Esri News
for State & Local Government
Summer 2022

North Carolina Manages Inventory of State-Owned Real Estate with Web Experience Builder Solution

Learn more about Esri's award-winning broadband solutions, which help jurisdictions make more equitable investments—see pages 14–17.

The population of the Tar Heel State, North Carolina, has grown by 8.9 percent since the 2010 Census, with the state ranking among the top five states people moved to in 2021, according to a survey. The growing population also means a surge in business for the state, new construction projects, and the expansion of existing properties like universities. The State Property Office, under the North Carolina Department of Administration (DOA), provides professional real estate services for all state agencies within North Carolina.

The services include the buying, selling, and leasing of property like warehouses and office buildings to state agencies. The State Property Office maintains the inventory of the properties via a public-facing website designed for organizations or individuals that may not have data on their own inventory. Users can see if a specific transaction has been completed, what the current inventory looks like for state-owned properties, and whether a building has been accepted into the state's inventory.

The site dedicated to managing the inventory was a text-based search engine accessible by the public. The State Property Office set out to create a new web page that included a map viewer to visually display data and search results. The office also wanted to provide more real-time information and have the data integrated with Esri technology.

The State Property Office partnered with Patrick Engineering Inc. to develop a new geocentric web page with a tool designed to create web applications and compelling web experiences. The new site has enabled users to view data, more easily obtain search results, and deliver superior business intelligence.

Challenge

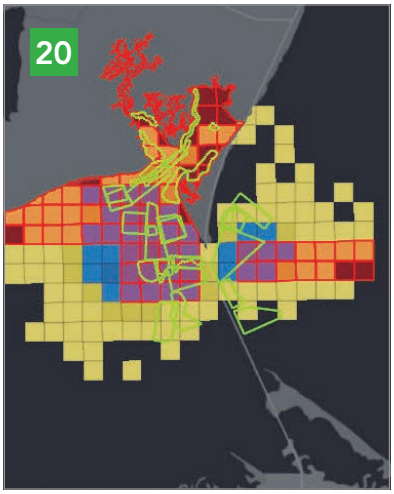
Users could query the database on the public-facing site to find information on the more than 11,000 state-owned buildings and about 5 million square feet of leased space. However, there was no visualization component or geographic data tied to any search results. Users also couldn't export records from the site. Previously, users had to capture a screenshot of the results.

According to John Cox, the facilities information section manager for the State Property Office, "We had to develop a

continued on page 10

Inside This Issue

Summer 2022



Subscribe to *Esri News for State and Local Government*

Residents of the United States can subscribe and receive future print editions of *Esri News for State and Local Government* at **go.esri.com/govnews**.

Manage Your *Esri News for State and Local Government* Subscription

Make changes to your subscription information at **go.esri.com/manage-subscriptions**.

Advertise in *Esri News for State and Local Government*

For more information regarding advertising opportunities in *Esri News for State and Local Government*, download the media kit at **go.esri.com/Ads4SLG**.

Submit Your Content

We encourage Esri partners, startups, nonprofits, and customers to submit an article for inclusion in future issues. Visit **go.esri.com/ShareStory**.

Esri News for State and Local Government is published quarterly by Esri at 380 New York Street, Redlands, CA 92373-8100, USA. *Esri News for State and Local Government* is written for state and local government users of Esri software and distributed free of charge.

ASSESS, RESPOND, AND RECOVER

Quick-start your assessment, response, and recovery planning immediately following natural disasters with inspection-grade imagery of impacted areas. Nearmap ImpactResponse accelerates your understanding of catastrophic damage with rapid collection of high-resolution aerial images following natural disasters, so you can be there for your customers and communities, even when ground access and inspection resources are limited. Learn more at **www.nearmap.com/slg-impactresponse.**

- **ASSESS** the scope and severity of damage, infrastructure impact, initial reserve or budgetary requirements
- **RESPOND** with desktop inspections, triage of field resources, and planning access routes
- **RECOVER** by tracking cleanup and rebuilding efforts, substantiating claims and relief grant decisions, and recalibrating risk and sustainability models

VISIT BOOTH 2019 AT ESRI USER CONFERENCE!

nearmap

esri Partner Network Gold

City of Frederick Reduces Weeks-Long Homelessness Point-in-Time Count into Minutes Using ArcGIS

The City of Frederick, Maryland, like other cities across the nation, is required to count unhoused individuals within its city limits every January. Without the correct data displaying the population of people experiencing homelessness on a map, the city may not understand where to administer resources or where to expand Housing First policies.

Due to shelter-in-place orders during the last few years, communities across the US were confronted with the challenge of providing housing for individuals who were experiencing homelessness. Governments were forced to set up temporary shelters in convention centers, recreation centers, and hotels. However, as COVID-19 restrictions were lifted, these establishments needed their space back. This forced individuals back on the street and left them unhoused and unaccounted for again. The city knew an accurate count of unhoused individuals would become even more critical, especially with the Point-in-Time (PIT) count drawing near. The city turned to geographic information system (GIS) technology that would allow personnel to standardize data collection and empower staff and volunteers to administer the count.

Meeting HUD Requirement Requires Modern Tools

Each January, governments across the US are required to conduct the PIT count, collecting data about all the sheltered and unsheltered individuals experiencing homelessness in each community. This requirement, from the US Department of Housing and Urban Development (HUD), helps establish a more complete nationwide understanding of the homelessness crisis. Now, with temporary shelters gone after the COVID-19 restrictions were lifted, the City of Frederick was no longer able to rely on centralized locations to conduct its PIT count.

While essential to addressing homelessness, the PIT count process can be time-consuming as communities send staff or volunteers out to document individuals experiencing homelessness. Oftentimes, this is a manual process and interviews are documented with paper and pen. Data is then entered into spreadsheets. It is also difficult to coordinate the government staff and volunteers administrating the count. If communities do not modernize the count, there are often miscommunication, data-entry errors, and hours of manual data processing.

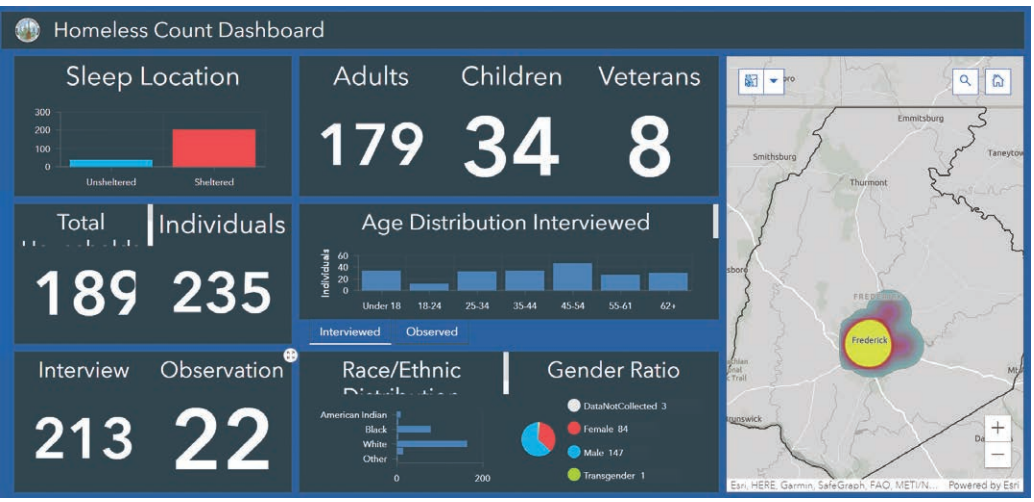
Geographic Solutions Put in Place

Such a time-consuming process requires a digital solution, which is what the City of Frederick found with the ArcGIS homelessness point-in-time counts solution. It delivers a set of capabilities that helps organizations capture surveys during counts, visualize the extent of homelessness, and export this information in a report that can easily be delivered to HUD.

Through the nonprofit corporation The Community Partnership, the City of Frederick learned that it was one of two communities in the partnership still conducting their counts using paper surveys. Seeking to modernize its procedure, the city reached out to neighboring local governments, which told Frederick staff about Esri's ArcGIS homelessness PIT counts solution. Before this, the city had never used a GIS but was confident that the ability to replace the manual procedure would be worth the learning curve.

The City of Frederick implemented the solution in December and was able to use it for the January count.

"There was very little confusion from the city staff when learning how to use ArcGIS for the first time," stated the city's data administrator, Jessica Handoko. "The solution



↑ City of Frederick survey results are displayed on an easy-to-read dashboard created using the ArcGIS Dashboards app.

proved to be extremely user-friendly, no matter the individual's GIS knowledge level."

The PIT count was turned into a modernized digital process in a matter of weeks, with only a month between the city seeking a new solution and staff becoming well-versed in the software and using it to conduct the city's annual count. The ArcGIS homelessness PIT counts solution not only saves governments hours in data collection but also makes submitting their HUD report as easy as a click of a button.

The solution includes the following:

- An ArcGIS Survey123 form used by health and human service agencies and their network of volunteers to conduct surveys of sheltered and unsheltered people experiencing homelessness
- An ArcGIS Dashboards app used by health and human service agencies to monitor results of a point-in-time count surveys of of unsheltered individuals as well as sheltered persons experiencing homelessness
- An ArcGIS Notebooks app used by health and human services staff to generate a report of homelessness point in-time counts to meet HUD requirements

Seeing Results in Real Time

Before the ArcGIS solution, staff members manually uploaded their PIT count results to a central Excel worksheet over the course of weeks. Having to go through each individual survey and upload its findings proved to be excessively time-consuming.

With the solution, as surveys were conducted throughout the city, staff back in the office received results in real time and were able to turn their data into easy-to-read visualizations using ArcGIS Dashboards.

"What was once a nightmare of a process is now an amazing workflow the staff gets excited about," Jennifer Beach, case manager for the City of Frederick, stated as the count was being wrapped up.

Seeing the survey results uploaded to a dashboard instantaneously removed what would have been weeks of manual work for the staff. The City of Frederick was able to then export its findings and submit them to HUD in a matter of seconds by utilizing the ArcGIS Notebooks app to create a report that follows HUD data standards.

Location-Based Solutions Make for Long-Lasting Solutions

Location-based solutions have provided cities with a better understanding of where to direct their resources and efforts. The City of Frederick, like many other communities, has learned how straightforward using ArcGIS software and solutions can be to better conduct annual PIT counts.

The PIT count provides local governments with the data needed to make decisions on where to allocate resources, provide services, and plan housing strategies. With the use of digitized, location-based solutions, local governments can submit this data to decision-makers almost immediately, giving them the data needed to work on long-lasting community solutions.

The City of Frederick will continue to use the ArcGIS homelessness PIT counts solution to efficiently conduct future counts. The city also plans on using the solution for the 2022 Youth Reach Count, Maryland's effort to better understand the number, characteristics, and needs of minors and young adults who are on their own and struggling with housing.

With the accurate data GIS provides, the City of Frederick can efficiently and effectively see where residents need the most support and then allocate resources to these areas.

↓ City staff travel to encampments like the one below to conduct the Point-in-Time count.

Improved Productivity and Asset Management: Lessons from the Rhode Island Department of Transportation

The ability to access and track data is critical for managing transportation projects. With scarce funding for transportation projects, the ability to measure return on investment (ROI) has become an important element to include in states' transportation plans. Rhode Island Department of Transportation (RIDOT) stakeholders and staff need more data to make timely and informed decisions.

Digitizing the transportation data intake process is making it possible for the state to realize higher ROI.

"Digitizing data has reduced staff time spent on collecting and updating transportation data in half. Staff at RIDOT and Rhode Island's Metropolitan Planning Organization [MPO]—the state's transportation policy-making body—are able to prevent duplicative efforts that can be made when manually collecting data. It also reduces the need to copy things over twice and do other inefficient practices," said Pamela Cotter, policy director at RIDOT.

The biggest ROI benefit that RIDOT staff have realized from digitizing data is the ability to visually spot opportunities to combine projects. The amount of data required to build and maintain highways, bridges, pavements, and sidewalks and

↑ The STIP Programming Bundler map allows staff to narrow down searches to specific projects and attain asset-related information quickly.

even manage road striping is tremendous. Rhode Island's efforts to build the STIP Programming Bundler map have saved RIDOT countless staff hours by minimizing manual data input and eliminating redundancies. Time is saved on the planning side, resulting in cost savings on the project delivery side.

Initially, the state's transportation plan focused on technical works, including a primary database and the design of the applications RIDOT uses. As the state continues to expand the project, educating people about how GIS works and what it can do has also become a critical element of the transportation plan. Asset inventories have been key to the expansion of the project.

"We decided to use GIS in the field to collect and manage our data inventory. The technology also was used to build applications and other tools for the project," said Stephen Kut, program analyst, RIDOT. "Without GIS technology, the project could not have been completed. GIS was the basis of this entire project."

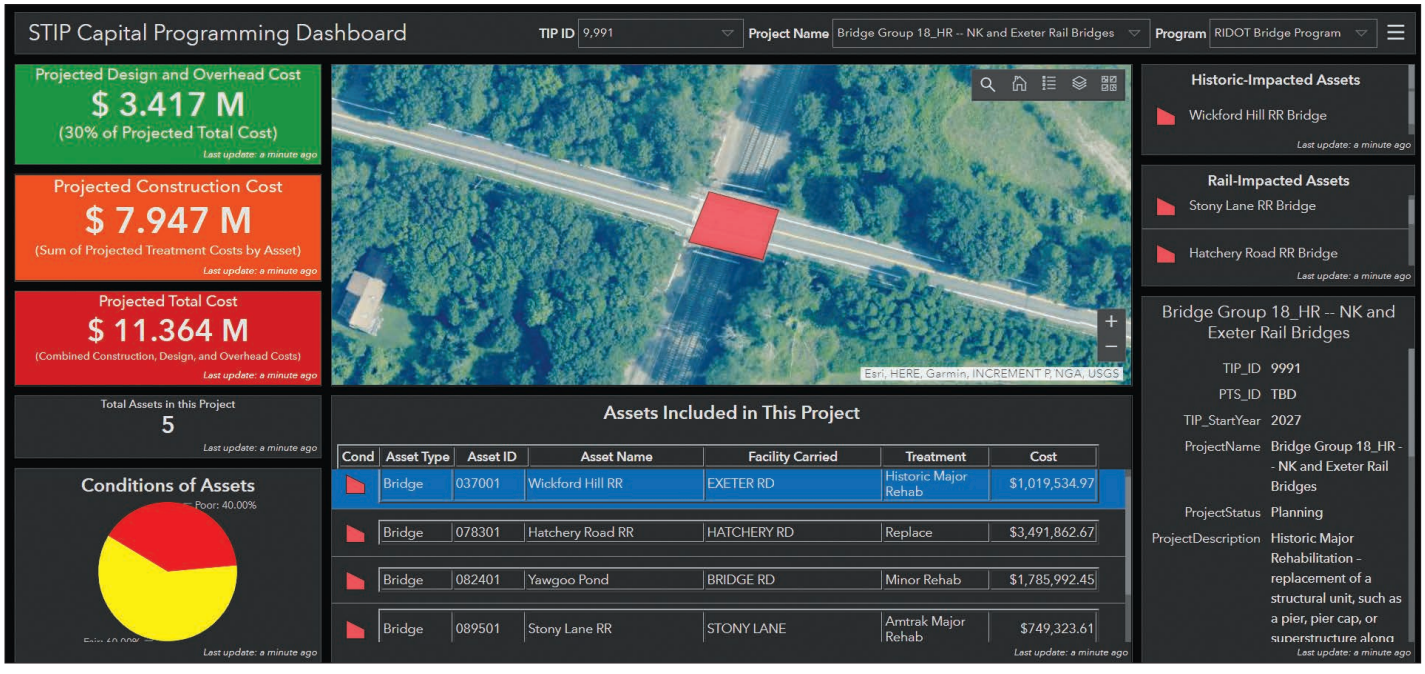
The primary benefit for RIDOT is time savings. The access to so much data enables RIDOT and other departments to generate many custom reports. Ken White, principal economic and policy analyst, RIDOT, generates up to six reports a day. RIDOT has also prepared a primary report for the transportation program. The new system allows the preparation of that report to be automated.

In the future, RIDOT's GIS will produce financial reports as well as project reports organized by town and population. Project reports that are generated by town represent the most-requested feature of the technology.

"Investing in GIS tools is going to save us in the long run because we will continue to build on the existing data. We want to be thorough and transparent, concentrating on the assets themselves. It also helps with budgeting and efficiency," said Cotter.

The last quarter of 2019 was spent designing the new system. By the spring of 2020, RIDOT had an operational system in place. Staff members are quick to point out that they are continually improving the system and developing new projects, many of which can be transferred into new ideas and processes.

For more information on how transportation agencies can use GIS, visit **go.esri.com/roadsNmore**.



↑ The STIP Capital Programming Dashboard relays the same information as the STIP Programming Bundler map but has much easier functionality to see specific projects.

4 Key Takeaways from the 2022 Esri Public Sector CIO Summit

On April 6 and 7, 2022, information technology (IT) leaders descended on Esri headquarters in Southern California for a nonvirtual, live event experience for the ninth annual Esri Public Sector CIO Summit. Each year, CIOs, IT directors, CDOs, and CTOs in state, city, county, and regional government attend this summit to receive a brief on the latest GIS capabilities, emerging trends, and best practices so that they can better communicate and leverage the power of GIS technology. This year there were four major themes that emerged among this group of executives. These are the priorities your leadership will look to you—as a GIS professional—to address with your GIS expertise.

1. The Geographic Approach Leads to Award-Winning Success

For years, many organizations at the summit would share a successful project or a more efficient workflow achieved through the use of GIS. But this year, leaders from jurisdiction after jurisdiction showcased how acceptance of the geographic approach led to massive adoption of GIS technology across their organization. They described how GIS allowed them to modernize, empower new departments with the technology, and rapidly innovate. Fairfax County, Virginia, GIS program director Michael Liddle received the Enterprise Approach to GIS Award for his leadership in empowering more departments and county staff with GIS solutions. Allentown, Pennsylvania, CIO Matthew Leibert received the Innovations in GIS Award for his demonstration of leadership during the COVID-19 pandemic and pioneering the use of GIS to enhance contact-tracing efforts not only within the city but across the region as well.

It was clear that the pandemic made IT executives more aware of the power of GIS and that they are looking at it as a critical infrastructure that other IT systems must integrate with. Trailblazing leaders are those who are apprised of the latest GIS capabilities and understand how it can enhance their workflows and support their priorities.

2. CIOs (and therefore you) Have a Role in Providing Solutions for Addressing Emerging Challenges

Every year, there is rhetoric around the role of the CIO expanding. And while this may be cliché, this has never been truer. Emerging challenges regarding topics such as broadband, electric vehicles, equity, and the presence of lead in water are just a few examples of cross-departmental issues that governments must address. But with these topics being so cross-cutting and involving multiple stakeholders, CIOs have an immense opportunity to lead the strategy and provide solutions.

Many of these challenges can be addressed with ArcGIS Solutions, the collection of configurable applications and dashboards that all Esri users have access to for free. Esri's ArcGIS Solutions team announced new GIS solutions to address broadband planning and investment. The team members also provided a preview of their work on future solutions, including tools for electric vehicle planning and the Environmental Protection Agency (EPA) Lead and Copper Rule. CIOs have recognized that these complimentary solutions can easily address the needs of the departments they serve. We invite you to explore the complete list of ArcGIS Solutions configurations and how they can help address top-of-mind issues such as equity, broadband, homelessness, opioid abuse, and right-of-way management. (See page 14 for more specifics on the broadband solutions.)

3. Everyone Is Thinking Equity

It should not come as a shock that almost every presentation discussed equity. One of the most inspiring and memorable presentations was from the City of San Diego, California. Kim Desmond, the chief of race and equity, and Kirby Brady, the chief innovation officer, discussed the need for greater collaboration between data leaders and equity leaders in order to address equity. Within their city, Desmond and Brady showcased how their close partnership has allowed them to deliver GIS data and tools to more departments with equity in mind. From parks to services to ways of addressing climate change, GIS is helping Desmond and Brady establish a benchmark for improving equitable access for all residents and allowing the city to have more informed conversations on equity with residents, department leaders, and elected officials.

In a conversation on how governments can leverage the various federal funding opportunities (the CARES Act, ARPA, IIJA), Teryn Zmuda, the chief economist and chief research officer from National Association of Counties (NACo), stressed the importance of including and considering equity when using funding or applying for additional funding. She mentioned that with the current administration's immense focus on equity, your considerations on addressing civic inclusion and delivering more equitable services will make all the difference in how you are able to use funds and apply for new funds.

The additional presentations that included equity made it clear that jurisdictions are using GIS in almost every department and workflow to target the unserved or underserved, better allocate resources to those at risk, enhance opportunity for more residents, and track their progress to improve equitable conditions.

4. Storytelling and Educating Up Are Essential to Success

Communicating your work to upper management and leadership is essential for securing buy-in and justifying GIS investment. National Geographic Society discussed the importance of storytelling and how it can help secure executive support, expand awareness of success, and establish meaningful connections that propel our work forward. In his closing remarks, Jack Dangermond stressed the importance of educating up—the practice of informing executives on GIS capabilities and how GIS tools can support their initiatives. The more you educate up, the more leadership is on board and supportive of GIS expansion within your organization. That starts with you—the GIS staff—communicating to CIOs and IT leaders, who then are empowered to communicate to their leadership and the elected officials. Success can't be recognized if no one knows about it.

To check out the event proceedings and get caught up on what IT executives witnessed, visit **go.esri.com/2022-cio-recap**.

↑ The chief of race and equity and the chief innovation officer of San Diego, California, showcase how GIS helps the city address equity.

↑ Executives from Fairfax County, Virginia, and Allentown, Pennsylvania, received inaugural awards for their leadership in embracing the geographic approach.

North Carolina Manages Inventory of State-Owned Real Estate with Web Experience Builder Solution

continued from page 1

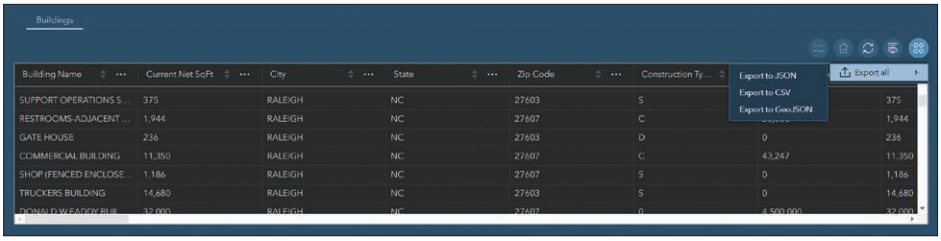
new interface to the public-facing site to tap into that [geographic] data. The original site for searching and querying was text based, so it didn't have a map viewer as a part of the page."

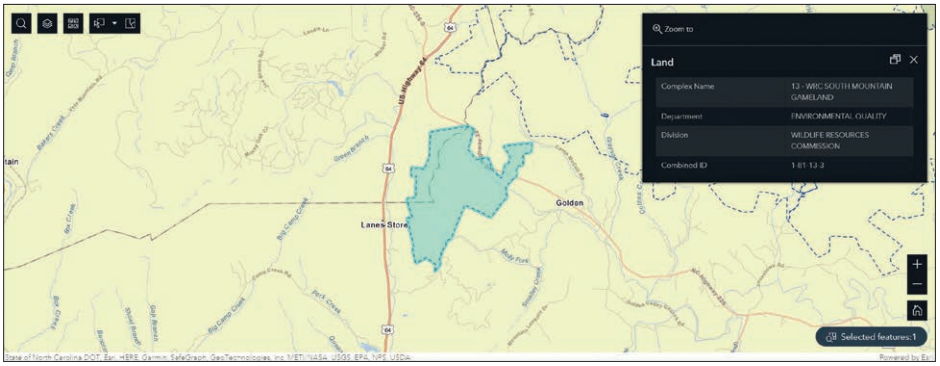
The State Property Office also wanted to develop a new site with ArcGIS as its backbone and use Cartegraph software that seamlessly integrates with the ArcGIS system, explains Charlie Charping, a GIS consultant with Patrick Engineering. Cartegraph software is designed to help organizations manage physical assets and operations.

"Another driver for the [new] site was to be able to tap directly into that [geographic] data," says Charping. "Since that data was already in Esri format at that point now, it just made sense to have the public-facing site tap directly into that data, instead of some complex process to extract the data from geographic information system and then put it back in another database just to get it back into the legacy system."

John Young, director of geospatial services for Patrick Engineering, echoes this sentiment and says he and Charping aimed to tie the data back to the State Property Office's real property management system to ensure that users could obtain near real-time information. This would also enable easier updating of information on the site.

> "Experience Builder is delivering a whole new level of flexibility to be able to offer a range of ways to look at your information. I think what Experience Builder has done is tap into new ways for delivering business intelligence."
>
> —John Young, Patrick Engineering





↑ The database view portion of the ArcGIS Experience Builder application shows text results and enables users to export data from the application.
↑↑ The interactive map portion of the Experience Builder application displays search results on a map.

"There was just a need to update and make that [data] available to the citizenry of the state of North Carolina," says Young.

Solution

With a strong interest in the project, Patrick Engineering, an engineering, design, and technology firm founded in 1979 and an Esri partner for more than 20 years began work on the new site. The Patrick geospatial services team members selected a product they had learned about at the Esri User Conference: ArcGIS Experience Builder. ArcGIS Experience Builder is a tool that allows users to transform data into web apps without writing any code. This would be the first time Young and Charping used Experience Builder for a client project.

"As soon as I learned about it, I knew immediately that this was going to be a great solution for many of our clients without even having any use cases at that point," says Charping.

For Charping, a primary driver for selecting Experience Builder was to have more control of the layout of the site compared to other solutions. He explains that without Experience Builder, the team would have had to recruit more developers to build the custom site from scratch. In addition, since the solution needed to integrate with ArcGIS Online, the Patrick Engineering team wanted to capitalize on the out-of-the-box tools Experience Builder offers, which reduces costs.

"Having Experience Builder was just a great option because it allowed us to be competitive in scoping the work with John [Cox], because having that SDK to work with meant that we could do the work at a lower cost . . . saving the State of North Carolina money and [providing] a great end product," says Charping.

Charping learned how to use Experience Builder with self-paced learning, including watching educational videos, reading available documentation, and connecting with other users in the Esri Community for users of Experience Builder. He says Experience Builder was very intuitive for GIS professionals who have developed with SDKs from Esri.

"In a nutshell, I taught myself how to use it, and it seems to be a great tool [that will] continue to mature and bring even more functionality," says Charping. "There were some hiccups along the way but . . . this speaks to the work [staff] have done at Esri. I was able to figure all this out without having to go through any instructor-led training."

Charping and Cox kicked off the project by meeting to discuss what Cox wanted in the new site, which included a map viewer and the ability to export data. Cox also wanted the look and feel of the site to be similar in layout and navigation to the legacy system for a simple transition for users. The team assembled a group of other state agencies to view the test site and provide feedback on the look and feel of the page.

The new site was moved from a locally hosted system to a cloud-based system with GIS data added. Cox says the State Property Office provided some training to users on how to use the tool, and feedback from them has been positive.

The data in the system is organized by location including county and complexes, which are geographic locations. Data also ties in with the North Carolina Department of Insurance for agencies that want to confirm that a building is insured.

Results

The new site has improved the user experience with enhanced capabilities such as exporting records and visualizing data on a map, giving state agencies geographic context to their data. With 8,000 hits to the site over the course of seven months, usage has increased and now gives users details on their current inventory. The map allows users to see building locations, a notable improvement from the previous text-based system.

The new Experience Builder site is now viewable on mobile devices and tablets and gives users full functionality, even if not on a desktop computer. The site is composed of multiple pages that are sorted by property and asset type. Predefined queries mean users can search by department division, county, street address, or building name. Once a result is selected, the map will zoom to that area and highlight it.

The site has empowered users to obtain the data they need on their own, without needing assistance from the State Property Office. Previously, state agencies would call or email the office with requests, and Cox would have to create a report; export it to a spreadsheet program; clean it up; and then send it to the user and create a map, if required. Now, users can see the property and export the data themselves.

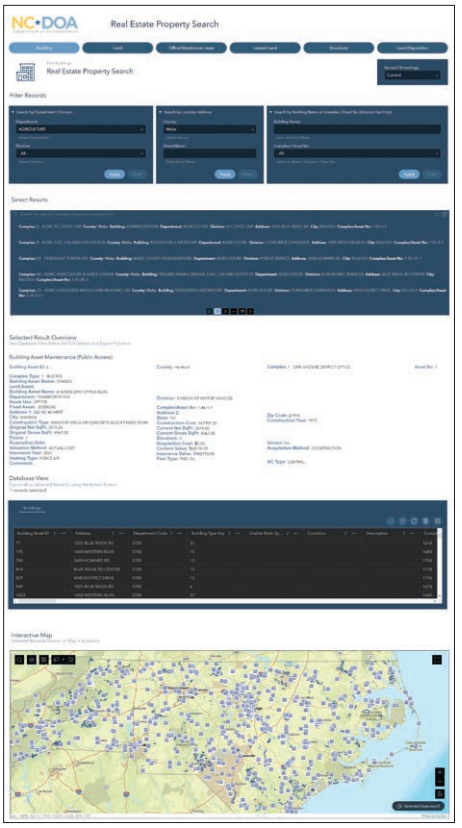
"Once the users were fully trained and they learned how to use it, it reduced calls and inquiries to me directly. It's helped my job and my staff serve the state agencies and the public with information," says Cox.

Experience Builder lets users easily add and manage pages, which was beneficial for this project, according to Charping. He explains that because the site had multiple pages that had similarities, the ability to take a page and duplicate it and change out the titles and data sources—as opposed to creating a page from scratch—was valuable.

"The ability to look at the [page] outline and give it tags and titles that made sense to me as I was building it was super helpful to make sure that I was connecting all the dots and architecting this in the correct way," says Charping.

The property data from the State Property Office is now being managed with Cartegraph and Esri technologies. Charping explains that with Experience Builder, the team tapped right into the REST services coming out of ArcGIS Server, increasing efficiency by not having to do more extract, transform, and load (ETL) work on data to put it back in another database.

"If it weren't for this site, I think we would've had to jump through some other hoops to wire up that data back from Cartegraph into [the] legacy system," says Charping.



↑ This is a view of the whole North Carolina State Property Office public-facing Experience Builder application.

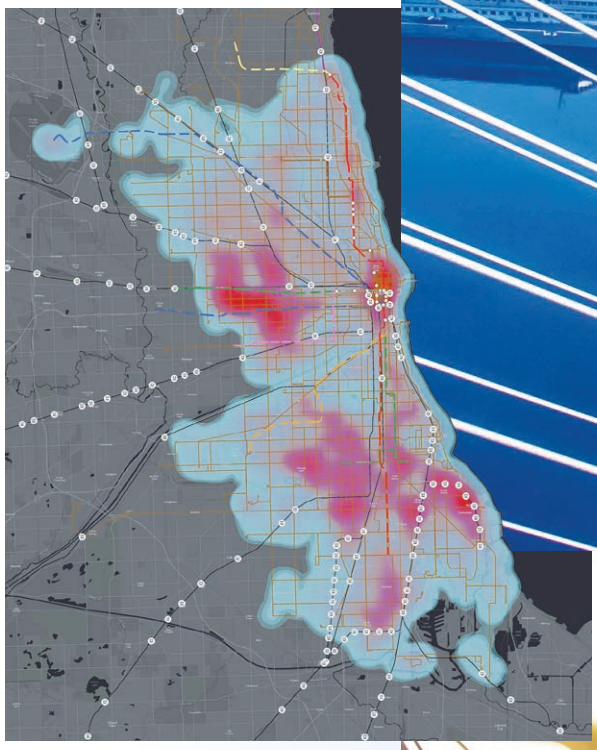
Experience Builder enabled the Patrick Engineering team to customize the design of the new site. Charping believes the ability to customize the site's layout has resulted in a more holistic view of what the site is intended to show and gives people better ways to interact with that data than they could get with just a text-based search.

"[I liked] the flexibility to place elements on the page wherever you want them to be, and the ability to really create more of a full website, not just a single map viewer," says Charping. "I feel like it opens up the floodgates for GIS professionals to be able to produce something that is based on GIS but—as the name [says]—is a whole experience."

Young adds, "There is a lot of business intelligence or tools out there that present a lot of ways that you can consume analytics, but if you're just looking for business intelligence about a particular asset, I think Charlie's proven out that this is a very good tool to use."

Navigating the Stimulus Programs

Progressing the Health, Economy, Infrastructure, and Equity of Our Communities with GIS



As the nation continues to bounce back from the pandemic, government organizations are using a geographic approach to speed up their economic recovery. Esri, the global leader in GIS technology, has resources designed to help governments see how they can use GIS to align their recovery efforts with available federal funding opportunities.

Making the most strategic investments with federal funding involves finding the optimal balance among factors such as safety, sustainability, equity, and mobility to achieve the greatest societal benefit. GIS analysis can help you understand the trade-offs between different investments and scenarios, ensuring that agencies' dollars deliver the greatest impact.

Esri has resource sites devoted to the following funded areas:

Community and Economic Development

Transportation

Health and Human Resources

Broadband

Environmental and Natural Resources

Public Safety

Stay up-to-date on the latest insight on using GIS to align your recovery efforts with federal program objectives. Visit Esri's web page at **go.esri.com/SLN-StimulusFunding**.


POLICE

New Broadband Solutions Ensure Equitable Investments

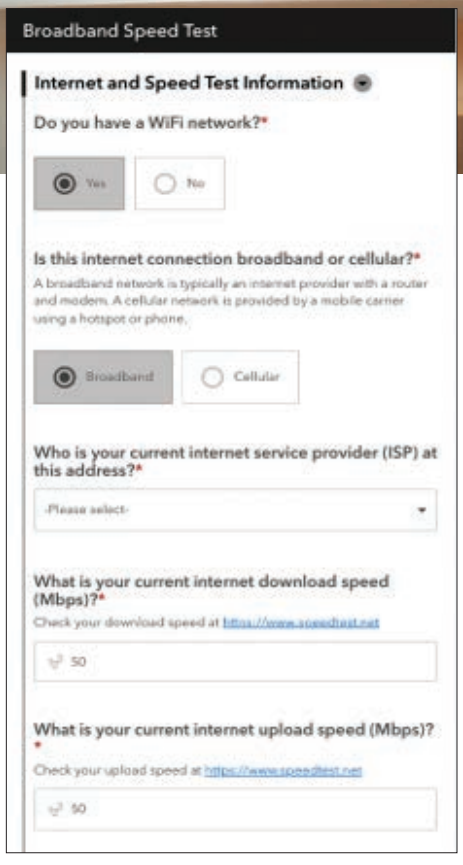
Geoenabled Solutions Address the Digital Divide in Three Steps

The Federal Communications Commission (FCC) estimates that approximately 35 percent of Americans do not have access to reliable internet service. That means 35 percent of your population may not have access to job, telehealth, education, or additional economic opportunities. To close this gap, governments must understand where gaps in broadband coverage exist, and use a geographic approach to make smarter infrastructure investments that promote equitable access.

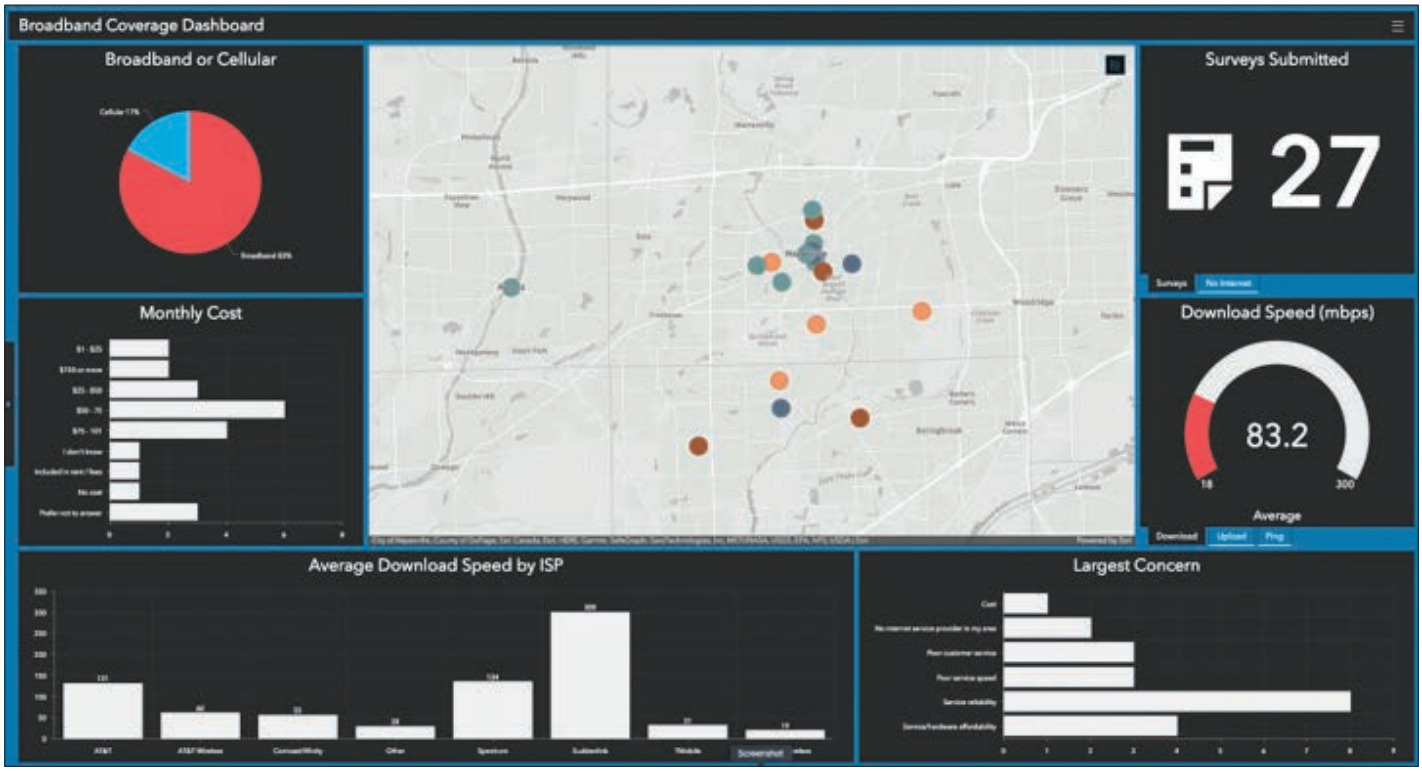
Esri has released a new ArcGIS Solutions collection called Broadband Outreach, which will help state and local governments understand broadband coverage in their community, inventory broadband investments and resources, and promote actions being taken to address the digital divide. Broadband Outreach solutions allow governments to carry out three essential capabilities.

1. Understand Current Broadband Coverage

To address broadband challenges, governments must first identify current service levels and establish baselines through accurate data collection. While the FCC has released broadband availability data, this must be supplemented with more current and localized insight obtained directly from residents. Broadband Outreach includes the Broadband Speed Test, an ArcGIS Survey123 configuration that can be used to solicit broadband speed tests from the public so that you can better understand broadband coverage in your community. You can adapt the configuration to get more feedback on your community's needs by including questions on current internet use, income level, household size, internet provider, and more. Deploy the Broadband Coverage Dashboard to monitor the broadband



↑ The Broadband Speed Test is an ArcGIS Survey123 configuration that residents and businesses can use to record broadband speed test results and provide additional feedback.



↑ The Broadband Coverage Dashboard, a configuration of the ArcGIS Dashboards app, can be used by decision-makers to monitor broadband survey metrics.

speed test results as they come in. By starting with a more accurate picture of broadband access, you can begin to better prioritize your investments.

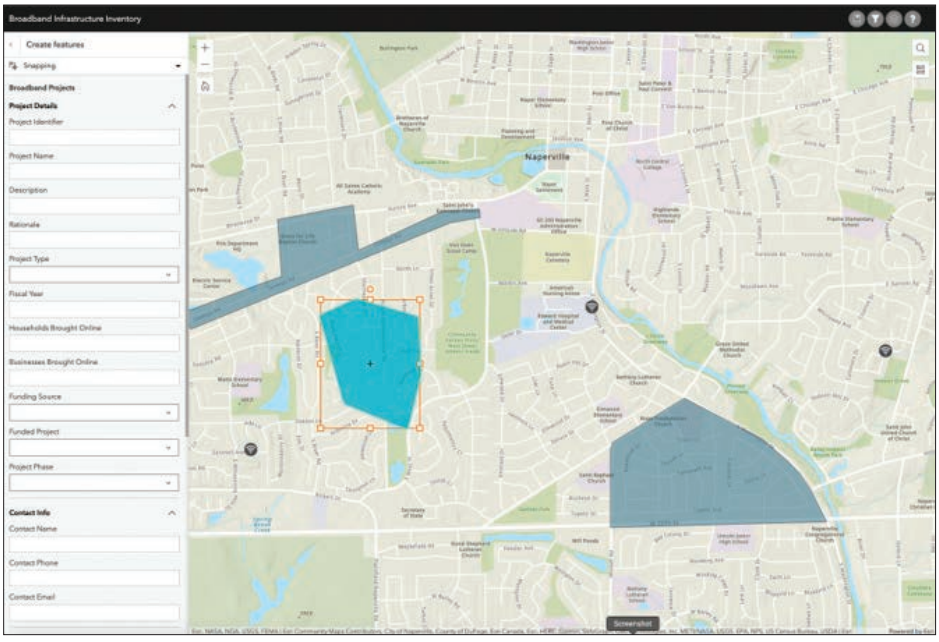
2. Streamline Broadband Investment and Resource Inventories

With historic amounts of federal funding available to drive expansion of broadband networks, government leaders need to feel confident in their investment decisions and where they will allocate funding and resources. GIS tools can provide insight to reduce or eliminate biased budget practices that may overlook underserved or unserved neighborhoods. The Broadband Infrastructure Inventory app can be used to create and edit public Wi-Fi and broadband project locations so that you can understand where resources are available in your community and where investments are being made.

3. Increase Public Awareness of Government's Work to Address the Digital Divide

With broadband access being such a major pain point for residents and an economic differentiator for communities, it is essential to communicate your

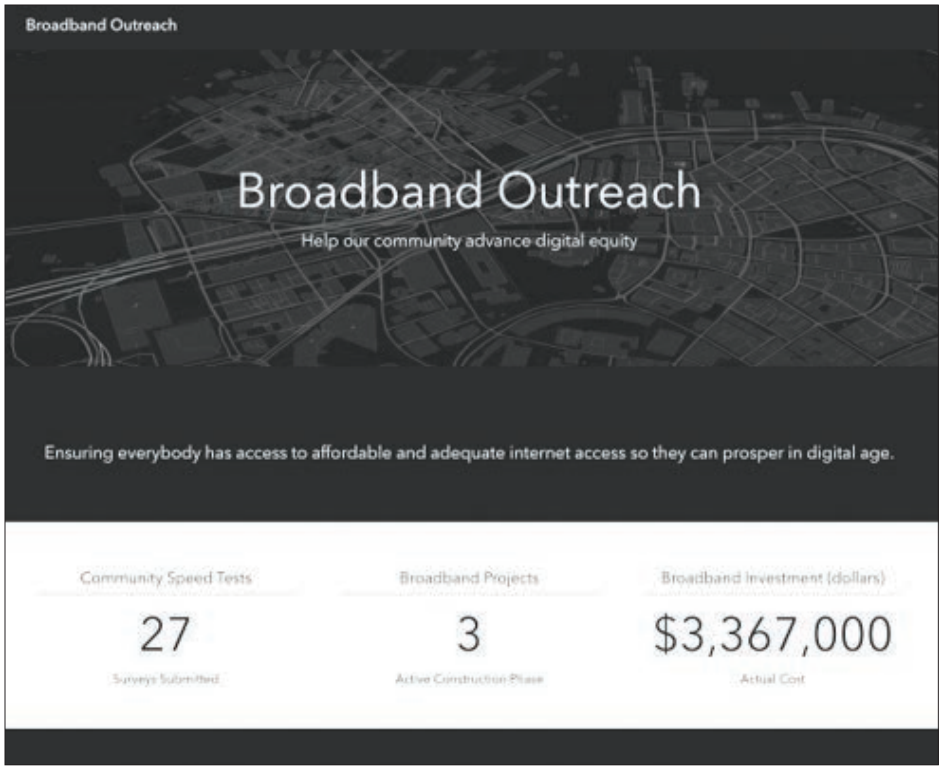
continued on page 16



→ The Broadband Infrastructure Inventory app, a configuration of ArcGIS Experience Builder, can be used to create and edit public Wi-Fi and broadband project locations.

New Broadband Solutions Ensure Equitable Investments

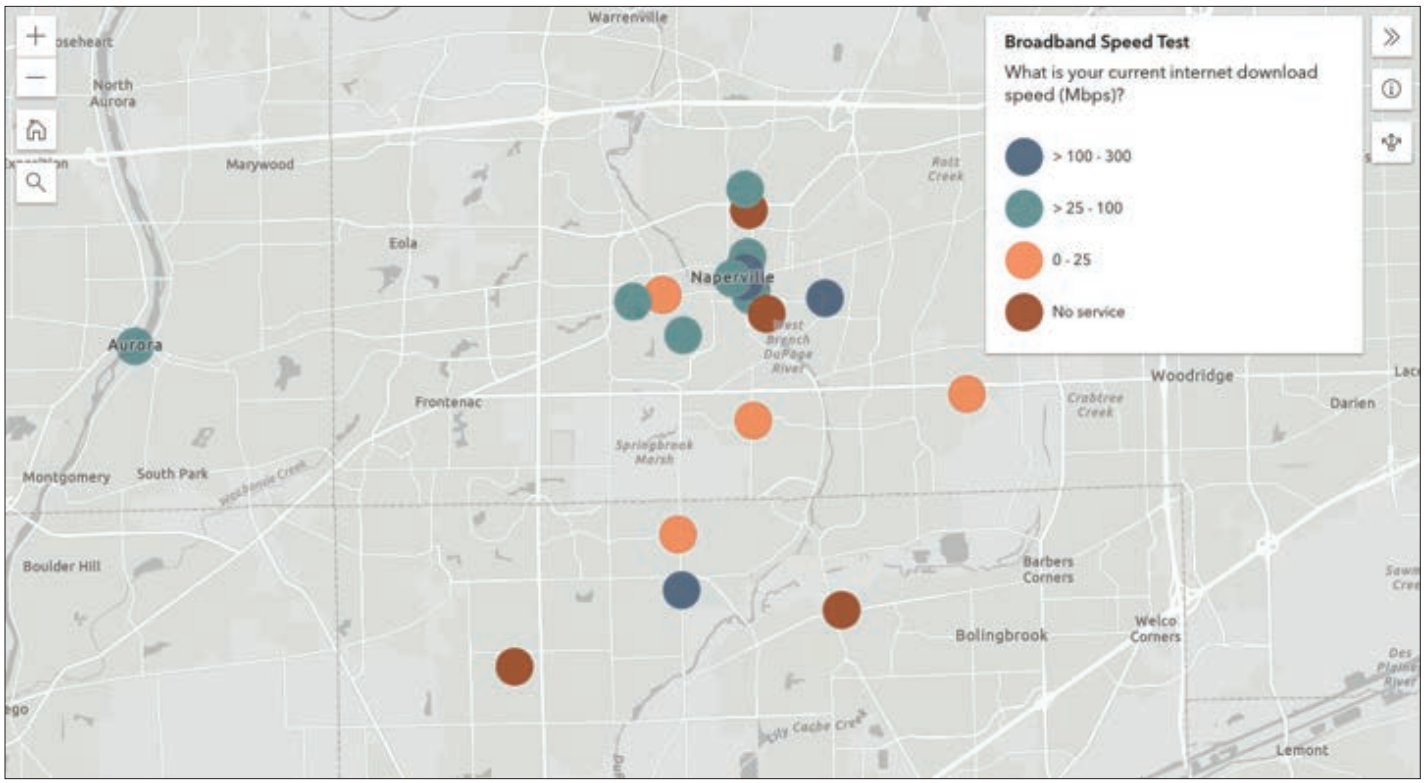
continued from page 15

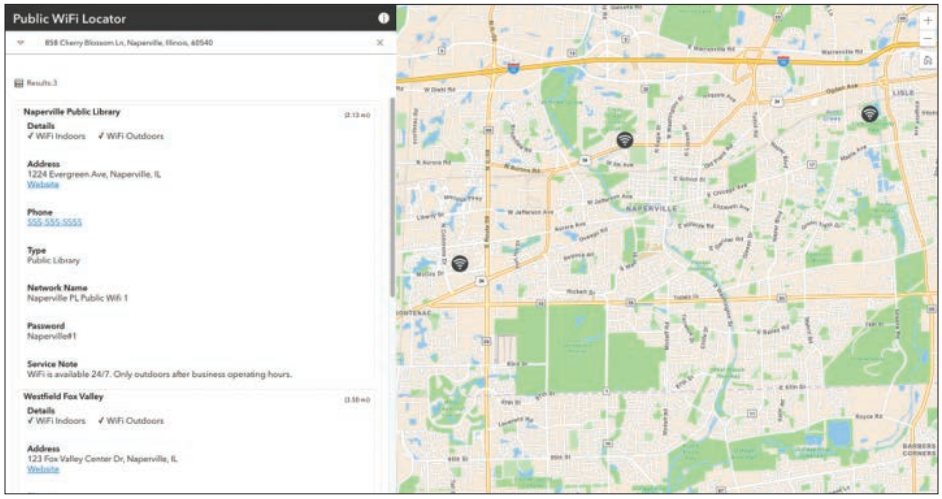


↑ The Broadband Outreach hub site, created using ArcGIS Hub, allows the general public to learn more about the broadband investments being made and how they will help improve coverage and advance digital equity.

progress and the investments you are making in your community. You can use the public-facing Broadband Outreach hub site to share broadband investment information and promote the available resources and actions that are being taken to address the digital divide. Deploy the Broadband Survey Results app to share the results of the broadband speed tests with residents so that they can better understand broadband coverage across the community. Make finding the locations of Wi-Fi hot spots easy for residents who don't have access to the internet at home, with the Public WiFi Locator app. The Broadband Investments app can be used to share active broadband investments in a modern, map-based report so that internal and external stakeholders understand the status of investment activities. Make sure residents know you are committed to providing affordable, reliable broadband by relaying coverage information as well as news about your work to improve access.

↓ The Broadband Survey Results app can be used by the general public to view Broadband Speed Test survey results.





↑ The Public WiFi Locator app can be used by the general public to find public Wi-Fi locations.
↑↑ The Broadband Investments app, created with ArcGIS Experience Builder, can be used by residents and other interested parties to review broadband investment projects.

Incorporate Equity into Every Step

The COVID-19 pandemic laid bare the significant gaps in broadband access and affordability that communities must address to ensure equitable opportunity for all. An effective broadband strategy must guide where money should be spent to make the biggest impact and support underserved populations. To do this, organizations can leverage Esri's Social Equity Analysis solution. While not officially part of the Broadband Outreach collection, it is a complementary solution. It allows governments to understand community characteristics and generate an equity analysis index that helps identify areas within a community that are adversely affected by lack of reliable broadband access. The solution creates an equity index map that can be shared via the Broadband Outreach hub site. The solution was developed with input from the Government Alliance on Race and Equity (GARE) and works to incorporate social equity and civic inclusion into any agency workflow. With this insight, community leaders can make data-driven decisions on where to allocate resources or investments to make the biggest impact.

To access and deploy the broadband solutions, visit **go.esri.com /new-broadband-solutions**.

Esri Receives Award for Its Broadband Outreach Solutions

These solutions were developed as part of the recent National League of Cities (NLC) Capstone Challenge series. They were tested by three city staff members. Esri received an award from NLC in recognition of delivering this set of GIS-based solutions, which will help communities prioritize broadband infrastructure spending, with a lens on equity.
go.esri.com/NLCESRI

Esri Site Lists Broadband Expansion Funding Opportunities

Visit Esri's federal funding website, where you can find opportunities that will support your broadband investment and expansion efforts.
go.esri.com/broadband-funding

GIS Allows Colorado Department of Transportation to Capture the Full Value of Its Properties

Bringing right-of-way data into a GIS environment is enabling the Colorado Department of Transportation (CDOT) to maximize the performance and potential of its real estate assets.

A key advantage of GIS technology is how it allows spatial and related data to be gathered, secured, and made accessible to a wide number of users. GIS services enable many disparate stakeholders to not only edit and maintain information but also provide access to support a wide range of business-specific applications.

CDOT's effort to move right-of-way (ROW) and real property information from its historical place in the filing cabinet and into a GIS database environment is a case in point.

Now, with just a simple query, CDOT's GIS team is able to provide both internal and external customers with accurate information on DOT owned and managed land and easements. Previously, such an effort might have required days or even weeks of searching, or else the results would have been little more than educated guesswork.

CDOT is now also increasingly able to see the true extents of its individual property assets and to determine how best to maximize and monetize these—whether by selling off excess parcels or by installing solar power generation in the right-of-way, both of which generate revenue for the department.

Data Gathering

The ROW effort at CDOT started in 2012, initially not so much for parcel data, but rather as the GIS team began to understand how to use CAD-to-GIS interoperability tools to move data from Bentley Systems software to its Esri-based GIS. It was not long before the GIS staff recognized that the ability to move data from CAD to a GIS could prove useful for converting all the paper and CAD records to a GIS, as Nick Mesenbrink, a GIS specialist with CDOT, explains.

At about the same time, CDOT's Headquarters ROW office, which had previously relied on the five regional offices for parcel and right-of-way information, began to investigate the possibility of having a centralized spatial database of the DOT's right-of-way.

These two efforts converged a couple of years later when CDOT brought on an external consultant (Applied Geographics) to help catalog, inventory, and convert the source plans and documents associated with the DOT's right-of-way.

The work done by Applied Geographics to help set up the ROW GIS database took five years and finished in March 2020. It represents a multimillion-dollar investment for CDOT. A strategic approach was taken to prioritize the ROW source documents, in the sense that the most recent (and, therefore, likely the most accurate and complete) were cataloged and incorporated first. CDOT's GIS team took a driving role in the conversion effort, which essentially set out to catalog "whatever we could find," according to Mesenbrink. That included delving deep into the regional offices' archives, as well as into new projects that included ROW-related information.

Two methods were then used to process the found data: the first involved converting DGN files where available, and the CAD-to-GIS tool was used to convert existing MicroStation files to GIS. The second and more labor-intensive method involved georeferencing and digitizing PDF files of right-of-way plans and as-builts and creating GIS records from that data.

The first method was responsible for producing roughly 20 percent of the records, while the more manual process accounted for about 80 percent of the total effort. Together, they were able to account for over 80 percent of the state's highways having GIS-based ROW information apportioned to the ROW database—rights-of-way boundaries, land parcels (including general ledger information apart from the highways), easements (both slope and permanent), and so on. The remaining 20 percent consists of either incomplete or missing source files, but the GIS platform includes a layer that shows where these areas are. These gaps are marked for future research by the team.

Life Cycles and Standards

The next stage was to start developing a life cycle for the continued maintenance of the data.

"Applied Geographics did a great job, but they were only able to capture what we gave them," Mesenbrink explains. "If they were only able to find a 1950s plan, then that's what they processed. If something came up that had happened in 1990 but a record couldn't be found, then the 1950s version remained the current one."

Recognizing the data currency issues, the GIS team is working with CDOT's Headquarters ROW group and Property Management teams to develop processes for data maintenance to ensure that the data is continuously maintained, and CDOT recently hired an intern to carry out the QA/QC work. This work includes checking the GIS database against county parcel records.

"We're lucky that in Colorado the Governor's Office of IT has been compiling statewide parcel GIS data. We can

↑ Staff can easily toggle between layers and in seconds filter between the different types of ROW and easements.

compare our data with that for all of the counties," Mesenbrink continues.

"CDOT's Property Management team, which operates separately from the Headquarters Right-of-Way group and from the GIS team, is interested in using the parcel data as their official parcel catalog," he says. "Right now, they're using Excel. We're really invested in getting the parcel data up to speed so that they can use it in real time. Getting that intern will really help."

Standards are an inevitable requirement, and another preoccupation for Mesenbrink has been building the documentation on how everything works—the metadata.

"We want to be really transparent about this data," he says, "and following feedback from the Property Management team, we're currently right in the middle of revising the data schema to enhance the usability of the data. The Property Management team is also going to be making an additional full-time hire to handle GIS data. That'll significantly increase our capacity to handle data updates and maintenance going forward."

Visibility and Dashboards

Colorado has been a leader in the development and use of dashboards, gaining praise (and awards) for its efforts from the National Association of State Chief Information Officers (NASCIO).

CDOT's GeoHub, which is powered by ArcGIS Hub, enables staff to develop, share, and use geospatial applications, web maps, and data. Built on Esri's ArcGIS Enterprise portal, it is a NASCIO award winner and provides users with information on traffic operations, wildfire situational awareness, freight and trucking, avalanches, Americans with Disabilities Act (ADA)-compliant curb ramp accessibility, operations readiness, and buildings assessment condition, among other applications.

The GIS team is already making the ROW data accessible and transparent. There is logic to this because as a multimillion-dollar project, which needed State Transportation Commission approval visibility of the data is highly important.

"For example," Mesenbrink explains, "we've looked to give the Property Management team the ability to see their data in real time, including how many excess and remainder parcels it has and how many leases they have in a given county, as well as other information by grouping.

"It's important to understand that this isn't survey-grade data. It's planning and mapping grade. The intention of the Real Property viewer is to get people to the authoritative data, to be a pointer to the as-built plans, deeds, leases, and so on. Previously, there was no one place that you could access that, but CDOT's ultimate aim is to have all data in one place.

"I don't see our ROW data going to any greater resolution—10 to 20 ft. is fine for planning purposes. That still allows the CDOT teams, including Property Management, to do some pretty cool things, though—and perform some very interesting analyses.

"We've been working with our Electric Vehicle Planning group to look at charging station placement, at solar power generation on rights-of-way, and with other state agencies to look at low overhead

continued on page 21

↑ The Real Property Data Viewer, the app that provides ROW information to the rest of CDOT, was originally created in ArcGIS Online and will be transitioned to ArcGIS Hub later this year.

Infrastructure on the Half Shell: Federal Funding for Oyster Stew

Chesapeake Bay Oyster Recipes consists of magazine cutouts and handwritten recipes in a small, tattered notebook that I proudly keep among my cookbooks. It is a collection of my great-grandmother's recipes, passed down to my grandmother and later to me.

The notebook is filled with the recipes that my great-grandmother cooked regularly for my grandmother in their little house on the Eastern Shore of Virginia. Sweet potato biscuits, baked crab, and deviled clams are just a few of the recipes that flood me with memories of visiting my grandmother nearly every year of my childhood. If my family and I arrived and the weather was cold, she inevitably had fresh oyster stew on the stove ready to serve as we walked in the door.

These recipes often rely on ingredients endemic to the Eastern Shore: blue crabs, eastern oysters, and the beautiful Hayman sweet potato.

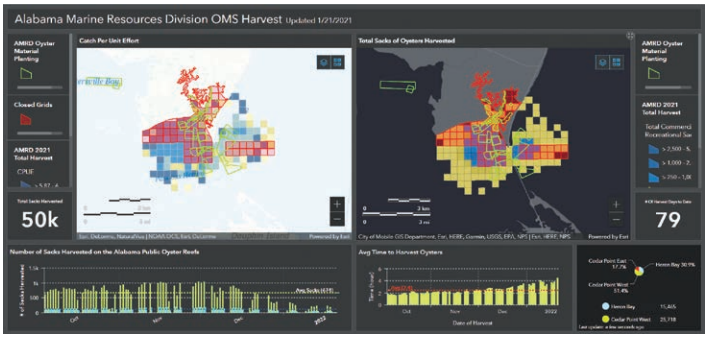
However, climate change, overconsumption, and a litany of other factors are resulting in the decline of healthy habitats that support these and other species along the coastlines, tidal marshes, wetlands, and other areas of the US and other countries around the world. Not only do these habitats contribute to a delicious variety of recipes, they also protect us from storm surges, flooding, coastal erosion, and other issues that are exacerbated by climate change. Ensuring their health, in turn, ensures our own health and wellness.

This is why at least two programs—those for habitat restoration and coastal zone management—in the Infrastructure Investment and Jobs Act were given a bit of a boost. Collectively, these two programs will receive $700 million as part of the nearly $47 billion earmarked in the act for climate resilience. Applications for funds through these two programs will be accepted beginning in the second quarter of 2022, with additional funds becoming available throughout the year for other, related programs.

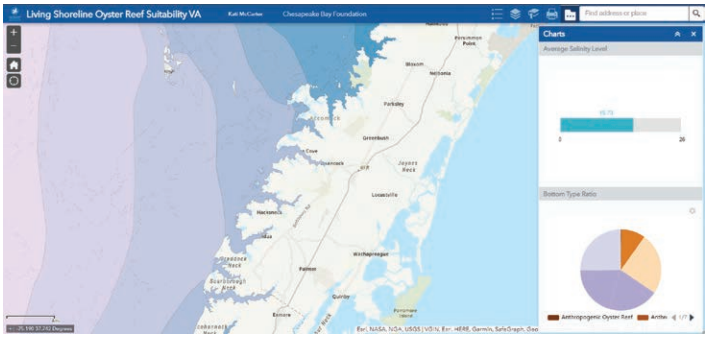
Many organizations are already applying a geospatial approach to tackling these complex challenges. I was delighted to come across a variety of endeavors from the Chesapeake Bay Foundation and I'd like to share a few examples here.

Restoring any kind of habitat requires that we know a few basic things such as answers to the following questions:

- **Where are these habitats and where are they most threatened?** Living Shorelines on the Nansemond River (arcg.is/1PPevm), an ArcGIS StoryMaps story, includes a variety of interactive maps that allow the user to examine coastline erosion through time. In addition to these maps, the StoryMaps story allows the Chesapeake Bay Foundation to guide users to understand what they're seeing, how erosion is being addressed, and other important pieces of contextual information.
- **Where are suitable locations to target restoration efforts?** The ArcGIS web app Living Shoreline Oyster Reef Suitability VA allows the user to explore a range of suitability metrics both collectively in spatial context and separately, broken down in a series of charts. These charts can be exported for the end user to include in reports, or the user can link the charts to forms and applications for the specified area.



↑ The Alabama Marine Resources Division Dashboard



↑ The Living Shoreline Oyster Reef Suitability VA Web App

- **Where has habitat restoration been implemented already and how is it doing?**
  The very simple but effective Living Shoreline Oyster Reef Suitability VA map allows users to see generally where oyster reef restoration has been implemented since 1996 throughout the Chesapeake Bay. This map goes a bit further, overlaying oyster sanctuaries, oyster plantings, and other key elements along with various widgets to allow end users to conduct basic queries and analyses on their area of interest throughout the bay.

Also, a great dashboard of the Alabama Marine Resources Division tracks oyster harvest over the past several years. Visualizing data like this, across both space and time, can help stakeholders make informed management decisions that protect not only our shorelines and these special habitats but also the livelihood of fishers and others supported by healthy ecosystems.

As organizations across our coastal communities prepare to apply for these grants, I'm looking forward to seeing even more examples of how they embrace Esri's innovative spatial technology. Whether it's to conduct the work outside, visualize these habitats and their complex interactions, analyze the success of restoration efforts, or provide context to stakeholders, GIS tools will help ensure a more sustainable future. My cookbook still has a few empty pages I'd like to fill!

To learn more about how GIS can align with federal funding programs, visit **go.esri.com/stimulusfunding**.

About the Author

Sunny Fleming is Esri's industry specialist for environment and conservation. With a background in plant ecology and botany, she has applied location intelligence throughout her career, from monitoring species in the field to helping state parks manage recreational assets across their systems. She continues to pursue her passion for protecting the environment by supporting others in applying location intelligence to their work.

GIS Allows Colorado Department of Transportation to Capture the Full Value of Its Properties

continued from page 19

dam analysis, land and water conservation, parcel cleanup and water quality . . . and a big one, one which originally got a lot of attention from the Transportation Commission, is selling off properties that are no longer needed and raising additional funding. Another example is helping our Roadway Data Management team to be more proactive about infrastructure improvements, capturing the information to update their HPMS [Highway Performance Monitoring System] data. That's important from a federal reporting and annual funding perspective."

Game Changer

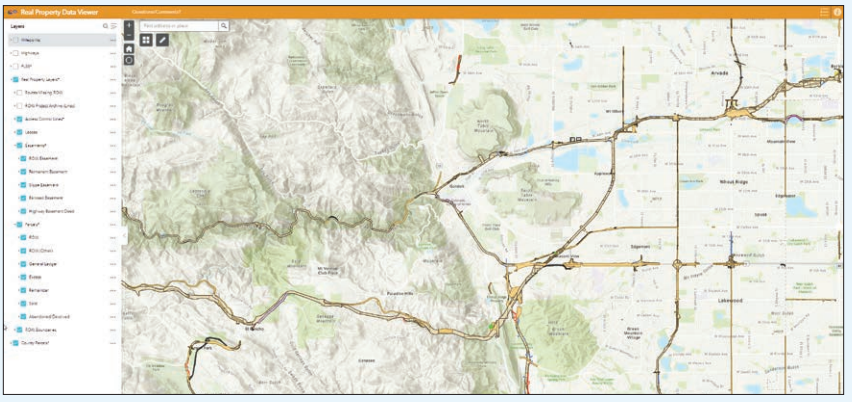
"We couldn't do any of this before because we didn't have the GIS representations," continues Mesenbrink. "Our precursor was centerline representations with links to the right-of-way plans. You couldn't see widths or anything like that. You couldn't do anything beyond [seeing] how many rights-of-way existed along a given highway. Now, we can do full spatial analyses. This data just allows people to see things they have never seen before.

"Intra-agency and interagency cooperation is already much improved, and eventually all of the data is expected to be public facing once we are satisfied with the quality and currency. The GIS team, the Headquarters Right-of-Way group, the Region Right-of-Way offices, the Survey Coordinator, and the Property Management team are all dedicated to seeing this project through and maintaining this data for the agency."

Mesenbrink says, "The data also holds the promise of being able to bring certain types of analyses—water quality and drainage, for example—in-house, which previously had been performed by a contractor.

"Rights-of-way provide a baseline for so much, and I'm surprised how few other DOTs have something like this. We're still discovering new use cases for the data, and as more assets come online in GIS, you're just able to do more and more. The sky really is the limit, and typically once a month we're having someone come to us asking about a new application of the ROW data. A year up the road, we'll hopefully have additional apps and interesting use cases that we've not yet even thought of."

For more information on GIS and Right of Way mapping visit, **go.esri.com/GIS4DOTROW**.



↑ As users zoom out of the Real Property Data Viewer, they can begin to see how much right-of-way CDOT maintains.

Ensuring That Thousands of Easements Remain Accessible Is Critical to Maintaining Infrastructure and Keeping Communities Safe

In the Charlotte metropolitan area, Union County Water operates and maintains the regional system that provides retail water and wastewater service to 55,000 customers located throughout unincorporated Union County as well as 13 of the 15 municipalities within the county.

With over 1,800 miles of service lines in its distribution system, Union County Water is also responsible for the areas where water and wastewater infrastructure assets (e.g., pipes and maintenance holes) are on private property. These areas are known as easements.

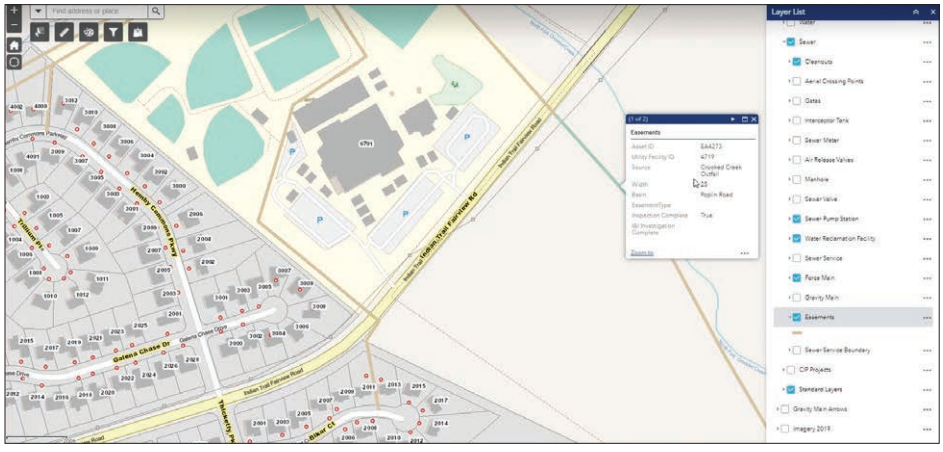
With over 7,700 easements throughout the county, staff turned to web-based maps and apps to inspect and maintain all water and wastewater assets that fell outside the right-of-way.

For years, Union County Water relied on paper reference maps with hand-drawn easements to direct staff in mowing and maintenance activities for the organization's easement inspection program. Staff would report back with an estimate of how many easements were mowed and tell if any major obstructions were found. That information would then be transcribed from a checklist into a paper or tabular report.

The amount of time spent on this easement inspection workflow caused such a backlog of work that it was hard to track work orders and keep information current. Field employees were unsure of where certain assets were in relation to the employees' exact locations, and they lacked the ability to inform office staff in real time. Furthermore, seeing any progress of work was impossible.

The utility's GIS staff worked with the easement inspection team to develop a geographic approach to its inspection workflow to answer each of the pain points the team had previously encountered.

"We had a fairly comprehensive GIS for our water and sewer assets, but the easement dataset was a mess," said Luke Fawcett, business systems program manager at Union County Water. "The first step we took was to identify all water and sewer mains that were spatially off-street. We assumed that those segments had easements, and that was our starting point for the dataset. Over time, we index those with plans and as-builts and build the attributes in our inspection process."



↑ The Matrix H2O web map contains all of Union County Water's water/wastewater service lines, valves, and assets. Staff can navigate and view easement areas as well as identify what assets fall within each easement.

GIS Is for Field Inspection Crews

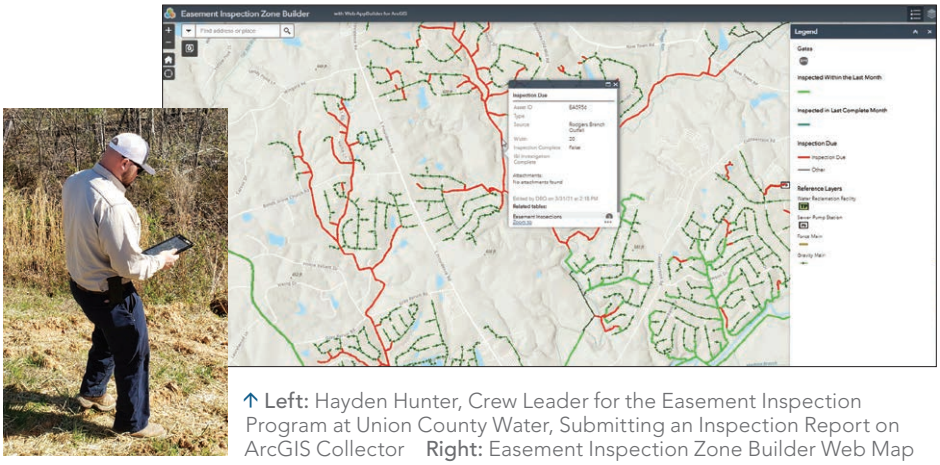
The benefit of mapping all of the easements really came when staff incorporated that spatial information and put it into the hands of easement inspectors.

Starting with the custom-built Easement Inspection Zone Builder web map, which uses the data of the easement locations, each easement section is color coded depending on when an inspection was conducted–when an inspection is past due, the section turns red.

"The web map also includes critical information pertaining to each easement, such as whether it's been mowed, the date of the last inspection, who inspected it, [and] whether there's an obstruction present," said Fawcett. "With a few clicks, I can filter through the data and provide real-time answers to common questions such as, 'Where are all of the obstructions? Where are all easements other entities manage?' The data becomes interactive instead of sitting in file cabinets."

This same map is referenced in each easement inspector's Apple iOS device when they are conducting field inspections. Using ArcGIS Collector, an app that leverages a mobile device to capture asset photos, notes, and locations, staff members can conduct their inspections and provide real-time information that updates the easement colors on the Easement Inspection Zone Builder map.

As field personnel work throughout the



↑ **Left:** Hayden Hunter, Crew Leader for the Easement Inspection Program at Union County Water, Submitting an Inspection Report on ArcGIS Collector **Right:** Easement Inspection Zone Builder Web Map

day, those in the office can see real-time progress of what's left to inspect versus what has been completed. Never needing to transfer inspection paper work manually once field personnel come back from work assignments has improved productivity and provided managers with complete awareness of day-to-day operations.

The data acquired through the inspection process has facilitated a significant jump in efficiency and allowed for a more targeted and strategic approach to the program as a whole. "As the crews inspect and move through each zone, they are able to identify easements that are normally maintained by other entities, such as a homeowner or a golf course. Going forward, this will allow for us to focus our time on more critical areas and easements that might need more significant mowing activity. It's data-informed decisions and practical asset management, all facilitated by great GIS tools and quality data," said Fawcett.

The Inevitable—Obstructions

The likelihood that access to water and wastewater assets is obstructed increases when it's on an easement. Whether it's a tree, bush, fence, or any other obstruction, it can hinder Union County Water from maintaining, repairing, inspecting, or replacing a water or sewer line.

"You'd be surprised, but we've seen everything from being fenced-off [from] our easements, to pools and trees impeding access to the pipes and maintenance holes we need to service," said Hayden Hunter, easement crew leader for Union County Water.

As staff members conduct their inspections and come across an obstruction, all they need to do is fill out the fields in the ArcGIS Collector app, take a picture of the obstruction, and submit their inspection.

All easement obstruction photos are simultaneously uploaded into the Easement Inspection Photos web map, where office staff can click on each easement that has an obstruction and see the related photo.

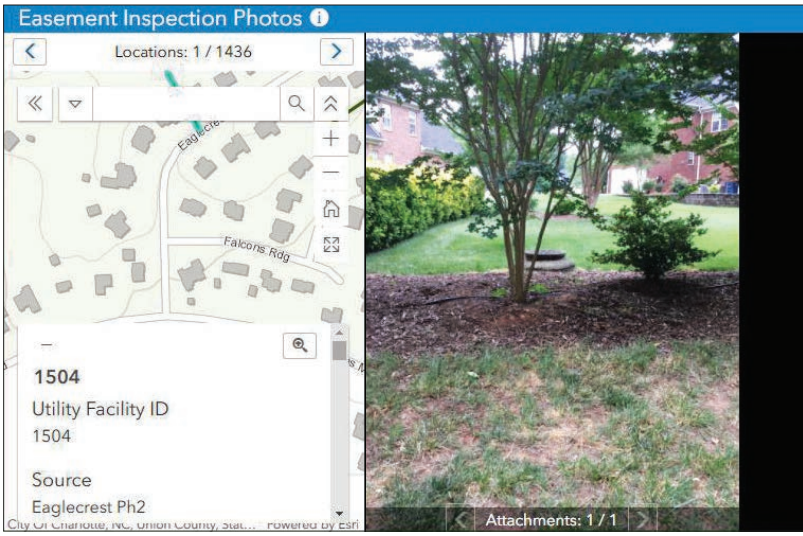
When the inspection is flagged with an obstruction, the information is automatically fed directly into Union County Water's work order management system and triggers a work order request to clear the area of any obstructions. Instead of relying on someone to submit the work order request by the end of the day, the process has now become synchronized.

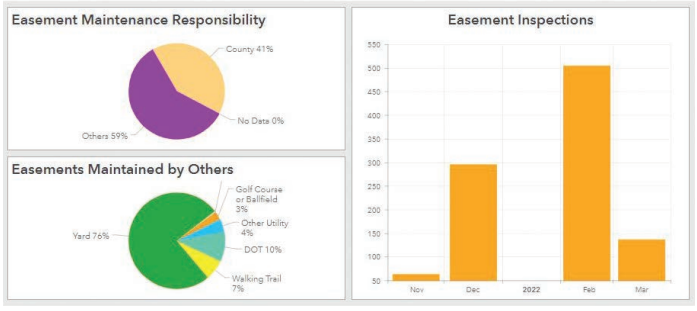
"The GIS tools have been a game changer for us. We can visualize our work activity and track our progress. And we now have the ability to automatically capture and route the obstructions we find into our Lucity work order system, which manages our notification-of-obstruction workflow with our customers," said Hunter.

Accessible easements allow Union County Water to save valuable time in responding to emergencies such as a sanitary sewer overflow. This reduces further damage to the distribution system, the environment, and nearby properties.

Later this year, the GIS team with Union County Water plans to turn to ArcGIS Field Maps, an all-in-one app that uses data-driven maps to help mobile workers perform data collection and editing for their inspection operations.

→ The Easement Inspection Photos Web Map





↑ The data that is collected throughout the day is fed into an interactive dashboard that provides key information to managers and supervisors.

380 New York Street
Redlands, California 92373-8100 USA

Don't miss out on news, insights, resources, and alerts.
Sign up for updates at **go.esri.com/subscribe**.

181667 G2739173