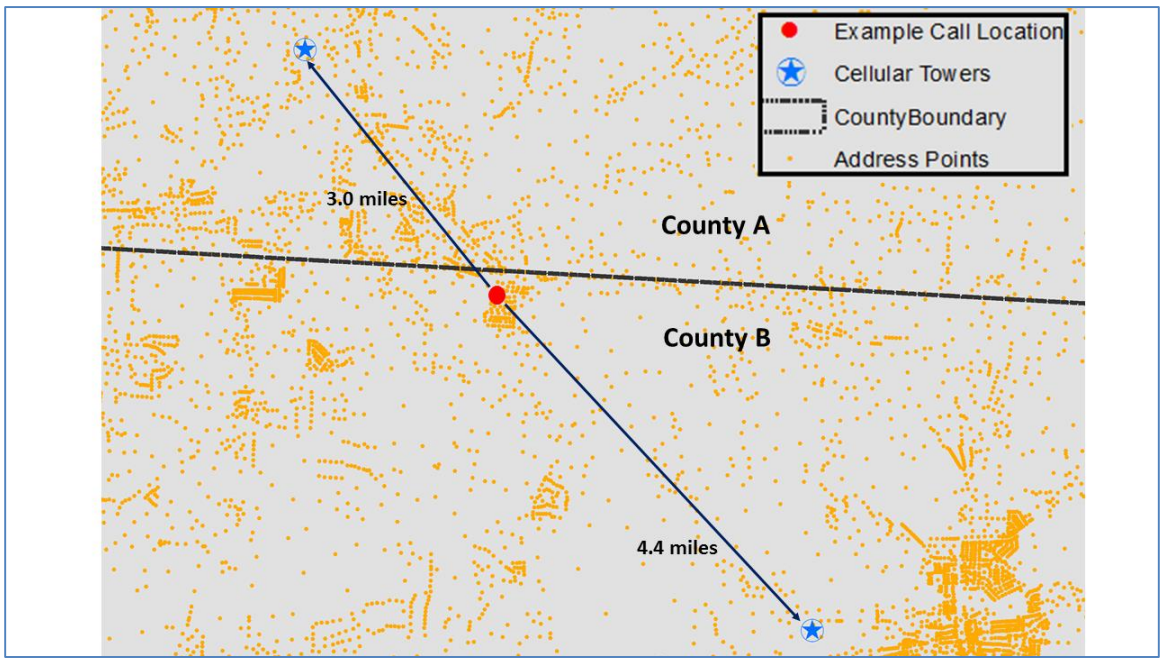


Figure 2: Same example as in Figure 1, with address data from both counties accessible by County A.

Behind the scenes, current "Enhanced 9-1-1" systems depend on situs addresses and the ability of the PSAP staff answering the call to identify the location of an address whether automatically transmitted via a landline or spoken from a cellphone. The distinction is important. 9-1-1 calls originating from a landline carry the address associated with the landline. In the case of a cellphone call, PSAPs may receive the location of the tower, the location of the caller, or a point in between depending on several factors such as terrain or technology of the caller's cell phone. Presently, over 74 percent of all 9-1-1 calls originate from a cellphone. Therein lies challenge number one and an opportunity for a new generation of 9-1-1 communications, called "Next Generation 9-1-1."

The transition from Enhanced 9-1-1 (E9-1-1) to Next Generation 9-1-1 (NG9-1-1) involves changing from an analog telephone system to a digital system. NG9-1-1 requires standardized interfaces from call and messaging systems, and processing of all calls including multimedia messaging and automatic crash data from car devices that can inform 9-1-1 communications, responders, trauma centers, and agencies for coordinated incident response. Required statewide datasets for NG9-1-1 include roads, addresses, and emergency service boundaries.

Here is where the NC Geographic Information Coordinating Council (the Council) adds value through two of its initiatives. *AddressNC* will work with local governments to maintain a complete, consistent source for statewide address points. Statewide orthoimagery, funded by the NC 911 Board, is a consistent, complete, current visual reference for emergency communications.

The statewide orthoimagery program delivers imagery to an individual county that extends seven miles beyond that county's boundaries, even imagery from neighboring states where needed. The program is managed by the Council staff at CGIA and funded by the NC 911 Board. Provided each county acquires address data from neighboring counties, the PSAP operator stands a much improved chance of (1) recognizing an address via cellphone to be outside their primary response area, (2) confirming that address, and (3) transferring the call as quickly as possible to the appropriate PSAP in the adjoining jurisdiction.

This should save seconds and minutes, and ultimately save lives.

On these efforts the Council, its committees and working groups, and CGIA are collaborating with:

- NC 911 Board
- NC Department of Transportation, Photogrammetry Unit
- Land Records Management Program in the Department of the Secretary of State
- NC Geodetic Survey in NC Department of Public Safety
- Government Data Analytics Center
- Office of State Budget and Management
- local governments

The 2020 Decennial Census and its Impact on North Carolina

A second challenge is to achieve a complete, accurate, defendable count of North Carolina residents in the 2020 Census for fair representation in the US Congress and fair distribution of tax dollars to the state and its cities and towns and citizens. What is at stake? The more residents counted, the more federal tax dollars are returned to North Carolina and its units of local government. The Census Bureau estimates each additional resident in the 2010 Census translated to $1,500 in federal funds per year, or $15,000 for the decade per person. The Council anticipates this value to increase based on the results tabulated from the 2020 Census.

Based on current data and population trends, there is a strong likelihood of increasing North Carolina's representation in the US House of Representatives. Since the number of available House seats is a fixed number, any increase in representation accorded North Carolina must be accurate and defendable.

In August 2013, the Council created the Working Group for Census Geospatial Data and appointed Bob Coats, Office of State Budget and Management and the Governor's Census Liaison, as chair. The US Census Bureau, unable to fund the historical boots-on-the-ground practice of enumerating residents, is relying on technology including orthoimagery to verify population counts for a large percentage of residential addresses.

The Council adds value by making its resources available for this important endeavor. *AddressNC* updates are being readied for use in address verification by North Carolina and the Census Bureau. In addition, statewide orthoimagery is available and online for visual reference. While the census is generally regarded as a once-in-ten-year event, the Council's strategy is to maintain the foundational address as changes occur between the decennial census efforts. Under this approach,

authoritative data provided by local governments is being maintained and made available to the many state agencies that normally petition the localities for much of the same information. Eliminating redundancies and providing a standardized data platform is beneficial to local units of government and state governmental agencies. Maintaining these foundational datasets will also aid the State Demographer and the Office of State Budget and Management in their population studies.

Council Programs at the Ready

The Council has been collaborating in preparation for these two events since 2013 and is poised to continue to provide leadership, oversight, and structure to ensure success for each program.

In brief, the Council has created and implemented four critically important and supportive, foundation-level programs:

1. ***AddressNC***—this is the latest consolidation project for statewide address points applicable to Next Generation 9-1-1, Census 2020, and many other public services.
2. **Statewide Orthoimagery Program**—high resolution, consistent, comprehensive imagery is acquired annually for one-fourth of the state (see page 10) and distributed to PSAPs to support emergency communications and many more public and private business processes; supported by the NC 911 Board.
3. ***NC Parcels***—this statewide collaborative effort by local and state government partners was completed in 2015 and is being updated twice annually as a standardized dataset to support a wide range of public and private business processes in emergency management, highway planning, public health, and environmental quality to name a few.
4. ***NC OneMap* Geospatial Portal**—online discovery and access to address points, parcels, orthoimagery and other priority geographic information.

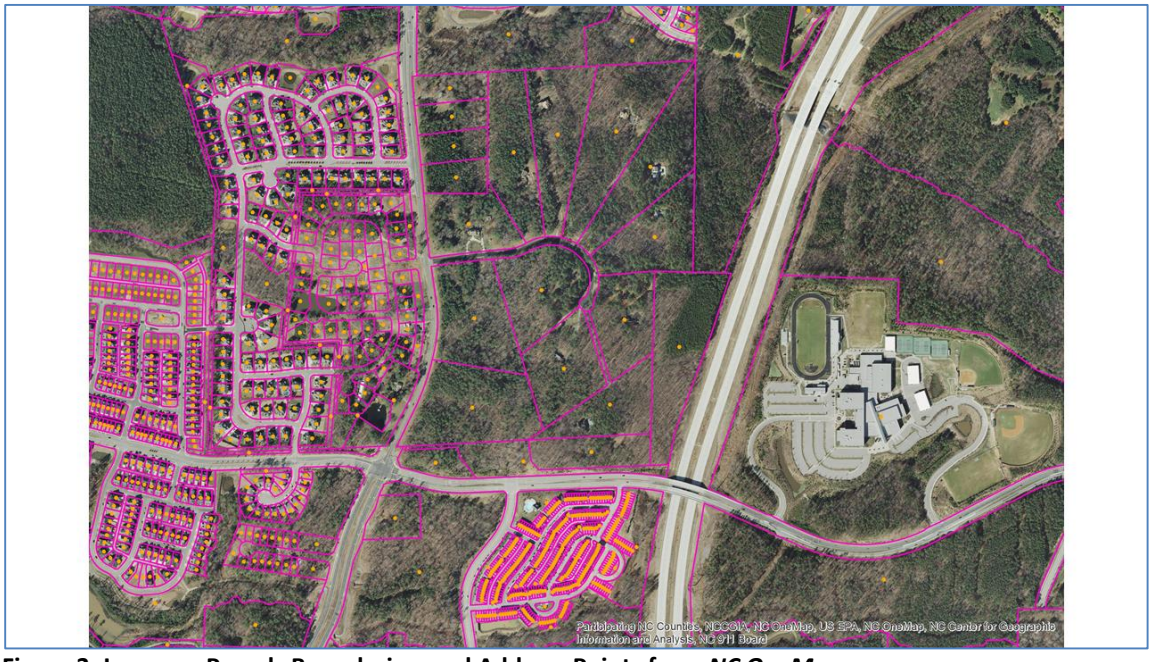


Figure 3: Imagery, Parcels Boundaries, and Address Points from *NC OneMap*

The Council advises and reports annually to the Governor and the General Assembly. This annual report describes how the Council puts collaboration into action in preparing for the aforementioned challenges and serving the public with geographic information.

Collaboration in Action

What is unique about geographic information in North Carolina?

The short answer: we have the critical data people need!

The state's wealth of statewide geographic data is consumed by state, local, regional and federal governments; private businesses; educational institutions; and the public to answer questions and make informed decisions efficiently and effectively.

North Carolina has a collection of statewide data for aerial imagery, land records, elevation, addresses, geodetic control and transportation that rivals any state.

How did North Carolina become unique and how will it continue to be a leading state in the nation for geographic information? How does a state with so many counties and municipalities and agencies achieve statewide products, discoverable and accessible by the public?

The answer: collaboration in action.

Collaboration in Action for Land Information

Accomplishment: Collaborated with all 100 counties to produce and maintain a complete statewide parcel dataset.

Plan: Continue updating parcels semiannually for currency.

North Carolina now has border-to-border land information online as standardized parcels. In a collaborative project involving all 100 counties and the Eastern Band of Cherokee Indians, the Council realized a longtime goal to compile and publish statewide standardized parcels: boundaries and property information. Combined with statewide aerial imagery, address points and other foundational geographic data, informative views of the landscape are readily accessible to all counties, the General Assembly, state agencies, and the public.

NC OneMap

"NC One Map is a fantastic tool we use in our business every day. We provide agronomic services to farms; the imagery allows us to create accurate professional maps and identify management zones for soil sampling. Our customers and their buyers often compliment the quality of our maps stating this is better than Google! The WMS system is a very simple way the access the imagery without taking up valuable hard drive space. This service is highly valuable to the agriculture industry in NC."

Mary Wilks
Carolina Precision Consulting, Inc.

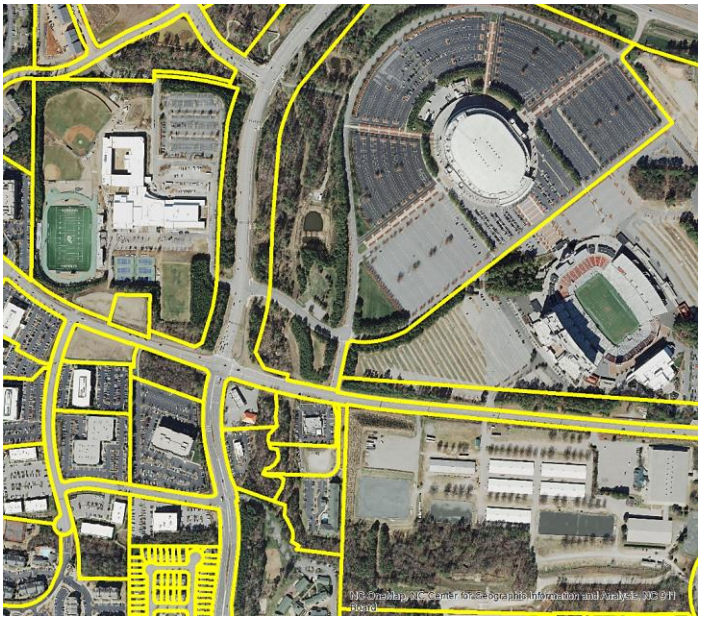
The *NC Parcels* Program received an international award as a "Distinguished Enterprise System" from the Urban and Regional Information Systems Association in 2016.

What is the value of standardized, statewide parcel data?

> "A statewide standardized parcel dataset is an incredibly valuable resource for a wide range of applications. North Carolina was an early national leader in land records automation, and completion of this parcel project puts the state back among the top five states for standardized, accessible parcel data." -- Nancy von Meyer, Fairview Industries, Inc.

Statewide parcel data informs decisions in economic development, emergency management, transportation planning, land development, utility management, public health and forestry to name a few applications. For example:

- NG9-1-1 requires accurate location data, including parcels and site addresses, integrated across jurisdictional boundaries, to match with emergency service areas.
- Businesses are benefitting from the collection of parcels across county boundaries. For example, Duke Energy uses parcels to determine land ownership when creating and maintaining utility rights-of-way and when engineering new transmission lines.
- Current parcel data for all counties are available from *NC OneMap* in the event of a natural disaster that might interrupt county data operations, and were applied by NC Emergency Management in assessing damage from Hurricane Matthew.
- The US Census Bureau is applying parcel boundaries to improve Census geography and support a complete, accurate, defendable count of NC residents.



Displaying parcels indicates patterns of land ownership as in Figure 4 that shows parcel boundaries over statewide aerial imagery in a Raleigh location. Consistent, complete, current, accessible parcel boundaries with information about location, use, size and value saves time and money for public and private business processes. As always, counties are the authoritative sources of the most current and detailed parcel data. For detailed research on specific properties, data consumers are directed to online county map viewers and/or county geographic information system (GIS) contacts.

Figure 4. Parcel Boundaries over Orthoimagery, NC State University Campus

Collaboration in Action for Imagery Quality and Efficiency

Accomplishment: The Statewide Orthoimagery Program completed phase 4 of 4 and acquired imagery for the Coastal region, phase 1 of the second four-year cycle, funded by the NC 911 Board.

Plan: Complete phase 1 of 4 in the second cycle of updates, and acquire imagery for phase 2 to refresh the Eastern Piedmont region.

Each year, a project team of partnering state agencies and contracted vendors carries out a systematic work flow that results in high resolution orthoimagery with consistent visual quality and accuracy on the ground. The NC 911 Board approved another four-year cycle of orthoimagery. Planning for Phase 2 of 4 is underway for imagery acquisition in winter 2017 covering 26 counties in the Eastern Piedmont region (see Figure 5 and an example of imagery in Figure 6). The Council and the NC 911 Board have achieved a systematic four-year cycle for imagery acquisition for more frequent, more consistent imagery than the pre-2010 county by county ad hoc approach.

The project team now delivers imagery to PSAPs for an area that extends seven miles beyond the home county boundary, ensuring that imagery used for visual reference in locating emergency calls covers the reach of a cell tower near a county boundary.

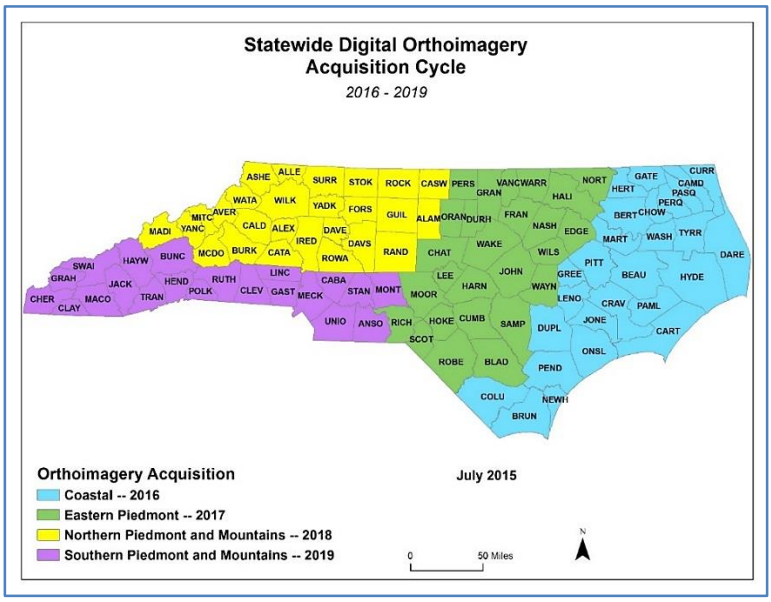


Figure 5. The Second Four-Phase Imagery Acquisition

What makes statewide orthoimagery so valuable?

Statewide imagery—a complete, consistent, current visual reference—adds value in 9-1-1 Communication Centers across the state and is vital for Next Generation 9-1-1 systems' cross-jurisdictional efficiency. The program has completed two statewide collections and archived 18.6 terabytes of imagery with State Archives to insure future generations will have a complete historic picture of the state.

Prior to the statewide effort, the Board had received $24 million in requests annually from local governments for orthoimagery projects. Based on project experience 2012-2015, the four-year statewide approach will cost approximately $14.02 million, saving as much as $82 million for statewide acquisition. About 79 percent of the cost is for services by private contractors, contributing to the state's economic vitality by sustaining private jobs in photogrammetric services.

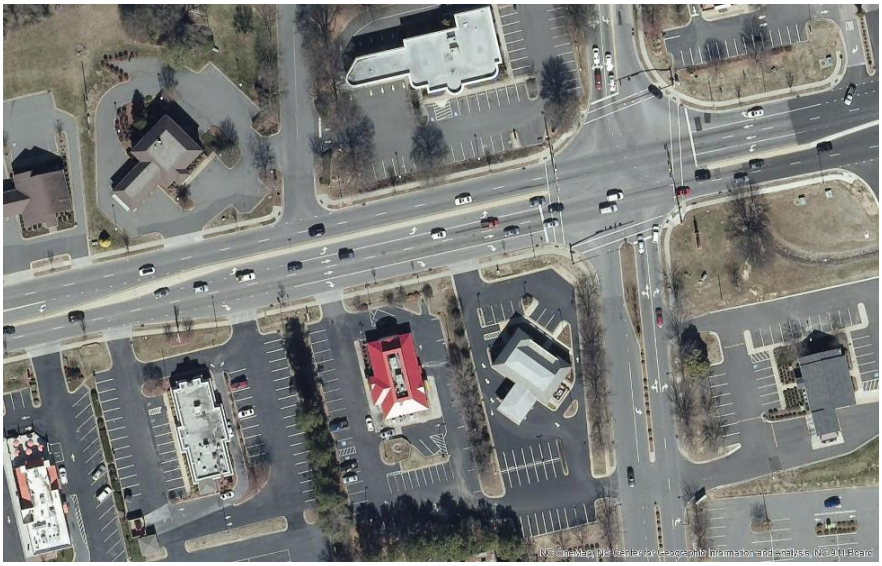


Figure 6. NC Orthoimagery Example in Cornelius, 2015

The imagery is available to state, local, federal and regional government agencies; the private sector; the academic community and private citizens as map services and downloadable files from *NC OneMap*. Benefits include: saving time in locating and responding to emergencies; saving time informing business decisions; and avoiding the cost of erroneous information from out-of-date imagery and map features.

The NC 911 Board recognizes the value of the imagery, not only for emergency response, but also for other uses and applications by the private sector and government agencies.

The project team collaborated with local PSAPs and GIS professionals to provide online training for visual quality control, achieve coordinated state and local imagery review early in the process and hold regional meetings for product delivery.

NC OneMap and Statewide Imagery

"The NC 911 Board has looked at the orthoimagery project as one of its crown jewels. Next Generation 9-1-1 will involve geographic data including statewide orthoimagery."

Richard Taylor
Executive Director
NC 911 Board

Collaboration for Public Access to Geographic Information

Accomplishment: CGIA managed a database of statewide geographic data, and provided reliable online access to the public from secure, replicated servers; CGIA and collaborating agencies updated and expanded the content of *NC OneMap* Geospatial Portal.

Plan: Expand the content and improve the usability of *NC OneMap.*

NC OneMap, managed by CGIA, is a primary initiative of the Council that ensures public investment in geospatial data and services will continue to generate benefits for a wide range of public and private purposes. Through the *NC OneMap* Geospatial Portal users can discover relevant datasets, determine their suitability and download data or stream data through a web service directly into a

desktop or web application. Keyword searches and searches by spatial extent make it easy to find content in a user's area of interest.

How do state government agencies provide their collective geographic information online? Where can consumers search for, discover, and get access to the best available statewide resources?

The State Chief Information Officer's *Geographic Information Systems, Report to the Joint Legislative Oversight Committee on Information Technology* explained that:

> "A focal point for the GICC is *NC OneMap*, a first-stop website where consumers of North Carolina data and web services can locate, discover and use statewide geospatial resources. This organized effort originated in 2003 as a GICC initiative in partnership with county, municipal, state and federal data providers, with a formal implementation plan. The *NC OneMap* vision promotes geospatial data standards; data currency, maintenance and accessibility; and data documentation (metadata)" (GIS Report, December 2014, p.3).

The GIS report included 10 recommendations, two directly related to *NC OneMap*:

- "The *NC OneMap* initiative should be fully funded to expand capability and hosting for all 37 priority datasets that could be made centrally available to anyone who requires the data."
- "There are opportunities for better shared and more central use of funding. Enterprise initiatives such as *NC OneMap* and *AddressNC*, along with other opportunities identified by the GICC, need to be given recurring funding to maintain critical shared datasets within the state" (p. 16).

NC OneMap is effective because of its extensive content (293 datasets and 135 live map services) and collaboration with other agencies to deliver data to consumers. As data moves from desktops to smart phones and tablets, consumption of geographic data continues to grow. Significant investments have been made in North Carolina's geographic data at the local and state levels to serve the business needs of government.

In 2015-2016, the Council's Management and Operations Committee continued to monitor the status of priority datasets for *NC OneMap* and their respective action plans to support quantity and quality. *NC OneMap* Geospatial Portal, shown in Figure 8, includes datasets and web services hosted by CGIA as well as data and services hosted by other public agencies linked to the Portal.

In 2015-16, new datasets and web services added to the portal included 2015 imagery for the 24 counties in the Southern Piedmont and Mountains project area. *NC OneMap* added two web applications to enable data consumers to view maps and get information through a web browser. One displays land parcel boundaries with standard descriptive information, and the other displays orthoimagery flight lines to enable look-up of flight date for imagery in any location in the state.

The Council and CGIA will continue to make geospatial data readily discoverable and reliable to apply in ways that benefit public and private entities in a broad range of activities that contribute to health, safety, knowledge, communities, natural resources and economic vitality in North Carolina.

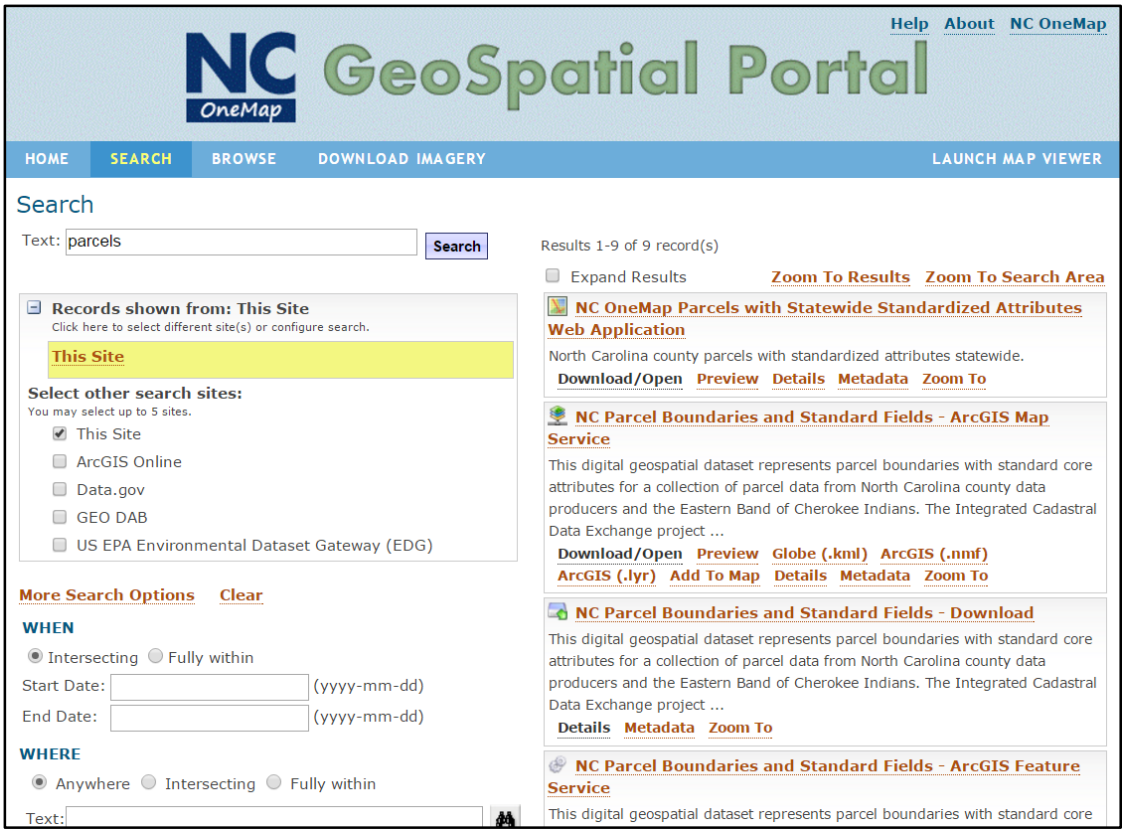


Figure 7. ***NC OneMap*** **Geospatial Portal, Word Search Example, June 2016, http://data.nconemap.gov**

Collaboration in Action for Locations

Plan: Update the statewide address point dataset, develop a maintenance plan, apply address points to address ranges in road centerlines maintained by NCDOT, and share address points in support of Census 2020.

Accurate geographic data representing locations of homes, businesses and public buildings are vital for emergency communications, broadband services, real estate, transportation planning, vehicle routing and more. An accurate count of population in 2020 will be valuable to North Carolina for fair congressional representation and fair distribution of federal funds based on population. Getting a complete count depends on compiling and sharing current and complete residential addresses with the Census Bureau to get Census forms to all residents.

Second, and no less important, are the addresses associated with business and industrial entities for identifying points of sale for statewide tax collection by NC Department of Revenue, based on business locations and jurisdiction boundaries, and tax distribution back to local governments based on point-of-sale and residential population.

Where are address locations across the state?

A Council initiative managed by CGIA—the *Address*NC database—relies on state-local collaboration to create a foundational statewide layer for complete population counts and comprehensive locations. The project integrates county authoritative data into a standardized statewide resource.

Next Generation 9-1-1 is but one example of business processes that will benefit. Advice and guidance by the Council and its stakeholders are essential for quality.

Collaboration in Action for Consistency

Accomplishment: The Council developed and adopted a new content standard for parcel data, and developed a technical document to guide use of mobile devices for field data collection. The Council redirected the ad hoc Metadata Committee to develop training materials and hold training sessions to demonstrate how to apply the new metadata standard.

Plan: Continue to apply the new metadata standard through training state and local data managers, update state standards for street centerlines and promote all Council adopted standards and practices.

Consistency and documentation are on the top of the list of data quality factors, in addition to completeness, currency and reliable online access. The Council and its collaborators agree on the data—priority datasets with the most value—and document the data to inform consumers. Documentation of geospatial data is called "metadata." The Metadata Committee is training local data managers to apply the State and Local Government Metadata Profile based on new ISO standards to locally managed geospatial datasets. This is a vital step to improve data quality across the state, thereby building integrity in data access by public and private interests.

How does the Council promote data consistency and effective use of geospatial data?

Up-to-date standards and recommended practices continue to be valuable for GIS data managers in state and local governments. The Statewide Mapping Advisory Committee revised the content standard for core cadastral data (land parcels) to be consistent with the findings of the *NC Parcels* Program. Revisions to the data content standard for and roads will benefit from the practical application of standards in respective statewide projects.

How are geographic features such as streams officially named or renamed?

The North Carolina Board on Geographic Names (NCBGN) is a committee of the Council's Statewide Mapping Advisory Committee (or SMAC). The NCBGN and the United States Board on Geographic Names (USBGN) work together to develop official names that are required to be used on federal products and are adopted by other non-federal organizations for use in mapping projects and databases. Official names are managed in the Geographic Names Information System (GNIS), a searchable database, acknowledged by the Council as the official North Carolina names repository.

Governance for Geographic Information

Accomplishment: The Council met regularly and engaged committees and working groups in carrying out initiatives.

Plan: Continue to be the focal point for engagement in consolidation and collaboration opportunities, as envisioned by the General Assembly.

The Council, CGIA and *NC OneMap* provide a coordination structure for governance of geographic information that engages stakeholders from state, local, regional, and federal government;

educational systems; and private business. Producers and consumers of geographic information are represented in committees and working groups that inform plans, strategies, policies, priorities and initiatives related to geographic data and GIS technology. In 2015, CGIA became part of the Government Data Analytics Center (GDAC) within the framework of the GDAC's overall data responsibilities. As a board under the Department of Information Technology, the Council will continue to emphasize data standards, data sharing and data quality to support analytics where location and revision date are key factors. Within the GDAC framework, the Council will continue coordination of geographic data and enterprise initiatives.

In mid-2016, the Council began a process of defining the current practice of GIS professionals in consideration of changes in geospatial technology that enable greater accuracy in the digital representation of features such as roads, buildings, fire hydrants, and timber stands, to name a few. The challenge for GIS governance is for the Council to clarify differences between the practice of GIS and the practice of professional land surveying, in collaboration with the NC Board of Examiners for Engineers and Surveyors, in ways that meet the respective responsibilities of the Council and the Board.

Sharing Information and Knowledge

Accomplishment: Continued to build a technical knowledge base and communicated with professional organizations and consumers.

Plan: Continue to be the focal point for knowledge sharing and communication for the GIS community and hold the 15th biannual NC GIS Conference in February 2017.

Quarterly Council meetings feature a technical presentation to inform Council members about investments in and applications of geographic data and technology. Recent presentations to the Council included:

- Unmanned Aircraft Systems, NextGen Air Transportation Center, NC State University, covering the technology, federal rules, state permitting, and commercial opportunities.
- Forest Change Detection, US Forest Service, demonstrating a system for detecting differences in vegetation over time in a location of interest in support of forest health.
- LiDAR Data Updates, NC Emergency Management, describing how the state is updating elevation data statewide in phases to take advantage of new technology and improve the accuracy of elevation.
- NC Coastal Atlas, East Carolina University, demonstrating a web mapping application that supports coastal research and analysis with imagery, shoreline, environmental features and other geographic information.
- The Value of GIS, Council members, presented as brief statements of how members use and benefit from geographic information in their organizations.

In addition, the Council's standing committees build the GIS community's knowledge base by hosting technical presentations that demonstrate tools and techniques and convey strategies and lessons learned in support of public business processes.

The 15th biannual NC GIS Conference will again provide a valuable forum for education and networking, achieving a true sense of community and collaboration among GIS professionals across North Carolina. For the 30th anniversary of the first NC GIS Conference the theme is "30 Rocks GIS." The conference will take place February 22-24, 2017 at the Raleigh Convention Center (Figure 8). Planning was well underway as the fiscal year ended. Attendees include government officials at all levels, members of the business community, college students, and education professionals.

Figure 8. Home Page for the NC GIS Conference 2017

In addition, Council initiatives were promoted in numerous venues around the state. Staff, along with Council and committee members, presented at meetings sponsored by the NC 911 Board, NC Property Mappers Association, NC Society of Surveyors, Mountain Region GIS Alliance and NC Arc Users Group. Council members participated in meetings of the North Carolina–South Carolina Joint Boundary Commission. Nationally, the Council and committee members were among North Carolina participants in the Esri International Users Conference and the Urban and Regional Information Systems Association conference, CGIA represents North Carolina in National States Geographic Information Council activities, and the Council Chair and staff attended national summits for address data and parcel data.

More About the Council

The Geographic Information Coordinating Council (the Council) was established by the General Assembly in August 2001. See Part 11 of Article 15 of Chapter 143B of the General Statutes, G.S. 143B-1420 through 143B-1422.

The Council is the focal point for collaboration in geographic information and statewide mapping serving a host of state and local government programs and services. Governance of geographic information and technology relies on stakeholders to discuss geographic data, standards, and data sharing and demonstrate practical examples of the value of geographic information systems in public and private business processes.

The Council is charged with advising and reporting annually to the Governor and the General Assembly on strategic direction, responsibilities and requirements as North Carolina applies geographic information system technology in collaborative ways to meet the needs of decision-makers at all levels. The Center for Geographic Information and Analysis (CGIA), within the Government Data Analytics Center in the Department of Information Technology, staffs the Council. The State Chief Information Officer is responsible for supervision and support of the Council.

The Council meets quarterly to consider policies, issues and initiatives. Council meetings took place on four occasions during Fiscal Year 2015-16: August 13, 2015, November 19, 2015, February 11, 2016 and May 11, 2016.

Members or their designees represent state agencies, local government, private business and federal agencies to achieve a broad set of stakeholders. Stan C. Duncan, retired from local and state government, serves as Chair of the Council. He has served as president of the NC Association of Assessing Officers and the NC Tax Collectors Association. Duncan is the first Council chair with extensive local government experience.

Committees and their diverse members are vital to the Council, bringing a unique perspective to issues and tasks. The Local Government Committee (LGC), State Government GIS Users Committee (SGUC) and the Federal Interagency Committee (FIC) are user-oriented standing committees. The GIS Technical Advisory Committee (TAC) and the Statewide Mapping Advisory Committee (SMAC) are standing committees that combine representation from each committee with subject experts to work on policy and technical issues from a collaborative perspective. In addition to Council members, more than 50 individuals are involved in various committees and working groups, including 23 representatives from state agencies, 12 from local governments, five from federal agencies, six from universities and five from private organizations.

The Council (https://it.nc.gov/gicc) and *NC OneMap* (www.nconemap.gov) web sites are widely used by committee members, the NC GIS community and the public to keep current on initiatives, meetings, opportunities and news about both the Council and *NC OneMap*.

For more information, contact Stan C. Duncan, Chair, stan.duncan2016@gmail.com and Tim Johnson, CGIA Director, tim.johnson@nc.gov.