Using GIS to Deploy High-Speed Internet in South Carolina

Leveraging Geospatial to Track and Manage the Administration of Broadband Deployment Grants

Michael Herzberger, GISP, CFM
Deputy Director
Office of Broadband Coordinator
mherzberger@ors.sc.gov

James Tanis
Senior Geospatial Data Scientist
Office of Broadband Coordinator
jtanis@ors.sc.gov

South Carolina Office of Regulatory Staff | February 8, 2024
Objectives

Goal: Provide Intro to Broadband and Its Geospatial Implications

- What’s happening with Broadband?
- What’s South Carolina doing?
  - General Overview
  - Geospatial Implications
  - Using Geospatial to Administer Grants
  - Q&A from Chat
What’s the value of High-Speed Internet (a.k.a. Broadband) in the home?

Allows simultaneous use of:

✓ Phone/Video Calls
✓ Work and School Online
✓ Home Security Systems
✓ Smart Thermostats
✓ Smart Appliances
✓ Gaming Consoles
✓ Movie/TV Streaming

Use:
Skills and applications to leverage technology to improve quality of life and community/economic development

Adoption:
Recognizing the value in broadband and subscribing either at home, work, or via public institutions

Access:
The physical connection to high-speed infrastructure

---

Healthcare
K-12 Education
Government
Travel & Tourism
Libraries
Higher Education
Entrepreneurship
Agriculture
Business

Public Safety
Research

Residential
Adoption
Business
Non-Adoption

Access

Population

0% 50% 100%
Capital Projects Fund

The Capital Projects Fund (CPF) provides $10 billion to states, territories, freely associated states, and Tribal governments to fund critical capital projects that enable work, education, and health monitoring in response to the public health emergency. These funds are addressing many challenges laid bare by the pandemic, especially in rural America, Tribal communities, and lower middle-income communities, helping to ensure that all communities have access to the high-quality modern services including broadband, needed to access critical services.

State and Local Fiscal Recovery Funds

The Coronavirus State and Local Fiscal Recovery Funds (SLFRF) program authorized by the American Rescue Plan Act, delivers $350 billion to state, territorial, local, and Tribal governments across the country to support their response to and recovery from the COVID-19 public health emergency.
Title II - Tribal Connectivity Technical Amendments
Furthers current Tribal Broadband Connectivity Program by investing an additional $2B to fund broadband adoption and infrastructure projects.

Title III – Digital Equity Act
Three programs, established for planning & implementation of programs that promote digital equity, support digital inclusion activities, and build capacity related to the adoption of broadband.

Title IV - Enabling Middle Mile Broadband Infrastructure
Provides funding to extend middle mile capacity to reduce cost of serving unserved and underserved areas and enhance network resilience.

BEAD
Formula-based grant program for U.S. states and territories. BEAD aims to close the access gap for unserved & underserved areas of the country.

$42.45B
Title I - Broadband Equity, Access & Deployment Program

$2.75B
Digital Equity

$2.00B
Title II - Tribal Connectivity Technical Amendments

$1.00B
Title IV - Enabling Middle Mile Broadband Infrastructure

FCC to administer ~$14B
For Affordable Connectivity Program, which will replace the EBB program

$14.2B

USDA to administer $2B
Via the Rural Utilities Service

$2.0B
Private Activity Bonds
$600M
Authorizes State/local gov’ts to use private activity bonds for rural broadband

$600M

Note: funding amounts inclusive of all administrative set-asides.
### Why does Geospatial (a.k.a. “the where”) Matter?

<table>
<thead>
<tr>
<th>Identify areas eligible for funding</th>
<th>Cannot overbuild existing infrastructure</th>
<th>Finite amount of funds to connect all homes and businesses</th>
<th>Funded deployment projects are design/permit/build</th>
</tr>
</thead>
</table>
| • Model locations as unserved and underserved  
  • Primary Data Source: FCC Reporting  
  • Must allow challenges | • Doing so could result in a ‘clawback’ of federal funds  
  • OK to build through, cannot build atop existing facilities | • Must balance locations where public investment can compliment privately funded networks  
  • Must track progress over time | • Must verify funds were used in awarded project area  
  • Must verify infrastructure meets technical specifications |
About the SCBBO...

“Our vision is for all South Carolinians to have access to affordable, reliable, highspeed internet, and to gain the necessary skills to benefit from this technology.”

– SCBBO –

☑ Office created July 2021
  🔺 2021-22 Budget Proviso Ratified by SC General Assembly
  🔺 Sections 73.6-73.7

☑ Administering Broadband Deployment Grants
  ☑ Established Broadband Advisory Council (BBAC)
  ☑ Map/Model statewide broadband availability
  ☑ Evaluate grant applications, issue grant awards
  ☑ Provide management and oversight of funded projects
  ☑ Eligible Applicants are Internet Service Providers (ISPs)
  ☑ Financial match is required by the ISP
  ☑ Prioritize Fiber to the Premise (FTTP)

https://ors.sc.gov/broadband
Overview of Broadband Investment in SC

Dollar amount and percentage of investment in broadband deployment funds across Federal, State, and Private sectors in South Carolina from June 2020 to June 2023

Private
$161,659,382
31%

Federal
$152,940,504
29%

State
$208,733,351
40%

2020 ACT 142 (CARES ACT I)
$16,728,421

2021 RURAL BROADBAND GRANT PROGRAM (RBGP)
$30,000,000

2025 BEAD INFRASTRUCTURE/WORKFORCE
$551,535,983

2023 ARPA CAPITAL PROJECTS FUND
$185,765,655

2022 ARPA SLFRF
$214,234,345

2021 PROVISO 73.6 (CARES ACT II)
$10,000,000

2022 BEAD PLANNING
$5,000,000

BROADBAND FUNDING
$1,013,264,404

ORS.SC.GOV/Broadband
ORS Website

https://ors.sc.gov/broadband

The Broadband Advisory Council oversees the state’s Broadband Advisory Council (BAC), which provides recommendations to the state’s broadband policy leaders on strategies to improve broadband access and affordability. The BAC also helps identify and prioritize broadband projects that will deliver broadband to unserved areas and the surrounding residential areas.

The BAC’s primary focus is to ensure that all South Carolina residents have access to affordable, reliable, and high-speed broadband services. To achieve this goal, the BAC works closely with various stakeholders, including state and local governments, telecommunications providers, and educational institutions.

The BAC’s recommendations are forwarded to the state’s broadband policy leaders, who use this information to make informed decisions about broadband funding and policy initiatives.

In addition to the BAC, South Carolina has established multiple programs and initiatives aimed at improving broadband access and affordability throughout the state. These programs and initiatives include:

- Broadband Equity, Access, and Deployment (BEAD) Program
- Capital Projects Fund
- Accelerated Deployment Grant Program

These programs are designed to provide funding for broadband infrastructure projects, support the development of new broadband networks, and ensure that all South Carolina residents have access to affordable, reliable, and high-speed broadband services.

The BAC and these programs work together to ensure that South Carolina residents have access to the technology and internet services they need to succeed in today’s digital world.
SC Digital Drive

https://SCDigitalDrive.org

The Dashboard allows users to view general broadband statistics at the SC county level. Much of the data reflected in the Dashboard is based on Federal Communication Commission...

Internet Speed Test

The Broadband Office uses anonymous speed test data to inform broadband maps in South Carolina. By running a speed test, consumers can provide information that may enhance maps. An internet speed test also evaluates the quality of an internet connection and allows consumers to compare the speed test results to the current internet service plan.
Technology Stack

- Microsoft Office 365
- ESRI ArcGIS Pro
- ESRI Field Maps
- ArcGIS Online
  - Hub site
  - Dashboards
  - Web App Builder
  - Survey123
  - StoryMaps
  - Experience Builder
- Microsoft SQL Server
- Adobe Pro
- Citrix ShareFile Platform
- ConstantContact
- Salesforce
Grant Management and GIS

**Pre-Award**
- Identify eligible areas for funding
- Publish GIS data of eligible areas
- Solidify Grant Guidelines, Application, Agreement, and Exhibits (including SCBBO GIS data standard)
- Publicize Grant Program
- Receive/Publish FAQs
- Publish Grant applications and Project Areas for public comment period

**Award**
- Screen Applications and Project Data
- Completion checks
- Minimum Program Requirement Checks
- Grant Application Scoring
- Cure Language and Data Deconfliction
- Compile Grant Agreements including maps and tables of funded areas
- Publish Project Areas to pair with press release

**Post-Award**
- Track Expenses and Progress through Quarterly Reporting protocols
- Obtain Geotagged photographs of construction
- Obtain Geotagged photographs of speed tests
- Conduct Site Visits
- Plot/Verify all findings in GIS
- Project Closeout Checklist and Post Construction Speed Test Reporting
- Distribute Funds & Federal Reporting
End-to-End Process Flow
Signing Up For Data Access and Grant Notifications

- Survey123 form used to request access to data and verify CostQuest licensing
- Survey123 form used to signup for grant notifications
- Microsoft power automate used notify SCBBO access has been requested
Eligibility Map / Locations

• Using SQL Server Management Studio to run set of scripts that query and format Federal Communication Commission (FCC) Broadband Serviceable Locations (BSLs) determined to be eligible for funding

• Import eligible BSLs into ArcGIS Pro and aggregate to 2020 Census Blocks to establish “priority areas” and publish SCBBO eligibility map

• Eligible BSLs provided separately through secure download pending verification of CostQuest licensing
Template GIS Data for Applicants

- SCBBO requires all applicants to use provided template GIS for all applications
- Streamlined workflow allows for analytic analysis using standardized data
- All elements needed to review and make decisions are present

**ATTACHMENT 1**

**DATA DICTIONARY FOR SUBMISSION OF GIS SHAPEFILES**

The utilization of Geographic Information System ("GIS") data will occur throughout the lifecycle of a project, beginning with an applicant’s initial grant submission and ending with delivery of as-built Shapefiles depicting areas where construction has occurred. This exhibit outlines the type and format of GIS data required for submission to the South Carolina Office of Regulatory Staff ("ORS"). GIS-based data will be used to evaluate grant submissions, manage grants awards, and track Broadband investments over time. GIS data may also be integrated into Quality Assurance measures developed by ORS to aid in the verification of work completed.

GIS Template Shapefile Data has been created to match with the data schema outlined in the sections that follow. It is available for download here: “ARPA CPF 1.0 Eligibility Map and Data” folder on Citrus. Applicants are highly recommended to use the templates as their starting point for developing conceptual designs of proposed projects they plan to submit to the ORS. Incorrect, incomplete, or missing data may disqualify an applicant from funding.

All data submitted to the ORS must include Federal Geographic Data Committee ("FGDC"), compliant metadata describing the source, characteristics, and methods used for data creation, manipulation/encoding, and associated attribution. As-built data (Fiber Lines, and Network Junctions), delivered at the completion of the project should be within reasonable parameters. Methods used for ensuring accuracy may include, but not be limited to, digitizing GIS data to match statewide aerial imagery, which is map accurate at ±1:24000 or ±1:200. Statewide aerial imagery is published through the state Geographic Information Council and located here: https://www.sgeos.com/sgis/inspector/index.html?layer=3a11d4b34764b435369b024211ed3b3 imagery is on a planned update of once per year. Therefore, modifying planning level data to conform to as-built data by mapping a 1:2400 scale using statewide aerial is an acceptable approach for ensuring horizontal accuracy thresholds have been met in accordance with this data standard. Regardless of the approach, applicants must document their methods chosen in the metadata for a given data layer.

Unless otherwise specified, Map Projections and Datums for GIS data submitted should conform to the following:

NAD_1983 StatePlane South Carolina FIPS_3900
WKT 2013 Authority: EPSG

**Broadband GIS Data Dictionary**

<table>
<thead>
<tr>
<th>Layer Name</th>
<th>Layer Type</th>
<th>Definition</th>
<th>Values/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible 2020 Census Blocks for Proposed Project Area</td>
<td>Polygon</td>
<td>Eligible 2020 Census block data depicting those areas for which a proposed project may occur</td>
<td>This layer should be a subset of records reflecting the project area produced using the SCBBO Eligibility Map 2020 Census Block Data</td>
</tr>
<tr>
<td>Attribute Name</td>
<td>Data Type</td>
<td>Definition</td>
<td>Values/Comments</td>
</tr>
</tbody>
</table>

**Proposed Served Structures**

<table>
<thead>
<tr>
<th>Layer Name</th>
<th>Layer Type</th>
<th>Definition</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed Line Work</td>
<td>Line</td>
<td>Proposed broadband lines an ISP will construct</td>
<td>Digitization should be separated by segments, by technology type, and deployment type, snapped to vertices of adjoining fiber lines. Upon award and completion of the project, ISP must submit as-built update depicting actual location of fiber lines that align with quantities outlined in expense reports prior to final payment</td>
</tr>
<tr>
<td>Network Junction</td>
<td>Point</td>
<td>Point location where existing infrastructure will to tie into the proposed project</td>
<td>An example of a Network Junction feature is a location where a fiber line will be spliced to extend services from an existing network</td>
</tr>
</tbody>
</table>

**FCC Technology Code**

<table>
<thead>
<tr>
<th>Layer Name</th>
<th>Data Type</th>
<th>Definition</th>
<th>Values/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Text</td>
<td>Description of connection point location</td>
<td>e.g., Optical Line Terminal (OLT) endpoint, splice point to extend services from existing network, etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length</th>
<th>Integer</th>
<th>Length in feet of a given line segment</th>
<th>Length in feet calculated from read-only length field</th>
</tr>
</thead>
<tbody>
<tr>
<td>DeepMethod Alias = Deployment Method</td>
<td>Test</td>
<td>The method for which Broadband technology will be deployed at a given line segment</td>
<td>Aerial, Buried</td>
</tr>
<tr>
<td>Proposed Served Structures</td>
<td>Point</td>
<td>Projected Home/Business/Other structures that will be passed upon completion of the project</td>
<td>Applicants must use all fields from December 31, 2022 FCC BLS Fabric</td>
</tr>
</tbody>
</table>
Grant Applications

- Application delivered in Excel format
- Easy for applicants to use
- Easy to consume, chart, and graph
- Can be imported to Master sheet for scoring and mail merges
- Can be joined to map documents
Application FAQs

- Applicants may not contact SCBBO directly during open grant rounds
- Must submit questions through Survey123 comment form
- Output is posted publicly as an FAQ
Applications Published
Public Comment Period Commences

• All applications received are posted to ORS Website
• All projects are mapped in Web-App
• Public comment period
Screen Applicant Project Areas

- All GIS related application material is standardized with all the required elements to evaluate projects.

- All applications can be mapped and presented in a manner most audiences can understand.

- Data is used to screen for any conflicts across applicants
GIS Data and Stats in Grant Agreements

• All GIS related application material is standardized with all the required elements to evaluated projects.

• All applications can be mapped and presented in a manor most audiences can understand.

• Data is used to screen for any conflicts across applicants.
GIS Data for Monitoring and Managing Projects

- All awarded applicants are required to submit Geo-Tagged photos on a quarterly basis:
  - Active Construction
  - Speed Test

- Data is plotted and verified it falls in project area and meets all project requirements.

- SCBBO conducts periodic site visits to verify project status. During site visits Geo-Tagged photos are taken.
Project Closeout

• As built GIS data

• Checklist completed

• Review all Geo-Tagged photos

• Plot post construction list of address
Current Events for **ALL BBO’s**: BEAD Challenge Portal

- BEAD Challenge Portal is a requirement for all states and U.S. territories

- Options for Portal Development
  - Procure GIS Development Team
  - Procure SaaS Solution
  - Develop In-House

- SCBBO developing in-house

- Combination of Experience Builder, Survey123, Microsoft Flow, and Power Automate
Current Work: BEAD Challenge Portal (Cont’d)
Lessons Learned

- Staffing
- Versioning
- Crowdsourced Speed Test Data
- Data Use Restrictions
- Transparency
- Publishing Data
  - “The State will not store restricted/confidential data in Esri's Cloud Services”
- Web-Application Maintenance
- Mitigate Over-Committing