



Application for URISA 2008 ESIG™ Award

Entrant: Horry County, South Carolina

System name: Geospatial Incident Management System

ESIG Award Category: Enterprise Systems

June 2, 2008

Contents

Application for URISA 2008 ESIG™ Award

A. System	1
1. Name of system and ESIG category	1
2. A letter from the executive administrator	attached
3. Summary	1
4. Three user testimonials	attached
B. Jurisdiction	3
1. Name of Jurisdiction	3
2. Population Served	3
3. Total Annual Budget	3
4. Chief Official	3
5. System Contact	3
C. System Design	3
1. What motivated the system development?	3
2. What specific service or services was the system intended to improve?	6
3. What, if any, unexpected benefits did you achieve?	7
4. What system design problems were encountered?	7
5. What differentiates this system from other similar systems?	8
D. Implementation	8
1. What phases did you go through in developing the system?	8
2. Were there any modifications to the original system design?	13
E. Organizational Impact	13
1. What user community does the system serve and how?	13
2. What are the ultimate decisions/operations/services being affected?	14
3. What were the quantitative and qualitative impacts of the system?	15
4. What effect has the system had on productivity?	16
5. What, if any, other impacts has the system had?	17
6. How did the system change the way business is conducted?	18
F. System Resources	19
1. What are the system's primary hardware components?	19
2. What are the system's primary software components?	19
3. What data does the system work with?	20
4. What staff resources were required to implement the system?	21
Addendum	
Graphic A - Enterprise GeoSpatial Network	
Graphic B - WebEOC® screenshot	
Graphic C - WebEOC® screenshot	
Graphic D - Verizon map of Horry County's fiber network	
Graphic E - GIS-centric Data Enterprise System	
Graphic F - WebEOC® screenshot	
Graphic G - WebEOC® screenshot	
Graphic H - WebEOC® screenshot	
Graphic I - WebEOC® board	



Application for URISA 2008 ESIG™ Award

A. System

1. Name of system and ESIG category

Entrant: Horry County, South Carolina

System name: Geospatial Incident Management System

ESIG Award Category: Enterprise Systems

2. A letter from the executive administrator

SEE ATTACHMENT: Horry_County_LTR_EXEC_ADMINISTRATOR

3. Summary

Horry County – the largest county in South Carolina at 1,134 square miles – is one of the first in the United States to build a Geospatial Incident Management System that enables intergovernmental cooperation among the County and participating cities within the county, as well as with state and federal agencies.

The effort was launched to provide seamless emergency management services across geopolitical lines. Famous for Myrtle Beach and Atlantic Ocean resorts, the region draws 4.5 million visitors annually – visitors who, in effect, become citizens requiring public safety services just as the County’s 200,000 year-round residents. Additionally, the region is particularly vulnerable to hurricanes. Category 4 Hurricane Hugo devastated the region in September 1989, and every hurricane season from June until November brings the potential for disaster. Emergencies and catastrophes don’t discriminate, often cutting a wide swath of destruction across more than one jurisdiction.

Accurate, assessable geospatial data is necessary for preparing for, responding to, and recovering from emergencies. The County’s IT/GIS and Public Safety departments have long held the philosophy that data can and should be shared across geopolitical lines in order to better serve the public. But for years, the County and cities within its boundaries had been using GISes and databases operating in “silos” – efforts were redundant; worse, the disconnect among systems resulted in inaccurate, incommunicative, often outdated data. Although well-intentioned, the multiple systems were not the best solution for serving the public, especially during times of emergency when coordinated response is paramount.

Thus, when the County began implementing a new E911 CAD (Computer Aided Dispatch) system four years ago, the County’s Public Safety director broadened the scope to include tying it to a single GIS accessible to authorized users across geopolitical lines. The undertaking would require building the case to County commissioners

and the cities within the County. It would require significant financial, infrastructure, and human resource investments. It would require a commitment among participants to uphold stringent standards, including an agreement that all new software applications being deployed must be GIS-centric, and all datasets compatible.

After gaining the approval of County commissioners, the County's IT/GIS and Public Safety departments pursued discussions and then formed alliances, first with the City of North Myrtle Beach and then with the cities of Myrtle Beach, Conway, and Surfside Beach. Work began in earnest on installing the infrastructure; developing the system and data models and standards; and equipping participants with the necessary hardware and software.

Today, the County and the participating cities access a shared system.

This system has four components that make it exemplary:

- 1. Governance** – a shared intergovernmental agreement, environment, and network whereby the County and the cities removed barriers to sharing data and today cooperatively maintain common datasets; the region is one of the first in the United States to develop such an agreement
- 2. Highly streamlined workflow** – data is created once and shared/maintained among signatories to the agreement
- 3. Single-source data** – all GIS data, from parcels to planimetrics to topography and imagery, is accessed from a single secure source
- 4. Regional integration** – collaboration with municipalities, state, and federal entities with a common goal of building and maintaining a unified system

The entities also share a GIS-centric enterprise work order system that is used not only for emergency management tracking of resources but also by the County's IT/GIS, Public Works, Stormwater, Engineering, and Maintenance departments. The goal is to deploy to all County departments and to the participating cities (North Myrtle Beach has already deployed the work order system).

ESi's WebEOC® software is also used as well as other emergency management resources provided by the State of South Carolina for FEMA coordination and reporting purposes. Future plans include integrating with HAZUS and CATS software.

By working together to build a powerful, integrated multi-jurisdictional system for sharing a geodatabase, a work order system, and other technical infrastructure, information-sharing has been brought to unprecedented levels of efficiency and accuracy. This, in turn, has improved service to the public.

This ESIG award application discusses the events that led to collaboration; the process of building a unified system; and the benefits that Horry County, participating cities, citizens, visitors, and state and federal agencies are now receiving.

4. Three user testimonials

SEE ATTACHMENTS:

1. Horry_County_TESTIMONIAL_NMB (letter from North Myrtle Beach)
2. Horry_County_TESTIMONIAL_HC-IT (letter from Horry County IT/GIS)
3. Horry_County_TESTIMONIAL_HC-EM (letter from Horry County Emergency Management)

B. Jurisdiction

1. Name of Jurisdiction

Horry County, South Carolina

2. Population Served

204,000 year-round residents

4.5 million visitors annually

3. Total Annual Budget

\$306 Million

4. Chief Official

County Council Chair:

Ms. Liz Gilland

County Administrator:

Danny Knight

Horry County

1301 Second Avenue

Conway, SC 29526

5. System Contact

Timothy Oliver, Horry County IT/GIS

103 Elm Street

Conway, SC 29526

Tel: 843.915.7367

Fax: 843.915.6240

olivert@horryCounty.org

C. System Design

1. What motivated the system development?

Better service to the public across geopolitical borders motivated the system development. A brief history of the events leading up to the new system:

Old ways needed to change

Horry County and the cities within its boundaries all have used GIS as an integral part of operations since the 1990s. Rapid growth in the region has demanded updates to core data almost daily; the core datasets, in turn, have required large data storage systems in order to manage huge quantities of data.

By the early 2000s, a number of GISes and databases were operational in the region, including a Master Street Addressing Guide (MSAG) used in conjunction with 911 emergency calls, various public works departments' maintenance systems, and a GIS addressing system with its own Excel spreadsheet. All contained entirely different information and none of them was in the same state of currency.

Meanwhile, the cities within Horry County had been using a "sneakernet" method of updating, maintaining, and sharing data. The method was inefficient and caused duplication of effort as well as significant issues with data currency and accuracy.

The result of this mismatched, sometimes outdated data – and the inability to effectively "talk" with one another – made it difficult for the cities and County to seamlessly coordinate emergency response, rescue, and cleanup efforts during hurricanes and other emergency situations.

The disparate systems needed to be consolidated into a single, accessible, accurate data source, but with responsibility of attribute editing delegated to respective jurisdictions.

Champions of change

Organizationally, Horry County's IT/GIS Department is within Public Safety. Their mutual philosophy is that there are only two kinds of data: spatial and financial. These data relate to one another, and they can and should be shared.

IT/GIS Manager Sheila Butler had a vision for shared data across departmental and geopolitical lines: via a common WAN, users could access a single data source for all countywide datasets; jurisdiction-specific datasets with common interest would be maintained in the common SDE datasets but edited by the responsible jurisdiction. The vision required all new software solutions to be GIS-centric; additionally, all new software solutions needed to conform to existing data structures.

Butler's vision fit well with Horry County Public Safety Director Paul Whitten's belief that the public's needs should trump geopolitical boundaries. His vision for seamless, intergovernmental public safety services required deploying a new E911 Computer Aided Dispatch/records management system in conjunction with a single, highly accurate GIS and address database – one that would be instantly accessible to authorized users from multiple jurisdictions.

In order to achieve its vision, the County would need to resolve the following issues:

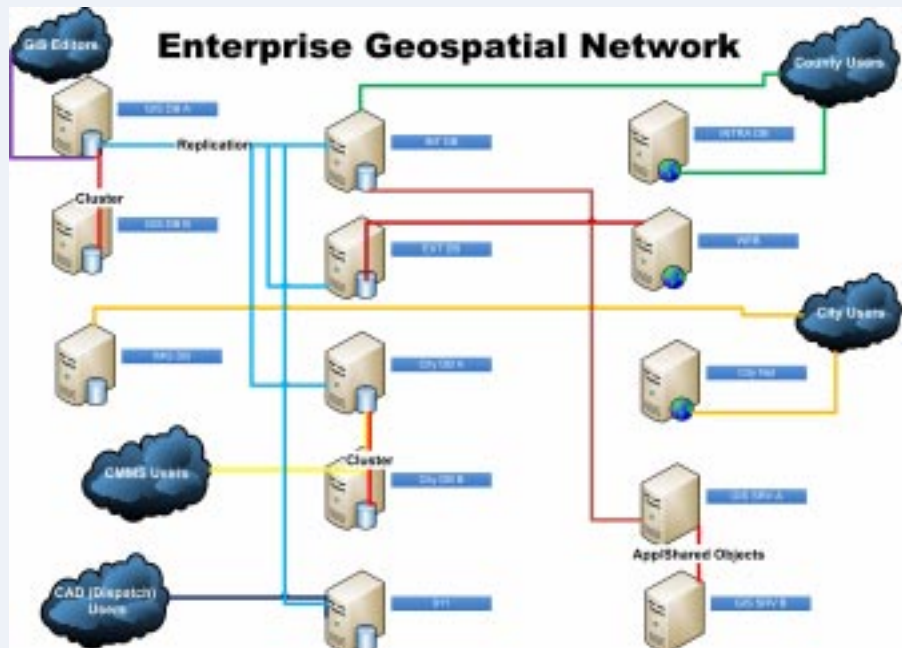
- Data editing processes created within the County would need to be streamlined in order to reduce redundancies, improve accuracies, and enhance accessibility
- Network connectivity would need to exist in order to allow all of the cities and the County to share the same enterprise dispatch system and associated records management systems
- To meet GIS-centric requirements, the cities and the County would need to not only view the same GIS data but also, where appropriate (i.e., the assignment of addresses), edit the same ArcSDE geodatabases
- Technical and administrative agreements would need to be developed and signed

(Further discussion of how the shared system was negotiated, designed, and deployed is in Section D of this application.)

Horry County's vision

- High-speed, reliable data network
- Single data source for users and applications
- GIS-centric focus
- High data confidence
- Browser-based access
- Field-based data collection and verification, and ...

... interoperability



Graphic A

2. What specific service or services was the system intended to improve?

The coordination, dissemination, and maintenance of street and address data in order to provide accurate information to E911 for dispatching and records management was the driving force behind the Geospatial Incident Management System. The intent was to improve the system to ensure the most efficient response to all public safety concerns, including potential large-scale natural disasters.

With the shared Geospatial Incident Management System, in the event of an emergency, the most current and most accurate information would be instantly available.

Results:

- **Regional, accessible database** - Emergency Operations Center staff now have access to a truly regional database without gaps or questionable data. They can see where events are taking place geographically, manage resources with greater agility, and report with incredible accuracy a multitude of actions that occurred in response.
- **Shared work order system** - the system connects to a shared GIS-centric work order system that is used for emergency management purposes. This integration, in addition to providing better service to citizens, enables reporting and management of costs associated with FEMA reimbursements.
- **Integration with other emergency software** - the system integrates with State-provided WebEOC® software for planning and coordinating emergency response; it also will allow the use of Hazards U.S. Multi-Hazard (HAZUS-MH) and Consequences Assessment Tool Set (CATS) software for emergency planning and response purposes.

How the work order system works with

the WebEOC® software: An E911 incident triggers creation of a service request in the work order system. The work order request tracks labor, materials, and equipment associated with the incident. Similarly, when in WebEOC® and reporting an incident, a task is created and sent to the work order management system. The work order is created and labor, materials, and equipment are assigned to the work order. Work order costs can then be tracked and associated with an incident.



- **In-the-field data/work order management** - the system has the capability to provide field units (i.e., laptops, pentops, PDAs) with data, plus the ability to "feed" data from the field back to the County's data center via wireless technology.

3. What, if any, unexpected benefits did you achieve?

Although the Geospatial Incident Management System was originally intended to improve EOC operations, the County and participating cities were able to build on their successes because of a foundation of collaboration, well-thought-out data design and system models, and infrastructure with planned-for extra capacity. While by design, an unexpected benefit was how quickly and efficiently the system has been launched for use in many departments within the County and in participating cities.

Unexpected benefits:

- **Additional system uses:**
Land-use planning
Facilities management
Environmental analysis
Transportation planning and management
Government administration
Additionally, the public can access non-sensitive data via the Internet
- **Additional work order management system users:**
IT/GIS
Public Works
Stormwater
Engineering
Maintenance

An objective is to deploy to all County departments and to the participating cities (North Myrtle Beach has already deployed the system), and also to enable citizens to make work order requests via the Internet.

4. What system design problems were encountered?

A significant design problem involved establishing a common data model that would work for multiple entities. This was especially difficult since most of the entities had been using their own GISes for some time. With the County proposing major changes to the data model for common datasets, participating cities would have to make corresponding changes to applications and mapping projects. A collaborative effort among all parties yielded approval of the new data model.

A second problem was how to allow access to the new system while protecting security and mitigating risk of viruses. With multiple networks (with

varying degrees of security and virus protection) poised to access the County's WAN, it was necessary to develop agreements among the entities that covered such issues as:

- Software upgrades and migration paths
- Virus protection
- Network segmentation
- Training and skill sets of those who might ultimately edit common datasets

A third problem was developing software interfaces to ensure that true integration (no duplicated of data/databases) was achieved. This presented some additional design demands on the team and the software companies involved. As testament to the thorough approach developed by the County, those companies now include many of the same interface requirements in their off-the-shelf software products.

5. What differentiates this system from other similar systems?

Horry County's shared Geospatial Incident Management System has four components that make it unique in local government:

- 1. Governance** – a shared intergovernmental agreement, environment, and network whereby the County and the cities removed barriers to sharing data, cooperatively maintain common datasets, and eliminated the "our data is better than your data" mentality; the region is one of the first in the United States to develop such an agreement (see Section D1 of this application for details)
- 2. Highly streamlined workflow** – data created once and shared/maintained among signatories to the agreement
- 3. Single-source data** – all GIS data, from parcels to planimetrics to topography and imagery, accessed from a single secure source
- 4. Regional integration** – collaboration with municipalities, state, and federal entities to build and maintain a unified system

D. Implementation

1. What phases did you go through in developing the system?

With the support of County council members, Whitten, Butler, and IT/GIS Director Tim Oliver set to work bringing a vision of a shared system to fruition:

- **Their first objective** was to enable County staff and offices to access the GIS data
- **Their second objective** was to enable the cities within the County to be able to access and maintain applicable data on the County's servers
- **Their third objective** was to enable the public to access non-sensitive GIS maps and data (i.e., assessor data) via the Internet and ultimately to make work order requests via a Web-based system

A number of issues needed to be resolved in order to meet these objectives. These issues were addressed in phases:

Phase 1 – build infrastructure

Enabling County staff to access the GIS was, in itself, was a major undertaking since County offices are spread over 1,100-plus square miles with more than 20 buildings on the network. Another issue: the Public Safety and Public Works facilities both were connected to the County's data center via a B1 - data transfer was slow; there was no way the existing line would be able to handle GIS data moving across the network.

The Emergency Operations Center needed a secure, high-speed network in order for Computer Aided Dispatch to work across borders on an 800 MHz system. Police, Fire,

Horry County's high-speed fiber-optic network was installed in three phases:

- **Phase I** - completed 2004 - connected the City of Conway, the County's public safety facility, procurement, detention center, public works and fleet buildings, and all other County facilities along the route - 13 miles of fiber installed
- **Phase II** - completed 2005 - connected the cities of North Myrtle Beach, Myrtle Beach, and Surfside Beach along with additional County facilities and all of the hospitals along the route - 73 miles of fiber installed
- **Phase III** - completed February 2008 - closed the loop between Myrtle Beach and North Myrtle Beach - 23 miles of fiber installed



E911, the Detention Center, and Public Safety departments would all use the network.

Also, the network would eventually be used to provide multiple users beyond emergency operations with access to the GIS, the work order system, CAMA and ownership data, mailing address information, and public safety data.

It was imperative that the data connection be owned by the County and not a third party with recurring costs associated with its operation. Horry County funded this endeavor by implementing a host tipping fee at the County-owned and operated landfill, with funding allocated to the public safety initiative. The distribution of funding included not only the upgrade to new software solutions but also the hardware and network equipment necessary to support the system. Since the cities were also paying the tipping fee through their waste collection services, they too would benefit from the host fee in that they would be provided with a public safety solution and additional access if they chose to participate.

With the funding in place, Verizon, the County's communications contract provider, proceeded in phases to install 109 linear miles of fiber-optic cable stretching like a web between the County's data center and the EOC to, ultimately, the cities of North Myrtle Beach, Myrtle Beach, Conway, and Surfside Beach. All County facilities along the route, plus hospitals and South Carolina Department of Transportation facilities, also had provisions made for connectivity.

Phase 2 – lay the groundwork for access to common datasets

The first undertaking was to design and configure a data repository and server network that met the needs of all participating jurisdictions. These steps/requirements were followed:

Inclusive system design

The County and participating cities collaborated from the onset in order to design a system usable by all and to avoid costly modifications and "tack-ons." The system was designed to function with existing workflows and processes. Significant amounts of data storage made it cost-prohibitive to store duplicate sets of the data for each separate entity or location; as such, the system design called for Horry County's servers to store datasets. Providing a single ArcSDE data source for GIS access required collaboration on network topology to allow access between and across multiple IT networks. Associated issues surrounding access to secure networks were discussed and resolved as part of the system design.

Inclusive data model design

The County planned to deploy a number of new applications, which required the creation and migration to new data models. The vision to provide access to the participating cities enabled the County to include the cities in the data model design from the very beginning, thus eliminating the need to revisit the design when cities came online with the system.



GIS-centric Data Enterprise System:

- Geodatabase is feature database
- Non-redundant feature data storage
- Data model is user-definable/customizable
- Non-proprietary data schema
- Interoperable, maximum compatibility
- Inherent data coordination location and connectivity
- Spatial analyses capabilities
- Data created/edited with ArcGIS editing tools

Software evaluation and implementation, GIS-centricity

In order to easily and cost-effectively share and maintain data, the County and the participating cities determined that all new software solutions would have to be GIS-centric. A GIS-centric database or software product is centered on a geodatabase rather than merely connected to it, providing a standardized reporting environment for users throughout an enterprise. A common SDE dataset and GIS data models would serve as a foundation for new applications; vast amounts of duplication across government entities would be eliminated.

Each piece of software that was to be incorporated into the system required complete evaluation of integration potential with the GIS, the data model design, and the system design. Using the GIS-centric standards developed by NAGCS (www.nagcs.org), the County and the cities evaluated all current and new software for true GIS-centricity. Ultimately, Environmental Systems Research Institute (ESRI) and Azteca software solutions were chosen.

Technology exchange agreements

One of the first-ever joint city-county technical agreements was developed and signed by participating cities. The agreement spells out data security, virus protection, and maintenance standards, and editing roles/responsibilities for the signatories.

According to Christian Carlson, the southeastern ESRI director, this is one of the first intergovernmental agreements in the United States to use ESRI's ArcServer and ArcEngine. Horry County holds the master license for the ESRI enterprise system as well as the Azteca Cityworks asset and work order system; this action saves on multiple license fees while eliminating duplicative efforts.



Using ESRI's ArcGIS and ArcSDE software, all participants access a single data source for countywide datasets such as streets, parcels, site address points, buildings, hydrology, and imagery. Horry County maintains the base data (parcels, imagery, streets, planimetrics) while individual cities within the County are responsible for assigning attributes to streets (names and address ranges) and address points within their respective jurisdictions. Jurisdiction-specific datasets of common interest – such as zoning, land use, valuation, and permitting – are maintained in common datasets but edited by the responsible jurisdiction via the shared network.

This has proven to be beneficial in that it enforces a division of labor, dramatically reducing the amount of time required to maintain data outside their area. This extra time is now used for quality control, policy review and enforcement, and more proactive data entry and analysis performance.

In order to maintain consistency, the agreement requires all entities to upgrade common software platforms at the same time. For the system's core applications to continue to function, all users follow the same migrations and upgrades as the County. Addenda agreements (based on project), allow each city to decide which pieces of the system they wish to be involved with.

Phase 3 – gather, combine, “scrub,” share data across borders

After completing the enterprise database and geodatabase design, and with installation of the fiber-optic network underway, County and city data updates began in earnest:

Centerline databases - 2004, 2005

All of the participating cities' street centerline databases were merged into one and updated.

Existing data - 2005

Data was identified, cleaned up, updated, and brought to a minimum standard. Additional data that needed to be collected, or existing data to be expanded upon, were identified.

New data and imagery - 2005, 2008

Data from ground-based orthophotography and advanced aerial imagery were gathered in order to create seamless imagery. The aerial imagery included infrared as well as color digital imagery. A new aerial and LiDAR (light detection and ranging) contract was signed in 2007 in order to gather additional data. Flights occurred in February 2008. The aerial imagery and LiDAR data were used to create new orthophotos, for planimetric updates, and for a land-use cover study. The data is currently being QA/QC'd.

Work order system and Web viewing tools - 2006

An asset and work order system was built using Azteca's Cityworks software.

Interactive Web viewing tools were built based on ESRI ArcGIS, ArcIMS, and ArcServer software. County IT/GIS staff have deployed the tools to most County departments; additionally, the City of North Myrtle Beach has also deployed, with other cities planned to come on board.

2. Were any modifications made to the original system design?

The system required changes during design and implementation to ensure integrity and security. Most of the issues dealt not so much with the system but instead with modifications to the standards within the agreements and the mechanics of establishing new relationships.

The significant modifications dealt with such technical issues as:

- IP addresses from five separate networks
- VLAN configuration requiring segmentation of networks to provide limited access to servers
- Relocation of production servers midstream due to SQL and software restrictions with regard to replication

E. Organizational Impact

1. What user community does the system serve and how?

The County and participating cities use a single source for GIS data and EOC operations. While most of the cities have an EOC independent from the County, major incidents are tracked and managed from the County's WebEOC® site, which shows what is occurring at County, city, and state levels.

System users served at County, city, state, and federal levels (for emergency management purposes) include:

- E911 dispatch personnel
- Fire personnel
- Police personnel
- Stormwater engineers and crews
- Public works crews
- South Carolina Emergency Management Division
- FEMA
- Department of Homeland Security

Additionally, data-sharing agreements were developed with the Grand Strand Water & Sewer Authority, Horry Telephone, Horry Electric Co-op, Inc., and Myrtle Beach



The enterprise GIS has been integrated with Emergency Operations Center functions.



With the GIS and wireless technology, data is accessible anywhere.

International Airport (a department of the County) to enable these entities to access data for emergency purposes.

System users served at County and city levels (non-emergency purposes) include:

- Planning and zoning administrators
- Code enforcement officers
- Stormwater engineers and crews
- Public works crews
- Maintenance crews
- Civil engineers
- Fire personnel
- Police personnel
- Assessment officers
- County and city treasurers

2. What are the ultimate decisions/operations/services being affected?

If appropriate, provide a few examples including, but not limited to: screen input/output forms, paper products, or other descriptive graphics.

Emergency management:

- Dispatch has access to the GIS map at all times from the dispatch console, where the location of a call is identified by a point on the map. This is particularly helpful as the County moves to compliance with cellular calls generating an x,y coordinate to designate the location of the call.
- This same technology is used to track areas with speeding problems, know which roads are closed/under repair/inaccessible, view alternate routes, know which facilities may contain hazardous materials, and know addresses of past domestic violence calls.
- Motorola Automated Tactical Mapping (ATM) software integrates with the system to track public safety resources in real time. The program incorporates automatic vehicle locator (AVL) technology, which is being placed on all "rolling stock" in Horry County Government, allowing dispatchers to see a graphical representation of each apparatus and enabling dispatch to recommend units based on where they are at any given moment. EOC staff can visually track and move ambulances and personnel as needed to the correct location.
- On the road, public safety vehicles wirelessly connect to the GIS and retrieve the same kinds of information. They can quickly access addresses, evacuation plans, Material Safety Data Sheets, and view aerial photos to review sites for potential staging points, all while en route to a call.

Beyond emergency management:

- Users have access to and the ability to view and use data from multiple jurisdictions, which enables better decision-making. Now decision-makers can see the entire picture, not just the parcel or property in question, but also adjoining properties, even if in another jurisdiction.
- The system provides users with the ability to improve customer service via a single work order management system and create service requests across jurisdictions; this alleviates the need to reroute citizens to the correct jurisdiction, meaning that they can actually assist the citizen by providing a mechanism to move the request forward without calling another number.
- Proposed new addresses are submitted and approved by one agency, which enters the information to the GIS. This provides information even as buildings and homes are being constructed, allowing for emergency workers to better identify locations. As Code Enforcement approves the final construction and the property assumes an official address, this data is updated.
- Using a Capitol Improvement project delineated on a map, utilities can see when a road is coming up for repaving and can schedule a coordinated road cut.
- The Master Address table is updated more precisely and is available for applications throughout the County. A built-in feature won't let users make spelling mistakes or other inputting errors.

3. What were the quantitative and qualitative impacts of the system?

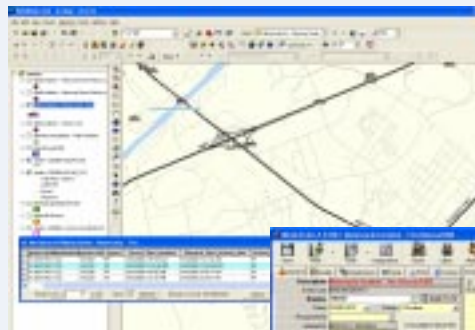
- Paper requests, records, and reports have been significantly reduced among all participating jurisdictions.
- Redundancies in data and in effort have been drastically reduced among all participating jurisdictions.
- Including participating cities in software licensing contracts negotiated by the County has saved money. The public safety software was negotiated to allow cities to purchase it as necessary. The County purchased a number of licenses and workstations to provide the mechanism for all entities to be on the same system. A site license for GIS software was negotiated to include the cities so as to eliminate any road blocks in further GIS-centric deployments. A site license for the work order management was also negotiated to allow cities to adopt the standard, if so desired, at a considerable savings.

- Collaboration not only enhanced the depth of data model development; it also improved data maintenance by identifying and resolving currency and accuracy issues of data shared between entities. As a result, cooperation on a number of projects has made operations more efficient. The primary benefit, aside from the vastly increased efficiency, was the expansion of the network and information flow to include the cities. This resulted in dramatic improvement of the quality control processes due to the increased number of individuals using and reviewing the same data.
- Intragovernmental collaboration on all levels has been enhanced by working together to develop a unified system. Barriers have been replaced by trust.

4. What effect has the system had on productivity?

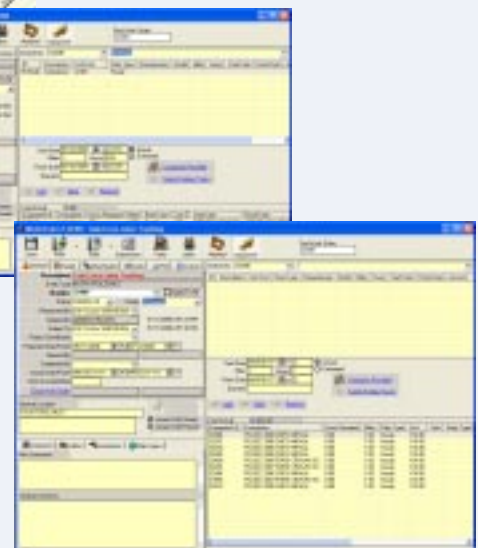
By making the system core to all new application deployments in all departments, the County has streamlined work processes and dramatically improved the efficiency of County staff and decision-makers accessing data. Also, productivity has dramatically improved because all entities have instant access via the high-speed fiber-optic network to the same system and datasets.

- Redundancies in work and storage have been eliminated
- Running from office to office to find someone who knows where a document might (or might not) be stored has been eliminated
- Sifting through files and paperwork has been eliminated
- Bottlenecks on decision-making have been eliminated



Tracking of incidents during Horry County's Bike Week

The new system has had a significant impact on the way incidents are tracked, reported, and reimbursed. The screenshots depict tracking of incidents during Horry County's annual Bike Rally, which brings 300,000 motorcycle enthusiasts to town. The top screenshot tracks incidents, the second related work orders, and the third, task force work orders.



The new system has also improved productivity in that the participating jurisdictions do not need to expend the time and energy to deploy new ArcIMS applications since the County has developed them, accessible via the network.

A major role of the EOC is tracking costs associated with an incident. The system makes the E911 and WebEOC® software the point of initiation for service requests, tracking, and record-keeping. Costs are tracked for analysis to budgets and for FEMA reporting and reimbursement purposes, should the incident be declared a federal disaster. This single source for all work orders, generated in real-time as an incident occurs, simplifies reporting and analysis, which has had significant impact on productivity.

5. What, if any, other impacts has the system had?

- Residents and visitors are receiving dramatically improved services across geopolitical lines. In the past, residents had to call multiple departments to get answers to questions or to submit and resolve problems. Now, the process has been dramatically enhanced so work requests and questions can be fielded by a central call center and distributed in a more regulated fashion. Further, with the millions of visitors each year, using visual cues derived from an online map helps people who don't know the area well enough to describe locations of incidents that they may be reporting.
- Horry County and participating cities' staff are excited about the improvements and how they've streamlined their work and ability to provide better service to the public. They are seeing process improvements, including less down time, less time searching for related data, better access to appropriate forms and reports, and having more time to quality control data due to the division of labor.
- The collaborative process has resulted in an enhanced sense of community among the participating jurisdictions. There is less confusion within the municipalities and among the public. Streamlined approaches to data management and standards enhance collaboration and data-sharing, enable various software tools without a great deal of conversion prior to data usage. As a result, information management is streamlined across jurisdictional borders. Further, preparing for, responding to, and recovering from catastrophic events are better coordinated and recorded, which enables the participating jurisdictions and the County to readily report activities and costs, and recoup funding from FEMA, as well as better analyze responses to learn from events.
- Decisions are no longer made in a vacuum. There is now discussion between departments and groups, which provides far-reaching positive impacts and ensures better problem avoidance. This has provided a positive impact by reducing the number of unknowns, and increasing consistency, interoperability, and trust in the system.

6. How did the system change the way business is conducted with and/or service delivered to clients?

Give specific examples comparing the old way with the new.

Old way	New way
Limited data access	Full data access to authorized users
Slow access	High-speed, instant access via fiber-optic network
Questionable accuracy	Consistent, current, accurate data
Redundancies in data, work effort	Reduced redundancies
Multiple systems that didn't "talk"	A single, accessible GIS with barriers removed between departments and across geopolitical lines
No standards or conflicting standards	Standards agreed upon and adhered to by all signatories
Bottlenecks in decision-making	Decision-making streamlined by giving authorized users immediate access to the best available data
Miscommunication among departments and jurisdictions	Clear communication because of single, accurate data source
No dedicated, centralized call center – a call or complaint would come in to a jurisdiction; after research, it would be determined that the call was the responsibility of another jurisdiction, and the customer would be provided with another number to call, often having to repeat the process before they found the right person in the right department	One call center number for citizens crossing geopolitical lines; when a call is registered in the system, the GIS functionality immediately identifies the responsible entity, prompts the call taker with some basic questions via a pre-determined script; the service request is created and appears in the queue of the appropriate entity for handling
Fragmented work order management, mired in paperwork, lack of accountability	Work orders are attached to GIS objects and tracked accordingly. Residents and visitors don't need to know which jurisdiction they're in; one call, tied to the GIS and the work order system, handles the request. Work order requests by citizens will be enabled online; they will receive an email confirmation and ability to track stages/handling/completion of the work order.
Lack of emergency management coordination among jurisdictions	When managing emergencies, multiple departments can be more interactive with field units and see what work is being done. The capabilities of real-time data access have gone from a best guess to an accurate understanding of the situation. The system provides records of all related activities for analysis later.
Lack of governance	A shared intergovernmental agreement, environment, and network whereby the County and the cities removed barriers to sharing data and today cooperatively maintain common datasets based on agreed-upon standards.

F. System Resources

1. What are the system's primary hardware components? Give a brief list or descriptions of the hardware configuration supporting the system.

A WebEOC® Board showing available information.



Graphic I

Horry County underwent a nearly complete upgrade of hardware systems that included image servers, redundant systems for emergency management, and the provision of fiber to all departments and the cities within the County's jurisdiction.

The hardware components include:

- High-speed fiber-optic network -
109 miles of County-owned fiber
- ArcIMS server for Citynet -
Dell Server PE2850 Dual Intel-Xeon 3.0 GHz Processor 2 GB RAM
- ArcSDE server for GIS and Cityworks data -
Dell Server PE2850, Dual Intel-Xeon 2.80 GHz Processor 3.4 GB RAM Sans attached 400 GB storage space
- ArcSDE Production Server -
Dell Server P6650 8-Intel-Xeon 3.00 GHz Processors 7.5 GB RAM Sans attached 800 GB storage space
- ArcSDE Image Server -
Dell Server PE2850 4-Intel-Xeon Processors, 3.5 GB RAM Sans attached 1 TB storage space

2. What are the system's primary software components?

Describe the primary software and, if a commercial package, any customizations required for the system.

Horry County's policy regarding all new applications is that they must be commercial off-the-shelf (COTS), GIS-centric, and work within the existing enterprise. The software solutions used for this enterprise system meet those requirements; any customizations are limited to software configuration or database model requirements. These software components include ESRI ArcSDE, Microsoft SQL Server 2000, ArcIMS, and Azteca Cityworks.

EOC management components:

- ESRI's ArcServer – used for updating and editing incident data
- ESRI's ArcIMS – used for external map viewing by agencies
- Azteca's Cityworks – used for work order management

- Crystal Reports Enterprise – used for reports including FEMA reimbursement
- OnBase – used for document management and record keeping
- Motorola’s CAD/ATM – used for E911 and accessing police records
- Radio satellite integrators (RSI) – used in conjunction with U.S. Computing’s ArcServer interface for locating public works vehicles
- ESI’s WebEOC® – a solution that links local, state, federal, volunteer, private, and even worldwide sources together, helping to facilitate coordination and decision-making for planning, training and emergency response, recovery and continuity of government and business operations; allows for two-way input of significant events

3. What data does the system work with? List and briefly describe the databases.

GIS

The County’s GIS data consists of the cadastral, planimetric, and aerial imagery stored in ArcSDE. The GIS also stores common/shared datasets among the entities, including address and zoning information.

E911 CAD Database

E911 Computer Aided Dispatch receives all addressing and street information via the GIS. The GIS data creates the geofile and then is used for map display within the CAD system itself. The resulting incidents receive an x,y spatial identifier, allowing analysis on incident history and information via the GIS.

Work order management system

The work order management system uses the geodatabase backbone built directly on the County’s GIS data. Work orders are attached to GIS objects and tracked accordingly. This application manages the call center operations for the County and is also deployed for the City of North Myrtle Beach. The County’s Public Works, Stormwater, Engineering, and Maintenance departments also use the work order system. The goal is to deploy to all County departments and to the other participating cities. The benefit to residents and visitors is, if they need to request emergency or even non-emergency service, they don’t need to know which jurisdiction they’re in; one call, tied to the GIS and the work order system, handles the request.

CAMA (Computer Assisted Mass Appraisal) Database

CAMA, connected to the GIS, contains datasets that maintain ownership, values, and neighborhood information along with sales history. CAMA datasets are uploaded nightly to provide up-to-date information.

Content/Document Management System

All County documents are in the process of being scanned and referenced in a comprehensive and searchable document management system that provides access to vast amounts of current and historical data using multiple search tools.

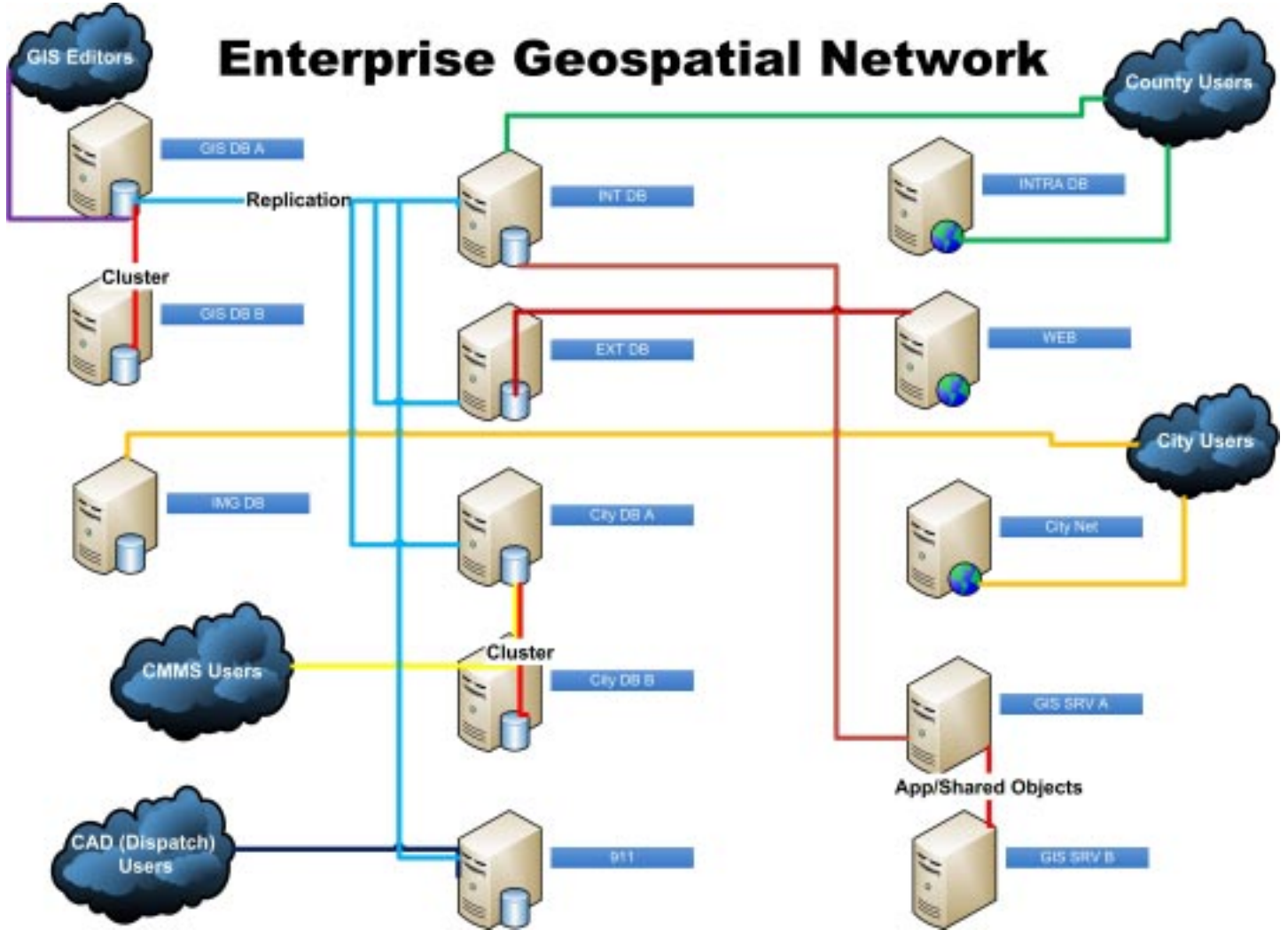
Aerial Orthophotography and Ground-based Orthophotography

The County provides measurable photography from both the air and a ground-based system that allows codes enforcement officers, pavement managers, emergency workers, and others to view photography for all paved roads throughout the County in conjunction with the more typical aerial photography that is also available.

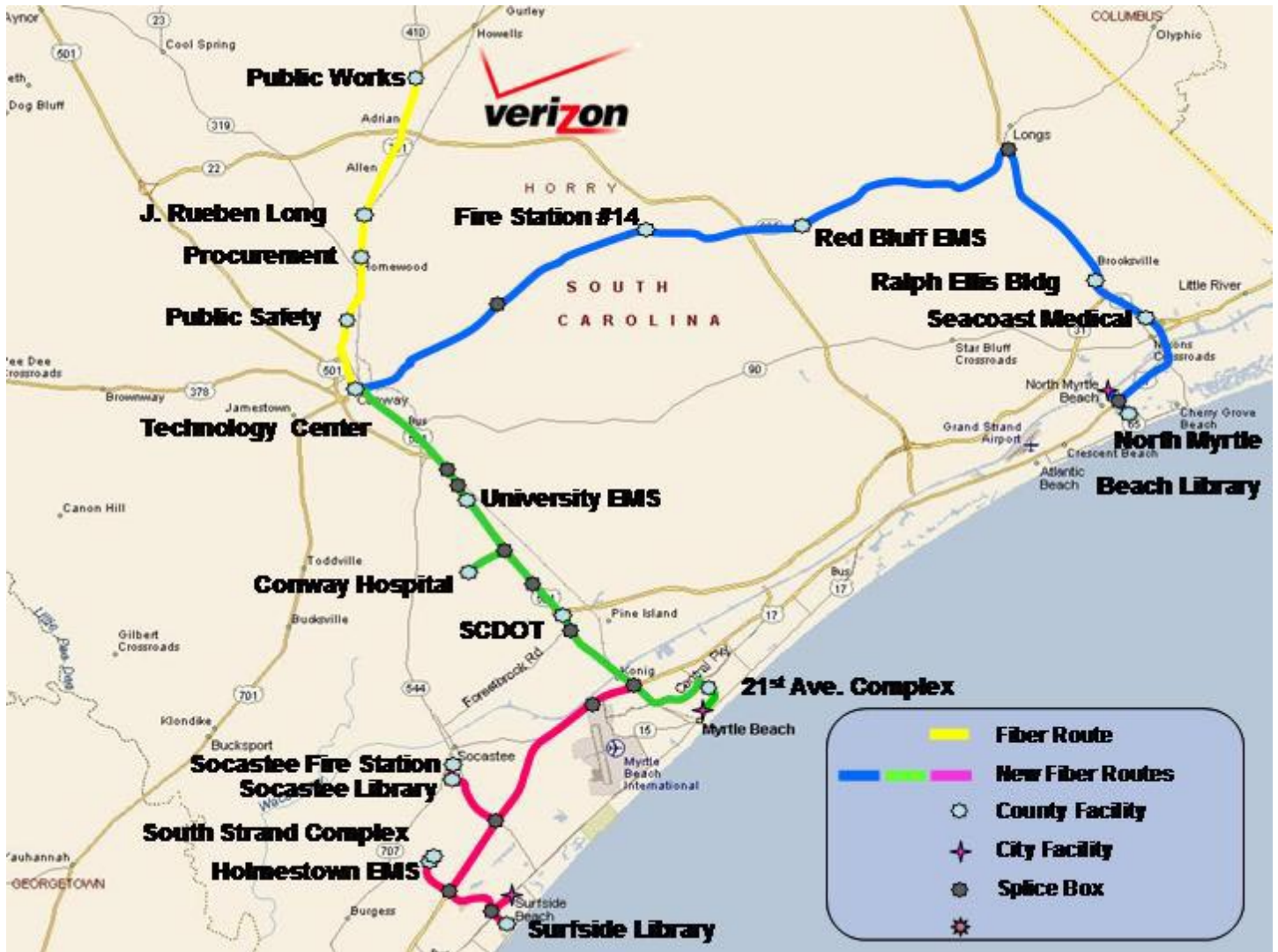
4. What staff resources were required to implement the system (i.e., report approximate staff and consultant time as FTE's)?

Staff	Number of personnel
Network Engineers	3
IT/GIS Staff	3
GIS Technicians	2
Project Managers	5
City IT	4
Stormwater	2
Public Safety	3
Consultants	5

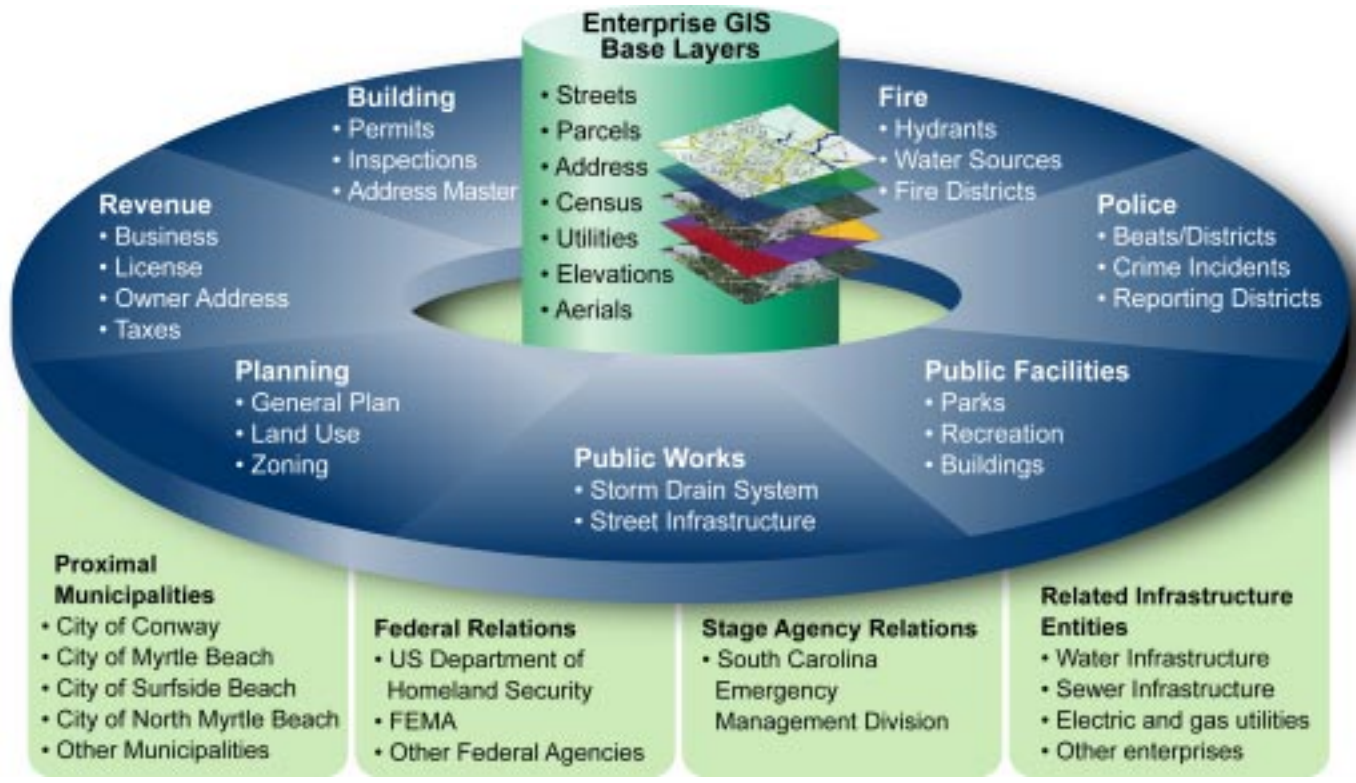
Graphic A - Enterprise GeoSpatial Network



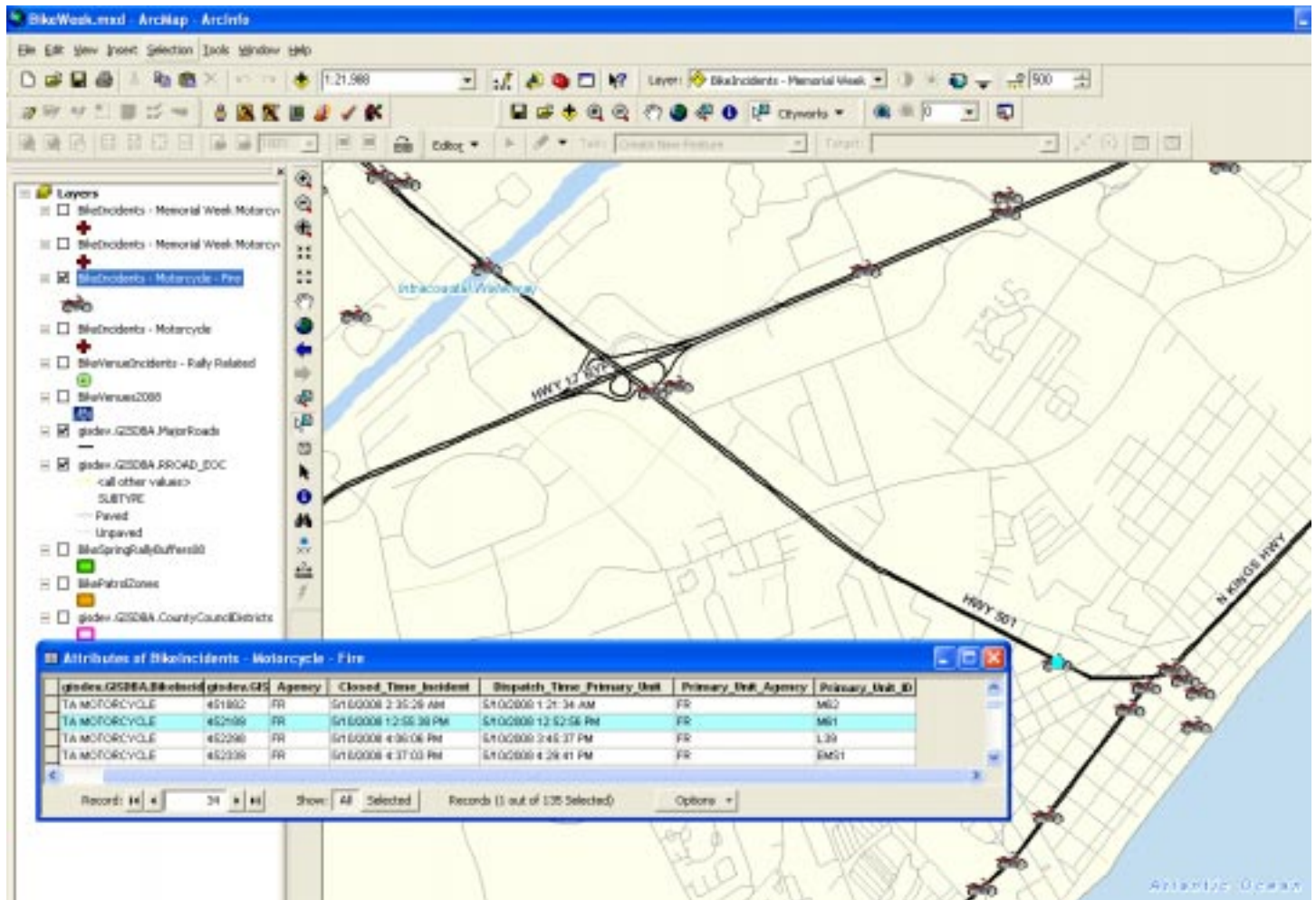
Graphic D - Verizon map of Horry County's fiber network



Graphic E - GIS-centric Data Enterprise System



Graphic F - WebEOC® screenshot



Graphic G - WebEOC® screenshot

Work Order # 23242 Motorcycle Incident - Fire Rescue/EMS

Save Print Tools Inspections Tasks Labor Material Equipment Find Work Order: 23242

General Details Attachments Cycle Print Custom

Description Motorcycle Incident - Fire Rescue/EMS

Entity Type BIKEINCIDENTS

Number 23242 Apply To All

Status COMPLETE Priority 3 Routine

Requested By

Initiated By BENTLEY, MICHAEL 5/16/2008 9:35:49 PM

Submit To EOC, 5/16/2008 9:35:52 PM

Project Coordinator

Projected Start/Finish 05/10/2008 05/10/2008

Opened By

Completed By

Actual Start/Finish MM/DD/YYYY MM/DD/YYYY

Units Accomplished

[Close Work Order](#)

General Location 452189 [Locate](#)

Locate With Streets Locate With Parcels

Comments Entities Instructions Map Layers

Search By NAME M-Medic

ID	Description	Unit Cost	Rate Type	Manufacturer	Model	Miles	Hours	Start Date	Finish Date	Actual
M-Medic	Ambulance	32.00	Hourly							

Start Date 05/10/2008 12:52 Actual Estimated

Miles 1 Hours 0.05

Finish Date 05/10/2008 12:55 [Contractor Provided](#)

Operator [Switch Entities/Tasks](#)

[Add](#) [Clear](#) [Remove](#)

Total Actual: \$1.60

Equipment ID	Description	Hours Required	Miles	Rate Type	Cost	Start Date	Finish Date
M-Medic	Ambulance	.05	1.00	Hourly	1.60	2008-05-10 12:52:00	2008-05-10 12:55:00

Graphic I - WebEOC® board

