Regional High-Speed Internet Strategy

Approved by the GCEDD Board on:
July 10, 2020

GULF COAST ECONOMIC DEVELOPMENT DISTRICT

Houston-Galveston Area Council

TABLE OF CONTENTS

SUMMARY

The *Regional High-Speed Internet Strategy* provides a roadmap for local governments seeking to expand access to high-speed internet, also known as broadband, in the Houston-Galveston region. It begins with general goals and recommendations for local governments and an explanation of high-speed internet technologies. The strategy provides local case studies of how the Brazos Valley Council of Governments, and the cities of El Campo and Mont Belvieu, Texas expanded access to broadband. The regional strategy delineates steps that a community should take to expand internet infrastructure. These include gaining leadership support, building community momentum, establishing goals, determining existing conditions, redefining policies, examining options for connectivity and financing. Finally, the strategy provides a compilation of potential federal financial resources and an appendix with the latest broadband mapping of the region.

GOAL AND RECOMMENDATIONS

Goal:

Expand access to high-speed internet for economic development, especially in rural areas

Recommendations for Local Governments:

1. Develop a broadband plan using *Becoming Broadband Ready: A Toolkit for Communities* as a template (see pages 9-17)

2. Adopt a 'dig smart policy' to install conduit (the piping that high-speed internet cables are placed in) during scheduled excavations of the right-of-way (see pages 12-13)

3. Update municipal building codes or subdivision ordinances to require that conduit is installed to the home in new construction

Recommendations for the Gulf Coast Economic Development District:

1. Identify and promote federal funding opportunities to expand access to high-speed internet

2. Support community efforts to expand broadband through technical and planning assistance

3. Encourage the incorporation of broadband infrastructure in Economic Development Administration funded projects in the region

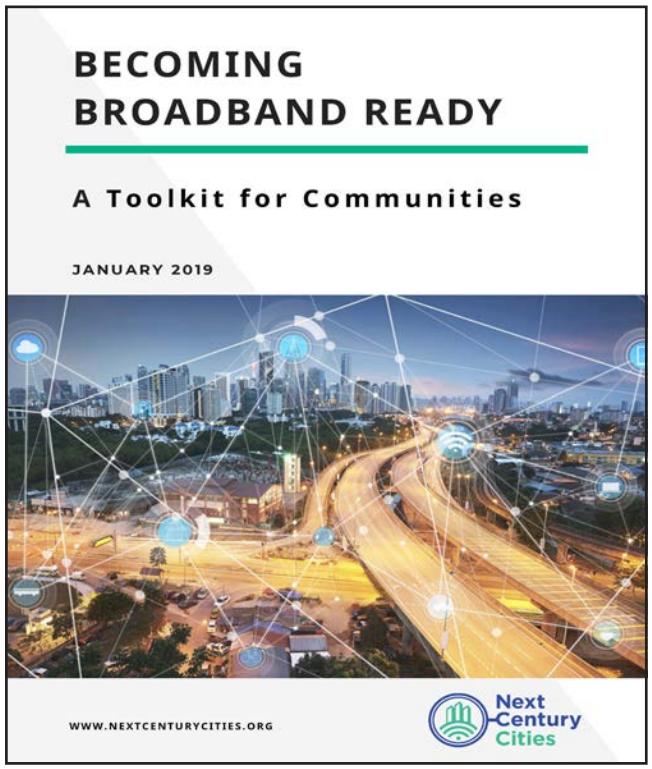
4. Begin to collect Geographic Information Systems information on broadband infrastructure in the region for asset mapping

The Gulf Coast Economic Development District is a 501(c)3 non-profit created to enhance regional economic coordination and to assist and advise elected officials on economic development. It is administered by the Houston-Galveston Area Council, a voluntary association of local governments in Austin, Brazoria, Chambers, Colorado, Fort Bend, Harris, Galveston, Liberty, Matagorda, Montgomery, Walker, Waller, and Wharton counties of Texas.

INTRODUCTION

High-speed internet, or broadband, infrastructure is crucial for the future of the Houston-Galveston region. Building a fast and affordable high-speed internet network that reaches all parts of the region is as challenging as building any other type of major public infrastructure, such as roads, water, and electricity networks, but it is just as essential for the long-term success of the region. Many cities and counties will have to work creatively with limited resources to build the broadband network demanded by their residents and businesses. To provide a roadmap for the process, the Gulf Coast Economic Development District adapted Next Century Cities' *Becoming Broadband Ready Toolkit* to the Houston-Galveston region, incorporating local case studies and examples.

NEXT CENTURY CITIES TOOLKIT



Next Century Cities is a non-profit organization founded to support communities in their efforts to ensure that everyone has fast, affordable, and reliable internet access. *Becoming Broadband Ready: A Toolkit for Communities* is the best available resource for communities seeking to expand access to high-speed internet. The document can be accessed at: https://nextcenturycities.org/becoming-broadband-ready.

This document borrows liberally from that work, and the original should be cited as the source document:

Next Century Cities. "Becoming Broadband Ready: A Toolkit for Communities." Washington, DC: Next Century Cities, January 2019.

Any items taken directly from the text of the *Becoming Broadband Ready: A Toolkit for Communities* will be noted with the Next Century Cities logo.

HOW THE INTERNET WORKS

The internet delivers bundled packets of digital information between devices. Like the mail, the internet is comprised of packages (packets) that are delivered (routed) to an (internet) address.

The definition of high-speed Internet, or broadband, has changed over time as technology has advanced. The fastest internet speed in 1995 was 145 million bytes per second (Mbps). As of early 2020, the fastest network speed recorded transmits information at 255 trillion bytes per second (Tbps), a growth of over twelve orders of magnitude.

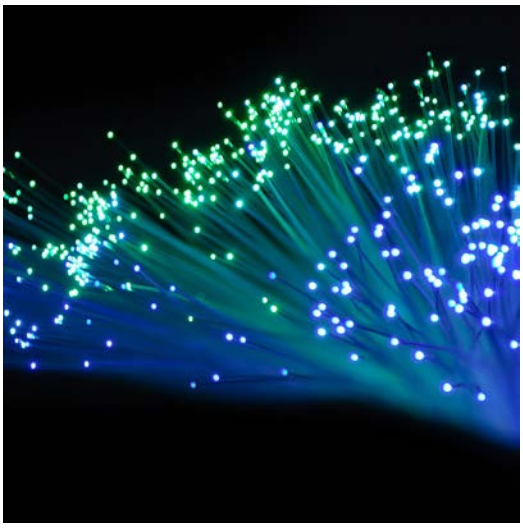
Here is how the definition of broadband has changed over time:

Year	*Minimum Download*	*Minimum Upload*
1996	200 Kbps	200 Kbps
2010	4 Mbps	1 Mbps
2015	25 Mbps	3 Mbps
2020 (proposed)	100 Mbps	10 Mbps

One major challenge with high-speed internet projects is building an expandable network. Just like a city's road network must meet the mobility needs of the current population and the future population without unnecessary roads that require maintenance, high-speed internet infrastructure should be poised to meet future needs without incurring the undo expense of excess capacity.

NETWORK TECHNOLOGIES

The Internet uses various medium to transmit information between devices, including the following:

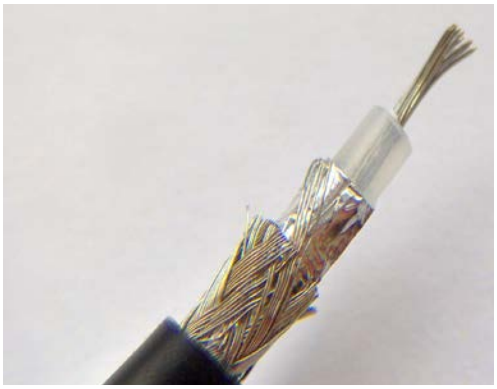


Fiber Optic Cable

Fiber optic cable is composed of transparent fibers, usually glass, and transmits information using beams of light. It is the medium that can transmit the most information at the highest speed. This is the material that forms the Internet's "backbone," or the Interstate Highways for digital information. Fiber optic cable is effective at moving a large amount of information quickly; it can move data the speed of light and is highly expandable. Fiber optic cable is considered the best medium for high-speed internet.

Right: Fiber optic cables transmit signals over transparent materials using beams of light.

NETWORK TECHNOLOGIES



Coaxial Cable

Coaxial cable, or coax, transmits radio frequencies and is commonly used by cable television providers. The technology has been in use since the mid-1800s. It allows for transmission of up to one gigabit of data but is not expandable beyond this limitation. Many homes are constructed to be pre-wired with coaxial cable, which can be used to link a home to the fiber-optic network.

Right: Coaxial cable is a type of electrical cable that has an inner conductor surrounded by an insulating layer, surrounded by a conducting shield.

Above: Wireless internet requires the use of an antenna to route data, often service providers use existing utility poles in the public right-of-way to install the antennas.

Wireless Internet

High-speed internet can also be transmitted via wireless radio signals, the same type of technology used by your cellular phone. Your cellular phone uses mobile wireless technology, meaning that it will bounce a signal off different cell phone towers as you move around. Many users have heard of 3G, 4G, 4G LTE, and now 5G technology. These differentiate the difference generations of technology (G for generation). This technology can also be used in fixed applications, such as wireless internet to the home. The wireless signal is beamed from a tower to an antenna or dish at the home. Like mobile wireless, fixed wireless can lose signal under certain conditions. Obstructions, like buildings and trees, and weather conditions, like humidity and rain (common in the region) can limit range and require more antennas.

Satellite Internet

Satellite internet is similar to wireless internet, but transmits data between orbiting satellites and fixed antennas on the ground. Satellite internet has limitations, including signal delay, or loss of signal during inclement weather. Adoption is highest in rural areas without other options for internet service.

Right: Like wireless internet, satellite internet requires an external receiver, and signal can be affected by obstructions and weather.

DSL Internet

DSL is an acronym for Digital Subscriber Line, it uses a telephone line to connect the user to the internet using a phone wall jack. Distance from telecommunications equipment can reduce the quality of the connection, and speeds are not as fast.

Right: DSL internet uses the telephone lines to transmit digital information. The filter pictured on the left helps to strengthen the DSL signal before it is transmitted over telephone lines.

CASE STUDY: MONT BELVIEU

Mont Belvieu is a small city on the Chambers-Liberty county line, between the San Jacinto and Trinity rivers. It has a significant petrochemical industrial base and a fast-growing residential population. In 2016, Mont Belvieu had a patchwork of internet service providers and top speeds around 5 megabits per second (Mbps), which was insufficient to meet the needs of residents and businesses. The City, in an effort to plan for and encourage growth, conducted a feasibility study to research the possibility of building an improved broadband network. According to the citizen survey that was a part of the feasibility study, 91 percent of residents and 100 percent of businesses believed that fast broadband was an essential service.

The City decided to build a publicly owned fiber network. Municipalities are not legally allowed to build some communications networks but are legally allowed to build and operate utilities. Proactively, the City decided to confirm that a home rule city could fund a publicly owned broadband network as a utility. The City sued the Attorney General and made the argument that internet was a public utility rather than a private service. The City won this argument and set the precedent in the State of Texas that internet service could be treated as a public utility.

Following the ruling, Mont Belvieu set up MB Link, a public system that manages the fiber optic network, and began the search for a broadband network engineer. Having the right personnel has been key to the success of MB Link. The City worked with a private provider to build infrastructure for the network and currently oversees the network's operation. The City adopted an ordinance requiring that all new residential construction place conduit for fiber and handholes for fiber to the home. The City installs fiber in the conduit and reserves room for other internet service providers to install their own fiber, allowing customers to choose their provider. The system offers a gig (1000 Mbps) to households and businesses throughout the community for $75 per month.

CASE STUDY: MONT BELVIEU

MB Link's subscribers are provided with a battery backup for their routers so even if electricity goes down they will still have their broadband service. The system data center also has a backup generator, to further enhance the system's resilience and reliability. In recognizing that high-speed internet access is a utility rather than an extra, the City of Mont Belvieu is helping create a model for how broadband can be viewed, built, and funded by municipalities. These efforts help support the goal that residents in the region will have access to education, training, jobs, and business opportunities that support a high quality of life and financial stability that broadband can bring.

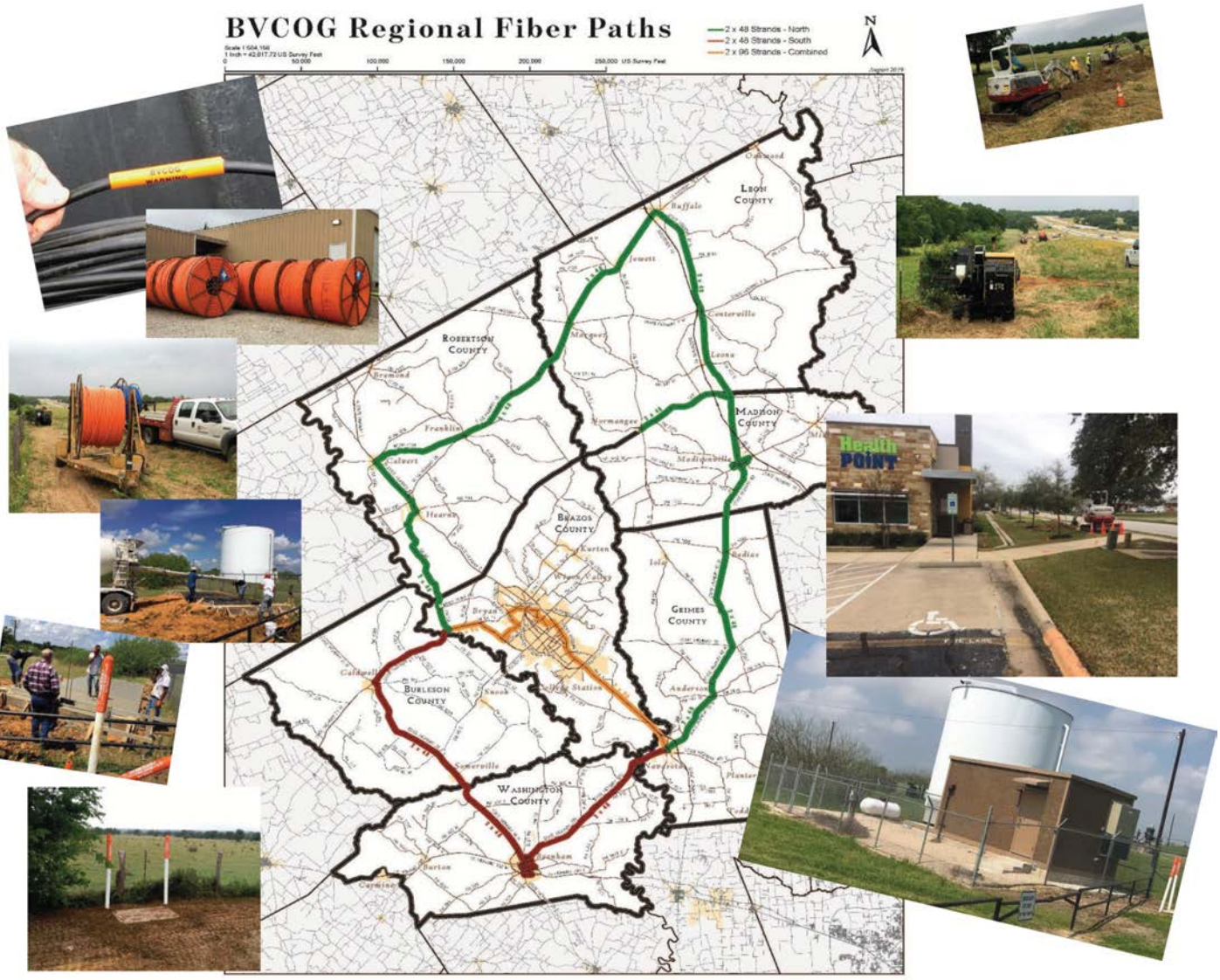
You can learn more about MB Link at: https://www.montbelvieu.net/301/MB-Link

CASE STUDY: EL CAMPO

The City of El Campo has a variety of internet providers throughout the city. This includes the Wharton County Electric Co-operative, which has provided broadband throughout their service area in the county since 2006; including wireless and satellite internet. However, the co-op offers speeds of only up to 12 megabits per second (Mbps) at $40 to $50 per month. In 2016, the City of El Campo partnered with a local small private provider, YK Communications, to offer higher speeds to residents and businesses throughout the city. The City and the City Development Corporation of El Campo decided to start building fiber throughout the core city institutions, including city hall, the emergency center, and the middle school during phase one of the project. Phase one of the project spurred the private provider to add two additional phases to expand the fiber network. Phase two expanded the network to include local businesses and residents. Phase three of the project began in June 2018 and expanded the network along a major highway, which allowed for more businesses and residents to have access to high-speed internet.

YK Communications owns and operates the network. They advertise speeds up to 1 gig for the fiber optic network. The network provides a variety of speeds at different price points for both residents and businesses. Executive Director of the City Development Corporation of El Campo, Carolyn Gibson, commented, "We are thrilled that fiber is rapidly expanding in its availability to businesses and residents in the area! We look forward to seeing our efforts come to fruition with the completion of fiber coverage throughout the city." The City of El Campo is an example of a small town's ability to plan long-term and build a foundation for the expansion of a fiber optic network that will lead to a higher quality of life for El Campo residents. The City, in partnership with YK Communications, will continue to increase connectivity for local businesses, educators, healthcare providers, and telecommuters.

CASE STUDY: BRAZOS RIVER VALLEY COUNCIL OF GOVERNMENTS



The Brazos Valley Council of Governments (BVCOG), home to the internationally renowned Texas A&M University, consists of seven rural counties in central Texas with a population of 315,000. Like many communities in rural Texas, fast, affordable broadband internet is not available. Local government officials recognized that the private sector was not addressing the broadband service gap with market-based solutions. These officials approached BVCOG to take a leadership role in developing a broadband network for the region. BVCOG undertook an examination of potential federal funding opportunities for constructing a broadband network that would meet their needs. Through this analysis, BVCOG identified the Healthcare Connect Fund as being the best match for meeting the region's broadband needs. The Healthcare Connect Fund uses infrastructure fees collected by the telecommunications industry to fund connecting rural healthcare facilities to broadband. The Healthcare Connect Fund requires a 35 percent local contribution (match) and provides 65 percent of the project's funding to successful applicants. To ensure a competitive application, BVCOG formed a "Healthcare Consortia" composed of non-profit and community healthcare institutions in the region that it wished to connect to the broadband network.

One of BVCOG's key takeaways from the process of developing their network is the need for a local contribution to make the project viable for federal funding. BVCOG's collaboration with non-profit organizations made this effort possible. BVCOG partnered with several local, non-profit organizations and

took a loan from one to make the project financially feasible. The fiber optic network is designed to grow to meet the needs of the region's healthcare institutions into the future. It is built on a single mode fiber optic cable that provides an initial 10 gigabit broadband backbone, which can be scaled up to 100 gigabits. Future interconnection points have been planned to allow for cost effective expansion to other network customers. The expansion could include additional medical providers, schools, or governments, or the expansion could facilitate leasing space to Internet Service Providers.

The core network consists of two fiber optic loops, totaling approximately 320 miles, that run though the seven-county region in a figure eight. The fiber is buried in a conduit that contains excess capacity for future expansion. BVCOG engaged one of the nation's largest fiber construction contractors to build the network. Texas A&M University's Telecommunications Department assisted with the design and initial oversight of the network's construction; the department has over 25 years of fiber optic construction. When the network is completed in June 2020 it will be the first large network of its kind under FCC guidelines for the Rural Healthcare Connect Fund.

SEVEN STEPS TO HIGH-SPEED INTERNET

Around the United States, many communities have sought to expand access to high-speed internet. The lessons learned about the best pathway forward to enhanced access for local governments were distilled in Next Century Cities' *Becoming Broadband Ready Toolkit*.

Items directly transcribed from the toolkit are denoted with the Next Century Cities logo.

STEP 1: GAIN LEADERSHIP SUPPORT

A successful broadband deployment will be led by a dedicated champion. The City of Mont Belvieu hired an experienced network engineer to develop their network. The City of El Campo's effort was championed by the economic development director in partnership with a local internet service provider. A staff member or committed volunteer who is enthusiastic about bringing the benefits of broadband to their community and who can communicate the vision of a connected community is fundamental to initializing a successful project. A champion will inform local elected officials and residents of the benefits of building a broadband network.

In addition to a champion, it is crucial to have local political leadership advocating for expanding broadband in the community. Local leaders' understanding and support of the economic and community development benefits broadband can bring to a community can make the difference in the project's success.

Next Century Cities developed a guide to hiring a broadband manager and identifies the following traits that successful project champions should have:

- Strong project management capacity
- Interpersonal and communications skills
- Flexibility and problem-solving abilities
- Empathy and listening aptitude
- Big-picture and out-of-the-box thinking

It is available at nextcenturycities.org/the-anatomy-of-a-broadband-manager/

STEP 2: BUILDING COMMUNITY MOMENTUM

Community demand for access to a high-speed broadband network is vital to the sustainability of the deployment of broadband infrastructure. Community involvement is necessary and can be accomplished by participating in community events, engaging the community in conversation, and maintaining high transparency and ongoing communication with the public. The Brazos Valley Council of Governments undertook an extensive outreach campaign to bring local institutions in on the development of their infrastructure. Consistent updates help maintain community interest and trust in broadband expansion. This can be done through a newsletter, an interactive map, outreach sessions, a project website, or a public outreach group that holds regular meetings.

Next Century Cities developed a checklist for building community momentum and identifies the following components that successful community movement should have:

- Use the government's convening power to bring together disparate stakeholders for project brainstorming and informing residents of project progress
- Involve anchor institutions, business leaders, civic and community groups, and local business in the conversation
- Identify community leaders and seek their advice and keep them informed of developments
- Analyze past communication efforts and determine what works best for your community
- Develop a consistent and inclusive communication plan

STEP 3: ESTABLISH GOALS

Once the project leadership is engaged and an outreach plan for the community is launched, a community must determine what issues broadband expansion project will address. Every community knows its particular needs best, so, it is key to engage a broad spectrum of stakeholders, especially those who may be least likely to be heard. Early and proactive community engagement will mean project goals and scope are more likely to address direct needs, increase participation in the process, and promote success.

Benton Institute for Broadband & Society, in *Five Lessons for Tech-Powered Civic Engagement*, provided a checklist of principals to guide inclusive civic engagement:

- Start with people- Integrate the people you aim to serve throughout your project
- Cater to context- Be aware of how your project is shaped by the community's political realities
- Respond to need- Listen to a broad cross-section of the population in prioritizing problems and formulating solutions
- Build for best fit- Civic technology should be developed to address the actual problems of the community
- Prove it- Constantly gather data as a check on decisions and use that data to make changes when needed

More information is available at: www.benton.org/NCC-civic-engagement

STEP 4: DETERMINE EXISTING CONDITIONS

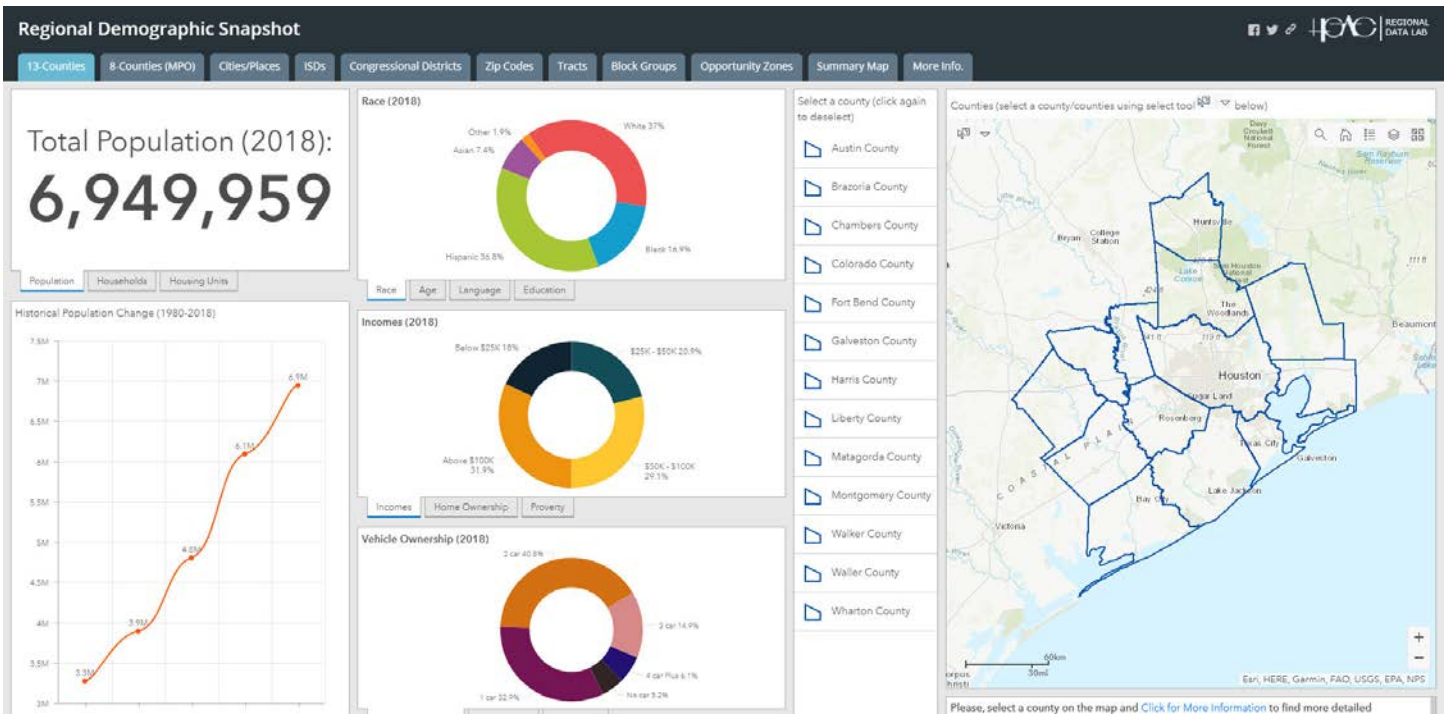
After a community documents its goals, the next step is to gather and organize information about existing conditions that may create an obstacle to broadband deployment.

STEP 4.1: ASSET MAPPING

When determining existing conditions, a community may want to start by developing an asset map. Through asset mapping, a municipality collects data on infrastructure assets including fiber, conduit, towers, and other infrastructure. This can be a challenge as the government provided data in the Census and the assessments produced by Federal Communication Commission are not granular enough to determine at the street to street level the availability and speed of broadband. For more information on broadband mapping, please review the service maps in the appendix of this document. Geographic Information Systems (GIS) can be a useful tool for infrastructure documentation. GIS maps can support broadband planning, budgeting, design, sales, and construction.

STEP 4.2: DEFINING DEMAND

Like all utilities and infrastructure, broadband requires enough demand to make the capital investment worthwhile. Accurately assessing the demand from businesses and residents is a crucial step in analyzing the market for broadband in the community. Mont Beliveu undertook a market study to ensure that their services would meet market demand. The Brazos Valley Council of Governments undertook a survey of institutional high-speed internet demands to ensure they were meeting the needs of their region. Communities can work to implement surveys or work with contractors to aggregate geographic demand. Publicly available data from the Census and other sources are useful in gathering baseline information about the community.



Above: The Houston-Galveston Area Council has tools for gathering baseline data on the Interactive Web Applications webpage, available at: www.h-gac.com/interactive-web-applications/default.aspx . The Demographic Snapshot viewer is particularly useful for gathering demographic data on communities in the region.

STEP 4: DETERMINE EXISTING CONDITIONS

When measuring broadband demand, communities can consider:

- Who is online?
- Who lacks service but wants to be online?
- Who needs more bandwidth?
- How much more bandwidth do they need?
- What are they willing to pay?
- Will there be enough bandwidth for future growth?

Assessing demand also includes gathering information on the providers already serving or planning to serve the community. Largely, providers aren't willing or compelled to share information about their competitive assets with public entities. Crowdsourcing is an option for communities. Residents may be more willing to share information, such as internet speeds, through community-launched polling tools.

Next Century Cities developed a checklist of items to consider when documenting the community's current conditions:

- Document the location of all municipally owned rights-of-way, fiber, conduit, and towers and create a simple system to allow you to share with relevant parties
- Develop a contract template and standardize policies to simplify leasing these assets
- Determine the speed offered by the current internet service providers
- Document the needs of businesses, anchor institutions, and residents
- Understand what residents can afford to spend for internet service
- Evaluate if there are any private or public assets in the community that could be leveraged to support better service to residents

STEP 5: REDEFINE THE BROADBAND POLICIES

The most important tactic a local government can take to drive broadband investment in their community is to create the policy environment to lower costs for installation of broadband infrastructure. This section highlights policies municipalities can implement to lower the cost of broadband.

Dig Smart Policies

The costliest aspect of developing a broadband network is the installation of the fiber and/or conduit in underground trenches where other utilities are often located. Dig smart polices install broadband infrastructure when the street is opened for construction. This lowers costs and decreases interruptions in the public right-of-way. Dig smart policies encourage, though incentives or mandates, cooperation between government, private companies, and utilities to minimize the frequency of roadway excavation and disturbance. Dig smart policies vary by community, however there are a few key similarities: planning, notification, and prioritization. Prioritization, or ranking excavation projects by location and need, is a key concept of dig smart policies. For instance, if road repairs need to occur throughout the community, and the community has planned to start their fiber network in downtown, then road repairs in the downtown would be prioritized over other road repairs, since fiber installation and road repairs could happen simultaneously.

STEP 5: REDEFINE THE BROADBAND POLICIES

Examples of Dig Smart Policies:

- The community will work with its municipal departments, service providers, utilities, and all potential partners to create a list of all possible excavation projects over the next 5 years to deploy fiber optic cable while the right of way is available.

- All local incentives for private providers will be contingent upon the private provider notifying and coordinating with the public works department and public utilities in the area.

One Touch Make Ready

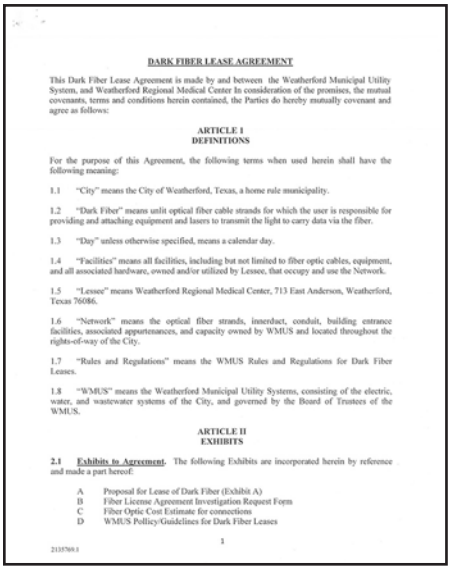
There are no national laws governing utility lines' attachment to poles; some states have their own regulations and other states, including Texas, use Federal Communication Commission controls. One Touch Make Ready is like the Dig Smart policy in that it reduces the cost of broadband infrastructure deployment and encourages competition. Usually, when a new provider wishes to string their utility infrastructure to existing utility poles, each incumbent provider must "make ready", or assess and move their wires to allow for the new provider. Typically, the new provider must pay the incumbents for this make ready process.

A One Touch Make Ready policy replaces the standard practice with a more streamlined approach. A contractor, or slate of contractors, are pre-approved to conduct make ready work. All pole owners agree on the policies and procedures for new make ready work. Pole owners and pre-existing providers whose wires were moved may choose to do post-make ready work inspection and call for remedial work if needed. Local governments typically have jurisdiction over the utility poles in their public rights-of-way. Municipalities can use this power to create policies that can make the installation of new broadband capacity on existing utility poles financially feasible.

Require Conduit to the Home in Building Code or Subdivision Ordinance

Bringing fiber optic or coaxial cable from the public right of way into the home can involve trenching a yard, which is expensive and disruptive. It is far more inexpensive to install conduit during the construction that can later have fiber optic or other cable run through it when the home wishes to connect to the internet. The City of Mont Belivieu requires that all new construction install conduit to the home. This ordinance is available on their website and can serve as a template for new construction in other municipalities.

STEP 5: REDEFINE THE BROADBAND POLICIES



DARK FIBER LEASE AGREEMENT

This Dark Fiber Lease Agreement is made by and between the Weatherford Municipal Utility System, and Weatherford Regional Medical Center In consideration of the promises, the mutual covenants, terms and conditions herein contained, the Parties do hereby mutually covenant and agree as follows:

ARTICLE I
DEFINITIONS

For the purpose of this Agreement, the following terms when used herein shall have the following meaning:

1.1 "City" means the City of Weatherford, Texas, a home rule municipality.

1.2 "Dark Fiber" means unlit optical fiber cable strands for which the user is responsible for providing and attaching equipment and lasers to transmit the light to carry data via the fiber.

1.3 "Day" unless otherwise specified, means a calendar day.

1.4 "Facilities" means all facilities, including but not limited to fiber optic cables, equipment, and all associated hardware, owned and/or utilized by Lessee, that occupy and use the Network.

1.5 "Lessee" means Weatherford Regional Medical Center, 713 East Anderson, Weatherford, Texas 76086.

1.6 "Network" means the optical fiber strands, innerduct, conduit, building entrance facilities, associated appurtenances, and capacity owned by WMUS and located throughout the rights-of-way of the City.

1.7 "Rules and Regulations" means the WMUS Rules and Regulations for Dark Fiber Leases.

1.8 "WMUS" means the Weatherford Municipal Utility Systems, consisting of the electric, water, and wastewater systems of the City, and governed by the Board of Trustees of the WMUS.

ARTICLE II
EXHIBITS

2.1 Exhibits to Agreement. The following Exhibits are incorporated herein by reference and made a part hereof:

A Proposal for Lease of Dark Fiber (Exhibit A)
B Fiber License Agreement Investigation Request Form
C Fiber Optic Cost Estimate for connections
D WMUS Policy/Guidelines for Dark Fiber Leases

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Template Lease Agreements

When a municipality owns excess broadband or fiber capacity, they can create a template lease agreement for leasing their unused capacity. This allows for enhanced broadband speeds for residents while providing an income stream for the municipality. The template lease agreements provide a structure for potential leaseholders to understand municipalities' terms and conditions, while providing the flexibility to be changed and adapted to the specific conditions. A template lease agreement was created in Weatherford, Texas, to lease the city's "dark" (unused) fiber optic capacity. The Brazos Valley Council of Governments is building excess capacity to ensure a system that can meet future needs. They intend to lease the excess capacity to private internet service providers. This will provide a revenue stream to the Council and increase consumer choice in internet service providers.

Above: A template lease agreement, as created by the City of Weatherford, Texas, is available online: nextcenturycities.org/wp-content/uploads/Weatherford-Municipal-Utility-System-dark-fiber-agreement.pdf

Clear and Simple Permitting

A confusing, lengthy, or inflexible permitting process will discourage investors and can stop broadband expansion before it begins. Municipalities that streamline the permitting process provide a clear pathway for investment and signal to investors that the municipality is interested in working with them. Creating a clear process for permitting the installation of fiber or broadband capacity will be advantageous for both the municipality and the internet service provider. Developing predetermined procedures for deployment of broadband infrastructure will be important for installations in historic, scenic, or theater districts. For example, permitting may prohibit the deployment of the infrastructure on historic light poles or other assets.

Leverage Existing Assets

Municipalities can lease their existing un- or under- used assets to providers and negotiate specific terms to create mutually beneficial agreements. For example, if a city has excess conduit capacity, they can lease the conduit to providers for broadband deployment. Without evaluating utilization of municipal assets and marketing underused assets to private providers, the assets will continue to be underutilized. The Brazos Valley Council of Governments intends to lease its excess capacity to private providers.

Access to Apartments and Condominiums

Apartment and condominium residents are often locked into non-competitive exclusivity agreements. In some cases, these agreements can allow residents to have access to quality, high-speed internet. Unfortunately, some of the agreements result in residents having sub-standard internet service. These agreements can present a challenge to the residents in having access to quality high-speed internet, but exclusivity agreements do work for some buildings, as they allow for high-quality and high-capacity networks connecting to fiber. Municipalities can pass ordinances that allow internet service providers access to buildings for the installation of their equipment but allow for just compensation to the property owners, making it possible for multiple providers to access the property.

STEP 6: OPTIONS FOR CONNECTIVITY

Each municipality's set of circumstances differ, and the connectivity options adopted by the municipality must meet the needs of the community. Following the assessment of the community's assets, needs, and priorities it is crucial to responsively tailor the choice of solutions to community needs.

Municipal Networks

Municipal networks are typically built, owned, and operated by a municipality. These networks can take a variety of forms: they can connect government assets such as the schools, libraries, and city halls to the internet, or include service business and residents. The City of Mont Belvieu is an example of a municipal network in our region. (See case study on page 6)

Open Access Networks

In an open access network, the network's owner (city, utility, private provider, e.g.) allows multiple internet service providers to access the infrastructure to provide broadband service to customers. Open access networks allow for multiple providers, and therefore enhance competition, and customer choice. This typically creates a more affordable broadband marketplace. The Brazos Valley Council of Governments will lease its excess capacity to private internet service providers, allowing them access.

Public-Private Partnerships

When public entities collaborate with private companies the resulting partnerships can reduce the risk that both parties would face as individual entities. A public-private partnership (also known as P3 or PPP) is a long-term contract between a private party and a government, for providing public assets or service. Public-private partnerships can potentially mitigate the overruns and schedule delays that plague traditional public infrastructure projects. The City of El Campo worked with a local internet service provider to extend their fiber optic network in the city, under a public-private partnership.

Public Sector Networks

A network linking public institutions, also known as an institutional network, connects multiple facilities, such as office buildings, schools, public safety, and libraries. They do not serve residences or businesses but can be co-located in conduit that can be leased to the private sector. These networks can create significant cost savings for the public and serve as the backbone for broadband expansion to homes and businesses. The Brazos Valley Council of Government's Brazos Vision 20/20 network is an example of a public sector network. (See case study on page 8)

Electric Cooperatives

Rural electrical cooperatives (co-ops) can develop a broadband network in the territory served by their electrical network. These electrical providers already have the infrastructure in place to take electricity to the home and can use that infrastructure to bring customers broadband service. Our region is home to three: Eastex Telephone Cooperative, San Bernard Electric Cooperative, and Wharton Electric Cooperative operating in rural Austin, Colorado, Liberty, Wharton, and Walker Counties.

STEP 6: OPTIONS FOR CONNECTIVITY

Working with Incumbent Providers

Telephone and cable companies are the primary providers of high-speed internet in our region. Working with the incumbent providers to expand the broadband network can take many forms. Companies have multiple considerations for making investment decisions in your community. The first consideration is how dense or how sparse the residents and businesses are. Areas where multiple customers are available within a small area are preferred as they require less infrastructure investment. The quality of potential customers and how much they would be willing to pay for service is also considered by broadband providers. One of the primary considerations is how much network development will cost and how long it will take to recuperate the investment. The final consideration is referred to as "lines of opportunity," or which customer segments present the best opportunity and value to the incumbent provider for deployments. Concerns for incumbent providers include aesthetic restrictions (such as where the company can put junction boxes), right-of-way access, and permitting.

STEP 7: OPTIONS FOR FINANCING

Every community has a unique context, including resources it brings and limitations it faces when considering expanding broadband. A financially unsuccessful project can set communities back in meeting their goals and can create public distrust. Communities can demonstrate success by starting with small, achievable goals and consulting financial decision makers, such as the city finance director, at the beginning of the project.

Public Municipal Bonds

A local government or utility can issue revenue bonds that are secured by the projected revenue generated by the broadband infrastructure. Revenue bonds differ from traditional general obligation bonds in that they can be repaid from a variety of sources. Revenue bonds require that the project have operating revenues. These bonds typically mature in 20 to 30 years.

Private Municipal Bonds

A local government or utility can issue revenue bonds and sell them directly to private institutions, such as insurance funds, or to high net worth individuals.

Direct Loan/Private Loan

A bank may be able to provide a loan for the construction of the network, and then when operational, other sources of financing can be brought in for long-term operation and to repay the loan.

Internal Loans

A department within the local government can borrow capital from another department to build the broadband network. This is similar to the strategy used by the Brazos Valley Council of Governments when

developing their network. One of the Council's subsidiary non-profits lent funds to another subsidiary non-profit to use as match funding for the federal resources needed to develop the network.

Private Equity Financing

Private equity firms typically purchase existing companies to bring value to investors. These same investors may provide the capital financing to construct the network and finance the operations while the network starts-up. These financiers then own the network, and the revenue generated by it the for an agreed upon timeframe.

Avoided Costs

A local government can lease existing broadband capacity, if available, to begin to operate its own network. This can result in faster connections at lower prices. This lease structure can be financed if the payback will be longer than a year with bond financing. This is a strategy can be used to incrementally build out networks.

Many of these financing options can be mixed or combined with state and federal funding opportunities to meet the financial burden of creating and operating a network. Municipalities and other public entities should fully research all available federal and state funding opportunities as these can contribute significant capital to the project.

FEDERAL RESOURCES

Reconnect Program

Who Can Apply: Local governments, Non-profit organizations, For-profit corporations, Limited liability companies, Cooperative or mutual organizations, States, An Indian tribe, and/or; A territory or possession of the United States. Eligible areas must be rural (a city population below 50,000) and must lack sufficient broadband access to at least 90 percent of the households (sufficient broadband access is defined as 10 megabits per second [Mbps] downstream and 1 Mbps upstream). Areas must not overlap with areas receiving other telecommunication funding from the U.S. Department of Agriculture (USDA).

How Much is Available: Up to $200 million.100 percent grants, 50 percent grant and 50 percent loan, or a 100 percent loan are available, based on community need.

What Types of Projects Are Funded: Funds can be used to construct or improve buildings, land, and other facilities required to provide broadband service; fund reasonable pre-application expenses; fund the acquisition and improvement of an existing system currently providing insufficient broadband service (eligible for 100 percent loan requests only); or fund terrestrial-based facilities that support the provision of satellite broadband service.

More Information: www.usda.gov/reconnect

FEDERAL RESOURCES

Community Connect Grants

The Community Connect Grants program helps fund broadband deployment into rural communities where it is not yet economically viable for private sector providers to deliver service.

Who Can Apply: Local governments, states, non-profit organizations, federally-recognized tribes, and for-profit corporations. Eligible areas must be rural areas that lack sufficient broadband access (sufficient broadband access is defined as 10 megabits per second [Mbps] downstream and 1 Mbps upstream). Areas must not overlap with areas receiving other telecommunication funding from the U.S. Department of Agriculture (USDA). How Much is Available: Up to $200 million.100 percent grants, 50 percent grant and 50 percent loan, or a 100 percent loan are available, based on community need.

How Much is Available: Amounts vary, Recent examples range from $2 million to $20 million with a 15 percent match from the applicant.

What Types of Projects Are Funded: Projects may include the construction, acquisition of facilities, spectrum, land, or buildings used to deploy broadband service for either all residential and business customers located within the proposed service area or all participating critical community facilities (such as public schools, fire stations, and public libraries).

Recent Example: In New Mexico, the Tularosa Basin Telephone Company Inc. will use an $11.8 million loan to improve telecommunications for nearly 10,000 customers in the Carrizozo, Cloudcroft, and Tularosa exchanges. Tularosa will build 176 miles of fiber-optic facilities, construct new fiber-to-the-premises (FTTP) facilities, and upgrade digital subscriber line (DSL) and FTTP electronics. The improvements will enhance the company's services and provide subscribers voice and higher broadband speeds.

More Information: www.rd.usda.gov/programs-services/community-connect-grants

Rural Broadband Access Loan and Loan Guarantee

The Rural Broadband Access Loan and Loan Guarantee Program furnishes loans and loan guarantees to provide funds for the costs of construction of, improvement to, or acquisition of facilities and equipment needed to provide high-speed internet service in eligible rural areas.

Who Can Apply: Local governments, corporations, limited-liability companies, cooperative or mutual organizations, states, and Indian tribes or tribal organizations. Eligible areas must be rural (a city population below 50,000) and must lack sufficient broadband access to at least 15 percent of the households (sufficient broadband access is defined as 10 megabits per second [Mbps] downstream and 1 Mbps upstream). Areas must not overlap with areas receiving other telecommunication funding from the U.S. Department of Agriculture (USDA).

How Much is Available: Amount varies from $100,000 to $25 million. This program offers loans, not a mix of grants and loans.

What Types of Projects Are Funded: Funds are available for the construction, improvement, and acquisition of facilities required to provide broadband service.

Recent Example: In 2018, the Thacker-Grigsby Telephone Company in Kentucky received a $20 million loan to build 427 miles of fiber. This project will help connect 30,000 customers to broadband.

More Information: www.rd.usda.gov/programs-services/rural-broadband-access-loan-and-loan-guarantee

Telecommunications Infrastructure Loans & Loan Guarantees

The Telecommunications Infrastructure Loans & Loan Guarantee program provides financing for the construction, maintenance, improvement and expansion of telephone service and broadband in rural areas.

Who Can Apply: Local governments, states, federally recognized tribes, non-profit organizations, corporations, and limited-liability companies. Eligible areas must be rural areas and towns with a population of 5,000 or less, areas without telecommunications facilities, or areas where the applicant is the recognized telecommunications provider.

How Much is Available: Amounts vary, this program offers loans, not a mix of grants and loans.

What Types of Projects Are Funded: The construction, improvement, and acquisition of facilities required to provide service at broadband speeds.

Recent example: In 2018, a rural Missouri telephone company received $13,659,000 to construct 500 miles of fiber. Missouri expects to improve service to 1,063 subscribers.

More Information: www.rd.usda.gov/programs-services/telecommunications-infrastructure-loans-loan-guarantees

E-Rate Program

The E-Rate Program helps schools and libraries obtain affordable broadband.

Who Can Apply: Eligible schools and libraries. Schools include institutional day or residential schools, and charter schools that provide elementary or secondary education, as determined under state law. Libraries may include school, academic, research, or private libraries.

How Much is Available: Amount Varies. Provides discounts ranging from 20 percent to 90 percent on eligible expenses. Discounts depend on the level of poverty and whether the school or library is located in an urban or rural area.

What Types of Projects Are Funded: Eligible expenses include telecommunications services, internet access, internal connections, and basic maintenance of internal connections to eligible schools and libraries. Recent Example: In 2019, the Grants Cibola County School District in New Mexico began using these funds to build a fiber network throughout the district.

More Information: www.fcc.gov/general/e-rate-schools-libraries-usf-program

FEDERAL RESOURCES

Healthcare Connect Fund Program

The Healthcare Connect Fund Program provides a 65% discount on eligible broadband connectivity expenses for eligible rural health care providers.

Who Can Apply: Eligible healthcare providers, including public or not-for-profit hospitals, rural health clinics, community health centers, health centers serving migrants, community mental health centers, local health departments or agencies, and post-secondary educational institutions/teaching hospitals/medical schools.

How Much is Available: Amount varies. Approved applicants receive a 65 percent discount on all eligible expenses.

What Types of Projects Are Funded: Eligible expenses include broadband services and equipment, and, for consortium applicants, Health Care Provider constructed and owned network facilities.

Recent examples: In 2015, the Bacon County Health Services in Georgia was awarded $2,239,580 to install a new 1 Gbps network that connected approximately 25 public and nonprofit health care facilities in rural and urban locations in Georgia to an existing network. The project enabled new telemedicine services, distance education, research, and effective disaster response initiatives.

The Brazos Valley Council of Government used this funding source in the development of their $18 million broadband network beginning in 2016.

More Information: https://www.usac.org/rural-health-care/healthcare-connect-fund-program/

ADDITIONAL BENEFITS OF HIGH-SPEED INTERNET

High-speed internet access is critical to the region's economy as an important factor not only for economic development, but also for educational attainment and quality of life. The *Regional High-Speed Internet Strategy* focuses on the economic development benefits that reliable access to internet can provide, such as access to global markets and increasing job growth. The recent response to the COVID-19 pandemic has demonstrated the need for strengthening regional broadband infrastructure, especially in rural and underserved areas. High-speed internet is increasingly considered as a basic utility to serve schools, healthcare institutions, and residences. Some additional benefits of reliable broadband for communities include:

Educational Opportunities

With schools transitioning to remote education during the COVID-19 pandemic, the need for universal access to high-speed internet quickly became apparent. School districts have taken steps to provide emergency access through mobile hot-spots on school buses and extending Wi-Fi into school parking lots, but these stop-gap measures do not adequately address the needs of students across the region. Students without access to internet face challenges in completing and submitting assignments, conducting research, or learning remotely. Building out a network will be crucial to closing the educational achievement gap in the region. In addition to the benefits for traditional students, access to high-speed internet allows workers to improve their skills and access remote job training.

Remote Healthcare

Clinics and hospitals must quickly connect with other medical institutions for test results, access to medical records, and consultations with specialists. Without access to broadband, hospitals can't meet the needs of their patients. Telemedicine allows patients to access health-care providers without leaving their homes. Using telemedicine can reduce overhead for health care providers and cut patient costs.

Remote Work

During the COVID-19 pandemic or anytime workers are asked to work remotely, the gap in access to reliable internet is a challenge. Workers are not able to perform their professional responsibilities without access to fast and reliable internet. It is crucial for the region's economic competitiveness to keep worker productivity at a maximum. Telecommuting keeps traffic off the region's roadway network while allowing employees flexibility.

Quality of Life and Connection

Today, access to high-speed internet is essentially a basic amenity for most people. It provides not only essential services such as education, healthcare, and remote work, but also quality of life benefits, such as access to information and entertainment, connections with friends and family members, financial services—paying bills and online banking—and engagement with local government. Plus, as information and entertainment content (movies, news, games, etc.) increasingly moves to streaming online, communities without access to high-speed internet are left behind. It will be difficult for them to attract new residents who have grown accustomed having this service.

The usefulness and necessity of access to internet is only increasing with time. The lack of adequate broadband access can be a major barrier to economic opportunity, educational success, and disaster response, as well as to the ability to deliver telehealth and other 21st century online services. Without a strong internet infrastructure, the region will not develop to its full potential.

NEXT STEPS

The Gulf Coast Economic Development District (GCEDD) will continue to work with communities in the Houston-Galveston region to expand the availability broadband. As per the GCEDD Bylaws, Board directors are encouraged to engage with government and economic development officials in their areas to use the *Regional High-Speed Internet Strategy* as a resource in identifying local priorities and pursuing activities to address local needs. Any endeavor to expand broadband will require significant effort and resources, and the GCEDD is available to provide technical support throughout the process. The GCEDD will also continue to seek outside sources of funding and technical assistance to enhance the abilities of communities in the region to meet their broadband service goals.

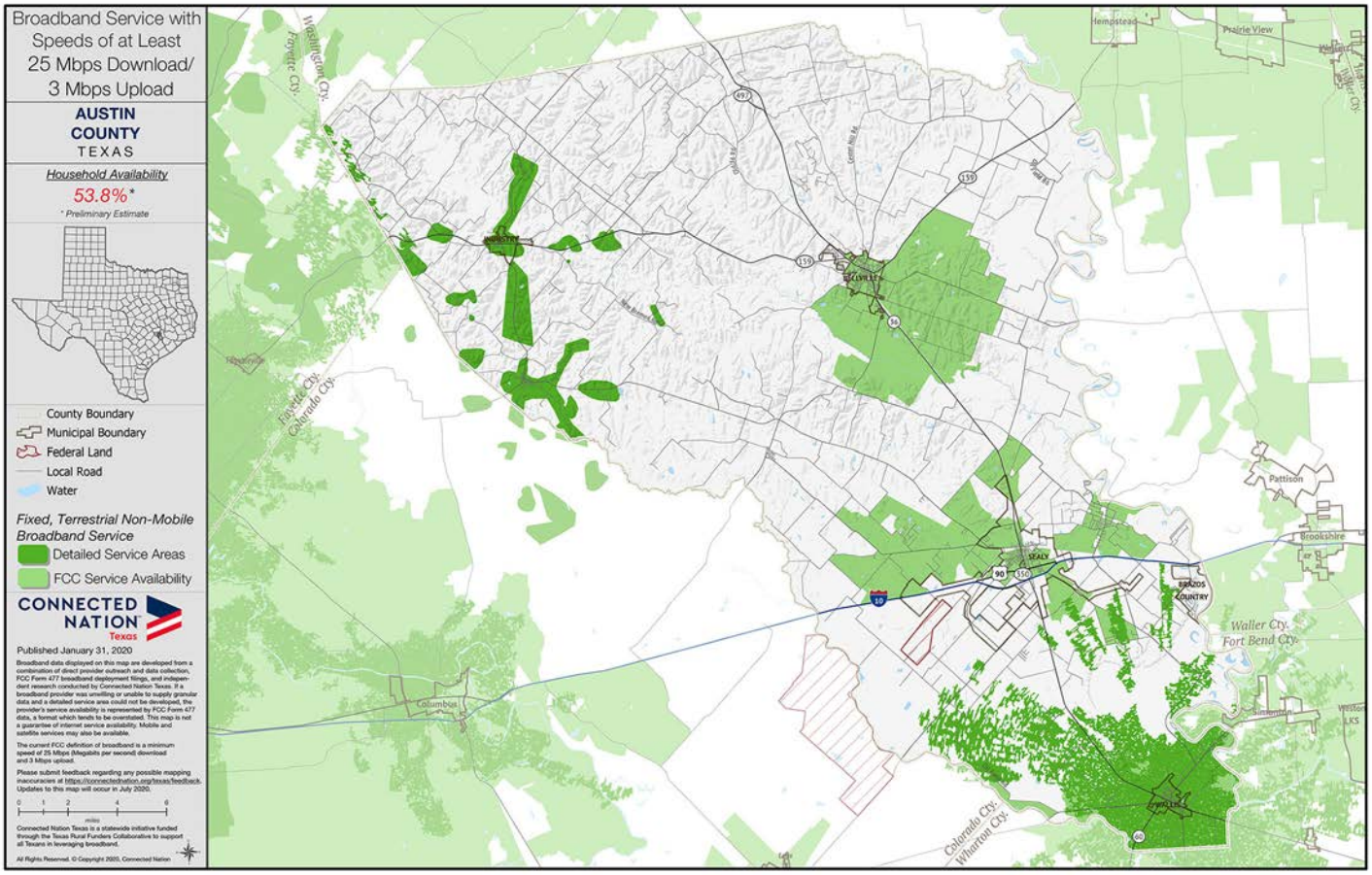
The GCEDD is currently (mid-2020) working with Connected Texas (a subsidiary of Connected Nation, a national broadband non-profit organization) to enhance county-level assessments of broadband internet in the region beginning with the region's rural counties.

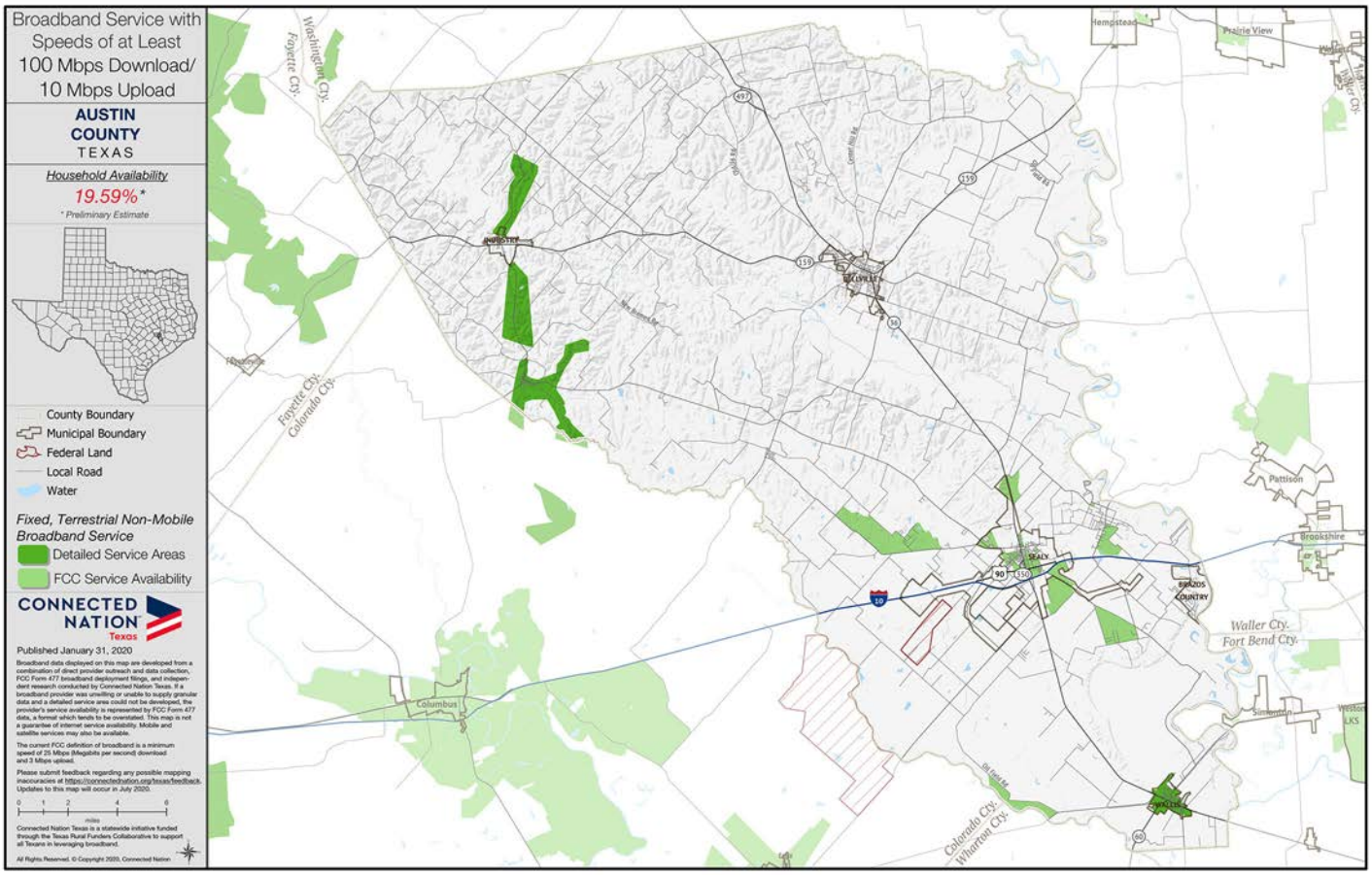
The best way to start on the pathway toward expanded broadband is to contact the GCEDD and discuss your needs.

Find the Gulf Coast Economic Development District at **www.gcedd.org**

APPENDIX: BROADBAND MAPPING

AUSTIN COUNTY





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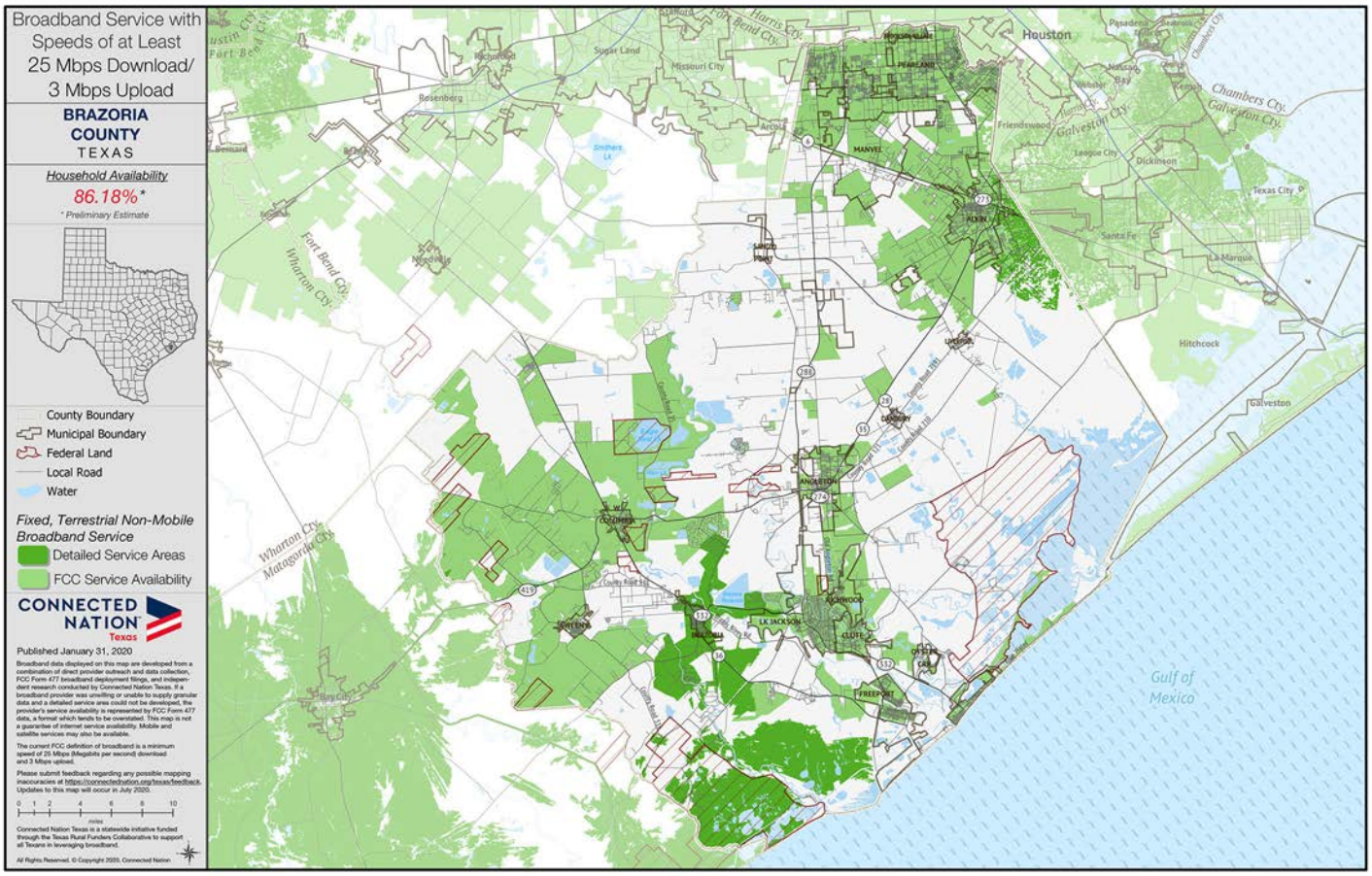

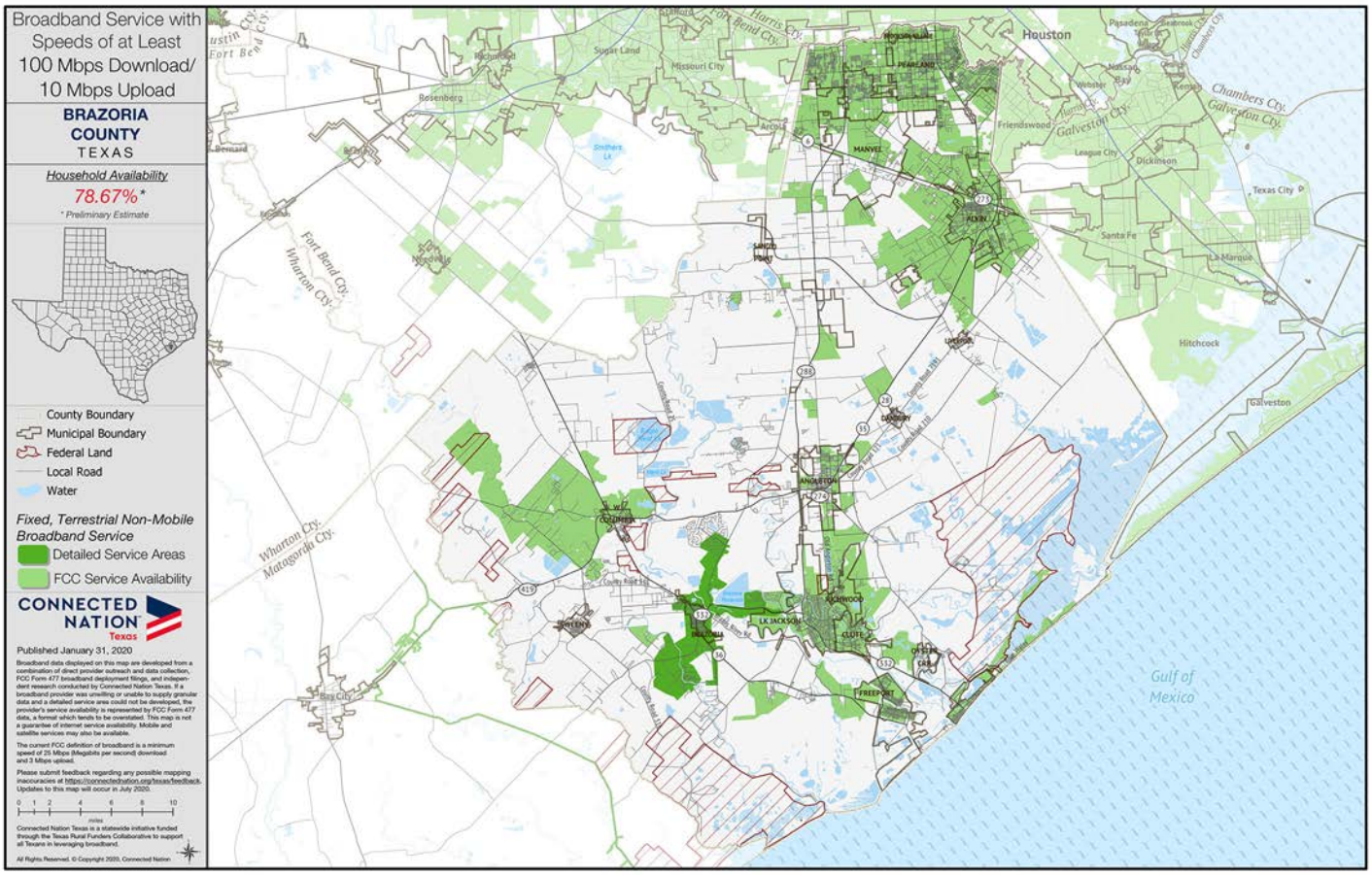

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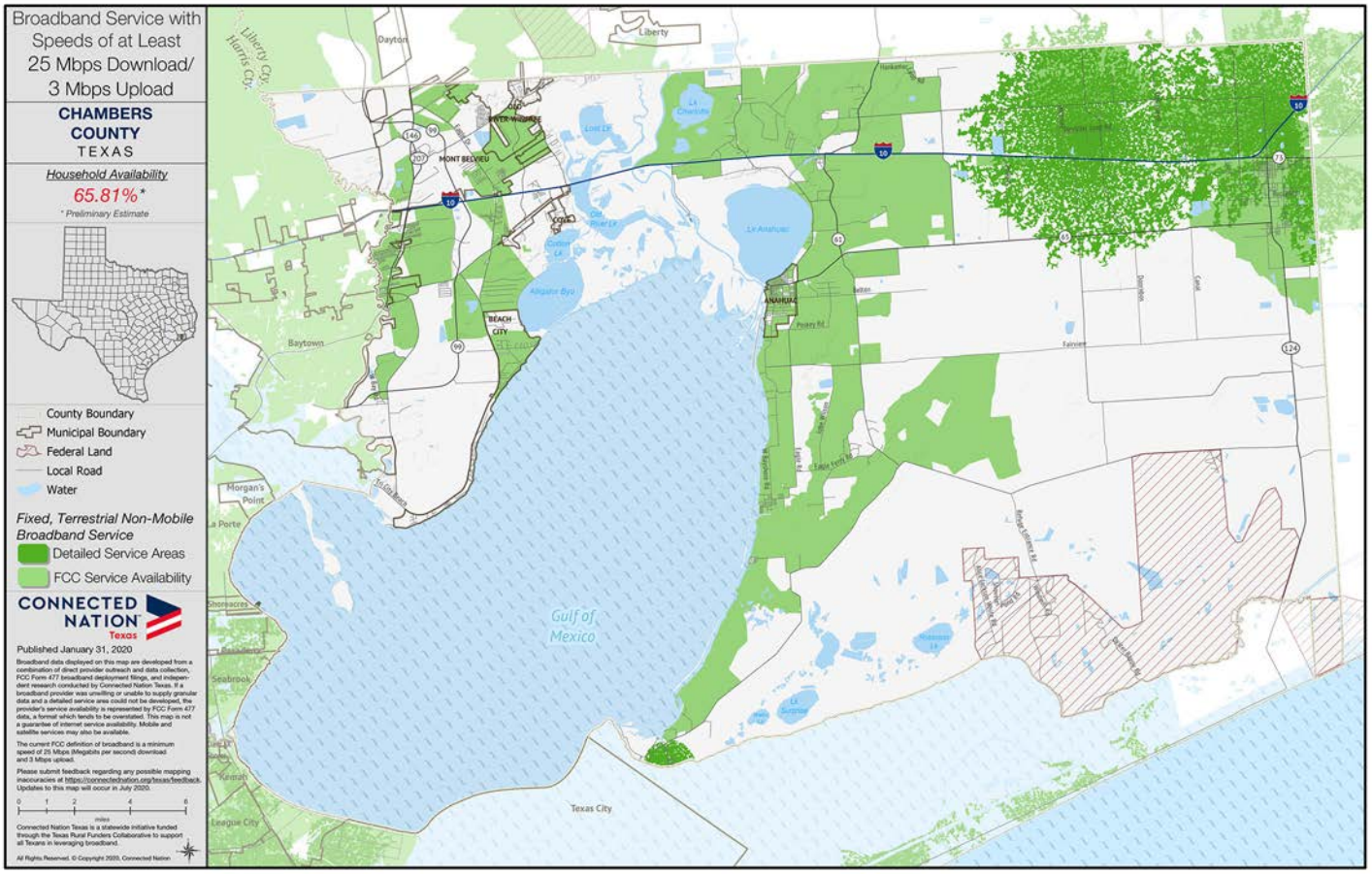

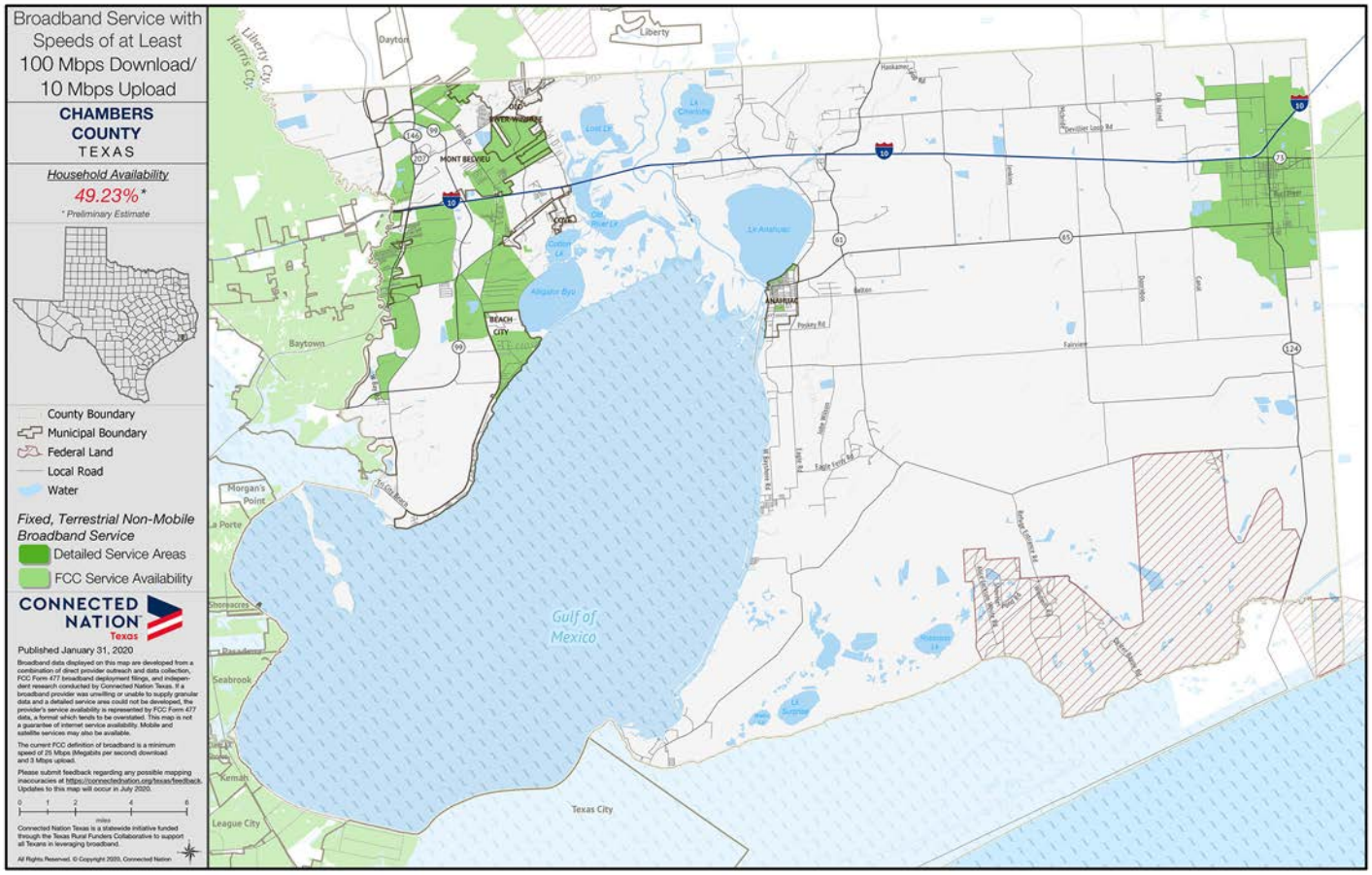

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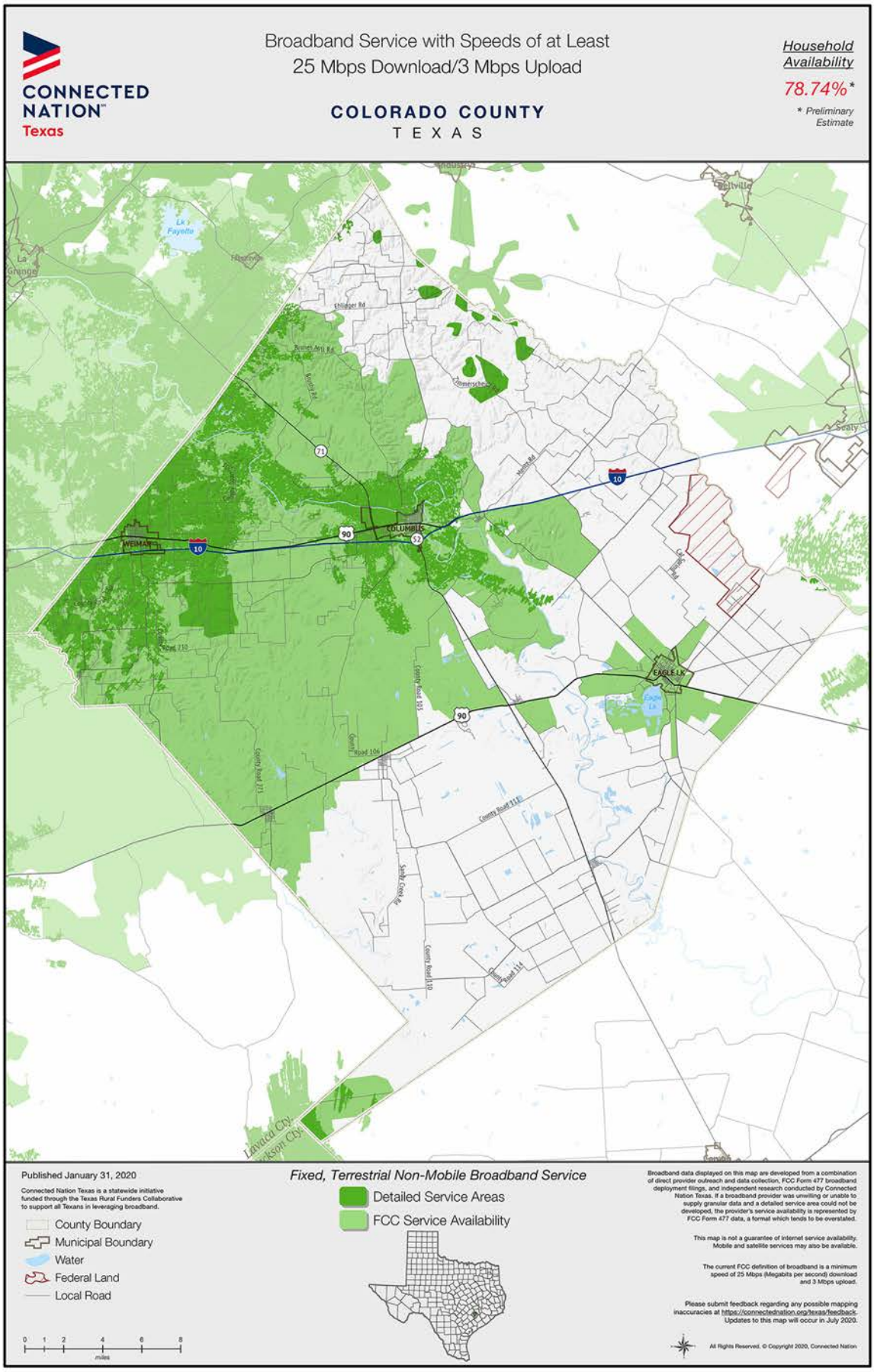

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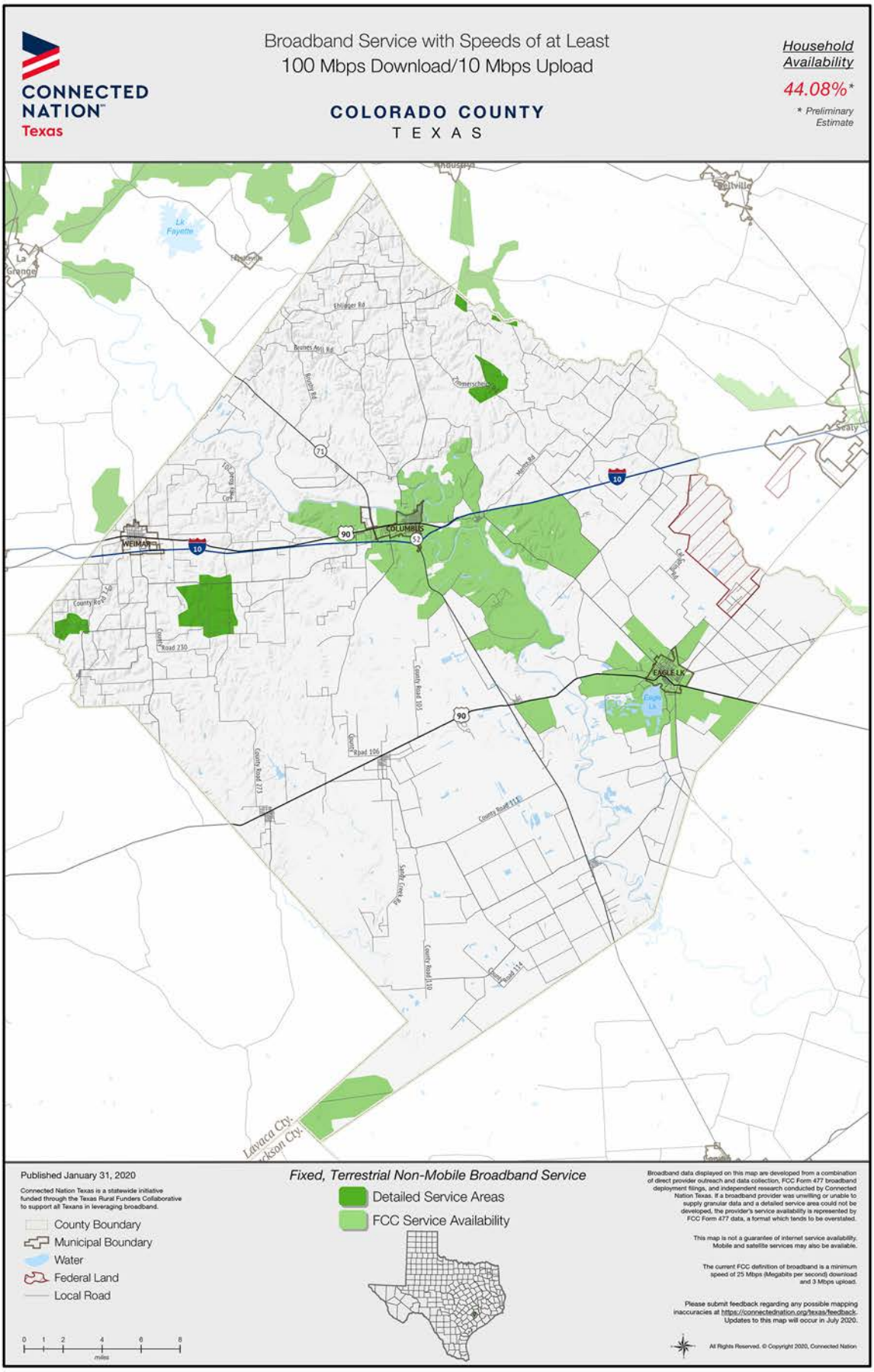

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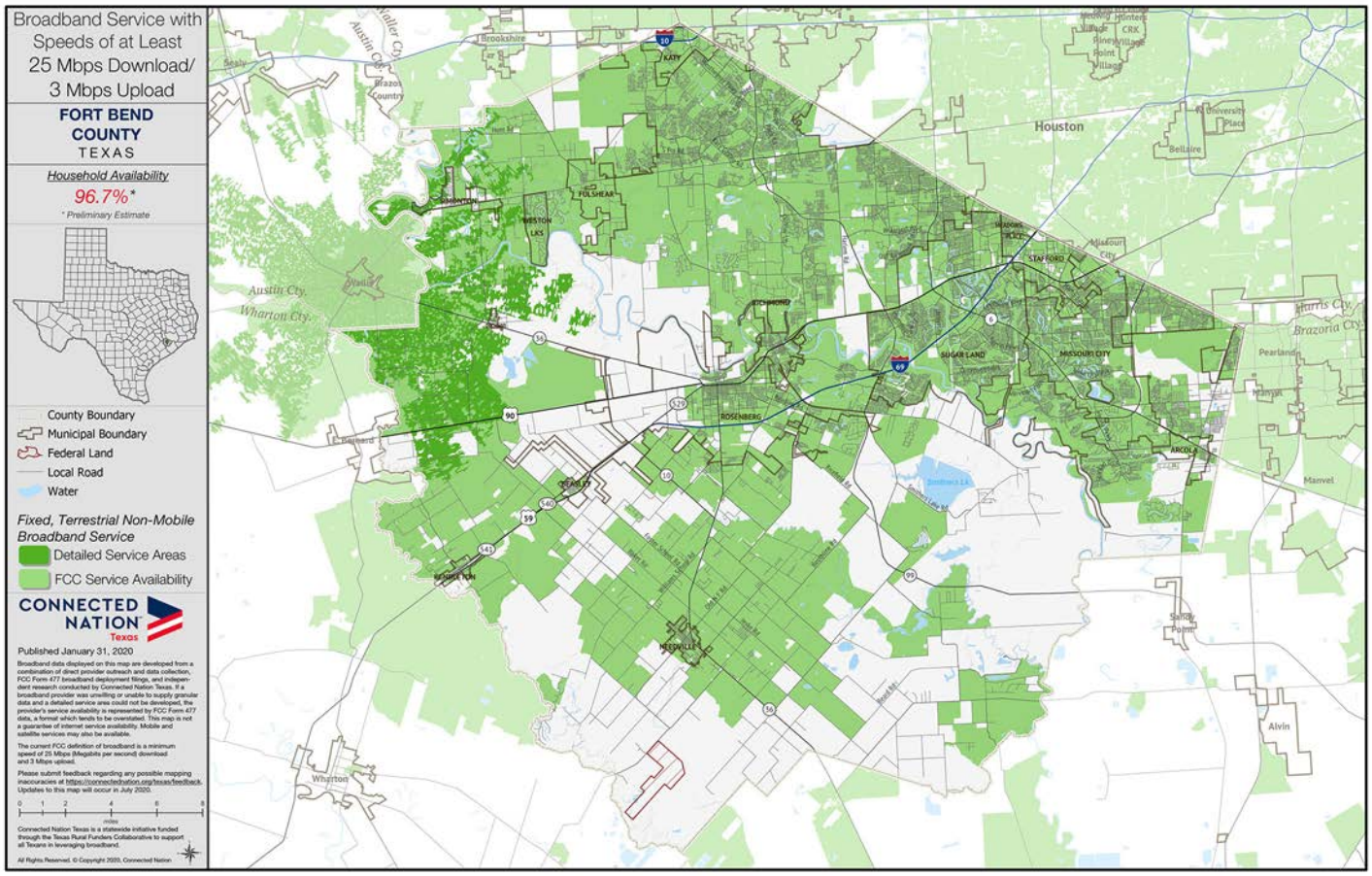

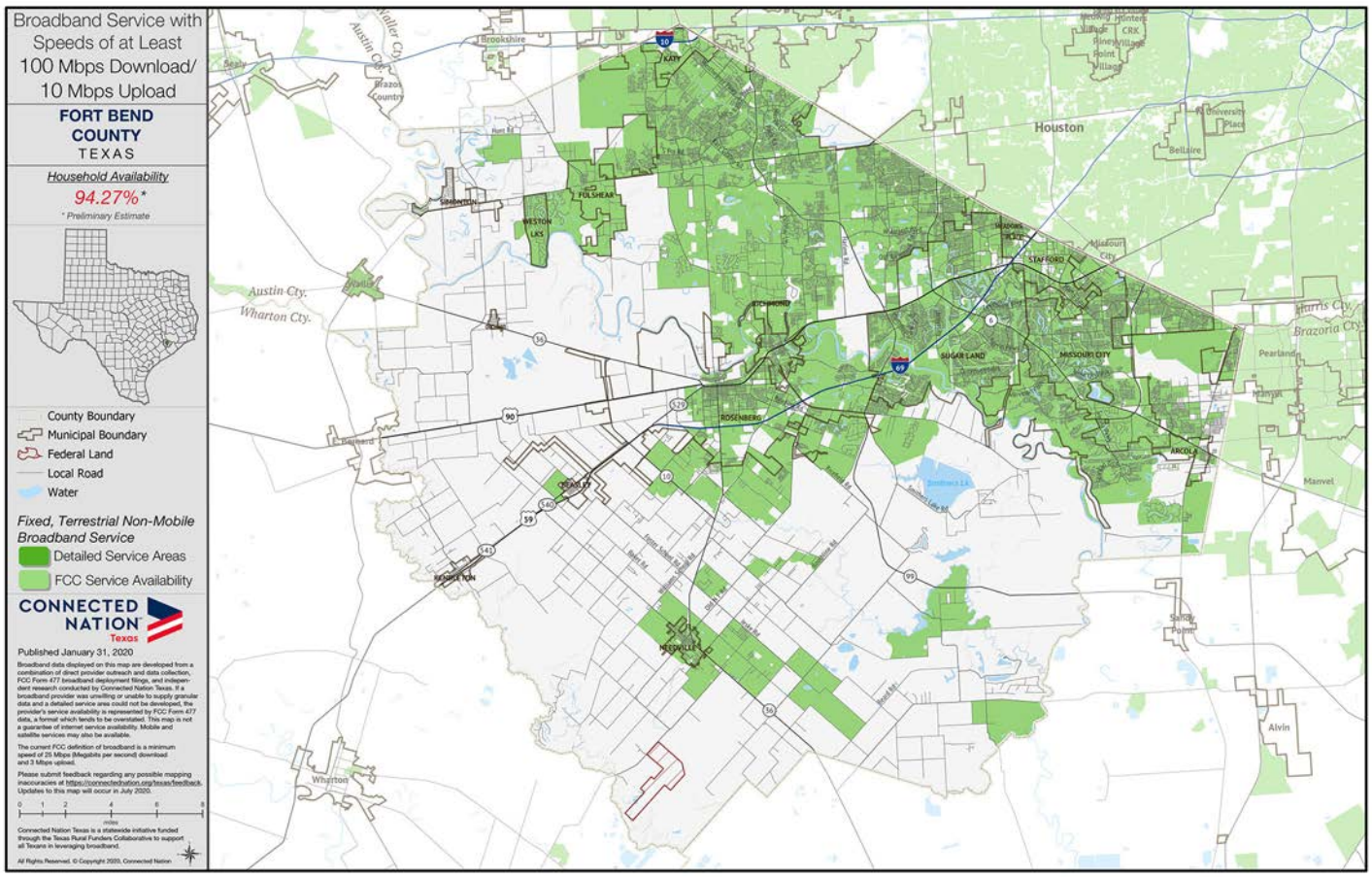

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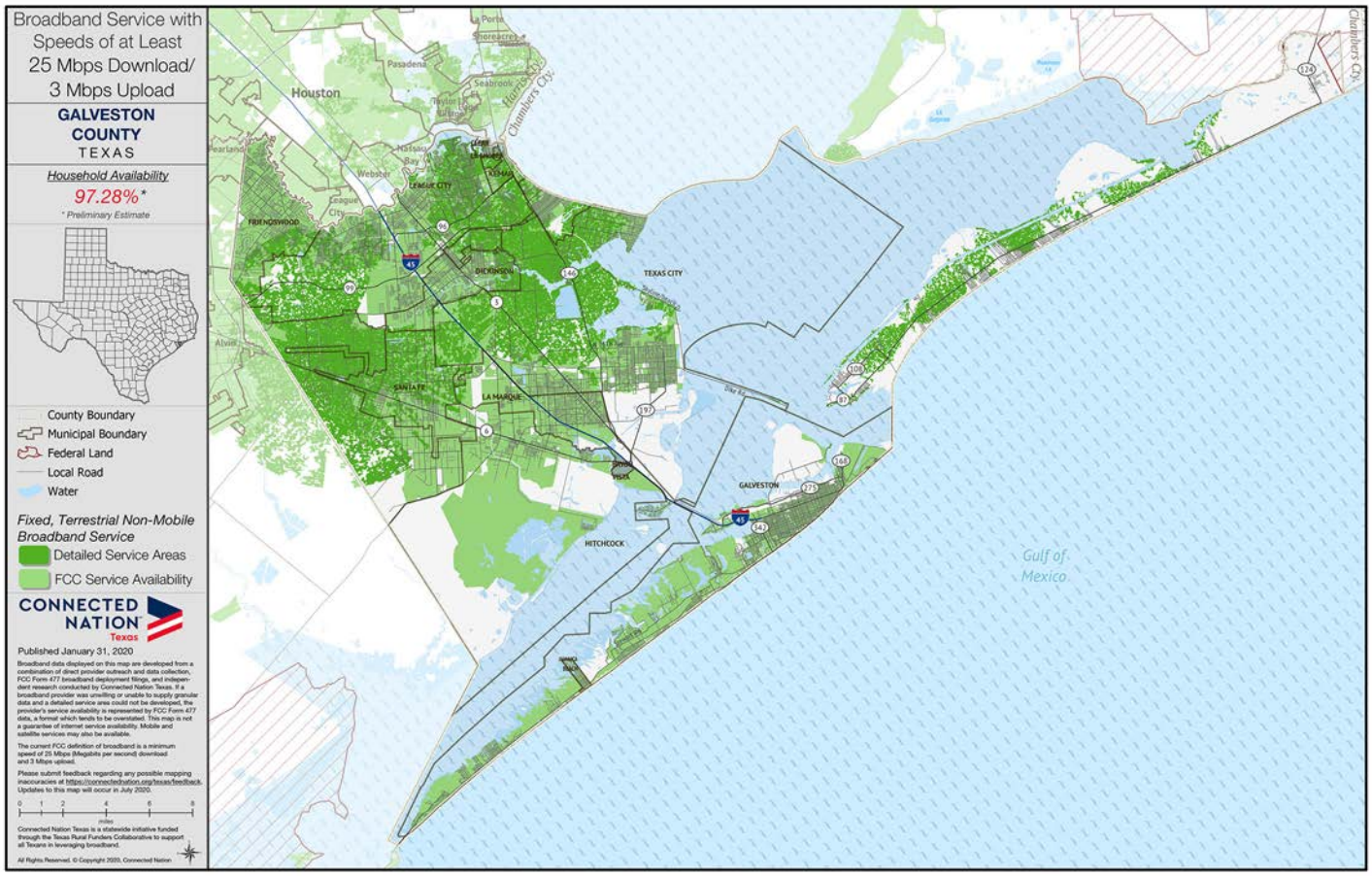

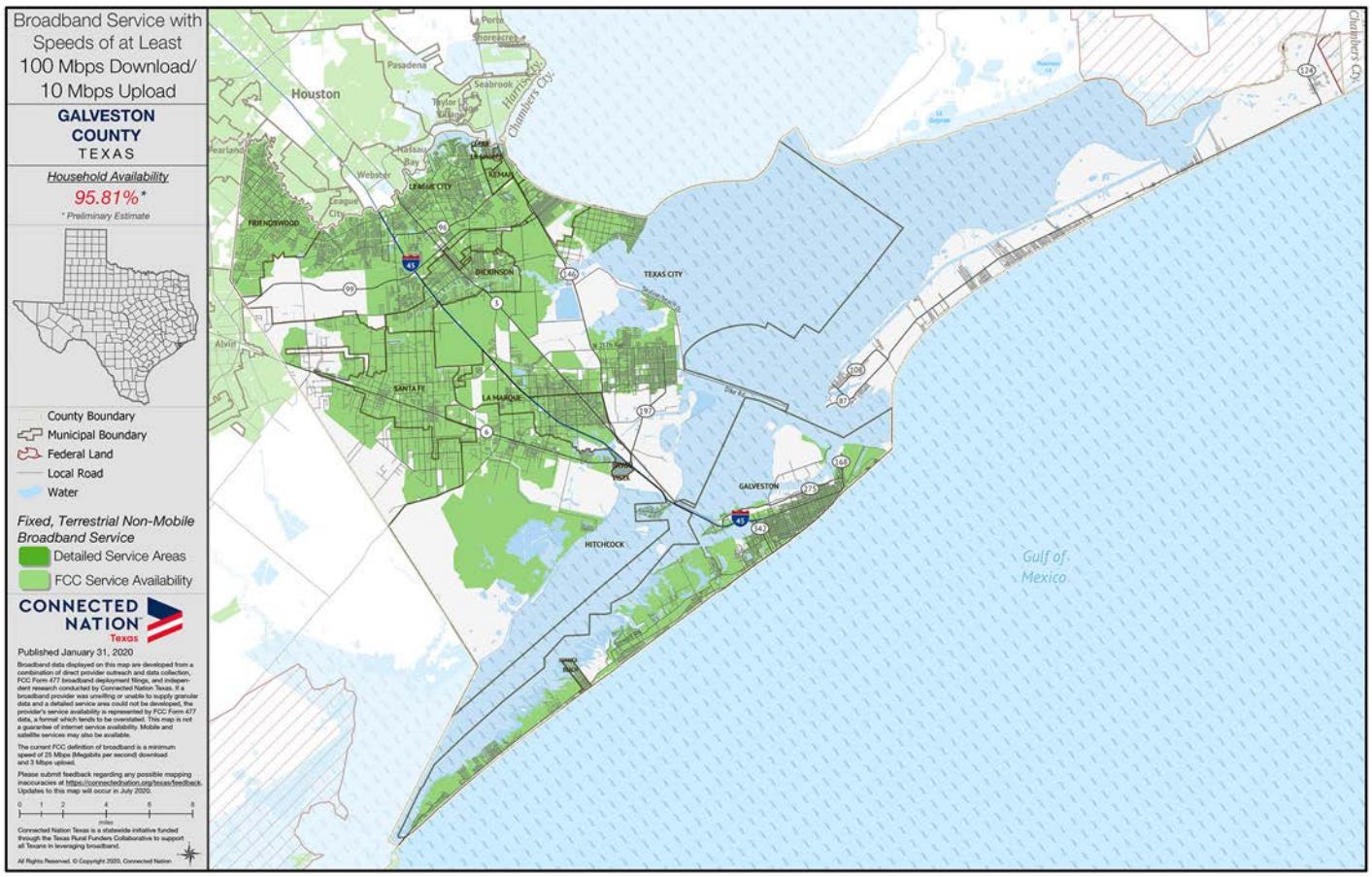

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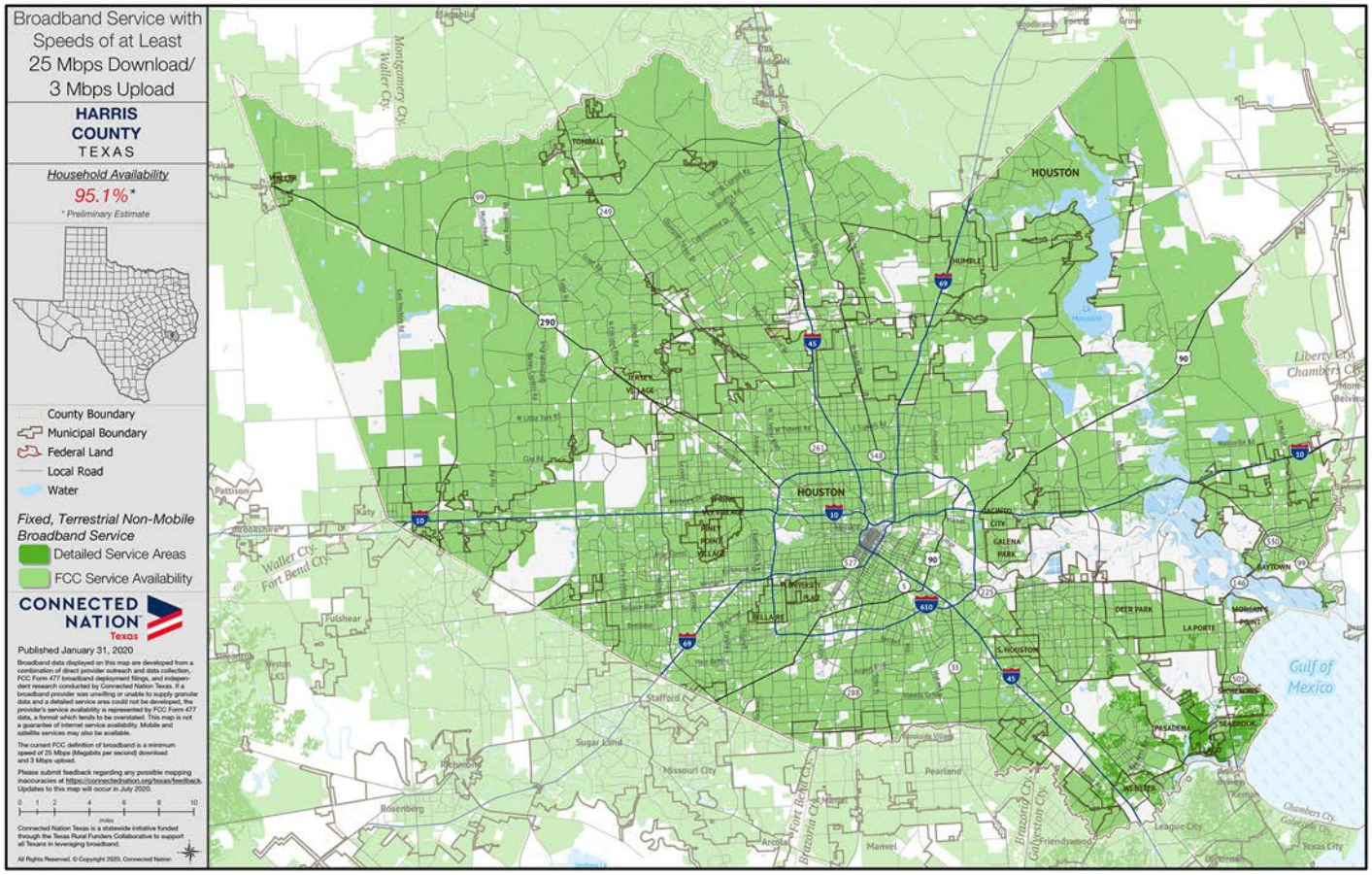

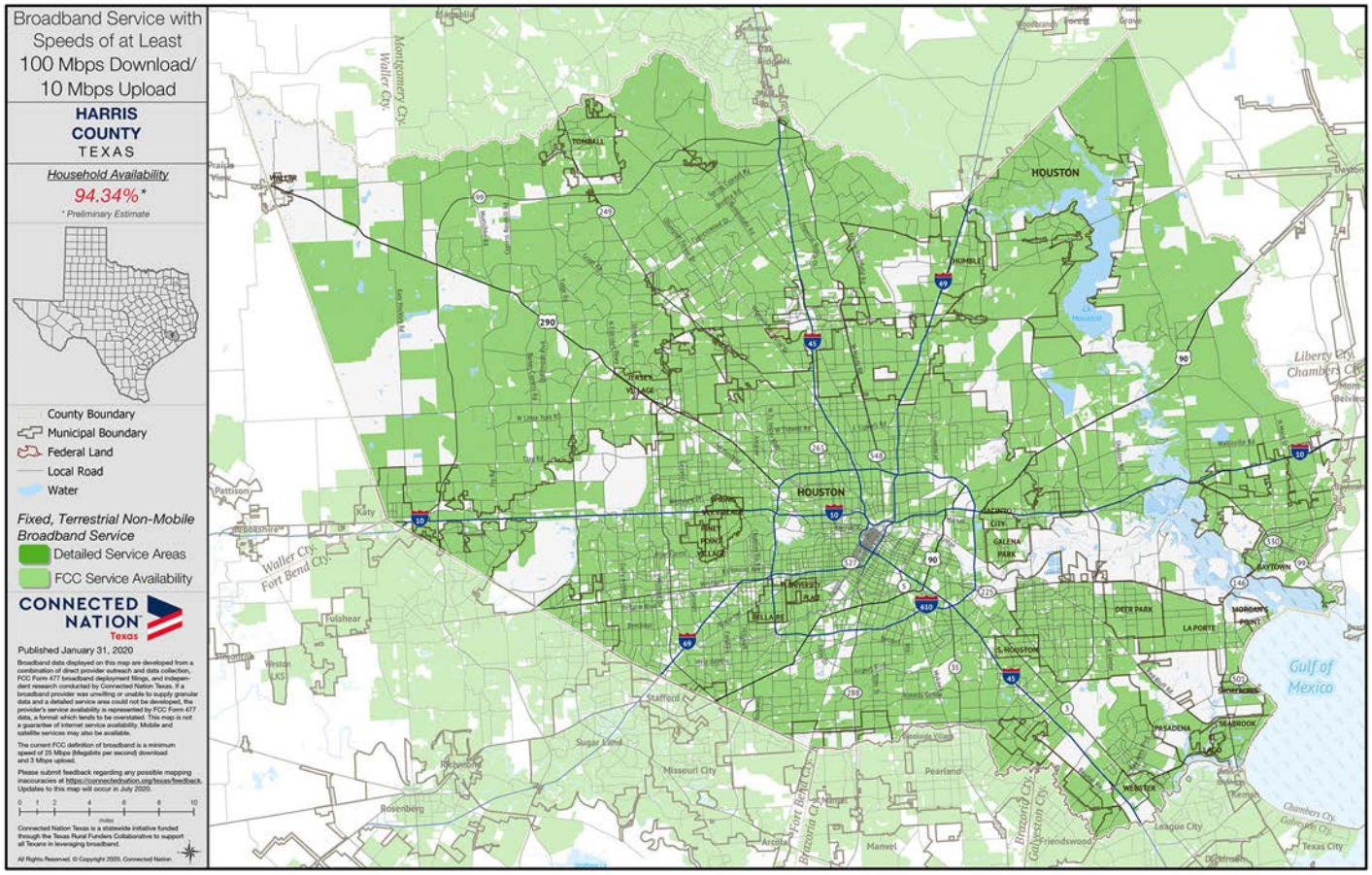

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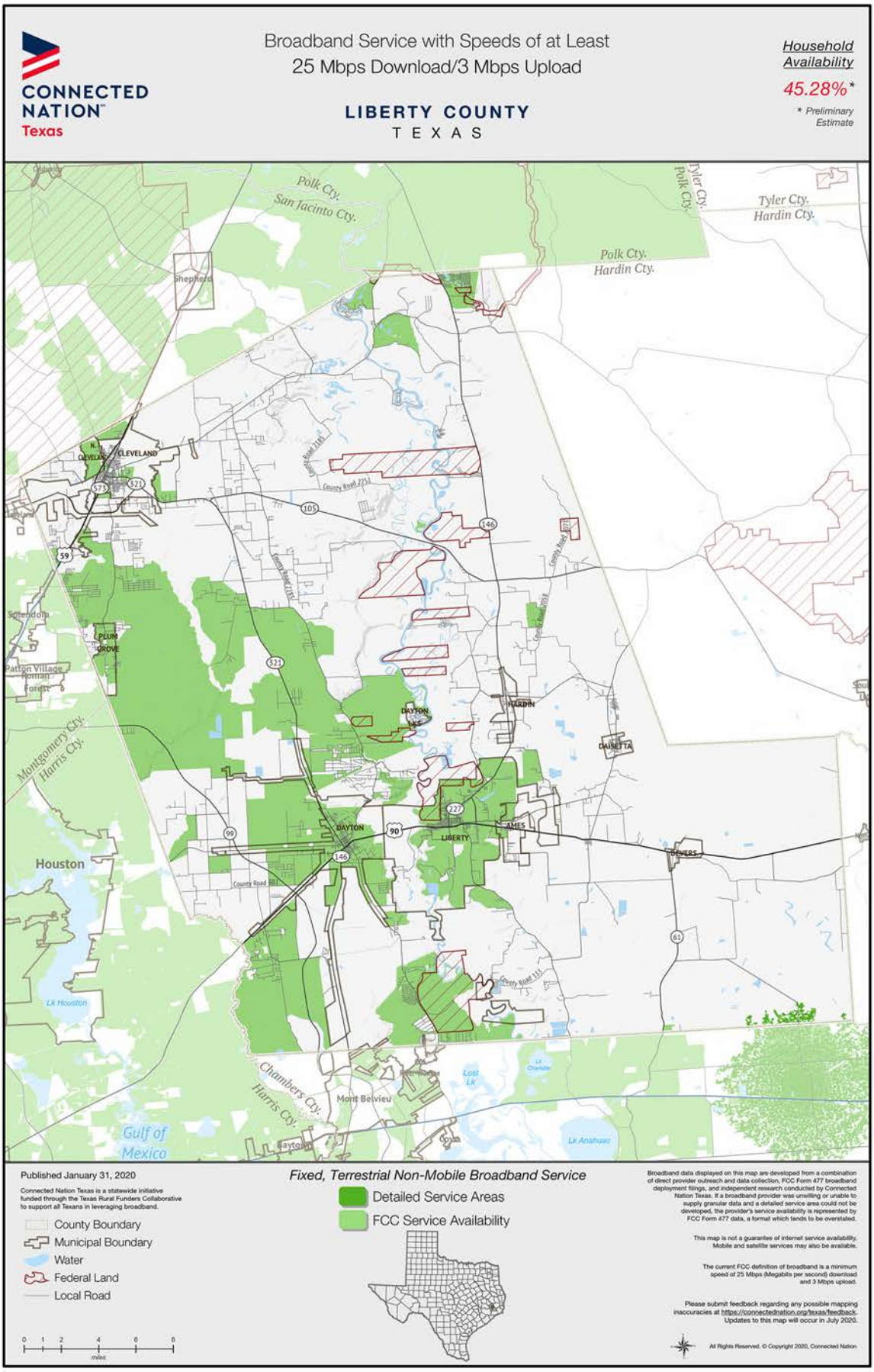

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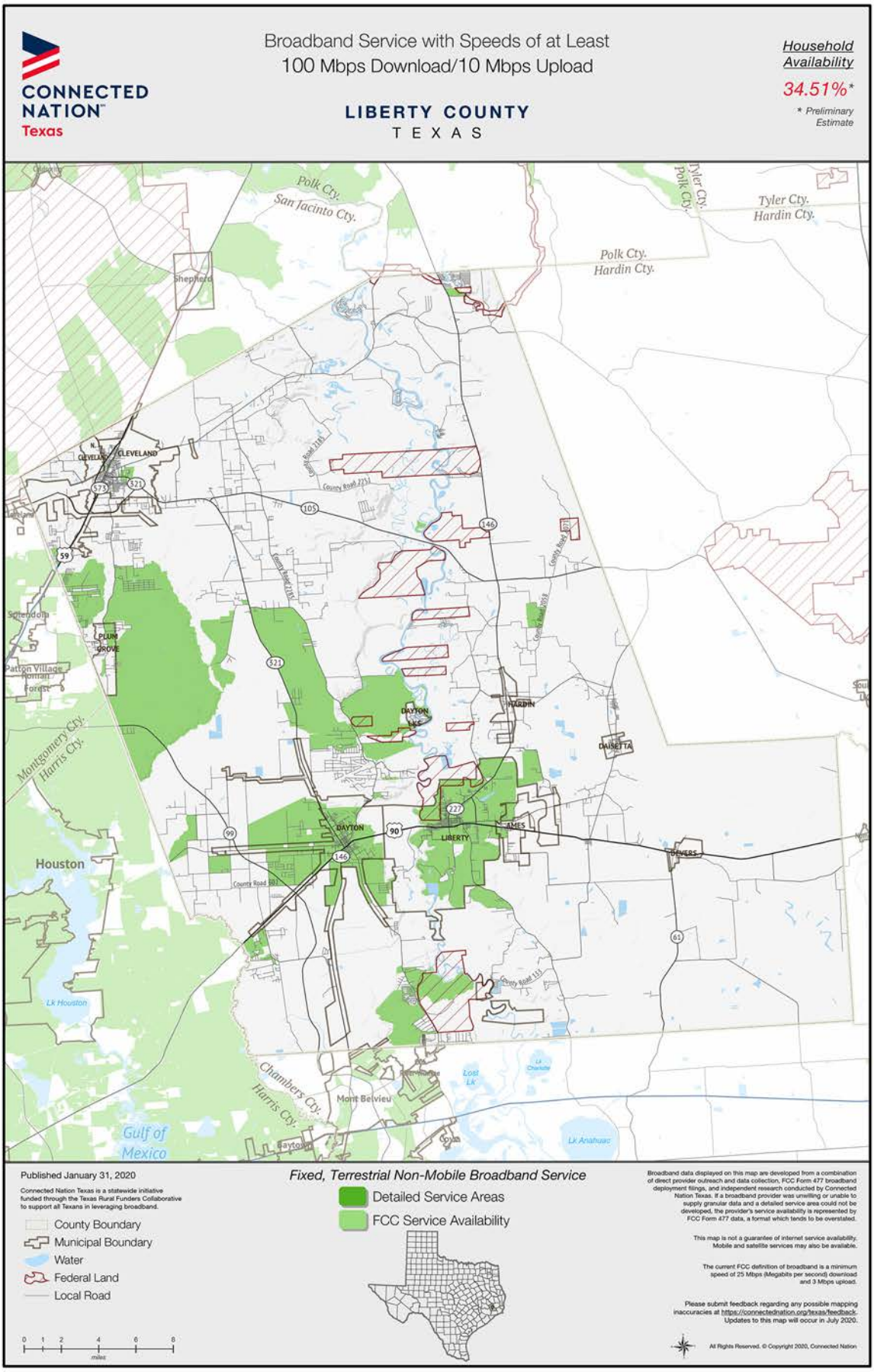

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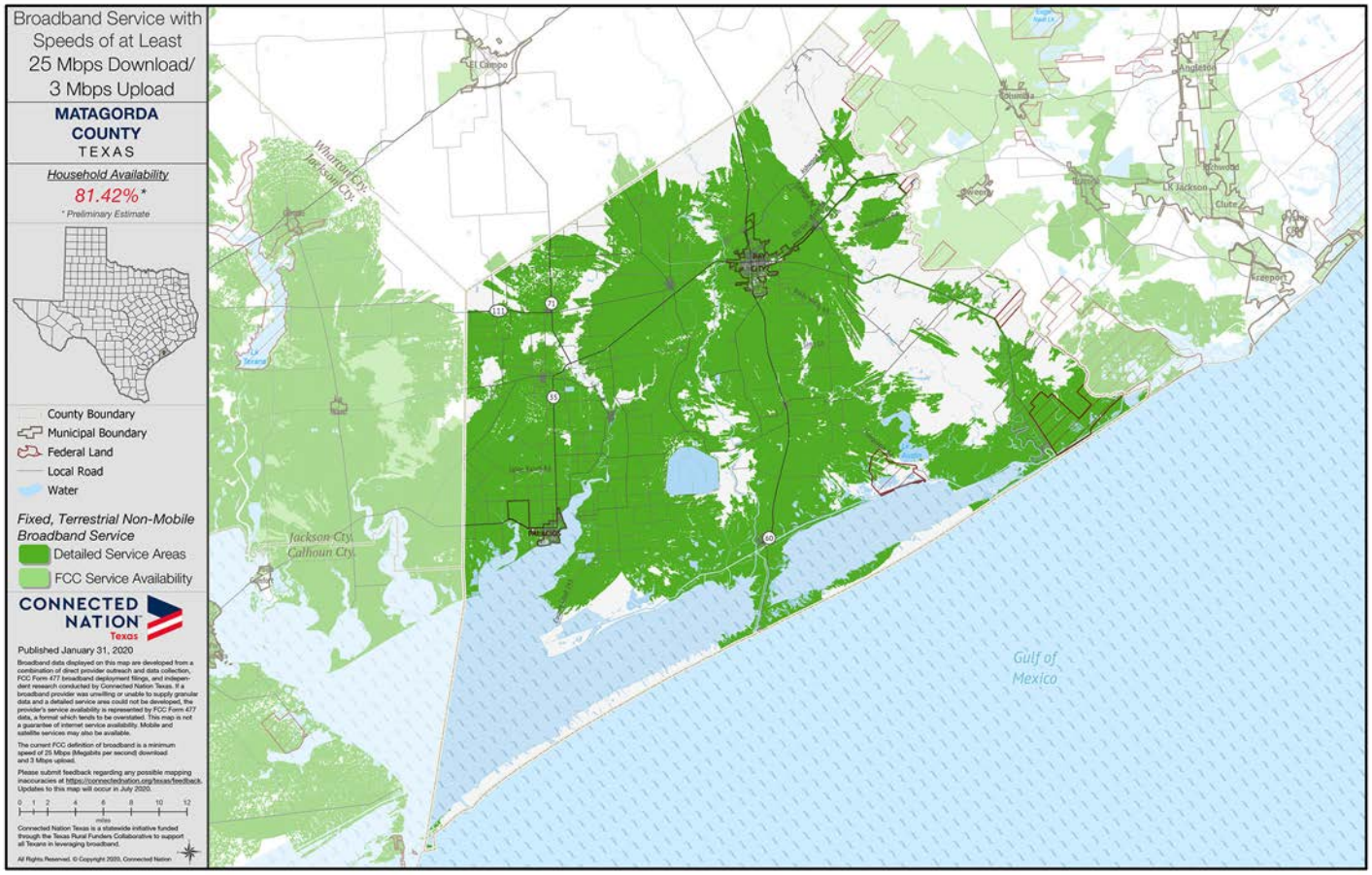

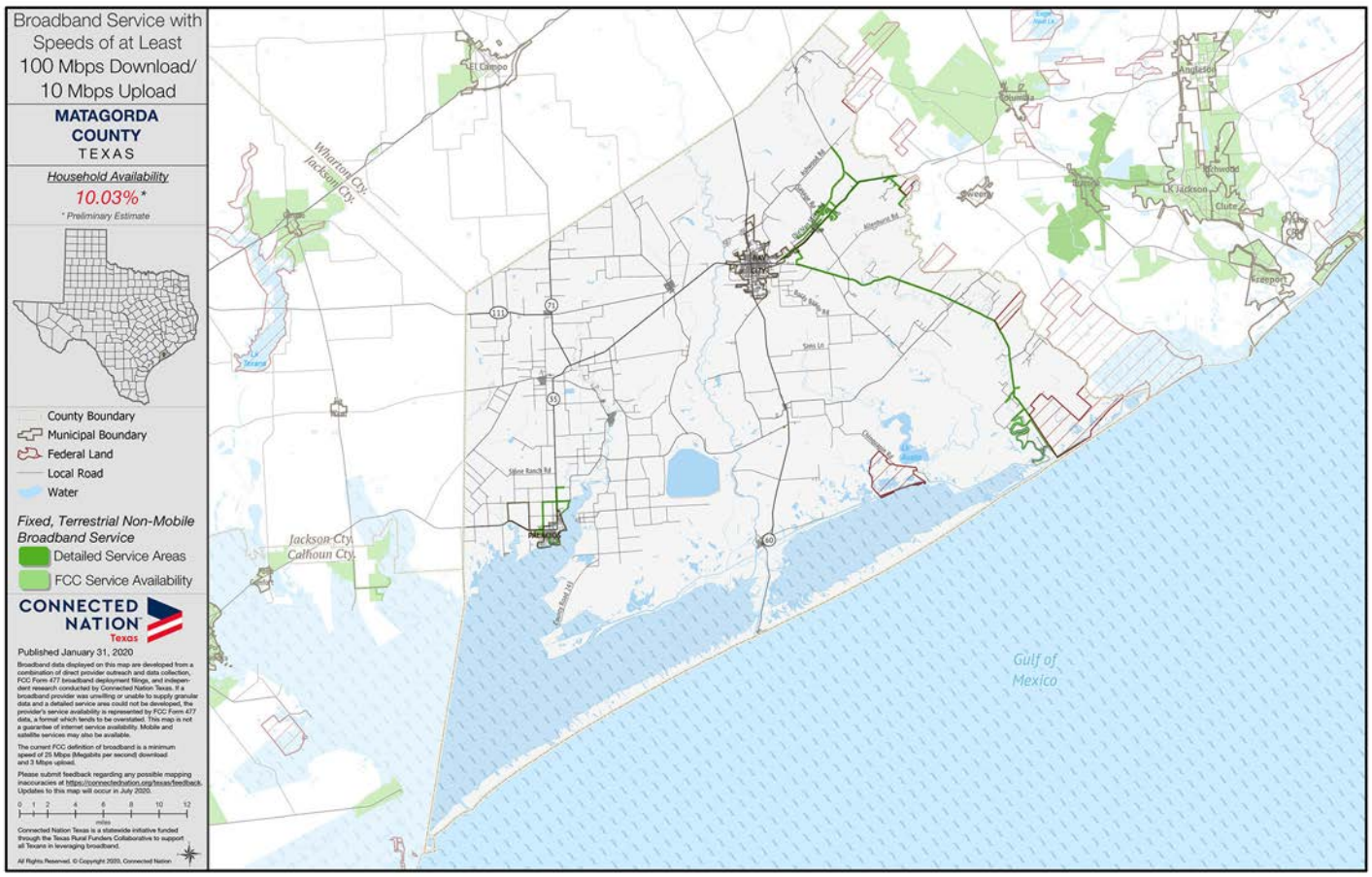

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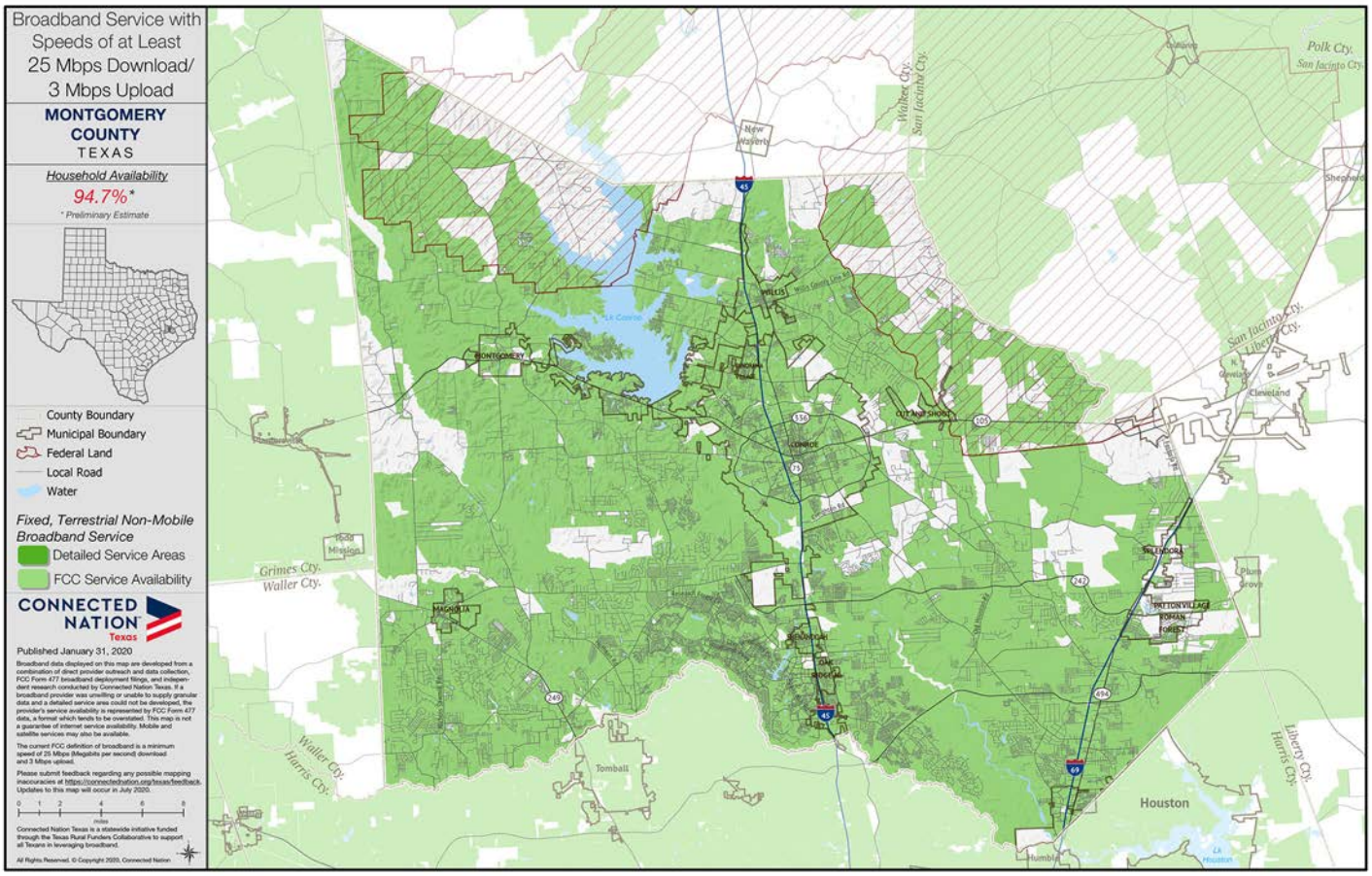

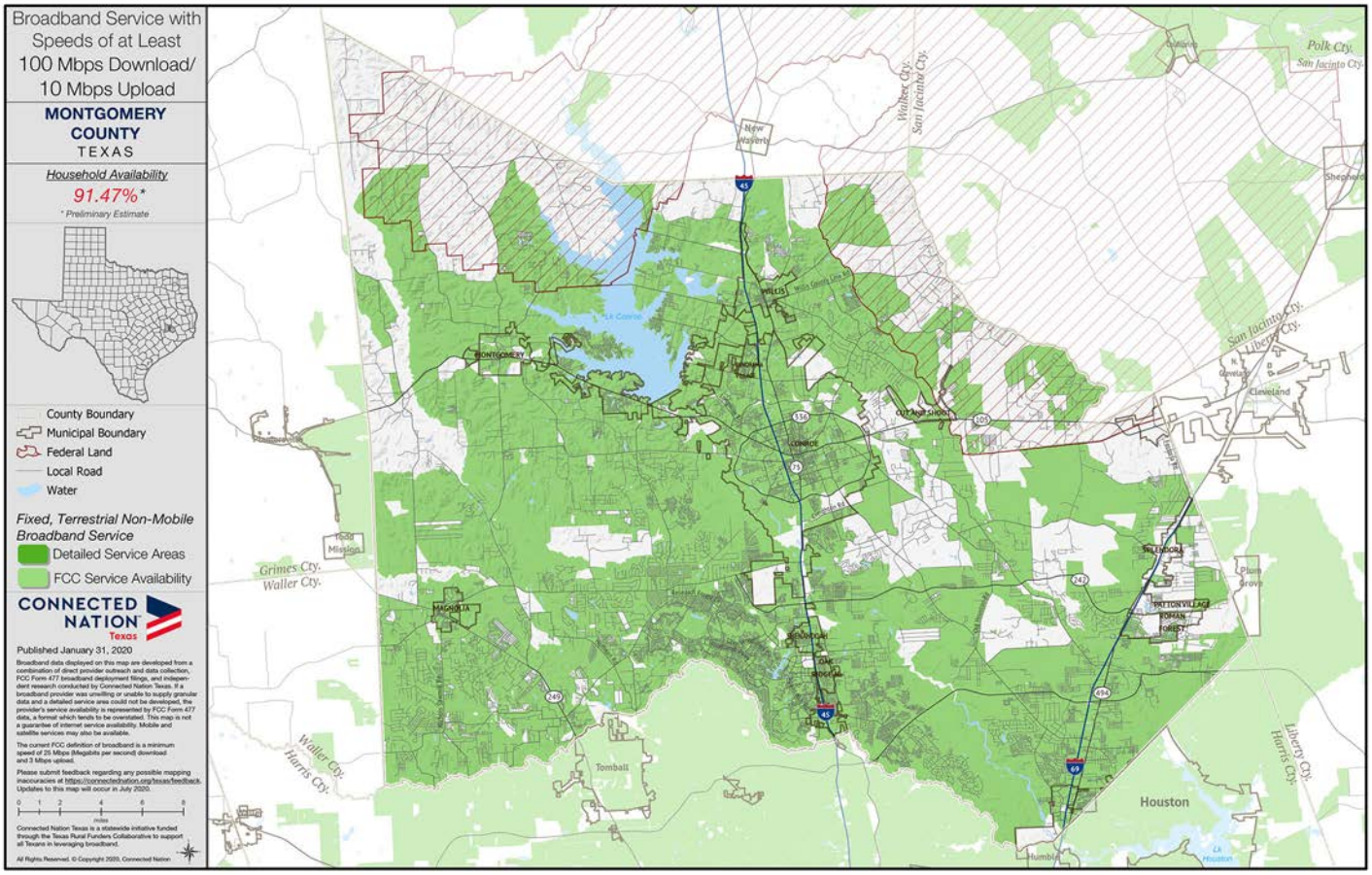

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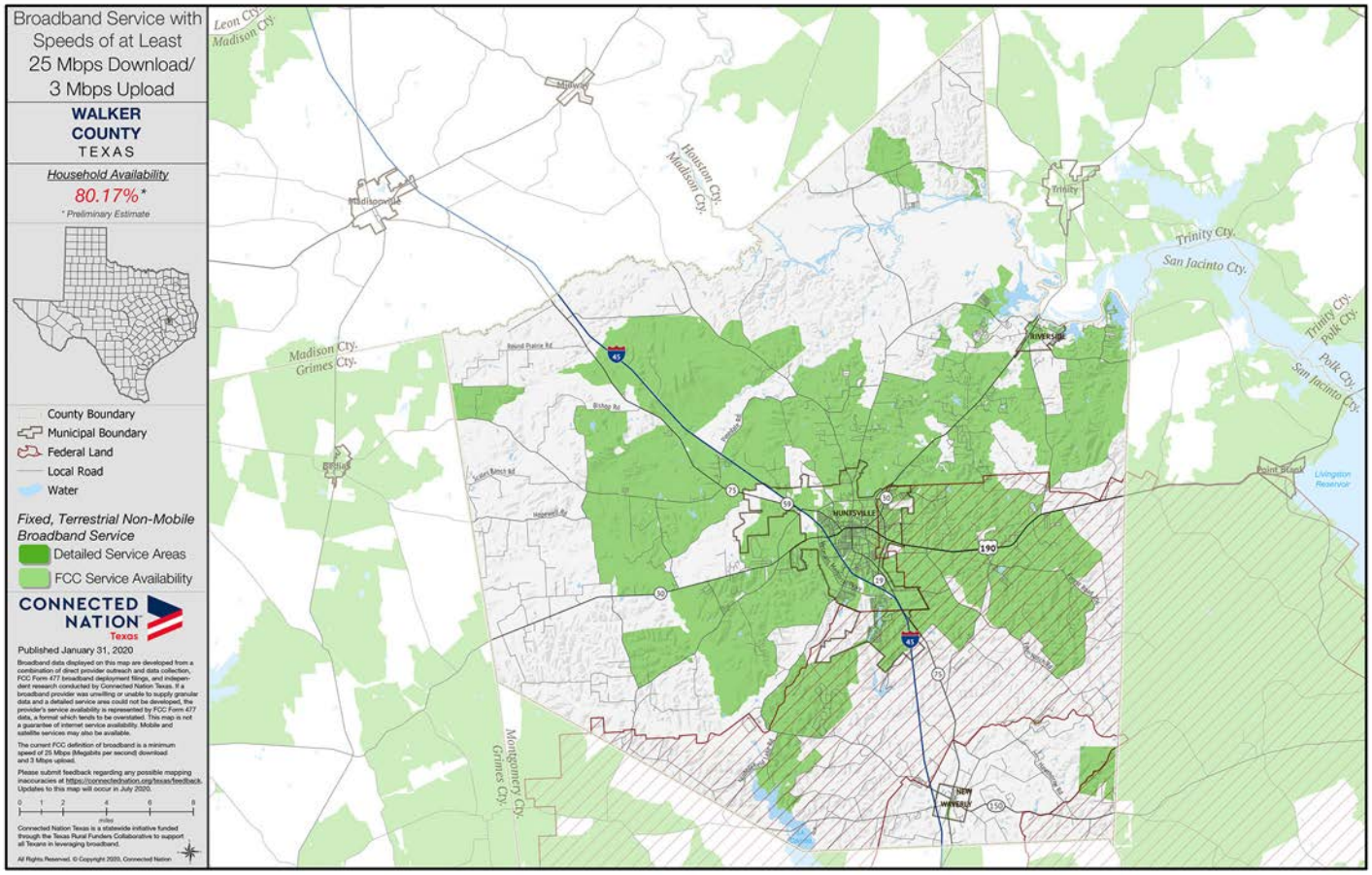

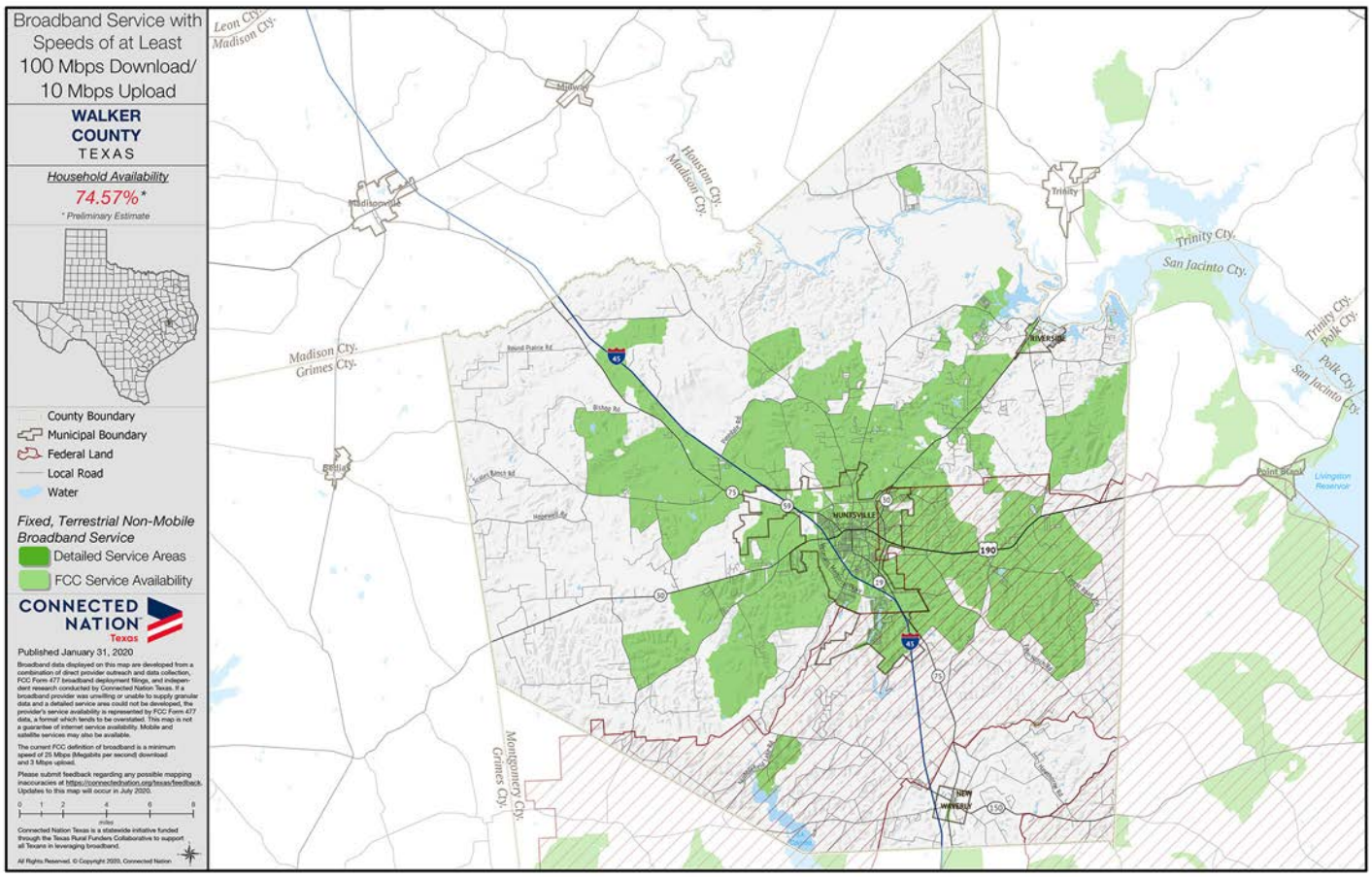

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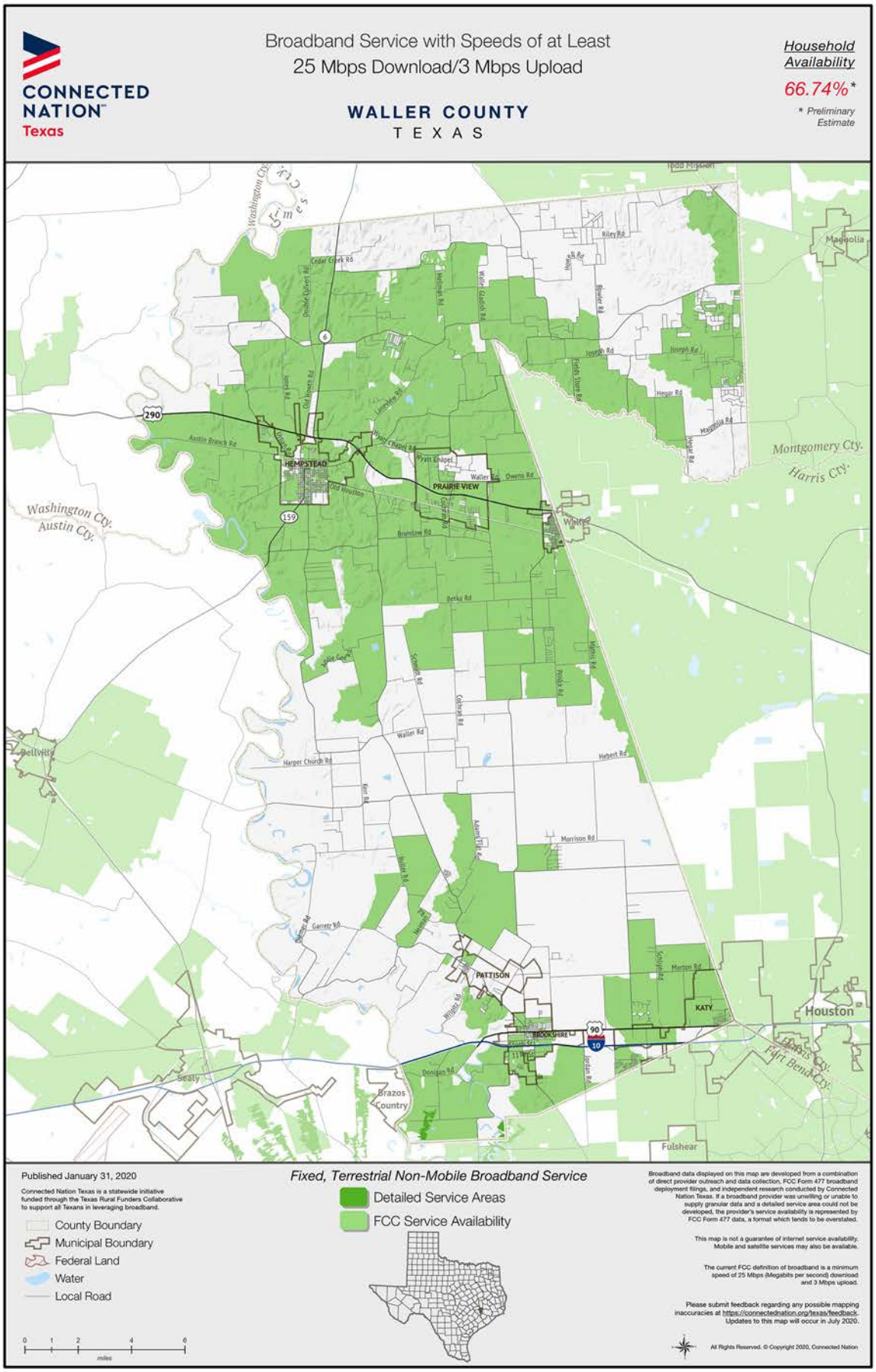

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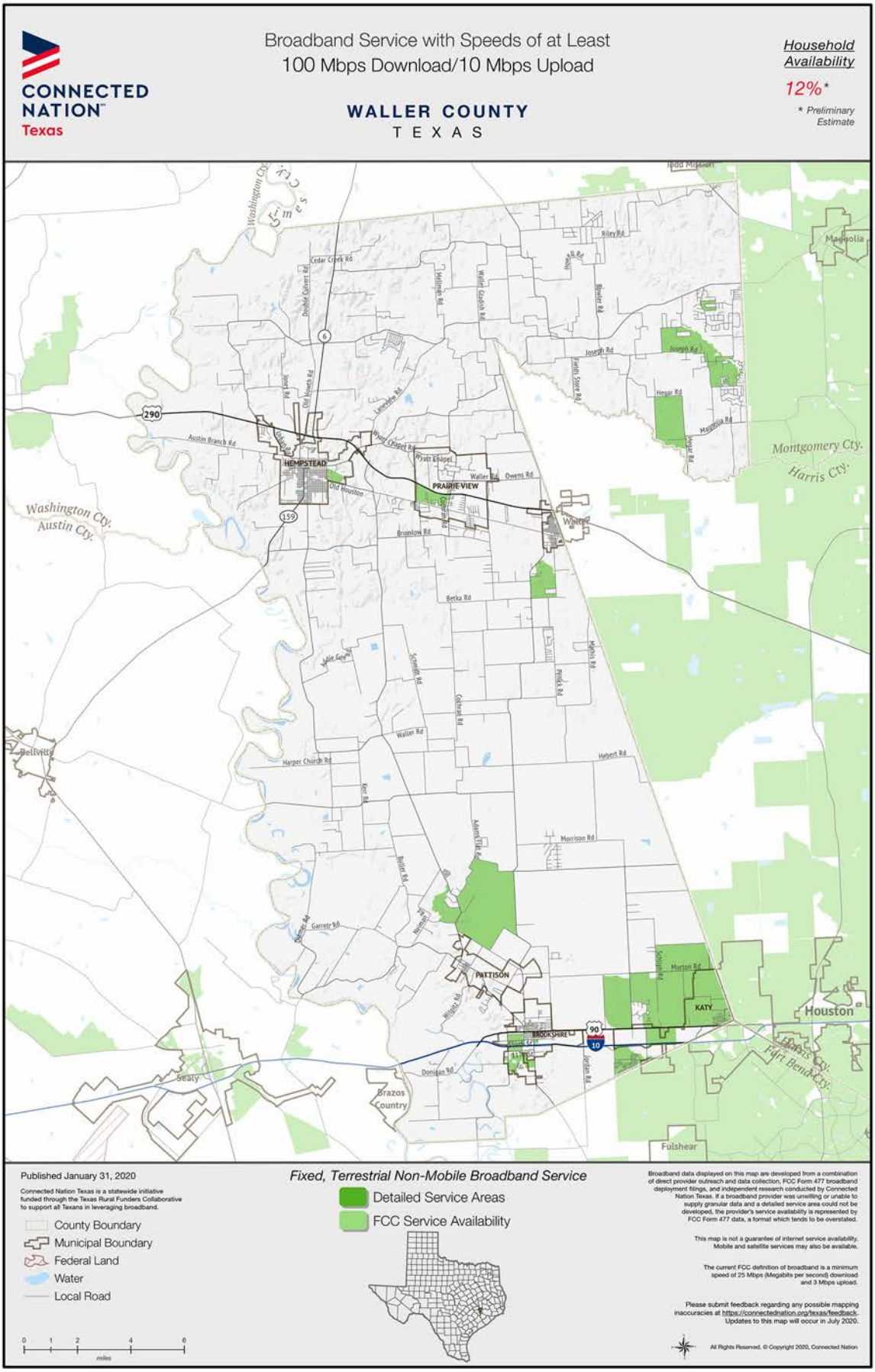

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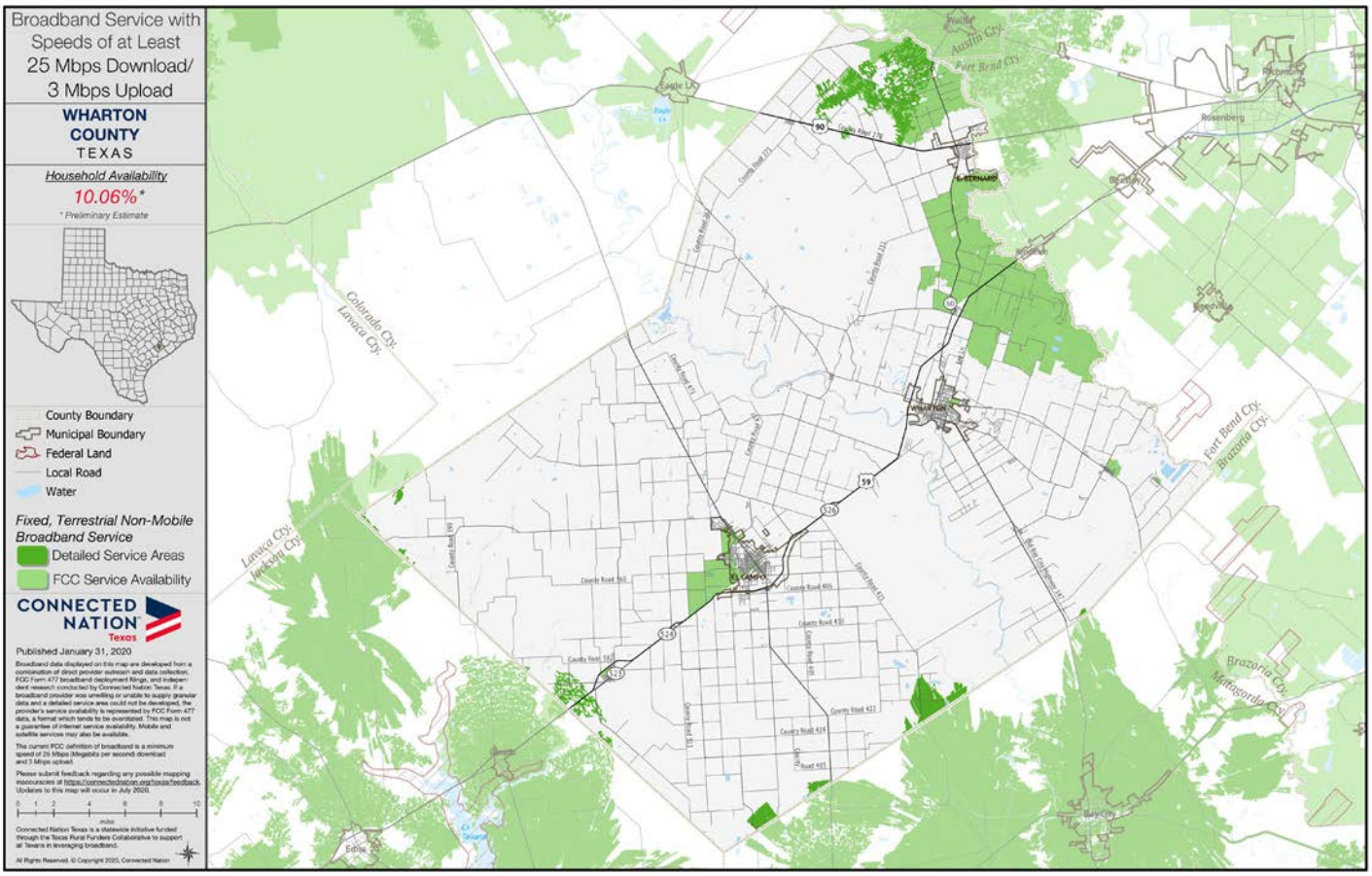

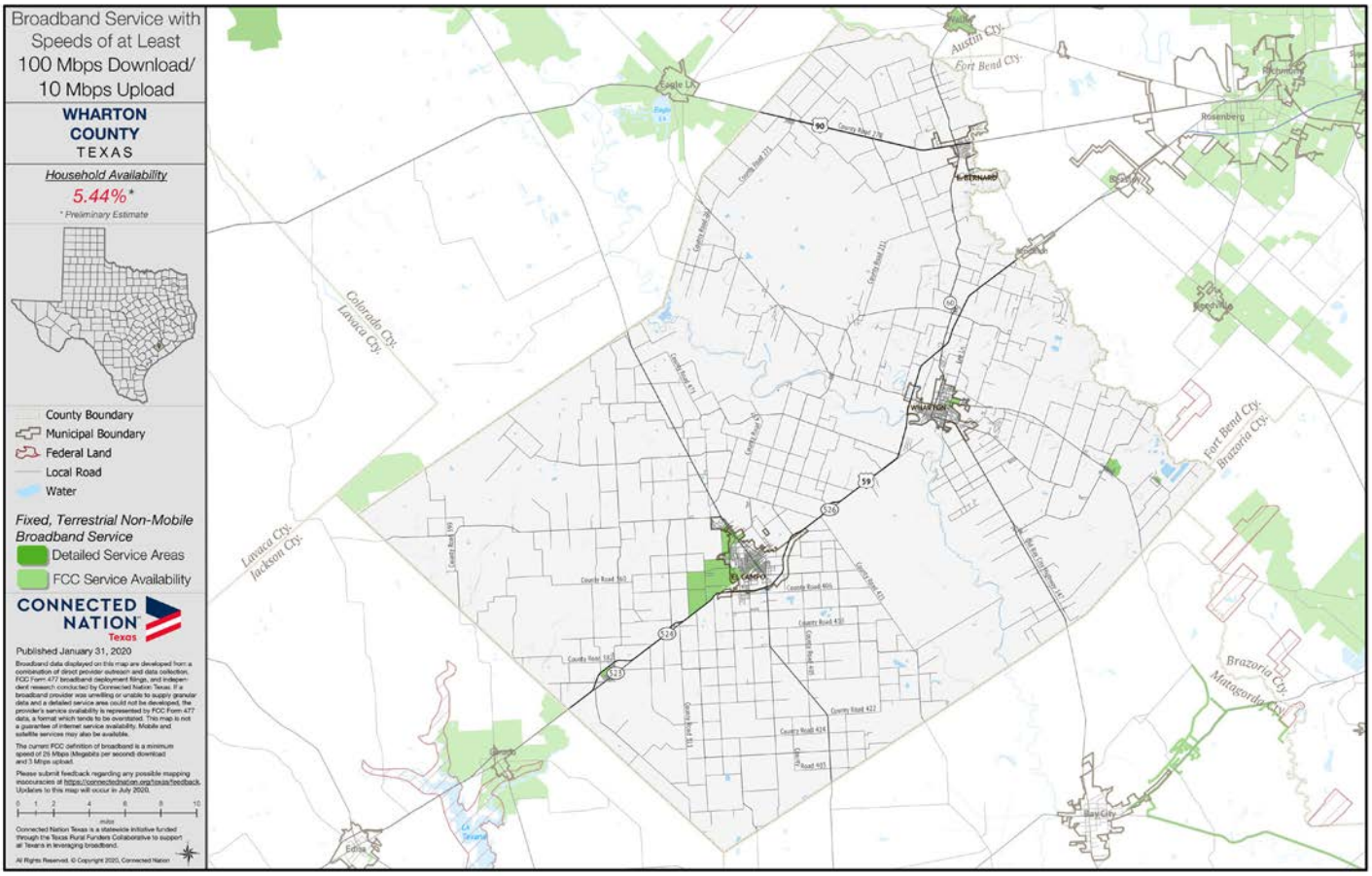


GULF COAST
ECONOMIC DEVELOPMENT DISTRICT
H-GAC
Houston-Galveston
Area Council