



St. Tammany Parish Broadband Solution Report

April 2023



3740 Davinci Court, Suite 100
Peachtree Corners, GA 30092

o | 770.368.1399

f | 770.368.1944

w | www.foresitegroup.net

TABLE OF CONTENTS

PROJECT OVERVIEW.....	3
EXECUTIVE SUMMARY	4
STRATEGY SESSION MEETING	5
NEEDS CASE ASSESSMENT	9
GAP ANALYSIS	17
BROADBAND NETWORK – HIGH LEVEL DESIGN	21
BILL OF MATERIALS AND PROFORMA	36
BUSINESS MODEL AND FINANCING ALTERNATIVES	43
RECOMMENDATIONS.....	55
APPENDIX A – GLOSSARY OF TERMS.....	57
APPENDIX B – DIG ONCE AND OPEN TRENCH POLICY EXAMPLES	60
APPENDIX C – ST. TAMMANY PARISH MAKE READY SUMMARY	72
APPENDIX D – ST. TAMMANY PARRISH PERMIT JURISDICTION SUMMARY	74
APPENDIX E – BILL OF MATERIALS	77
APPENDIX F – DATA DICTIONARY	91
APPENDIX G – NETWORK ARCHITECTURE HANDBOOK	121
APPENDIX H – VENDOR ASSESSMENT	141

PROJECT OVERVIEW

SPONSOR:

St. Tammany Parish Government
Grant Black
Director of Technology

LOCATION:

21490 Koop Dr
Mandeville, LA 70471

DATE OF REPORT:

April 11, 2023

STATEMENT OF PURPOSE:

The purpose of this project is to evaluate the needs of St. Tammany Parish related to broadband infrastructure and present solutions for increasing connectivity in the areas throughout the Parish with the greatest need.



EXECUTIVE SUMMARY

Broadband deployment in the United States has seen two distinct pathways that can be attributed to the urban/rural divide. Since urban areas are more compact and offer access to a higher number of customers per constructed foot, these areas tend to have access to more robust networks that provide higher speeds and competitive service between multiple providers. Rural areas, in contrast, have more limited networks, with fewer options and many more physical boundaries for deployment. St. Tammany Parish is an example of both scenarios existing in proximity. One of the biggest challenges to bridging the digital divide is determining the most optimal broadband network for reaching as many remote and underserved areas in a region as possible.

The goal of the Broadband Solution Report is to evaluate the needs of St. Tammany Parish related to broadband infrastructure and present solutions for increasing connectivity in the areas throughout the Parish with the greatest need.

Foresite Group conducted a Strategy Session with representatives of St. Tammany Parish, evaluated current broadband access throughout the Parish, created community outreach videos to help educate the Parish on broadband, and evaluated local broadband and telecommunications in the market. A needs case assessment and gap analysis were also performed to identify gaps in the Parish that can be improved by broadband.

Foresite Group identified three gaps as it related to broadband and two immediately actionable solutions for St. Tammany Parish.

Gap	Lack of broadband connectivity throughout the Parish
Gap	Lack of broadband infrastructure in new developments
Gap	Lack of broadband coordination in capital improvement projects
Solution	Coordinate with local ISPs
Solution	Enhance infrastructure policies and planning

Following the strategy session and assessment research, Foresite Group proposed moving into the network planning phase by designing a middle-mile ring and fiber-to-the-home (FTTH) network focused on the northern and central areas of the Parish. These designs would explore identified broadband gaps of the community by establishing a Parish backbone network and providing broadband access to unserved and underserved homes in the Parish. The high-level design portion of the project included activities such as local data collection, determining the network architecture and schema, field ride-out, and permit review. A bill of materials (BoM) was created for the high-level design that provided engineering, construction, and material estimates for the design which were utilized in the proforma to project a potential model for estimated return on investment (ROI), profit generation, and ongoing network maintenance and operation costs. Foresite Group explored potential grant opportunities, various governance and ownership strategies, and investigated potential strategies and incentives for third party participation. In addition to these efforts, Foresite Group reached out to various network providers to show the design, receive their feedback, and gauge their interest in potential participation.

Following the BoM, Proforma, and strategy research, Foresite Group's final recommendation is for the Parish to focus on high priority fiberhood zones. This should be accomplished through a Public-Private Partnership model where the Parish would contribute funds to a local internet service provider to extend their fiber network to unserved and underserved locations within the high priority areas.

STRATEGY SESSION MEETING

On November 16th, 2022, Foresite Group and representatives from St. Tammany Parish completed Strategy Sessions for the St. Tammany Parish Broadband Solutions Project. The Strategy Session included:

- Introductions and a project overview
- Identifying key stakeholders
- Beginning the process of detailed investigation of the community challenges, infrastructure, and opportunities through questions and open discussion with Strategy Session attendees
- Discussing funding methods
- Reviewing options for broadband expansion

One of the major needs of the Parish is for utility access to catch up with the rate of residential expansion. In May 2022, the Parish Council approved a Zoning Density Moratorium, halting any re-zoning applications. This does not stop building under the current zoning classifications but will prevent rezoning of residential property to higher density developments. In August the moratorium was extended until the new zoning density code is approved. The primary motive for the moratorium is the need for further studies to be completed on drainage, transportation, wetlands, and other growth-related issues.

The capacity of infrastructure and utilities is a concern with continued growth and increased density within the parish. Some large infrastructure projects offer the opportunity to align broadband related infrastructure to be developed in tandem and save construction costs. For example, there is a known road expansion that will connect LA 41 to LA 435, LA 435 to LA 36, and LA 36 to LA 434. If broadband infrastructure is included in these plans, it can potentially save large amounts of construction cost and incentivize ISPs to connect and serve the areas of growth faster. For the community there is the added benefit of not having to deal with the hassle and inconvenience of repeated road construction, closures, and detours.

Session I

Attendee	Title
Grant Black	Director of Technology
Clarence Powe	Director of Emergency Preparedness
Jay Watson	Director of Public Works
Bill Sloan	VP of Operations (Foresite Group)
Lee Comer	Practice Area Leader (Foresite Group)
Thuy Le Ho	Regional Leader (Foresite Group)
Ashley Ball	Program Manager (Foresite Group)
Son Le	Community Broadband Analyst (Foresite Group)
Sherri Eakin Sande	Community Broadband Analyst (Foresite Group)

Session I included representatives from the Parish’s emergency preparedness department and the public works department.

Questions included:

1. What are St. Tammany’s biggest challenges today dealing with telecommunications? This can be both from the perspective of safety and emergency response or general needs seen throughout the community.
2. How do your emergency services currently utilize telecom and broadband services? If it isn’t municipal or Parish fiber, who are the providers?
3. Are there areas within the Parish where emergency responders have difficulty staying connected to internet or cell service?
4. Are there any initiatives emergency services groups cannot implement because of broadband or connectivity limitations?
5. Can you supply a list of all emergency response locations?

Session I Primary Takeaways:

1. The rural areas within the Parish struggle most with connectivity.
2. Increased bandwidth demand and lack of redundancy pose potential communications issues during emergency response.
3. Telecommunications conduit placed during new development and construction projects would be attractive to the Parish.

Session II

Attendee	Title
Grant Black	Director of Technology
Karin Jones	Permits and Development Department
Christina Evans	GIS Manager
Lee Comer	Practice Area Leader (Foresite Group)
Thuy Le Ho	Regional Leader (Foresite Group)
Ashley Ball	Program Manager (Foresite Group)
Son Le	Community Broadband Analyst (Foresite Group)
Sherri Eakin Sande	Community Broadband Analyst (Foresite Group)

Session II included representatives from the Parish's permits and GIS departments.

Questions included:

1. What are St. Tammany's biggest challenges today dealing with telecommunications? Feel free to answer this question both from the perspective of your department as well as your personal experience with your home internet.
2. Does St. Tammany have planned infrastructure upgrades or public works projects?
3. How is St. Tammany growing? What are the plans to handle this growth?
4. Where can Foresite Group access permitting information? Can you walk us through local permitting processes?
5. What level of detail is required on new site plans for permitting applications submitted by Internet Service Providers?
6. Are there any large private or commercial investments planned for the community?
 1. Large commercial growth or expansion, new businesses
 2. Call centers, distribution centers, data centers
 3. Retail or shopping areas, restaurants
 4. Housing developments, apartments/townhomes, multi-tenant housing
7. What data or information can you make available for current infrastructure, property data, future planned developments, or current ongoing projects?
 1. Do you have a GIS database and who is dedicated to maintaining the GIS records?
 2. Do you have any information about recent permits approved or soon to be approved that tie into telecommunications infrastructure (fiber/conduit installation)?
8. Process for commercial building permits? Is broadband connectivity a part of the front end of permitting/development?

Session II Primary Takeaways:

1. New development taking place around Pinnacle Parkway that will include a Costco and a hospital and land is being cleared for a business park near Abita Springs.
2. There may be cellular connectivity issues within the Parish.
3. AT&T submits permits through the state instead of the local level.

Session III

Attendee	Title
Grant Black	Director of Technology
Erin Cook	Senior Land Use Planner
Jeanne Marino	Grants Director
Lee Comer	Practice Area Leader (Foresite Group)
Thuy Le Ho	Regional Leader (Foresite Group)
Ashley Ball	Program Manager (Foresite Group)
Son Le	Community Broadband Analyst (Foresite Group)
Sherri Eakin Sande	Community Broadband Analyst (Foresite Group)

Session III included representatives from the Parish’s Planning and Grants Departments.

Questions included:

1. What are St. Tammany’s biggest challenges today dealing with telecommunications? Feel free to answer this question from both the perspective of your organization as well as your personal experience or experience of others within the community.
2. Does the Parish or your organization have specific Information Technology needs for:
 1. Connectivity for municipal or government buildings, public service locations (police, fire, EMA, disaster recovery)
 2. Schools, hospitals, libraries, local businesses, anchor institutions
 3. Public wireless internet or hotspot requirements
3. Does St. Tammany have any specific technology initiatives or economic incentives used to attract consumers or businesses?
 1. Smart city applications (i.e., LED lighting, traffic, parking, cameras, monitoring, etc.)
 2. Technology trials, autonomous vehicles
 3. Defined business districts, retail showcase areas
 4. Industrial zones, opportunity zones, business improvement districts
 5. Innovation centers, university, or higher education centers
4. For schools, are any connectivity issues apparent among students? Lack of connectivity at home? Lack of devices? Would not being able to connect to the Internet for homework present a major obstacle?
5. Are there any unrealized initiatives due to shortcomings in broadband or connectivity?
6. Are there supporters outside of your Parish/region that could offer assistance or further influence community improvements? These could include:
 1. Political contacts (local, state, or national level)
 2. Funding partners
 3. Foundations or institutions (such as the Gates Foundation)

Session III Primary Takeaways:

1. Subdivisions are being developed at a rapid pace. Moratorium on rezoning for increased density. Infrastructure capacity is having a difficult time keeping up with growth.
2. Area of growth North of I-12 around Hwy 434 – Subject of ULI report in 2015
3. Political support for broadband connectivity project is generally easy to get and the Parish encourages productive partnerships with private entities.

NEEDS CASE ASSESSMENT

The impact of access to broadband internet has never been felt more intensely than now. The world of technology applications is going to continue to evolve and expand, and places with the bandwidth to partake in that world are going to have a constantly increasing disadvantage in quality of life and economic expansion. Consequentially, the demand for faster internet speeds and more reliable broadband infrastructure will grow. From 2010 to 2015 the FCC changed the definition of broadband to 4 Mbps download and 1 Mbps upload to 25 Mbps download and 3 Mbps upload. Currently, there is pressure to increase the definition to as high as 100 Mbps symmetrical service.

The digital divide describes the deficit in opportunity to connect to internet networks because of access, affordability, or adoption. Complete connectivity requires all three A's: Availability, Access, and Adoption. If there is no infrastructure available in an area, that is an obvious access gap. However, there may be infrastructure in an area, but it has not been expanded from a middle mile or backbone network to a last mile network, this is also a case of lack of access. If a direct connection to the residence is available, but few people are subscribing to internet service there could be a gap in affordability or adoption. Typically, the difference in this access is felt most harshly by rural communities compared to urban environments.

In St. Tammany Parish the digital divide is evident. Population centers, such as Covington and Slidell, generally have access to multiple internet providers offering high speeds. However, the rural areas, especially on the northern edge of the parish, lack access.

Broadband Availability

Foresite Group collected broadband coverage information, which was acquired from various sources, including U.S. census data, telecommunications industry information sources, and the Federal Communication Commission (FCC) broadband databases. The FCC collects broadband information by census block using Form 477 from all facilities-based providers who offer Internet access including wireline, fixed wireless, and mobile broadband. In recent years, the FCC broadband data has been highly criticized due to lack of accuracy in rural areas. Previous guidelines for reporting allowed a census block to be classified as served if a single address within the census block has broadband service. This led to more area and addresses inaccurately appearing served, especially in rural areas where blocks cover larger areas of land. On November 18, 2022, the FCC released a new version of the maps that reports Internet service availability on a location basis. This map is still in a challenge period, but the new release does open the door to a higher level of analysis of current coverage and community needs.

Even with the acknowledged shortcomings, the FCC 477 dataset is still the most comprehensive dataset available. This dataset will not be used as the sole source of information to determine gaps in broadband coverage and availability, but it will serve as a kickoff point to generally understand the Internet service providers and speeds available throughout St. Tammany Parish.

Broadband Technologies

Internet bandwidth is measured in megabits per second, or Mbps. This refers to the speed at which data packets can be received (downloaded) and sent (uploaded) from your personal computer or other connected device. For instance, streaming a television show primarily utilizes download bandwidth while sending an email with a large attachment would be utilizing upload bandwidth. An activity such as a video conference uses both download and upload speeds as the device is both receiving video and sending video to other devices. Asymmetrical broadband is where the download and upload speeds are not equal and most commonly the download speed will be higher than the upload. This is often seen in older technologies such as copper and coaxial. Symmetrical broadband refers to equal speeds between the received and the transmitted data. Higher symmetrical speeds are often preferred to support modern interactive applications and video services and are feasible through newer broadband technologies such as fiber.

In 2010, the FCC defined “broadband speeds” as 4 Mbps download/1 Mbps upload. In 2015, the FCC updated their broadband speed definition to 25 Mbps download/3 Mbps upload due to advances in technology, consumer demand, and Internet service provider market offerings. There are many companies, consumer advocacy groups, and legislators who are urging the FCC to again increase the minimum definition for broadband to require higher speeds. There are numerous reasons driving the need for increased bandwidth including: evolving technologies for both consumers and businesses, proliferation of streaming video services, interactive gaming, distance learning and web conferencing, telehealth and telemedicine, COVID-19 challenges with home-based learning and remote workforce restrictions, bandwidth challenges in rural areas and underserved communities, and the evolving world marketplace where many other countries exceed the U.S. in broadband speeds. Congressional lawmakers have proposed various legislation to improve the broadband infrastructure in the U.S. and many federal funds, such as the USDA ReConnect Grant, call for a minimum broadband definition of 100 Mbps symmetrical speeds to qualify for the funds being made available.

Levels of service are important when considering broadband connection. Broadband connection is not necessarily a clear yes or no but rather a broad spectrum of speeds and reliability. The data collected from the FCC Form 477 is presented here in different speed tiers, “unserved” which corresponds with available speeds below 25/3 Mbps, “underserved” which corresponds with speeds between 25/3 Mbps and 100/20 Mbps, and “served” which corresponds with speeds greater than 100/20 Mbps. While “underserved” is still greater than the current FCC threshold for broadband service, it does not meet the requirements set forth by some funding opportunities, such as the USDA ReConnect Grant discussed in the previous paragraph. A location shown as served does not guarantee the availability of sufficient broadband service to every home within that census block but indicates that a provider has reported serving speeds within the indicated tier to at least one address within the census block.

FCC Data

Two iterations of FCC Datasets were used in the analysis of St. Tammany Parish. In November 2022 the FCC released new broadband maps that report internet service availability on a location basis. This is unlike the previous maps which reported service on the block level. While these maps are certainly an improvement compared to past reporting, they are still in contention. Therefore, the latest maps were used to inform, but not as the primary analysis source for this report. The maps displayed in this report section will be data as reported to the FCC through Form 477 in June 2021.

Figure 5.1 shows the fiber service available throughout the parish according to the June 2021 reported FCC data. Overall, access to fiber-based internet service appears to be limited to the most populated and wealthiest areas of the parish. Based on the blocks reported to be served in the June 2021 FCC dataset, up to 38.9% of addresses may have access to fiber. This percentage is likely much lower, however, because the reporting process for FCC maps at this time would count an entire block as served even if only one address within that block had service available.

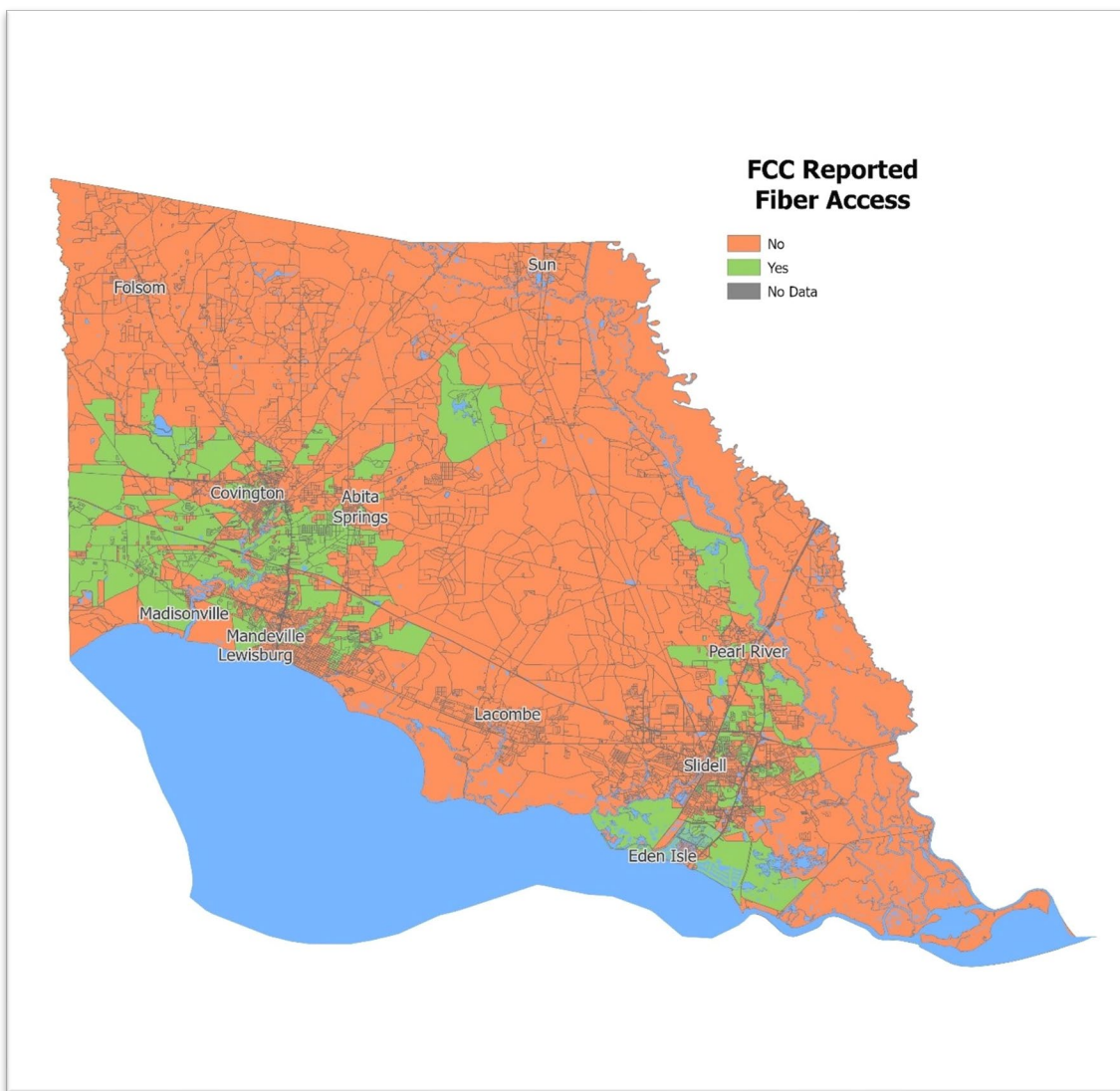


Figure 5.1 Reported Fiber Service in St. Tammany Parish as of Dec. 2021

Figure 5.2 presents data at the service levels of Served (> 100/20 Mbps), Underserved (between 100/20 Mbps and 25/3 Mbps), and Unserved (< 25/3 Mbps). Blocks considered served are highlighted in green. A large portion of the Parish appears to have access to speeds considered served. Outside of the fiber providers mentioned in the previous map, Charter is the primary contributor to the served area throughout the parish. Like the fiber reporting, the latest maps, which are still under contention, appear to have a lower percentage of served addresses. This is because the newer maps are reported on a location basis instead of the block level. The June 2021 data reports 98.0% of addresses having access to broadband speeds of at least 100 Mbps download and 20 Mbps upload. The maps released in November 2022 with data from June 2022 report estimates 90.5% of addresses have access to these speeds.

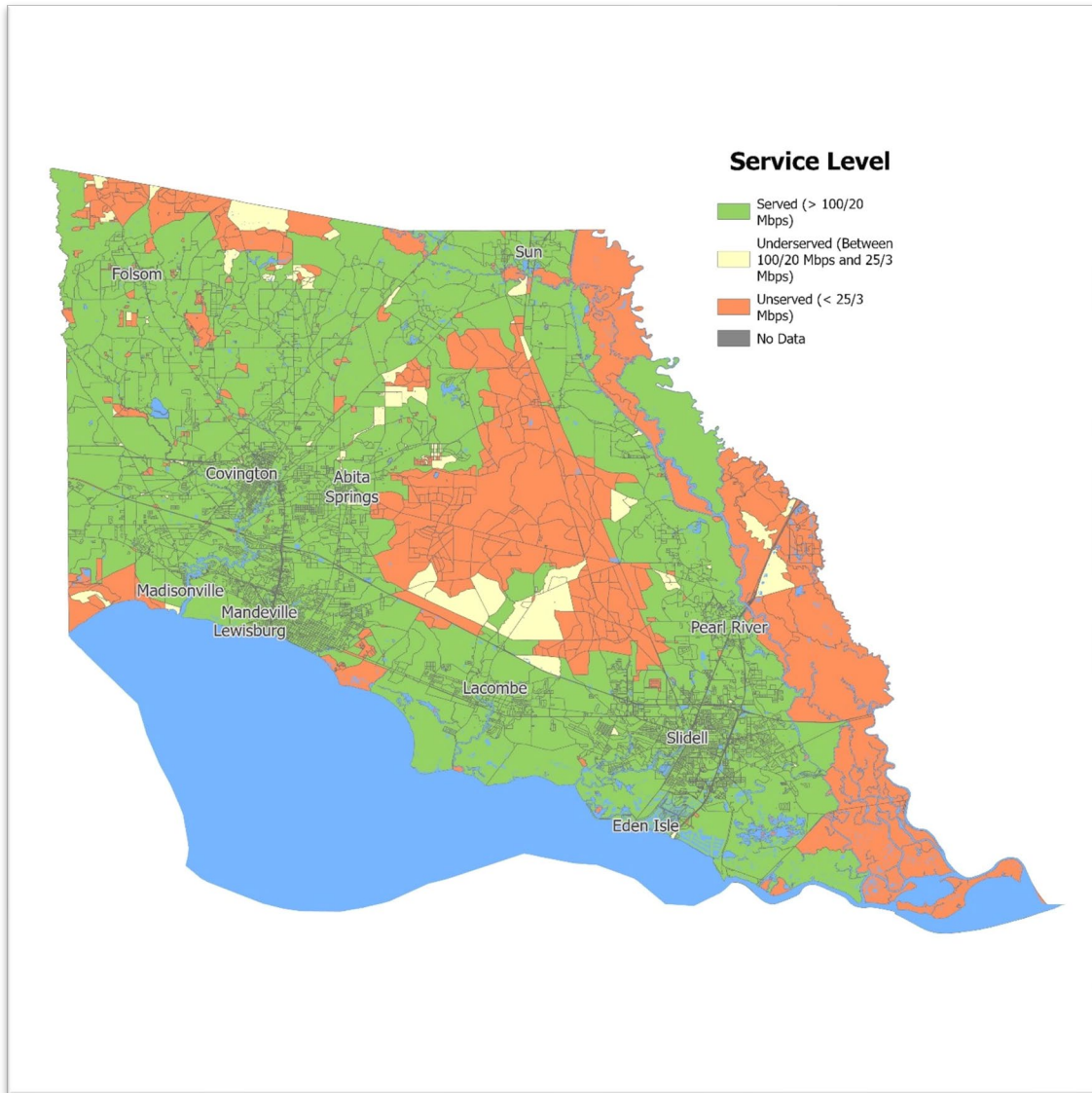


Figure 5.2 Reported Service Speed in St. Tammany Parish as of Dec. 2021

While the data presented in the map above may create the perception that the parish is very well served, it helps accentuate the divide between the well served and the underserved and unserved.

Ookla Dataset

Foresite Group utilized the Ookla Speedtest Intelligence® dataset to compare reported service levels reported by the FCC to speeds collected by speedtests. The dataset provided insight into speeds in the parish based on over 17,000 speed test results. Based on the data, the primary providers in the region are Charter (cable), AT&T (fiber), Vexus (fiber), and Verizon (fixed wireless). Of these four, Charter, AT&T, and Vexus have average or median (check which) download speeds of over 200 Mbps. AT&T and Vexus have average or median upload speeds of over 170 Mbps.

After reviewing the Ookla Speedtest data, it was determined that internet coverage throughout the parish is generally fair where speed tests are available, except for the area around the northern most border and the central area where few people live. While fiber connection seems to exclusively be available to Covington and Slidell residents, Charter’s cable connection looks to be available throughout the majority of the parish. It isn’t symmetrical gig speed, but it is sufficient for current and near future residential broadband needs. With the goal of expanding fiber service to unserved and underserved areas, there is an opportunity to connect homes where, while not “underserved”, do not have access to symmetrical speeds.

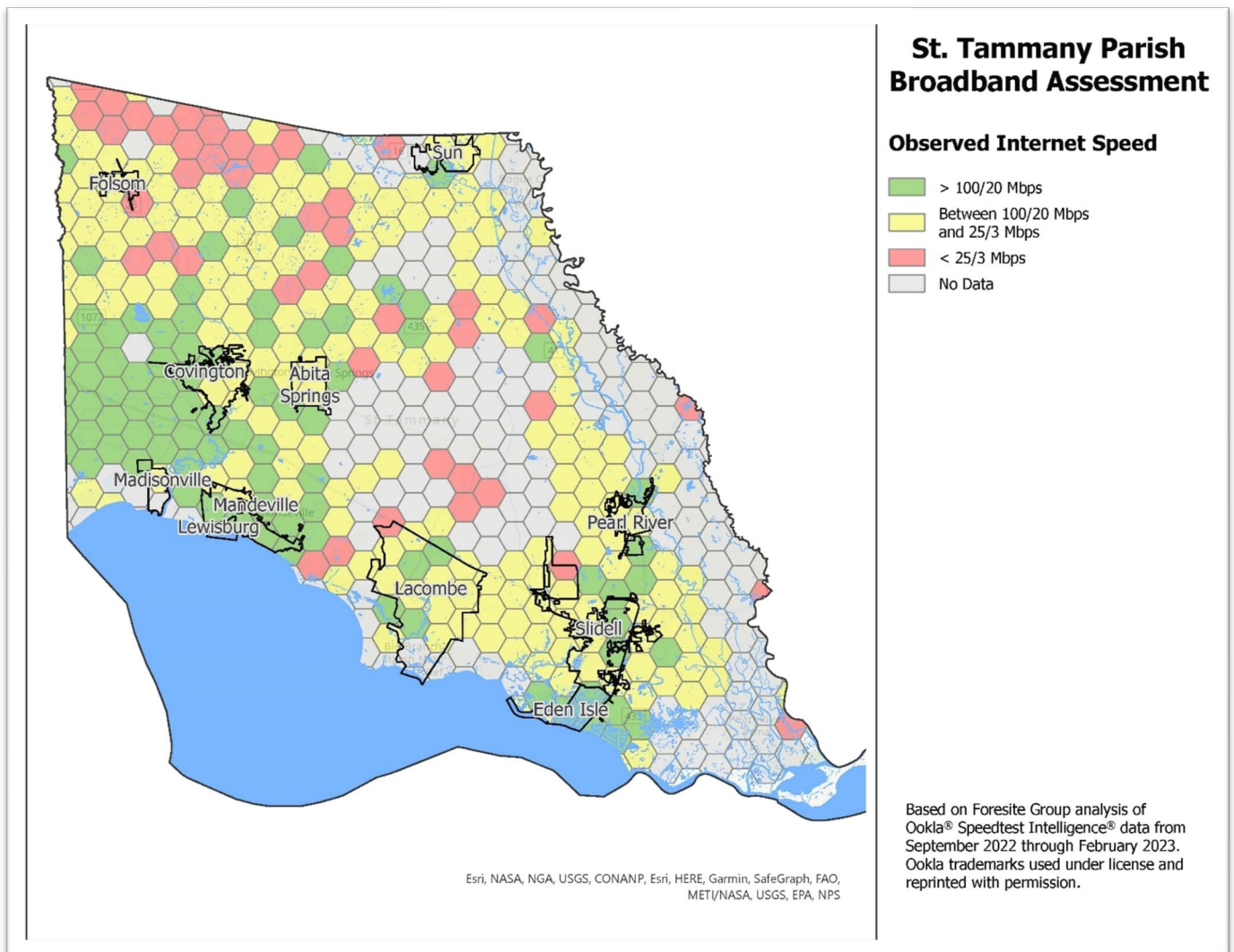


Figure 5.3 Median Download and Upload Speeds for St. Tammany Parish

Fiberlocator

Fiberlocator shows St. Tammany Parish to be a relatively fiber rich environment. There should be opportunity to tie into existing metro and long-haul networks. Vexus, a company who is offering FTTH service in some of the more densely populated St. Tammany communities, has a metro network cable that runs through some of the area lacking fiber service (royal blue line through Folsom to Covington). Windstream and Century Link both have long-haul fiber that runs along Interstate 12 across the southern portion of the parish, connecting major cities along the Gulf Coast including New Orleans, Houston, Mobile, and Biloxi.

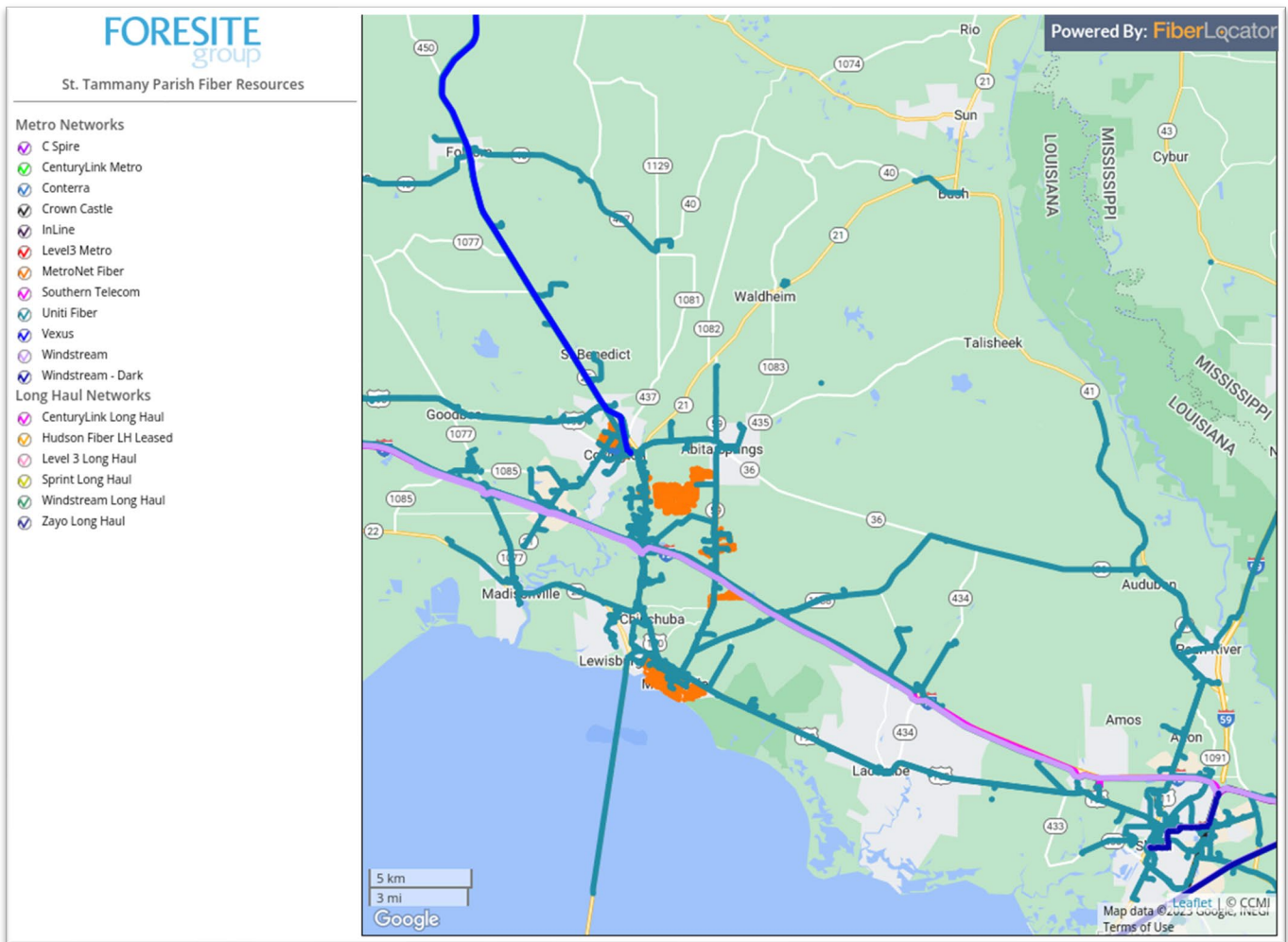


Figure 5.4 St. Tammany Parish Metro and Long-Haul Networks

Socioeconomic Data

St. Tammany is one of the highest earning, most populous parishes in Louisiana, ranking 4th in both. It also has one of the lowest unemployment rates in the state at just over 2%.

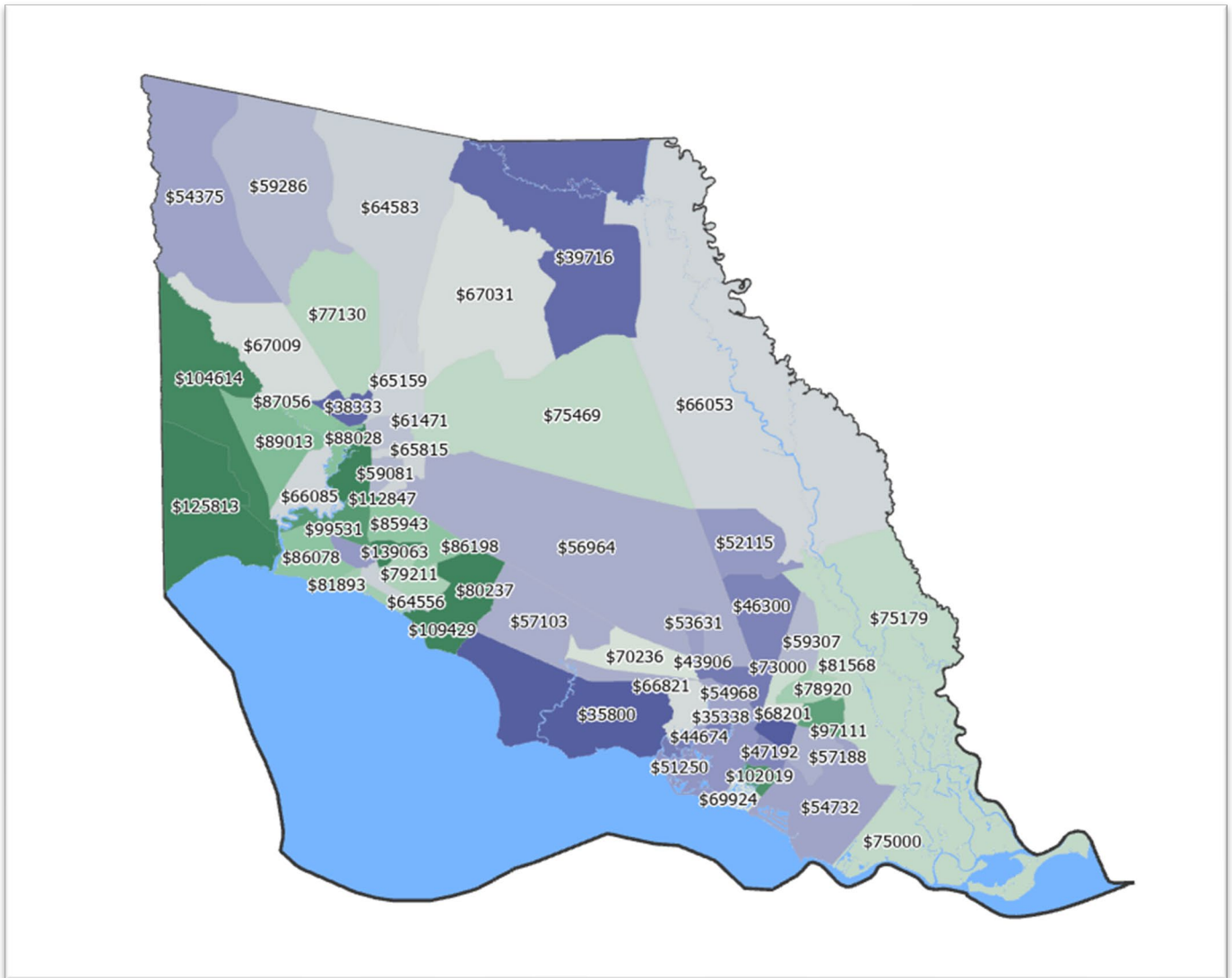


Figure 5.5 Median income by Census tract in St. Tammany Parish

Generally, St. Tammany Parish has high median income. The map above displays data from the American Community Survey. It appears that wealth is more concentrated in the Covington area, and median household income is significantly lower in the more rural areas of the parish. When compared to the fiber availability maps in previous sections, blocks with fiber availability seem to correlate with higher income tracts.

After reviewing other demographic information, income and density seem to be the two primary variables correlated with broadband availability. The Parish is generally well educated, has a high percentage of homeowners, and newer housing stock than the surrounding parishes.

Broadband Subscription Estimates

Prior analysis in this report has primarily focused on the physical location of infrastructure and whether service at a particular speed is available or not. As other data sources are discussed, such as the American Community Survey data and US Census, there may be more discussion related to affordability and adoptability.

For an individual to subscribe to a broadband service three requirements must be met:

Accessible – the physical infrastructure is available to the end user

Affordable – the service must be offered at a price compatible with the end user’s budget

Adoptable – the end user has the tools and skills to meaningfully utilize the broadband service

Understanding the types of Internet subscriptions within the community is also important. According to the 2021 American Community Survey 5-year estimates in Figure 5.6, almost 80% of St. Tammany’s population has a broadband subscription. With served broadband speeds estimated to be available to 95% of addresses, this appears overall. No major issues seem to be prevalent between broadband access and affordability.

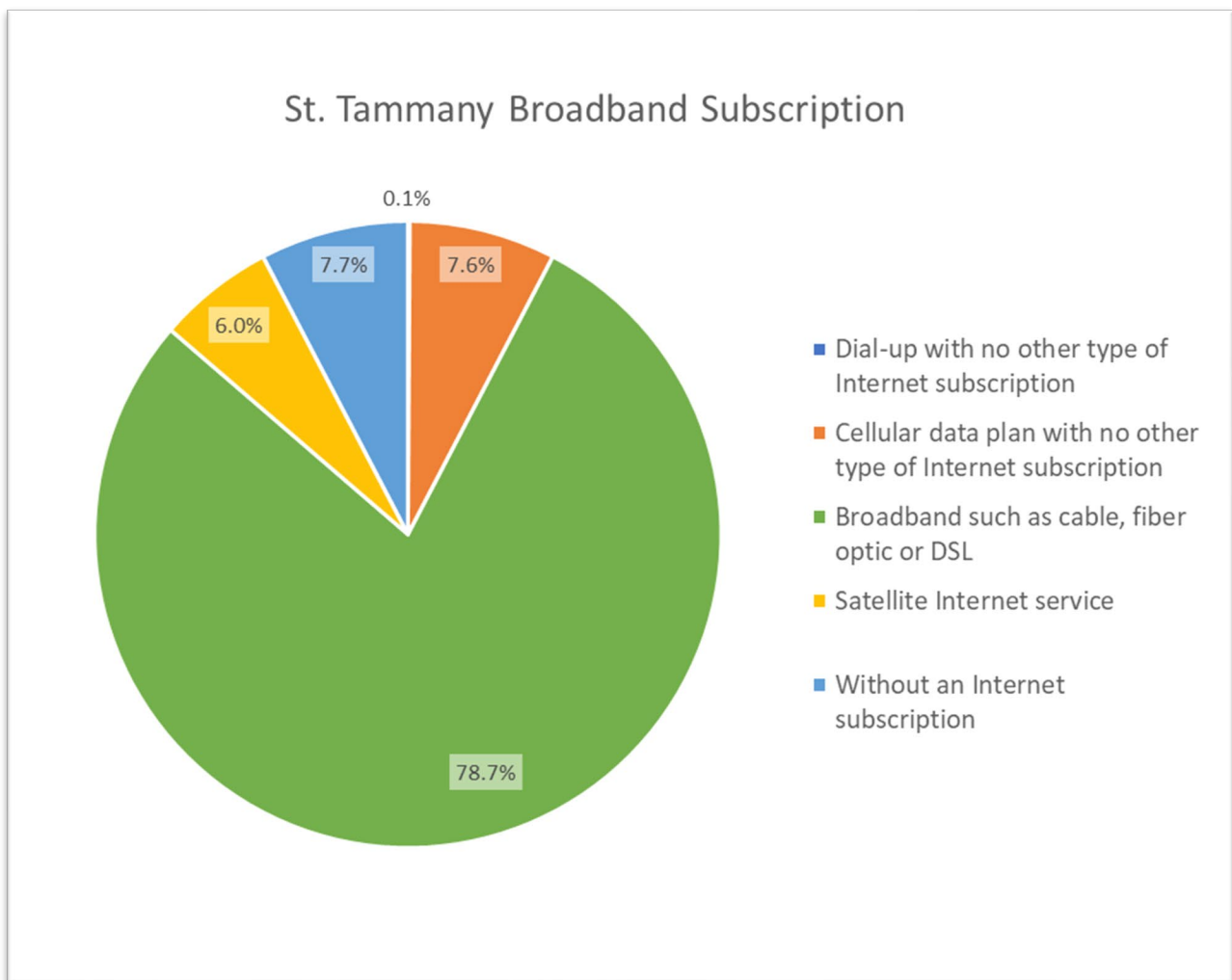


Figure 5.6 Broadband Subscription Estimates

GAP ANALYSIS

The following gaps, solutions, and opportunities were identified through the strategy session, needs case assessment, and broadband research phases of this project. Along with the three gaps there are two immediately actionable solutions and three potential opportunities the Parish can capitalize on through investment in fiber infrastructure.

Gaps

Following the strategy session and broadband assessment, Foresite Group identified three gaps related to broadband service and infrastructure within the Parish. These range from the accessibility of service for all residents to general infrastructure planning.

Lack of Broadband Connectivity Throughout the Parish

Based on Foresite Group's discussion with the Parish, the primary goal of this study is to create a plan to reach unserved and underserved locations in the Parish. After analyzing multiple data sources containing broadband connectivity and infrastructure information, as well as discussions with current internet service providers (ISPs) in the area and leaders across multiple Parish departments, Foresite Group is proposing the exploration of a design to help the Parish plan and prioritize next steps and incentives for extending broadband connectivity to the unserved and underserved areas. Foresite Group has identified areas displaying the greatest need in the north and central portions of the Parish. These areas are the most rural parts of the Parish where incumbent providers have little incentive to extend service and new providers are unlikely to establish a footprint due to a lack of return on investment.

Lack of Broadband Infrastructure in New Developments

New residential developments have also been identified as not having access to internet speeds considered served (25/3 Mbps). These development types, with high customer density, often create profitable scenarios for internet service providers. This helps incentivize providers to expand their network to the surrounding unserved and underserved locations, since the developments may help offset the cost of extending service to these areas.

In the future, there are steps the Parish can take to prevent lack of broadband infrastructure in new developments. The Parish could consider implementing a policy to incentivize conduit installations in all new developments. The current development policies could be revised to provide incentives to developers to install full telecom conduit runs along all proposed right-of-way they intend to turn over to the Parish upon completion. These incentives can range from an expedited review process to the waiving of certain requirements or reduced fees. Enough conduit should be provided for both the Parish's own use and private provider's use via leasing.

If the Parish can create and include incentives for telecom construction within Parish ordinances and building codes, it can reduce one of the larger obstacles for these providers and lead them to improve or expand their current network to meet the growing broadband demands of the community. An expedited review process can incentivize providers to build out or improve their networks as it would expedite their construction schedules and allow for a quicker return of investment in their endeavors. In Kansas City, Missouri, when the city was attempting to attract Google fiber to build out a network, they streamlined the permitting process and waived permitting fees. This helped the city win the bid for the network, and today, they have a Google Fiber network

that offers plans of 1Gbps and 2Gbps for \$70/month and \$100/month, respectively. The network was awarded in 2011 and is still expanding today.

Lack of Broadband Coordination in Capital Improvement Projects

Based on Foresite Group's experience building fiber networks, street excavation to install underground infrastructure typically represents 65% to 75% of the cost of a fiber network buildout. A dig-once or open-trench policy could reduce the cost of network construction, while also ensuring efficient, non-duplicative street cuts. This could be especially beneficial in a Parish with a high growth rate and many new subdivisions and capital improvement projects coming online. If these new developments can be used as an opportunity for broadband infrastructure expansion, it can decrease the cost for providers to get into market and increase the speed at which this occurs. Proactive policies can be a good tool for ensuring St. Tammany residents have high quality internet services available.

Solutions

The following solutions provide actionable items the Parish can use to address the broadband gaps identified in the previous section.

Coordinate With Local ISPs

St. Tammany Parish has an opportunity to coordinate with city, parish, and state governments on their planned infrastructure projects such as road improvements and water projects. By notifying local ISPs of upcoming infrastructure projects and coordinating with the various communities to allow a window for ISPs to complete broadband construction, this can reduce the construction costs that local ISPs encounter when expanding or improving their network. Lower construction costs will allow local ISPs to expand their network farther while consistent permit application processes can increase "speed to market".

Enhance Infrastructure Policies and Planning

The Parish should consider implementing a dig-once policy for all public construction projects that involve breaking ground in the public Right-of-Way. This would include the installation of conduits and handholes for broadband use. These conduit runs should be for the entirety of the impacted Right-of-Way and should, at a minimum, include dedicated conduits for the Parish's own use, conduits available for leasing purposes and spare conduit. The Parish could incorporate a construction moratorium for a reasonable amount of time to minimize any additional construction that might impact Parish maintained streets. In turn, the Parish would make the installed conduit available to any service provider, in a non-discriminatory way, for use in installing telecommunication service to residents and businesses to help with any perceived burden the construction moratorium might cause.

As a variation of the dig-once policy, the Parish could consider incorporating an open-trench policy. Along with requiring Parish-owned and leasable conduit to be installed on all public projects, the Parish could invite existing and prospective telecom providers to participate and take advantage of ongoing construction to install their privately-owned conduits in the same trench. Interested providers would need to contribute to the effort, which would help reduce some of the project's costs. This option would give incumbents an opportunity to enhance their infrastructure but keep it under their management. At the same time, the Parish-owned infrastructure would provide an opportunity to newcomers and help bolster a more competitive broadband market.

For reference, listed below are links to existing municipal dig once policies. The Gonzales, CA Dig Once Policy is straightforward and lists the types of projects that would require the installation of a spare conduit for the City of Gonzales, CA. The policy also specifies the standards for the conduit type and installation. Dig Once/Open Trench policies from other municipalities are provided with this gap summary. The list of communities used for reference is included below:

- [Salinas, CA](#)
- [Gonzales, CA](#)
- [Santa Cruz, CA](#)
- [Breckenridge, CO](#)

In addition to the implementation of these policies, the Parish should consider planning broadband expansion with other capital improvement projects. This would allow the Parish to deploy conduit infrastructure while saving on the cost of a separate conduit installation project. An asset would be developed that the Parish could use to either lease out to incumbent ISPs to reach high priority areas with fiber or for their own Parish purposes. For example, the road project connecting LA 40/41 to LA 434 creates an opportunity to have broadband infrastructure integrated into an existing project that could serve the area with not only a road, but also the infrastructure to extend broadband connection.

Opportunities

Foresite Group determined three opportunities to be explored through the network planning phase. These opportunities may not necessarily be immediately actionable but are relevant to the Parish's needs and should be considered in future broadband planning efforts.

Fortify Parish Emergency Preparedness

During Foresite Group's strategy session meetings with Parish Stakeholders, the need for redundant and reliable connectivity to emergency shelters was discussed. St. Tammany Parish's proximity to the Gulf Coast puts it in a high-risk area for hurricanes. Being prepared in an emergency is invaluable. Maintaining lines of communication is vital for the execution of successful emergency response plans. Whether it is on the scale of organizing an entire region or a single emergency medical respondent, it is important to maintain lines of communication. The creation of a backbone network for the Parish presents the opportunity to fortify existing infrastructure. Foresite Group will explore this opportunity during the network planning phase. Where feasible, emergency shelters should be tied into the backbone network, or the backbone network should be used to provide redundancy to those locations.

Potential Parish Facilities Connection

During the initial strategy session, it was discussed that St. Tammany Parish was satisfied with the current service they are receiving from private service providers to Parish facilities. However, if the backbone ring proves to be a feasible, it should be used as an opportunity to improve connection to Parish-owned facilities. Improved connection can include faster speeds available to Parish facilities, increased redundancy, and higher autonomy over the network if the Parish is the infrastructure owner. This could result in cost savings or revenue generation if the Parish is the infrastructure owner and leases conduit space to ISPs.

Extend service to unserved and underserved areas of the Parish

Foresite Group will explore a design consisting of two elements, a backbone ring that would connect Parish buildings, provide redundancy for emergency shelters, and expand middle-mile access for providers. The second portion is a FTTH design that models how the backbone network would be utilized to reach unserved or underserved locations. The FTTH design will be used to create a business model, determine feasibility, and prioritize areas of the Parish based on current user experience, provider reported services, and cost.

A high-level cost estimate will be generated based on the design. The cost estimate will include pricing for engineering, materials and labor, and capital expenditures. The goal would be for St. Tammany Parish to use this design and cost estimate to partner with ISPs to extend service to unserved and underserved locations. Foresite Group will explore whether a build out of the full design is feasible at this time or if the HLD and subsequent prioritization should instead be used to identify specific areas of focus and future broadband planning of the Parish.

BROADBAND NETWORK – HIGH LEVEL DESIGN

Broadband deployment in the United States has seen two distinct pathways that can be attributed to the urban/rural divide. Since urban areas are more compact and offer access to higher number of customers per constructed foot, these areas tend to have access to more robust networks that provide higher speeds and competitive service between multiple providers. Rural areas, in contrast, have more limited networks, with fewer options and many more physical boundaries for deployment. St. Tammany Parish is a perfect example of both versions existing in proximity. Its larger urban areas, with cities like Covington and Mandeville and their immediate suburbs, have access to multiple providers, choices of speed and service, and a thoroughly covered footprint. The rural communities, on the other hand, have a much more limited set of offerings available for both providers and service, and have more sparsely distributed infrastructure. One of the biggest challenges to bridging the urban/rural digital divide is determining the most optimal broadband network for reaching as many remote and underserved areas in a region as possible.

Broadband Network Design Alternatives

Selecting the optimal network model for a community requires evaluating models based on cost for deployment, topographical barriers, and subscriber distribution. Two components were evaluated to determine the best-fit option available. These components are discussed on the next page.

Last-Mile Network

A “Last-Mile” network is a term given to a broadband distribution network that delivers internet service from a service provider’s hub location, commonly referred to as a central office or CO, directly to a customer. This type of network offers direct service to customers and can be deployed via both wired cable and wireless alternatives. Wired options include service through traditional copper cables, coaxial cables, and fiber optic cables. Wireless alternatives include over-the-air services including fixed wireless and satellite broadband.

Wired options are considered more reliable in terms of internet speeds offered and low-latency service. Latency refers to the time it takes data to pass between two points in a network. The longer time it takes, the slower the response and slower service feels on the client side. Lower latency is a requirement for more advance internet applications, such as video conferencing and telemedicine. Low latency is one of the strongest aspects of a wired network. These networks, however, require the physical deployment of cables and infrastructure and are more costly to build-out, especially when trying to reach remote locations. The most common wired networks include:

- **Fiber-to-the-Home (FTTH):** An FTTH network consists of deployment of entirely fiber-optic cable networks that interconnect customers to a provider’s central office. FTTH networks offer the highest possible speeds and low-latency service via a dedicated connection to the customer. The biggest downside is that the equipment required to offer the service is more costly than other types.
- **Coaxial:** A coaxial network relies on offering internet service through the same coaxial cables that offer television service in most areas. An advantage of this network type is it can use existing coaxial cable networks that have been deployed in developed areas and may require less capital investment on augmenting the system. Its biggest drawback is that internet service shares a “common pipe” through a cable, which can reduce the speed and quality of service delivered when multiple customers are sharing the cable.

- **Hybrid Fiber Coax (HFC):** A HFC network utilizes fiber optic cables for the headend and feeder distribution systems and coaxial cables for the customer’s end connection. A HFC network allows cable providers to leverage their existing coaxial network to provide Internet and telephone services. HFC networks are more reliable than coaxial networks and have minimal signal loss over distances. However, HFC networks are not able to provide the high speeds or symmetrical speeds that FTTH networks offer. HFC networks also share the same drawback of a coaxial network, sharing a common pipeline with multiple subscribers as explained in the coaxial network description.
- **Asymmetric Digital Subscriber Line (ADSL):** An ADSL network consists of usage of copper cables that are traditionally used to deliver telephone service and can be augmented to offer internet service. Like coaxial networks, ADSL networks can leverage existing copper networks to deliver the service. ADSL networks, however, have stricter distance limitations than the other two wired networks, the signal degrades the longer it travels through the existing plant. Copper networks also tend to degrade faster than the other two and are considered mostly obsolete in the modern landscape.

Wireless alternatives have the advantage of requiring less physical infrastructure deployment to provide service. Because the primary delivery method is “over the air” the primary investment is the equipment required for both transmission and reception of the signal. Conversely, wireless alternatives tend to offer services with lower speeds and higher latency than wired alternatives. Distance and physical barriers are also a limiting factor for availability and the level of service offered. The most common wireless networks include:

- **Fixed Wireless:** A fixed wireless broadband network is a network that delivers internet connectivity over the air via transmission from a fixed distribution point, usually a cellular antenna tower. As the term “fixed” specifies, both the transmission point and reception point utilize equipment that is fixed in place and provides a consistent distance for signal delivery. These networks are useful in remote and rural areas because they forgo the need for installation of physical cable between client and central office, and their fixed nature ensures a consistent level of quality. Fixed wireless networks are limited in service offered by distance and can be impacted by physical barriers to direct line of sight, such as buildings and tree canopies.
- **Satellite:** A satellite broadband network offers internet service over-the-air via transmission from a satellite in orbit around the Earth. This network has the advantage of being able to reach customers at nearly any location due to its direct line of sight from orbit and lack of distance limitation. Satellite internet service, however, tends to suffer high-latency due to the distance the signal must travel. The service is also affected by weather conditions in the atmosphere, which is a limitation faced by no other alternative.

Middle-Mile Network

A “Middle-Mile” network is a network that acts as an intermediary connection between one or multiple last-mile network(s), which directly connect to customers, and a “first-mile” network that connects a single region to other regions. The middle-mile is an often-overlooked component of any regional broadband network that can have a large impact on the reliability of service offered and expansion interest of current or new providers in an area.

For internet service in a broadband network to function properly the network must have access to carrier cross-exchange sites, commonly referred to as Point-of-Presence or POPs. These POPs are locations where multiple carriers can set up equipment that allow interconnection between different networks. POPs include equipment set up by long-haul carriers that operate via the first-mile network, which make internet connection possible

from region to region. POP sites traditionally are in denser, more developed urban areas, where multiple networks meet. This allows for easier deployment of new or improved networks in urban areas already saturated by existing providers. In contrast, rural areas tend to lack POP sites, forcing existing and proposed rural networks to work their way back to urban areas to provide connection. Because last-mile providers are focused on connecting as many potential clients as possible capital expenses related to connecting back to POP sites are not often a top priority. When costs associated with routing back to a POP site are considered, it often results in excessive amounts that disincentivize investment and deployment. As a result, legacy providers tend to avoid building out to these areas, and available services tend to be limited to satellite and fixed wireless providers who can provide limited coverage via radio transmission.

A Middle-Mile network acts as a bridge between these two elements. The Middle-Mile network, which can also be referred to as a “regional backbone” provides high-level transit service through a region, which can allow interconnection between existing or newly proposed provider hubs and existing POP sites. Middle-Mile networks traditionally are used to offer wholesale connectivity service and are not used to serve potential customers directly. Rather, they allow a last-mile operator to deploy a new local “central office” site from which they can build out and offer service to new customers. Additionally, it can help Wireless Internet Service Providers, or WIPs, by delivering high-capacity broadband service to existing antenna sites and augmenting the service capability of fixed broadband alternatives.

When adequately deployed, a middle-mile network can greatly enhance telecom expansion interest in a region. It helps lower the amount of capital expenditure required to enhance or create a new network and entices investment from both legacy providers and new providers who saw a barrier to entry.

St. Tammany Parish Middle-Mile and Fiber-to-the-Home Network

Following analysis of design options and consulting with parties of interest, a set of key determinations for the network were determined:

- St. Tammany Parish has a vested interest in enhancing broadband availability throughout the unserved and underserved portions of the Parish.
- St. Tammany Parish has expressed they would prefer experienced 3rd Party ISPs to own or operate a network that provides direct service to residential or business customers.
- St. Tammany Parish has expressed a preference for underground infrastructure. This preference is supported through environmental impacts, overall topography, and soil composition.
- Make ready and permitting considerations were evaluated. Details can be found in **Appendices C and D**.

With these determinations in mind, Foresite Group will explore the development of a FTTH network connected through a backbone ring. Due to the distance between populated areas and the physical separations by rivers and watersheds, the design will consist of a single backbone ring, anchored by seven point of presence sites, or huts, to feed a FTTH network within a defined serving area around each hut.

The backbone ring will encircle the project area providing connectivity between hut sites via an 864-count fiber optic cable, with availability for direct service to anchor institutions which could include municipal service buildings and schools, as well as health and safety facilities. In addition, the backbone fiber cable can provide fiber connectivity for existing and future cell tower locations, and available spare dark fibers available for lease or expansion of future technologies.

Each hut is centrally positioned within a serving area boundary determined by topography, number of required fiber services, and physical distance from the hut to the furthest service point.

The FTTH network will extend from the hut location utilizing various fiber optic cable sizes to provide feeder fiber to individual fiber distribution hubs, FDH cabinets, within the hut serving boundary. Each FDH will have a defined service boundary that is based on efficient cable pathing and groupings of service points. From the FDH cabinet the last mile connection to the customer service point is provided.

An overview of the backbone and FTTH network design within the recommended area of consideration is presented in figure 8.1 and figure 8.2.

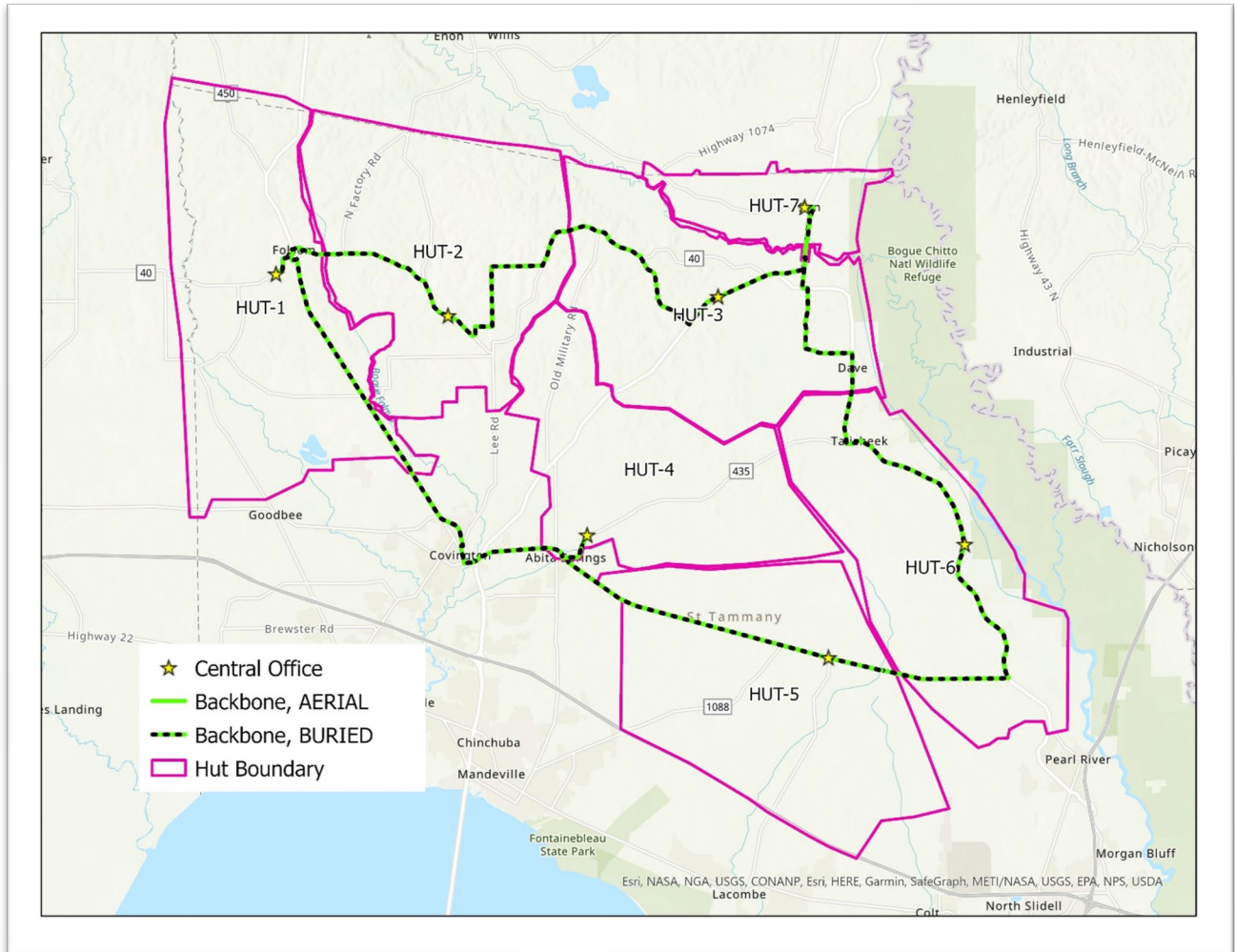


Figure 8.1 – Middle-mile network and Central Office Locations with Service Area Boundaries

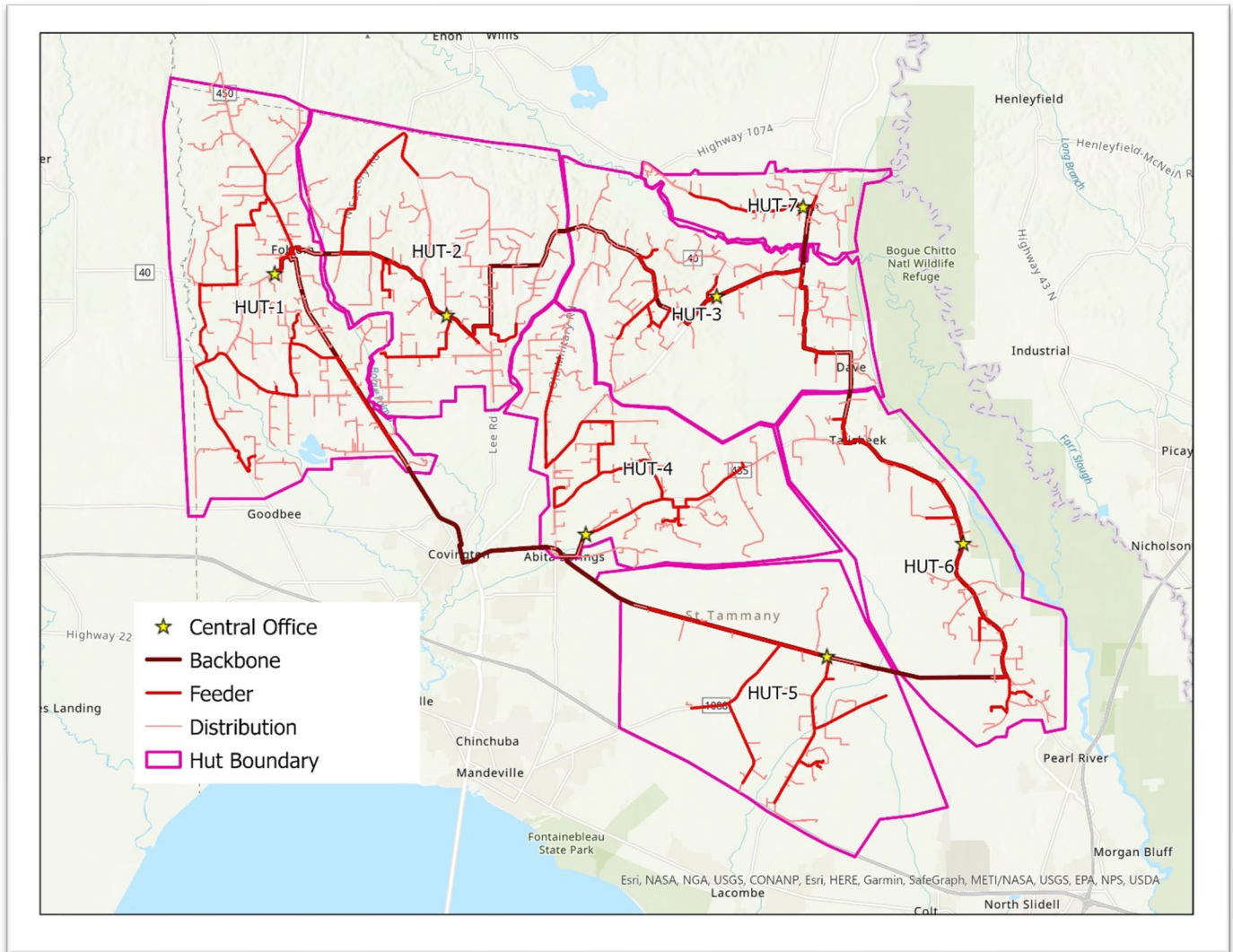


Figure 8.2 – Fiber-to-the-home feeder and distribution with service areas

Address Verification

The process of address verification is necessary to identify and classify all address points that require service within the HLD plan area. Address verification has a direct impact on the overall HLD in terms of cable routing and cable sizing.

The process begins with acquiring available parcel and address point data from the Parish. This data is then uploaded to a GIS database. All relevant information provided with the address points such as full address and zoning (residential/commercial/government) is uploaded as well, if available.

Once this data is uploaded, a point-by-point evaluation is performed to verify the data against desktop map sources and the most up to date available aerial imagery. The following items are verified and populated within each address point to be used later in the HLD process for demand requirements and cable sizing:

- Address Type – Residential, Business, Government, Cell Tower
- Address Unit Count - Single-Family Unit, Duplex, Triplex, Multi-Dwelling Unit (#), Single-Business Unit, Multi-Business Unit, Government, Vacant Lot
- Number of Fibers Required
- Type of Fiber Required – Split or Unsplit

In the case of vacant parcels, further research is completed through Parish zoning data and evaluation of surrounding parcels to determine the number of fibers required. If the Parish has an established zoning or density code in place this will be applied according to parcel size to allocate fibers required for future development. In instances where vacant parcels exist within otherwise developed areas the fibers required are based on the surrounding properties' Address Type and Address Unit Count.

Field Ride Out

The purpose of a field ride out, is to review areas of a high-level design (HLD) in the field for constructability, or ease of construction, and capture data not attainable from desktop review or other data sources. The field ride out process began with the completion of the high-level design along with a desktop review of cable routing utilizing online map sources for both aerial and street view imagery. Polygon areas defined which streets to ride out for constructability review within a field data collection map. A field ride out team was then deployed to evaluate the polygons. The field ride out for the St Tammany Parish HLD consisted of approximately 40-45% of the overall project area.

In the aerial environment, pole routes were evaluated for available attachment space and the extent of make ready engineering (MRE) required to attach. These pole routes were marked in the field ride out map as either viable or not viable. When marked nonviable, this initiated an environment change from aerial placement to underground cable placement. In the underground environment, routes were reviewed to determine if underground construction was possible. If viable, previously unknown pole routes were found along an underground design route they were noted and considered for aerial cable placement.

In addition to constructability, other items were considered when identifying an area for field ride out which included available existing network data, service availability derived from broadband speed tests and FCC data, and any information regarding future network builds. During the field ride out, these areas were evaluated for visible existing fiber infrastructure, new fiber infrastructure currently under construction, and the proximity of the area to existing service that would indicate potential future expansion. If fiber service was found to be present or appeared to be pending, this information was applied to the HLD update and these areas were considered for removal from the overall HLD plan.

Once the physical ride out portion of field ride out was complete the data received from the field ride out team was reviewed and applicable updates were made to the HLD. These updates included adding service areas based on new construction, removing and altering route sections due to constructability issues, changes of environment for cable placement, and removal of service areas where existing or pending service was found.

Market Driven Demand Tools

During the initial phases of the project, Foresite Group researched and ingested information from a variety of public and purchased sources. Once the high-level design was complete and a field ride out verified the viability of the design, it was then divided into fiberhoods. A fiberhood is a geographic grouping of service points associated with a fiber distribution hub (FDH cabinet). Each hut area has multiple FDH cabinets within its boundary. The fiberhoods were determined by creating a polygon boundary encasing all address points served by each fiber distribution hub. Foresite Group then used a combination of data gathered throughout the previous phases of the project to establish priority levels for fiberhood areas. Three distinct aspects were considered:

1. User Experience – Current speeds experienced by St. Tammany Residents
 - Median Ookla Speedtest download
 - Median Ookla Speedtest upload
2. Cost Factor – Number of addresses passed per road mile
 - Addresses per road mile
3. FCC Data – Information provided by internet service providers about the quality and coverage of their networks.
 - Number of unserved locations
 - Best available technology type (Fiber, Cable, Other)

These three categories and five elements were used to produce one composite priority score for each fiberhood within the Parish boundary, known as a priority fiberhood zones. Overall, there is little fiber-to-the-home within the design area. Instead, most connection types are cable, DSL, or fixed-wireless. While most fiberhoods' median speedtests were greater than the unserved threshold of 25/3 Mbps, few were greater than the underserved threshold of 100/20 Mbps; therefore, most fiberhoods could be categorized as underserved.

The following table provides an overview of how priority levels align with corresponding scores and colors on the map. In the fiberhood model, scores can range from 5 at the lowest priority and 25 at the highest priority. In St. Tammany, 23 was the highest score of any fiberhood and 9 was the lowest score, not counting areas that lacked enough information to determine appropriate priority grades.

Priority Level	Zone Score	Color	Fiberhood Count
High	20-23	Red	5
Medium-High	18-19	Red-Orange	7
Medium	16-17	Orange	13
Medium-Low	12-15	Yellow-Orange	25
Low	9-11	Yellow	10
Insufficient Data	n/a	Grey	8

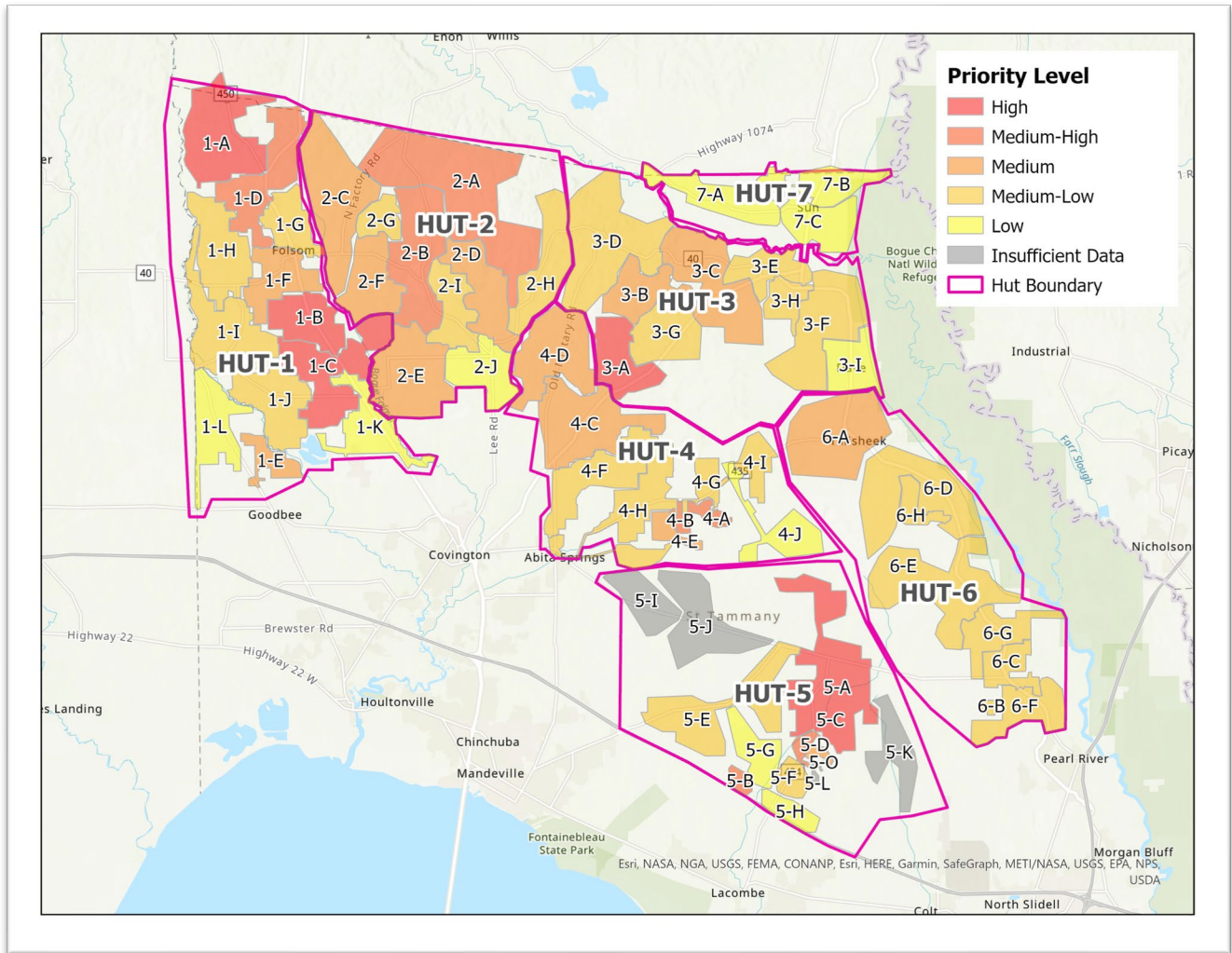


Figure 8.3 – St. Tammany Parish Fiberhoods

Various priority levels associated with each fiberhood are shown in Figure 8.3. Observations are provided for each hut specific to its associated fiberhoods, hut-level fiberhood map, and tables showing the overall priority score and relevant attributes that contributed to the grading of the fiberhoods.

Hut 1 - Folsom

Hut 1 is located in the north-western corner of the Parish. It contains twelve fiberhoods with three high priority fiberhoods (1-A, 1-B, and 1-C). Hut 1 contains three of the five highest priority fiberhoods within the design area.

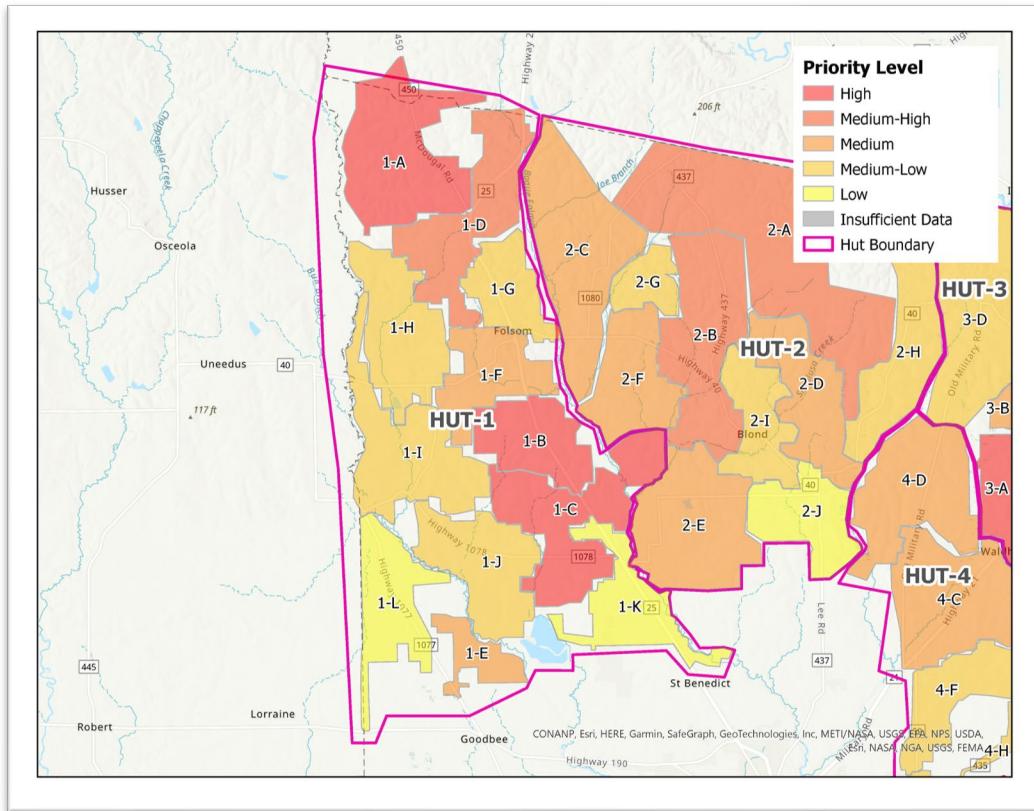


Figure 8.4 – Hut-1 Fiberhoods

Fiberhood ID	Priority Grade	Median Download	Median Upload	Address Count	Unserved Locations	Best Tech	Gumbo Grant Awards
1-A	21	22.1	4.5	250	138	Copper	18
1-B	20	32.2	5.3	328	156	Cable	50
1-C	20	31.5	2.2	409	106	Cable	57
1-D	18	26.1	5.1	381	109	Cable	44
1-E	17	78.8	8.6	186	90	Fiber	0
1-F	16	170.2	9.4	372	106	Fiber	55
1-G	15	117.6	9.8	396	63	Fiber	86
1-H	13	343.6	18.5	341	63	Cable	88
1-I	13	166.1	11.3	414	88	Cable	62
1-J	12	255.1	32.5	403	41	Cable	30
1-K	11	211.6	14.1	388	24	Fiber	9
1-L	11	180.3	11.3	249	15	Cable	0

Hut 2 - Blond

Hut 2 is located in the northern portion of the Parish. It contains ten fiberhoods with two medium-high priority fiberhoods (2-A and 2-B). Fiberhood 2-A has the highest number of GUMBO grant locations which should help increase service in this area.

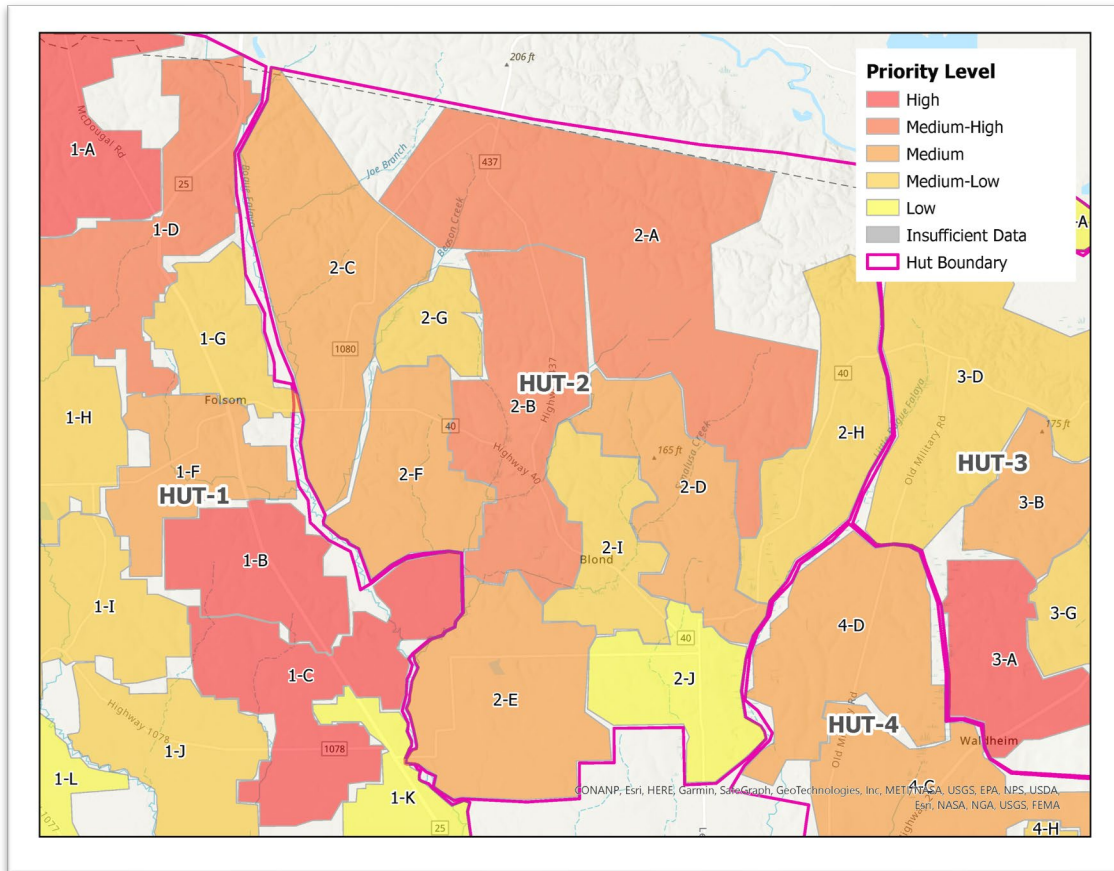


Figure 8.5 – Hut-2 Fiberhoods

Fiberhood ID	Priority Grade	Median Download	Median Upload	Address Count	Unserviced Locations	Best Tech	Gumbo Grant Awards
2-A	19	26.6	4.7	538	338	Cable	104
2-B	19	42.2	8.9	385	110	Cable	31
2-C	17	57.9	6.5	223	85	Cable	68
2-D	17	203.3	13.6	401	119	Cable	0
2-E	17	57.7	12.9	393	64	Cable	19
2-F	16	100.2	11.0	253	90	Cable	33
2-G	14	131.1	10.8	107	16	Cable	20
2-H	14	105.9	10.6	343	45	Cable	0
2-I	12	366.4	21.2	279	53	Cable	2
2-J	11	289.6	10.9	385	51	Fiber	0

Hut 3 - Fire District 9

Hut 3 is in the north-eastern portion of the Parish, south of Sun. It contains nine fiberhoods with one high priority fiberhood (3-A). Most fiberhoods within Hut 3 seem well served compared to other areas in the Parish. Median download speeds are sufficiently high, and cable service seems to be available throughout the hut.

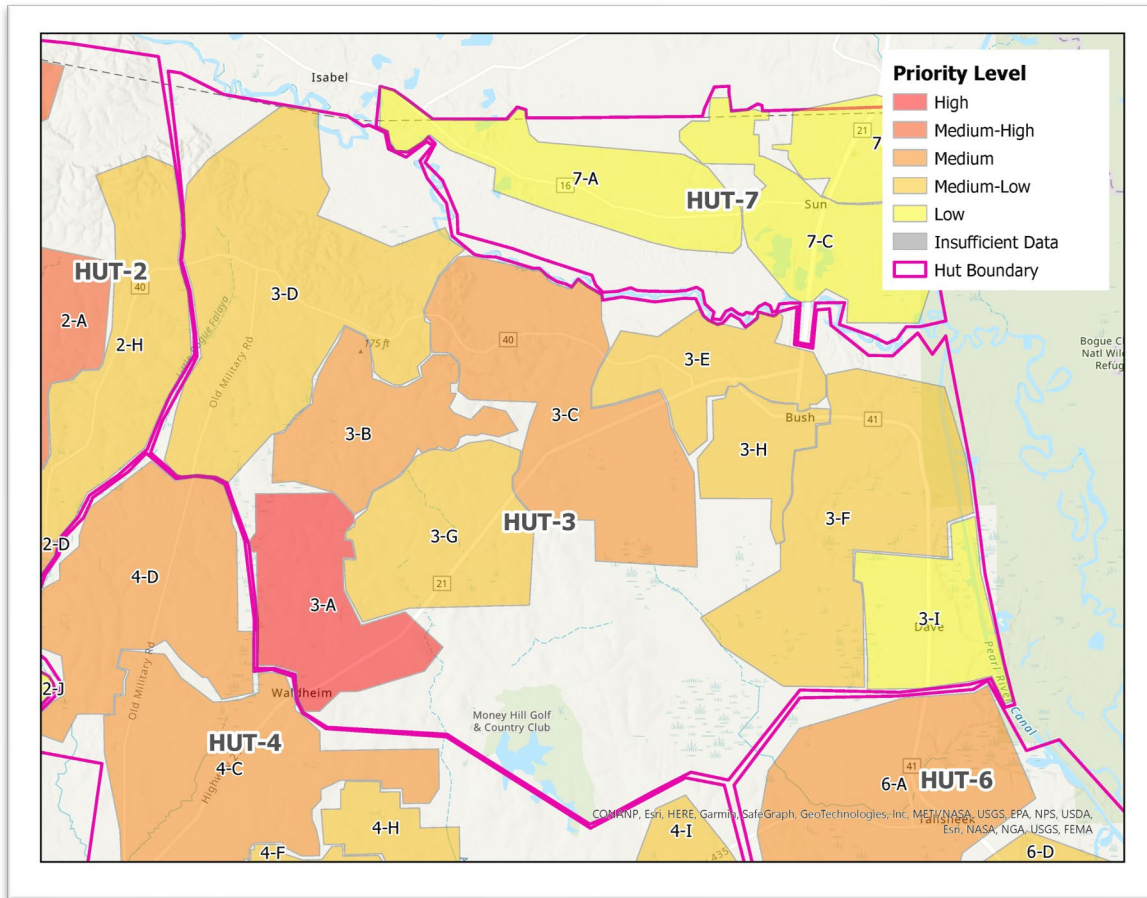


Figure 8.6 – Hut-3 Fiberhoods

Fiberhood ID	Priority Grade	Median Download	Median Upload	Address Count	Unserved Locations	Best Tech	Gumbo Grant Awards
3-A	20	71.6	7.6	207	83	Copper	0
3-B	17	135.1	10.7	306	76	Cable	16
3-C	16	73.6	11.8	338	94	Cable	46
3-D	15	129.0	11.2	403	92	Cable	2
3-E	15	146.4	10.9	264	28	Cable	30
3-F	15	136.9	9.6	407	40	Cable	36
3-G	12	213.5	11.1	324	14	Cable	45
3-H	12	342.9	11.1	146	12	Cable	29
3-I	11	284.3	19.8	125	35	Cable	17

Hut 4 - Abita Springs

Hut 4 is located near Abita Springs and contains ten fiberhoods with two medium-high priority fiberhoods (4-A and 4-B). Hut 4 had a significant discrepancy between provider reported data and consumer experience. Fiber was reported in several areas of the hut, yet the median download and upload speeds are very low and would be considered underserved.

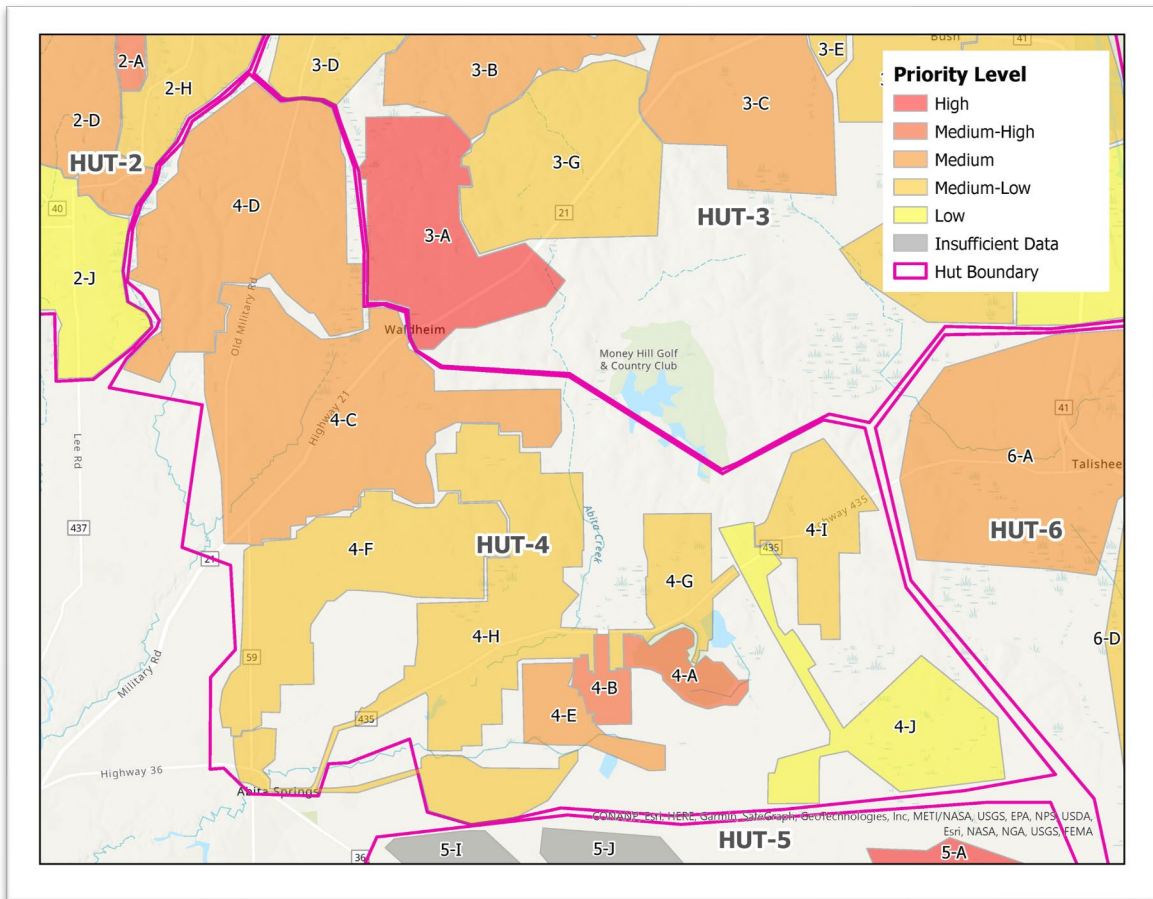


Figure 8.7 – Hut-4 Fiberhoods

Fiberhood ID	Priority Grade	Median Download	Median Upload	Address Count	Unserved Locations	Best Tech	Gumbo Grant Awards
4-A	18	11.2	0.9	333	18	Fiber	0
4-B	18	12.0	0.9	408	26	Fiber	19
4-C	17	54.5	7.0	401	184	Fiber	23
4-E	16	118.5	2.6	338	41	Fiber	35
4-D	16	96.2	10.2	296	60	Cable	5
4-F	15	117.2	11.4	400	97	Fiber	5
4-G	15	63.3	8.7	186	17	Fiber	0
4-H	13	118.0	11.0	405	72	Fiber	10
4-I	12	94.9	12.2	50	6	Fiber	12
4-J	10	67.5	13.5	57	8	Fiber	9

Hut 5 - Fire District 7

Hut 5 is the most centrally located hut within St Tammany Parish. It has fifteen fiberhoods with one high priority fiberhood (5-A). Hut 5 is unique among the hut’s considered in this design area. While there is more vacant land than other huts, it has some of the highest development potential. A few large development projects are currently in progress, so it is likely that the nature of this hut will look significantly different in a few years in terms of residential and commercial density.

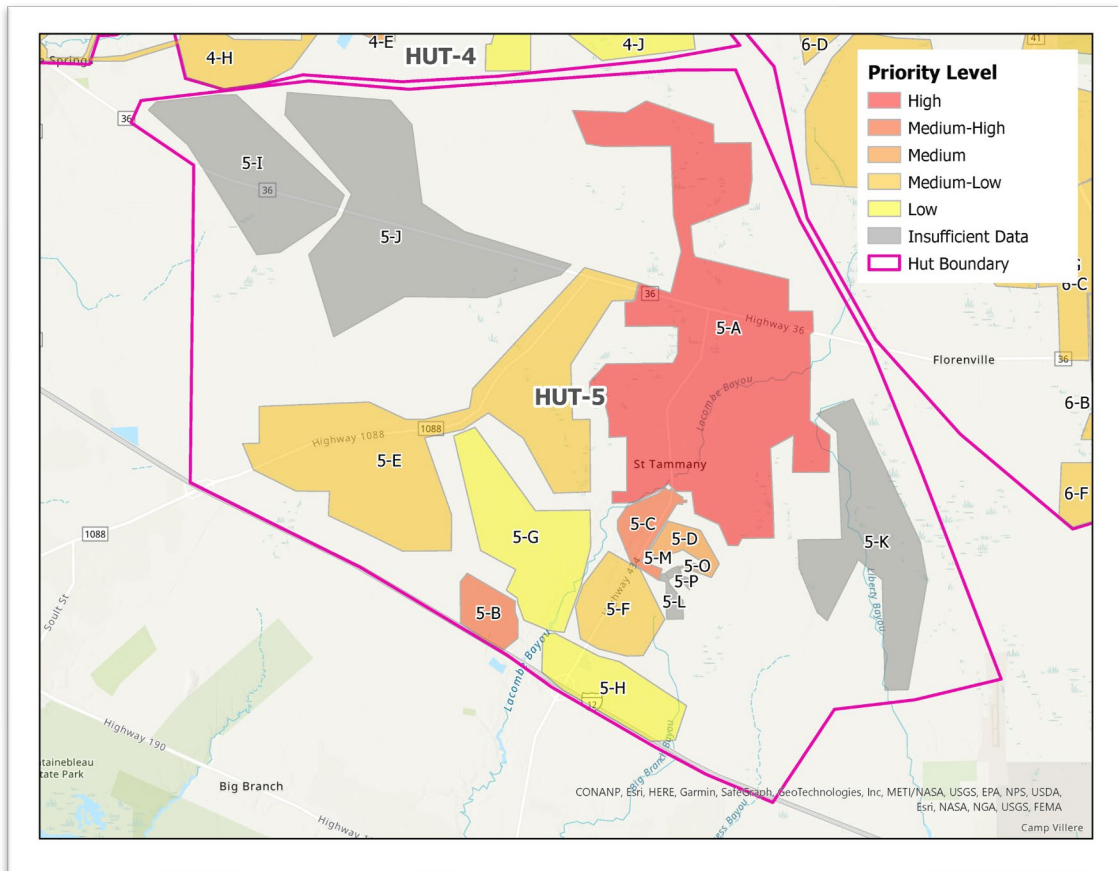


Figure 8.8 – Hut-5 Fiberhoods

Fiberhood ID	Priority Grade	Median Download	Median Upload	Address Count	Unservd Locations	Best Tech	Gumbo Grant Awards
5-A	23	8.9	0.8	338	186	Copper	24
5-B	18	5.9	0.3	9	1	Copper	4
5-C	18	31.0	2.3	19	15	Copper	3
5-D	16	15.6	9.2	1	1	Fixed Wireless	0
5-E	15	37.9	4.4	18	2	Fixed Wireless	0
5-F	13	36.3	39.1	15	3	Cable	0
5-G	11	412.7	11.3	65	3	Cable	35
5-H	9	112.9	23.0	57	7	Fiber	4
5-I – 5-P	Not Enough Information						

Hut 6 - 6th Ward Elm

Hut 6 is located on the eastern side of the Parish. It has eight fiberhoods with no fiberhoods higher than a medium priority grade. Most fiberhoods already have cable service available to at least some locations and there is fiber service reported by providers in this area. The northern most fiberhood is the least served of this hut with significantly lower median download and upload speeds with unserved locations.

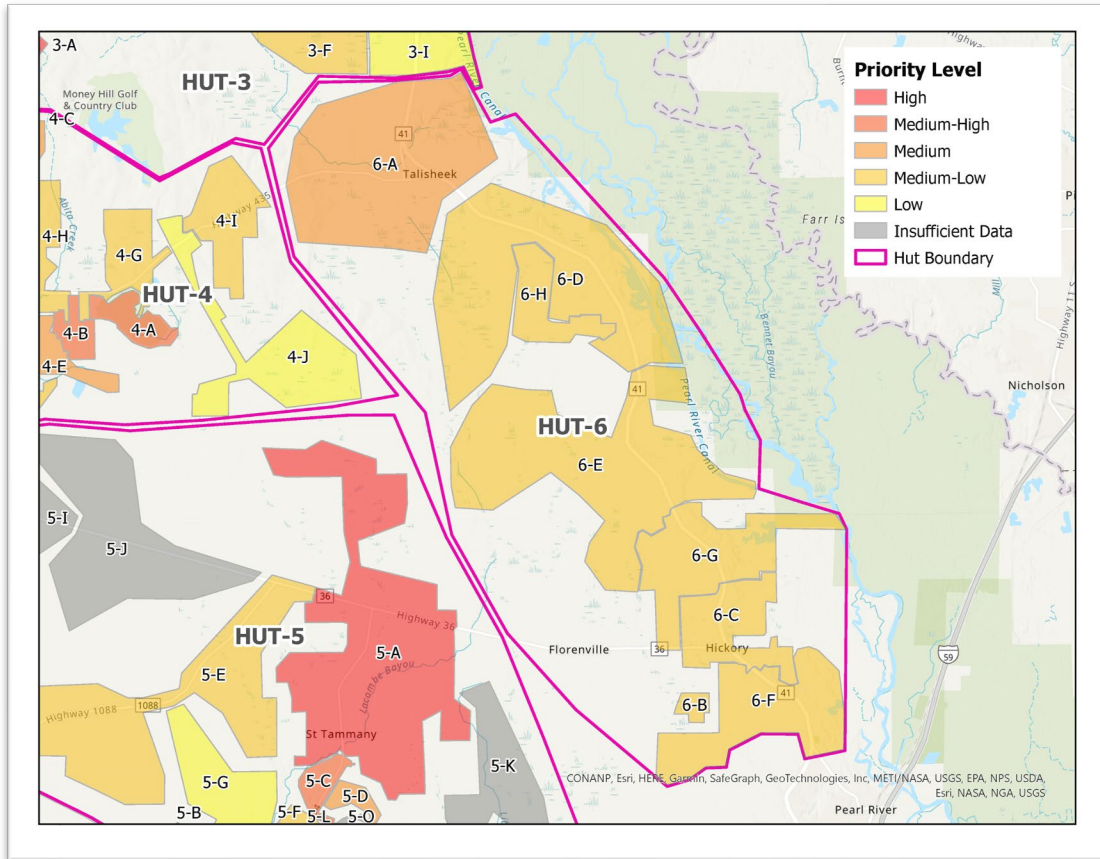


Figure 8.9 – Hut-6 Fiberhoods

Fiberhood ID	Priority Grade	Median Download	Median Upload	Address Count	Unserved Locations	Best Tech	Gumbo Grant Awards
6-A	17	15.8	11.7	369	108	Fiber	53
6-B	15	330.1	6.6	43	0	Copper	0
6-C	15	95.4	12.0	400	11	Cable	0
6-D	14	92.4	7.7	324	23	Fiber	0
6-E	13	69.1	10.4	408	43	Fiber	0
6-F	13	173.4	11.3	415	14	Cable	0
6-G	13	320.9	10.9	433	18	Cable	0
6-H	12	531.5	18.4	90	23	Cable	0

Hut 7 - Sun

Hut 7 is the most northern hut, including Parish areas north of Bogue Chitto. It contains three fiberhoods all of which are considered low priority. Cable service is available in each fiberhood has some of the highest median download and upload speeds in the Parish.

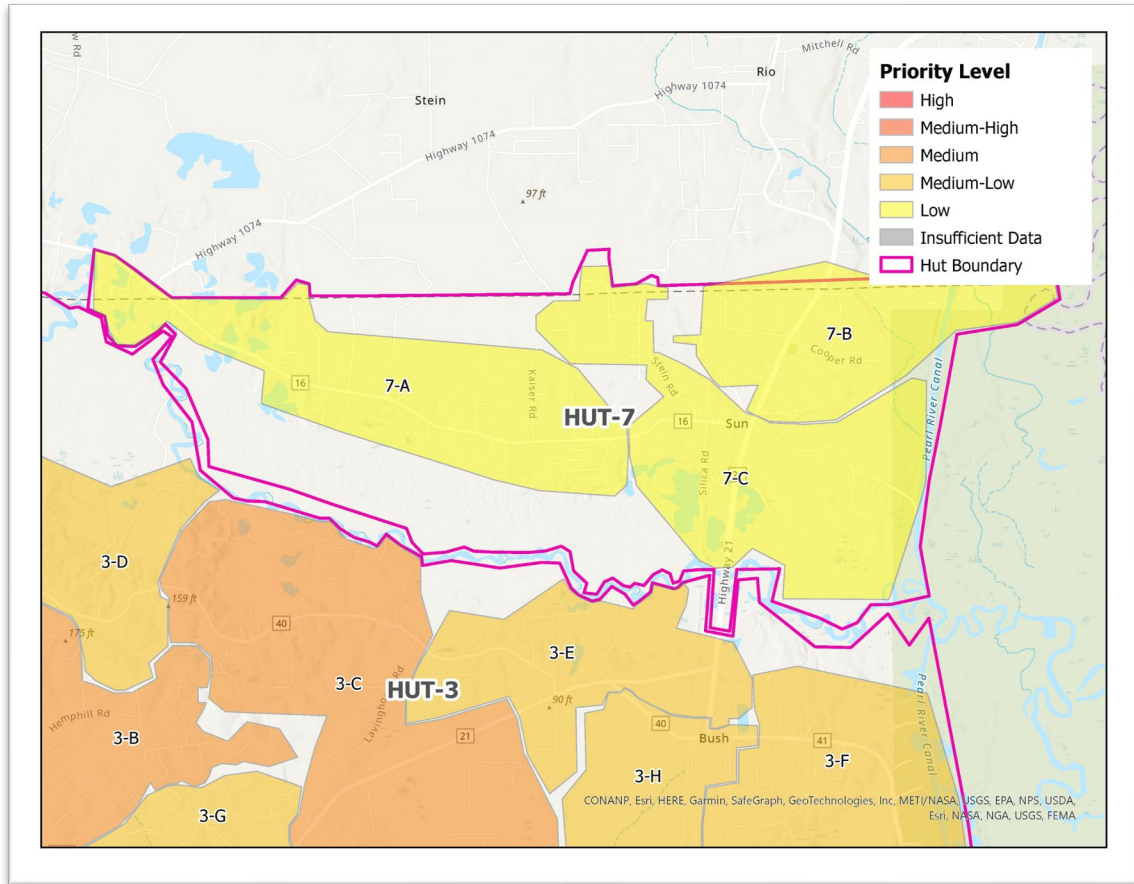


Figure 8.10 – Hut-7 Fiberhoods

Fiberhood ID	Priority Grade	Median Download	Median Upload	Address Count	Unserved Locations	Best Tech	Gumbo Grant Awards
7-A	11	120.1	22.5	263	41	Cable	0
7-B	11	183.2	17.6	107	23	Cable	0
7-C	10	366.8	15.7	165	39	Cable	0

BILL OF MATERIALS AND PROFORMA

A bill of materials has been created to provide a comprehensive listing of estimated labor and material costs expected from the proposed buildout. In addition, a proforma has been prepared which provides a look at the overall expenditure and revenue expected from the development and operation of the network over a 30-year period. FTTH Network connected through a backbone ring.

Bill of Materials

The included bill of materials, or BOM, for the proposed backbone and FTTH network is based on high-level estimates of assumed construction material and labor costs associated with the project. These estimates are tentative and based on the routes and design environments established in the **Broadband Network - High-Level Design** section of this report. This BOM is meant to provide a high-level breakdown of construction costs and help in determining the overall cost of the project when requesting financial aid. It includes both labor and material cost estimates, based on the competitive rates of the current telecom industry. These costs have been modeled on the hut level as well as some examples that include the highest priority fiberhoods throughout the Parish. As a high-level overview, the estimated construction costs of network are below.

BACKBONE

- Proposed Aerial = **\$38,049.50**
- Proposed Underground = **\$8,541,941.06**
- Proposed Fiber Optic Cable = **\$4,083,072.08**
- Estimated Total Cost = **\$12,663,062.64**

HUT 1: FOLSOM

- Proposed Aerial = **\$80,436.00**
- Proposed Underground = **\$18,713,010.99**
- Proposed Fiber Optic Cable = **\$10,459,399.40**
- Estimated Total Cost = **\$29,252,846.39**

HUT 2: BLOND

- Proposed Aerial = **\$42,457.11**
- Proposed Underground = **\$14,115,142.93**
- Proposed Fiber Optic Cable = **\$8,416,692.09**
- Estimated Total Cost = **\$22,574,292.13**

HUT 3: FIRE DISTRICT 9

- Proposed Aerial = **\$0**
- Proposed Underground = **\$11,253,833.91**
- Proposed Fiber Optic Cable = **\$6,624,315.20**
- Estimated Total Cost = **\$17,878,149.11**

HUT 4: ABITA SPRINGS

- Proposed Aerial = **\$15,976.00**
- Proposed Underground = **\$11,739,786.97**
- Proposed Fiber Optic Cable = **\$6,304,631.05**
- Estimated Total Cost = **\$18,060,394.02**

HUT 5: FIRE DISTRICT 7

- Proposed Aerial = **\$16,285.00**
- Proposed Underground = **\$4,940,569.10**
- Proposed Fiber Optic Cable = **\$2,231,096.28**
- Estimated Total Cost = **\$7,187,950.38**

HUT 6: 6th WARD ELM

- Proposed Aerial = **\$2,642.55**
- Proposed Underground = **\$8,509,135.75**
- Proposed Fiber Optic Cable = **\$5,037,512.33**
- Estimated Total Cost = **\$13,549,290.63**

HUT 7: SUN

- Proposed Aerial = **\$0**
- Proposed Underground = **\$4,007,310.27**
- Proposed Fiber Optic Cable = **\$1,710,200.31**
- Estimated Total Cost = **\$5,717,510.58**

Fiberhood 1-A

- Proposed Aerial = **\$0**
- Proposed Underground = **\$1,720,160.46**
- Proposed Fiber Optic Cable = **\$867,737.58**
- Estimated Total Cost = **\$2,587,898.04**

Fiberhood 1-C

- Proposed Aerial = **\$0**
- Proposed Underground = **\$2,199,895.17**
- Proposed Fiber Optic Cable = **\$1,159,549.46**
- Estimated Total Cost = **\$3,359,444.63**

Fiberhood 2-B

- Proposed Aerial = **\$10,061.64**
- Proposed Underground = **\$1,962,432.03**
- Proposed Fiber Optic Cable = **\$1,000,520.19**
- Estimated Total Cost = **\$2,973,013.86**

Fiberhood 5-A

- Proposed Aerial = **\$0**
- Proposed Underground = **\$2,211,362.27**
- Proposed Fiber Optic Cable = **\$875,936.04**
- Estimated Total Cost = **\$3,087,298.31**

Fiberhood 1-B

- Proposed Aerial = **\$0**
- Proposed Underground = **\$1,543,213.36**
- Proposed Fiber Optic Cable = **\$721,322.34**
- Estimated Total Cost = **\$2,264,535.70**

Fiberhood 2-A

- Proposed Aerial = **\$0**
- Proposed Underground = **\$2,048,584.34**
- Proposed Fiber Optic Cable = **\$1,241,811.89**
- Estimated Total Cost = **\$3,290,396.23**

Fiberhood 3-A

- Proposed Aerial = **\$0**
- Proposed Underground = **\$913,045.59**
- Proposed Fiber Optic Cable = **\$412,074.49**
- Estimated Total Cost = **\$1,325,120.08**

It should be noted that the costs and materials listed in this bill of materials are estimates based on a high-level design. Should the network design and construction be implemented, a more detailed design would be required which may result in costs and amounts that diverge from this BOM. A more detailed breakdown of the St. Tammany Parish Broadband Solution – Bill of Materials are available in **Appendix E – Bill of Materials** of this report.

Proforma

The prepared proforma is a model which provides a cost vs revenue comparison of estimated costs for design, construction, and operation over a 30-year period. This helps to visualize how the finances of the network might look like. Proformas have been prepared for each of the seven huts along with an overall proforma for the design area. The backbone network has been incorporated into the seven individual hut proformas. The components and assumptions made to prepare the proforma model are discussed in further detail below.

Capital Expenditure

The proforma models capital expenditure to include all costs for the development and deployment of the fiber network. This includes all planning and design effort conducted by engineering vendors as well as all labor and material costs associated with the construction vendors.

- **Planning and Assessment Effort:** Planning and assessment effort for this proposal includes a single strategy session and kick-off meeting which will include all parties that have a stake or involvement in the project.
 - The model estimates a one-time cost of **\$70,980.00** for this phase for all efforts.

- **Design and Engineering Effort:** Design and engineering effort covers the cumulative costs of one, or multiple, engineering vendors.
 - Design is estimated to vary between approximately 6 and 12 months.
 - The model assumes that design and production of construction documents require 6 months for each hut. Construction document production is expected to start approximately 2 months after design begins.

Network Name	Duration (Months)	Engineering Design Cost	Engineering Construction Cost
Hut-1 Folsom	6	\$1,467,731.57	\$35,766,274.86
Hut-2 Blond	6	\$1,142,258.11	\$27,954,581.79
Hut-3 Fire Dis. 9	6	\$947,064.43	\$22,152,284.47
Hut-4 Abita Springs	6	\$995,933.47	\$22,364,318.97
Hut-5 Fire Dis. 7	6	\$620,800.03	\$9,467,459.44
Hut-6 6th Ward Elm	6	\$790,852.99	\$17,781,029.15
Hut-7 Sun	6	\$515,322.00	\$7,863,232.84

- The model assumes design management and overhead costs for the vendor to run for an additional 6-month period, and it includes management of start-up, production, and close-out efforts of the project. These durations are estimated to be 12 months for each hut.
- **Construction Effort:** Construction effort covers the cumulative costs of one, or multiple, construction vendors.
 - Construction efforts are estimated to vary between 9 and 21 months. The overall build is estimated to be a 95% to 5% ratio of underground to aerial construction and both methods are expected to be design concurrently.
 - For underground construction the model assumes:
 - 2-4 construction crews depending on the hut
 - Each crew can install approximately 1400 ft of cable and conduit per day.
 - Crews are working 5 days a week, 48 weeks per year.
 - Based on the above rate the installation of underground conduit and cable is estimated to vary between approximately 4 and 12 months, with an additional 3 months for cable installation and splicing effort.
 - For aerial construction the model assumes:
 - 1 or 2 construction crews, depending on the hut
 - Each crew can install approximately 1400 ft of cable and strand per day.
 - Crews are working 5 days a week, 48 weeks per year.
 - Based on the above metric the installation of aerial strand and cable is estimated to vary between approximately 1 and 3 months for huts where aerial construction is applicable with an additional 2 months for cable installation and splicing effort.

Network Name	Aerial Construction		Buried Construction	
	Duration (Months)	Cost	Duration (Month)	Cost
Hut-1 Folsom	5	\$849,003.91	14	\$28,406,446.09
Hut-2 Blond	3	\$297,260.88	11	\$22,278,239.12
Hut-3 Fire Dis. 9	0	\$0.00	11	\$17,879,000.00
Hut-4 Abita Springs	3	\$170,078.76	11	\$17,890,921.24
Hut-5 Fire Dis. 7	3	\$143,042.01	8	\$7,046,957.99
Hut-6 6th Ward Elm	3	\$23,260.43	11	\$13,529,439.57
Hut-7 Sun	0	\$0.00	6	\$5,719,000.00

- The model estimates monthly costs of **\$30,000.00** and **\$3,000.00** for management and overhead respectively, with durations varying between 10 and 18 months.

Network Name	Duration (Months)	Construction Management Cost	Construction Overhead Cost
Hut-1 Folsom	18	\$540,000	\$54,000
Hut-2 Blond	16	\$480,000	\$48,000
Hut-3 Fire Dis. 9	14	\$420,000	\$42,000
Hut-4 Abita Springs	14	\$420,000	\$42,000
Hut-5 Fire Dis. 7	12	\$360,000	\$36,000
Hut-6 6th Ward Elm	12	\$360,000	\$36,000
Hut-7 Sun	10	\$300,000	\$30,000

- **Total Costs:** Total capital expenditure costs are expected to vary approximately between \$8,378,554.84 and \$37,234,006.43 with overall total project costs estimated at \$149,829,144.12.

Network Name	Total Cost
Hut-1 Folsom	\$37,234,006.43
Hut-2 Blond	\$29,096,839.90
Hut-3 Fire Dis. 9	\$23,099,348.90
Hut-4 Abita Springs	\$23,360,252.44
Hut-5 Fire Dis. 7	\$10,088,259.47
Hut-6 6th Ward Elm	\$18,571,882.14
Hut-7 Sun	\$8,378,554.84
Total Overall Cost	\$149,829,144.12

Capital Investment

Capital investment refers to the initial funds that are required to be invested into the network to cover the construction of the project. These can be introduced as a single lump-sum or gradually introduced yearly throughout the life of the project. The source of investment varies and can include capital invested directly by interested parties, third-party investors, or government grants. The proforma models third-party investment as the primary source of capital investment for the project. The third-party investments are being modelled as a one-time, first year investment per hut. The model also accounts for a one-time, \$7,000,000 investment from St. Tammany Parish which would be applied to the hut of the Parish's choosing.

Grant Funding

Although grant funding options are available for aid in funding the project, these options were not accounted for in this proforma. At the time of this report most grant opportunities are either near the end of their application window or have guidelines and rules that are still being developed. As such, it is too difficult to accurately model how grant funds would be incorporated to the project. Additionally, this proforma aims to present what could be considered a "worst case" scenario for the project, where third party investment would be crucial, and the potential risks and rewards associated with it. Should applicable grant funding be determined, these funds would typically cover approximately 75% of the project amount and require a 25% match from the network owner. Further details about possible grant opportunities and recommendations are discussed in the **Business Model and Financing Alternatives** section of this report.

Operational Expenditures

Operational expenditures refer to costs related to management and maintenance of the network after its completion. These costs do not apply directly to its design or deployment and can be one-time or continuous fees.

- This proforma models a one-time fee of **\$50,000.00** related to all legal deal developments that would be needed at the onset of the project.
- One-time setup fee for business engine of \$425,000 and one-time fee for marketing and branding startup of \$50,000
- It also models a continuous "operations and maintenance" fee which covers the monthly cost of hiring and maintaining an operations and maintenance (O&M) subcontractor. Because the designed network operates as a middle-mile network, O&M costs are expected to be reduced and the model estimates a monthly cost of **\$15,200.00** applied once a month, every month after construction completion. This is estimated to start the first month after construction is completed and projected until Month 240. Other recurring costs include Marketing and Branding Recurring Fees \$2,200 per month for 44 months and office space and equipment fees \$2,750 per month for 240 months.
- Continuous operational costs are not covered by any of the capital investments and will have a consistent cost of approximately **\$305,400.00** per year, every year after year 3.

Revenue

Revenue was modeled based on the following assumptions:

- \$100/month subscription fee
- 35% take rate
- Return on investment per hut ranged from 29 – 40+ years

Network Name	Demand Points	Take Rate	Est. Connected Locations	Est. Monthly Income	Projected ROI
Hut-1 Folsom	4,336	35%	1,518	\$151,760.00	29 Years
Hut-2 Blond	3,447	35%	1,206	\$120,645.00	31 Years
Hut-3 Fire Dis. 9	2,590	35%	907	\$90,650.00	38 years
Hut-4 Abita Springs	2,850	35%	998	\$99,750.00	34 Years
Hut-5 Fire Dis. 7	566	35%	198	\$19,810.00	> 40 years
Hut-6 6th Ward Elm	2,519	35%	882	\$88,165.00	33 Years
Hut-7 Sun	538	35%	188	\$18,830.00	> 40 years

Alternative Approach

It is Foresite Group’s understanding that St. Tammany is interested in utilizing their current \$7 million in ARPA funding to extend service to unserved areas as soon as possible. While the full design would require more capital investment than is currently available, there are some ways the Parish could immediately put their dedicated funds to use. The Parish could consider subsidizing providers who have existing network to extend service to the unserved areas within the Parish. Ultimately, it would be the decision of the Parish and provider to choose the best possible areas, but Foresite Group recommends using the fiberhood priority zones as a guide for selecting expansion areas. Fiberhood 1-B and 1-C are presented as examples to show build out’s capital expenses could be covered with currently available funds. Operations and management costs have been removed as existing providers would already have infrastructure in place. This model is focused on reaching unserved areas and incentivizing existing providers to extend their network.

Fiberhood 1-B

Assuming \$430,640.05 for engineering and construction overhead and management and cost to extend drops, plus a construction cost of \$2,499,095.14. Total capital expenditures for this fiberhood are estimated **\$2,929,735.19**.

Fiberhood 1-C

Assuming \$510,760.59 for engineering and construction overhead and management and cost to extend drops, plus a construction cost of \$3,580,968.86. Total capital expenditures for this fiberhood are estimated **\$4,091,729.45**.

BUSINESS MODEL AND FINANCING ALTERNATIVES

Deployment of a broadband network can be seen as a very difficult task due to the general scope and requirements expected of one. Broadband networks that cover large regions, such as rural counties, have the added challenge of requiring heavy capital investment upfront for a network that is likely to serve a limited subscriber base. It is very important for prospective network owners or managers to be well informed on the various existing alternatives for business models and financing opportunities that are available.

Business Model - Options

There are various business models which offer differing degrees of ownership, management, and investment options for interested parties. For a government body interested in developing a broadband network, proper selection of a business model is strongly defined by its desire to control the trajectory of its development, as well as its own level of interest in owning or operating the network. The following business model alternatives were considered:

Option 1 – Infrastructure Ownership and Leasing Model

Description:

An infrastructure ownership and leasing model is a business model where an entity, such as St. Tammany Parish, owns fiber and conduit infrastructure within a given area and they lease out dark fibers within the network to local organizations or private service providers.

Details of this type of business model are:

- St. Tammany Parish would be the owner of the network infrastructure (cable, conduit, handholes, manholes, and other miscellaneous components) but the only service it operates is its own internal network.
- The fiber network contains additional “dark fibers” which are unused and unlit optical fibers. These dark fibers can be accessed at different locations within the network and can provide additional connections or services.
- St. Tammany Parish leases the dark fibers in a non-discriminatory manner to any public or private institution that wishes to utilize them to provide service to clients or to enhance their existing networks.
- Public institutions not directly managed by the entity (such as school districts) are generally considered as 3rd parties in this model and are not directly served by the owner’s internal services.
- St. Tammany Parish may also lease out existing, vacant conduits for a public or private 3rd party to use for installing their own fiber cable.
- Leasing is typically done on a “per footage” basis of used infrastructure.

Advantages:

- St. Tammany Parish is only responsible for the ownership of the physical infrastructure and does not need to own or manage any broadband services outside of its own internal needs.
- Leased fiber/conduit agreements can be a consistent source of revenue for St. Tammany Parish.
- Leasing agreements would allow St. Tammany Parish to control the terms and limits though which 3rd parties must abide by when creating their networks.

Disadvantages:

- St. Tammany Parish would be responsible for the management of the infrastructure regarding physical faults or damage.
- A 3rd party operations and maintenance (O&M) vendor would most likely be necessary.

Case Study:

- **Santa Clarita, CA** – Santa Clarita is a city in Los Angeles County in California. It is the third largest city in the county, with a population of over 200,000 as of 2020, and is home to such attractions as the Six Flags Magic Mountain theme park. In 2002 Santa Clarita first installed fiber for the purpose of managing traffic signals and street cameras. This network gradually expanded to over 70 miles of coverage. The city took advantage of this fiber infrastructure, of which only one-third of its capacity was being used to serve traffic lights and cameras and used the spare fiber to interconnect all their municipal facilities. The city originally entered into an agreement with Freedom Dark Fiber Networks (now Wilcon) in which they lease out dark fibers on their network to serve businesses. After being acquired by Wilcon in 2013, the city renegotiated the contract and extended its duration as well as the promise of additional coverage to even more potential businesses beyond the ones already being served. The city did not establish any exclusivity with Wilcon, so additional dark fibers are still available for lease.
- **NoaNet, Washington State** – Northwest Open Access Network (NOANet) is a non-profit telecom organization founded in 2000 by a group of Washington State Public Utility Districts (PUD) for the purpose of enhancing broadband service in the underserved and unserved sections of the state. They act as a middle-mile, statewide network that offers wholesale broadband to hundreds of communities and businesses across all counties in the state. The company began at a time when investment in broadband was mainly focused along the I-5 corridor between Seattle and Portland and areas in rural Washington state were losing support. Rural PUDs had started to invest in their own regional fiber networks but interconnection across the state was hard to come by. Taking advantage of the Bonneville Power Administration's (BPA) initiative to lease out its statewide dark fibers if they served all districts where BPA had fiber, the PUDs collaborated to form a telecom company to lease and operate along the BPA fiber network. This company would go on to become NOANet, who in the present day operates more than 3,300 miles of fiber throughout Washington state and connects anchor institutions and independent communication networks to each other.
- **UTOPIA Fiber** – UTOPIA (Utah Telecommunication Open Infrastructure Agency) Fiber is a group of 11 Utah cities that joined together in 2004 to build, deploy, and operate a fiber to the home (FTTH) network to every business and household within their communities. The UTOPIA network allows subscribers to connect to the world in ways they have never experienced before, providing blazingly fast Internet speeds, phone, and television services. Using an active Ethernet infrastructure and operating at the wholesale level, UTOPIA supports open access and promotes competition in all telecommunications services. UTOPIA Fiber's 19 service areas represent nearly 28% of all communities in the United States that can enjoy 10 Gigabit service on a publicly owned network.

Option 2 – Infrastructure Ownership and Provider Model

Description:

This model is like the above-mentioned infrastructure ownership and leasing model, in which a government jurisdiction owns the fiber cable and conduit infrastructure and leases out dark fibers to 3rd party service providers. The difference is, in addition to providing service to their own structures and institutions, the government jurisdiction also offers service to community anchor and public institutions within their jurisdiction. These community anchors typically include school districts, higher learning institutions, public utilities, and public safety institutions, which might not be directly administered by the institution.

Details of this type of business model are:

- The government jurisdiction is the owner of the network infrastructure (cable, conduit, handholes, manholes, and other miscellaneous components) but the only service it operates is its own internal network.
- Community anchors and public institutions, such as school districts, public safety institutions, and public utilities, not directly managed by the government jurisdiction are also offered 1st party service as part of this model.
- The fiber network contains additional “dark fibers” which are unused and unlit optical fibers that have been placed. These dark fibers can be accessed at different points of the network and can provide additional connections or services.
- The government jurisdiction leases the dark fibers in a non-discriminatory manner to any public or private institution that wishes to utilize them to provide service to clients or to enhance their existing networks.
- The government jurisdiction may also lease out existing, vacant conduits for a public or private 3rd party to use for installing their own fiber cable.
- Leasing is typically done on a “per footage” basis of used infrastructure.

Advantages:

- St. Tammany Parish would only be responsible for the ownership of the physical infrastructure and does not need to own or manage any broadband services outside of their own internal needs and anchor institutions.
- Leased fiber/conduit agreements can be a consistent source of revenue for the jurisdiction.

Disadvantages:

- St. Tammany Parish would be responsible for the management of the infrastructure regarding physical faults or damage.
- A 3rd party operations and maintenance (O&M) vendor might be necessary.
- Serving community anchor and public institutions adds some additional management requirements as opposed to the infrastructure ownership and leasing model.

Case Study:

- **Seminole County, FL** – Seminole County is a county in central Florida, located northeast of Orlando and has a population of 466,695 as of 2020. In 1992 the County’s Traffic Engineering department started an effort to upgrade the lines serving their traffic signals from copper cables to fiber optic cables, which offered higher capacity and better protection from lightning strikes that were causing problems for their network. Over the next 20 years the County continued to gradually expand their fiber network by taking advantage of road expansion projects to lay down more fiber cable throughout the county. The Traffic Engineering Department recognized the benefit this fiber network could have for other county agencies and invited them to join. By mid-2000 it was considered common for multiple non-county agencies, including educational institutions and city public service agencies to be on the County’s network. The County has considered expanding access to the network to third-party ISPs to enhance broadband coverage in the county, but there are some jurisdictional limitations that complicated the matter, and they tabled it for the time being. The County has recently restarted to explore their options to expand further beyond just the community anchor institutions.
- **Wilson, North Carolina** – Wilson, a city of 49,000 in eastern North Carolina, once enjoyed the distinction of being the tobacco capital of the world faced serious challenges when manufacturing and the tobacco industry began moving out of the region. The city’s leaders turned their focus towards local investment including the city’s information infrastructure. Efforts were made to negotiate with the existing internet provider Time Warner Cable including an offer to partner with TWC to build the FTTH that was rejected by the national company. After a proposed partnership with EMBARQ (now CenturyLink) also fell through, Wilson decided to go it alone and in 2008 began building a citywide FTTH network called Greenlight. Financed by the city the network was completed on budget in January 2009, a year ahead of schedule, and Wilson became the first gigabit city in the state. Wilson realized that a municipally owned fiber network not only offered more control over the quality and speed of internet access for residents, it also provided a potential engine for economic growth. By 2012, they had completed a fiber ring linking every school in the county, connected the area’s largest employer with gigabit service, and deployed Wi-Fi hotspots for public use in the downtown area and at the airport, library, and sports complex. Officials calculated it saved the community more than a million dollars per year – money that stayed in the local economy. Even those who kept TWC as a provider enjoyed lower, more stable prices and better speeds due to the new competition. The fast, reliable network attracted new businesses like Los Angeles-based ExodusFX which chose Wilson over Kansas City’s Google Fiber network. By the summer of 2020 the Greenlight network was nearing a take rate of almost 45%, offering symmetrical internet up to 1Gps as well as considerations for low-income residents. Through smart investment and planning, Wilson built a network capable of serving the city and the surrounding area for decades to come.

Option 3 – Public-Private Partnership (P3) Model

Description:

A public-private partnership model, or P3, is a business model where a government jurisdiction partners up with one or more private organizations and jointly plan, build, manage, and maintain a fiber optic network within their own jurisdiction. These partnerships allow for multiple parties to combine their areas of expertise into the joint goal of building a viable broadband network. Government jurisdictions will usually contribute their regulatory expertise and larger capital financing capabilities, and private organizations will contribute their expertise at building, managing, and operating a fiber network.

Details of this type of business model are:

- The government entity involved generally has full or partial jurisdictional authority or existing relationships with those jurisdictions over the area intended to be served and acts as the primary party of interest.
- Private organizations bring various opportunities to the partnership which can include:
 - Network design and construction experience.
 - Plant operations and maintenance experience.
 - Capital investment opportunities.
- All interested parties need to determine their preferences and organize their expectations and responsibilities before any actual activities may begin.

Advantages:

- Public-private partnerships allow for more even distribution of financial and management responsibilities among multiple parties and helps to minimize expenditures from each party.
- P3s provide opportunities for smaller ISPs that might otherwise find the cost of entry into the market too burdensome.
- If St. Tammany Parish does not wish to own and maintain a network, this would allow an easier time separating the responsibility while still retaining key deciding interest in the direction the network's development takes.

Disadvantages:

- Effort requires striking a balance between the interests and expectations of multiple parties that can easily become complicated to navigate.

Case Study:

- **Medina Fiber** - Medina Fiber is a locally operated internet service provider powered by Lit Communities. In 2013, Medina County completed the build out of an open access middle mile fiber ring, which brought connectivity to large and midsize businesses across the county—but not residents and small businesses. Medina Fiber was founded to partner with Medina County Fiber Network (MCFN) in solving that problem and building a FTTH/B network across the county which will connect 50,000 residents and businesses.
- **Holly Springs, NC** – Holly Springs is a town in North Carolina located southeast of Raleigh and with a population of 36,595 as of 2020. In mid-2014 the town decided to invest in their own fiber network to serve their own institutions and save financially by avoiding the need to pay a third-party for the service. North Carolina law prohibits government institutions within the state from directly offering internet services to customers, so the city had to consider other options. In 2015, the city entered into an agreement with Toronto-based company Ting, who agreed to provide 1 Gbps service in the city, using the city's own fiber network as a base and growing out its own last-mile. Ting now reaches out to residents and business across the town and offers 1 Gbps service.
- **Delta Electric Power Association, Mississippi** – When the Mississippi legislature went about tackling their rural broadband access problem, they turned to the state's rural electric co-ops. Many of which had been preparing broadband rollout and were looking for funding. Using the grants provided under the CARES Act, the state provided these private, independent electric utilities the funding needed to move forward with their builds. Headquartered in Greenwood, Delta Electric serves the most rural and sparsely populated region of the state. It is using \$10 million of its own matching funds and partnering with Conexon, a broadband company specializing in electric co-op fiber builds, the not-for-profit company completed a pilot project in northern Carroll County, and announced plans to expand to surrounding areas when the project was complete.

Infrastructure Grants and Loans

Capital expenditure costs are some of the strongest barriers to the development and deployment of a new broadband network. The initial costs often act as a barrier to entry for small and new ISPs and limit the ability for legacy providers to expand further. This is even more pronounced in rural areas, where expected return on investment (ROI) for providers is so minimal that it disincentivizes new developments. The issue with bridging the urban/rural broadband divide has been a priority for lawmakers at both the state and federal level for years and has resulted in historic and unprecedented amounts of government funding becoming available. There are more options for broadband funding today than any time in recent history and fully understanding the programs available is critical to creating any new network. The following financial opportunities were evaluated:

Affordable Connectivity Program (ACP)

Granting Organization(s): US Federal Communications Commission (FCC)

Status: Open

Description:

The Affordable Connectivity Program (ACP) is an FCC benefit program that helps ensure households can afford the broadband needed for work, school, healthcare, and more. The benefit provides a discount of up to \$30 per month toward internet service for eligible households and up to \$75 per month for households on qualifying Tribal lands. Eligible households can also receive a one-time discount of up to \$100 to purchase a laptop, desktop computer, or tablet from participating providers if they contribute more than \$10 and less than \$50 toward the purchase price.

Requirements:

- Eligible households must apply for ACP at www.affordableconnectivity.gov.
- Eligible households must select a service plan from a participating internet service provider.

Advantages:

- Reduces the monthly cost of internet service through participating providers.
- Allows households internet access who might otherwise not be able to afford monthly internet.
- Eligible households can purchase a computer or tablet through their provider at a reduced cost.

Disadvantages:

- Not all internet service providers participate in the program.
- Application process has multiple layers and may be tough to navigate.

Broadband Equity, Access, and Deployment (BEAD) Program

Granting Organization(s): Federal Level - National Telecommunications and Information Administration (NTIA)
State Level – Louisiana Office of Broadband Development and Connectivity – ConnectLA

Status: Open

Description:

The Broadband Equity, Access, and Deployment program (BEAD) will provide federally funded grants for the purpose of broadband planning, deployment, mapping, equity, and adoption. Funding is available to all U.S. States and Territories, as well as Native American Tribal Lands. It will be the responsibility of each government entity to manage and disseminate the grant funding within their jurisdictional boundaries. The primary goal of the grants is to fund opportunities to “bridge the gap” and improve broadband availability in all unserved (less than 25/3 Mbps) areas of the jurisdiction. Underserved areas (less than 100/10 Mbps) will qualify as well if all unserved areas within the jurisdiction have been addressed. In Louisiana, BEAD funds will be administered by the Louisiana Office of Broadband Development and Connectivity.

The NTIA announced that Louisiana was awarded \$2 million to fund items such as Identification of unserved and underserved locations, outreach to diverse stakeholders across all entities and geographies within the state, training for employees of the broadband program, asset mapping across the Eligible Entity to catalog broadband adoption, affordability, equity, access and deployment activities, surveys of unserved, underserved, and underrepresented communities to better understand barriers to adoption, efforts to support local coordination including capacity building at the local and regional levels.

Available Funding:

The BEAD Program provides \$42.45 billion to expand high-speed Internet access by funding planning, infrastructure deployment, and adoption programs. Louisiana anticipates receiving a projected \$1 billion in BEAD funding.

Requirements:

- At the Federal Level only governing entities (States, Districts, Territories, Commonwealths, and Native American administered Tribal Lands) are eligible to request and receive BEAD funding. Each entity will be expected to have a minimum of \$100 million allocated as potential funds.
- States will be responsible for evaluating, applying for, and administering grant funds for “subgrantees” at the local level.
- BEAD does not currently define what may constitute “subgrantees”, but it defines that it may not exclude “a cooperative, nonprofit, public-private partnership, private company, public or private utility, or local government” from eligibility.
- “Unserved” and “Underserved” areas will be defined by the new FCC National Broadband Map released in November 2022.
- The BEAD Grant program establishes a 5-year window for completion. Primary grant holders (i.e. States) must provide NTIA with a 5-year plan that outlines all BEAD related proposals within their jurisdictions, including all awarded subgrantees who will perform the work.
- Final Plan to NTIA is expected within 1 year of funds being awarded. Awarded subgrantees will have 4 years to complete the proposed buildout, with an option for a 1-year extension if appropriate circumstances are met.
- An awarded grant will have the following obligations:
 - Service providers must offer at least 100 Mbps downstream and 20 Mbps upstream and latency less than or equal to 100 milliseconds.

- Service providers must offer at least one “low-cost broadband service option” for eligible subscribers.
- Service providers must deploy and commence providing broadband service to customers within four (4) years of receiving the funds.
- Service providers laying fiber optic cables and/or conduit must include interspersed conduit access points at regular and short intervals.
- Service providers must provide at least 25% of the project’s cost.
- Service providers must comply with a “Buy American” requirement that deployed networks use at least 55% domestic materials.
- Service providers must notify the public of broadband services and highlight benefits of their improvement.
- Service providers who are no longer able to provide the service must be able to sell the network capacity at a reasonable price.
- Service providers must provide access to broadband service to each customer in a reasonable and non-discriminatory manner.
- Eligible Broadband Projects:
 - Deploying and/or upgrading broadband networks for “unserved service projects” and “underserved service projects.”
 - Deploying and/or upgrading broadband network facilities for “eligible community anchor institutions.”
 - Data collection, broadband mapping, and planning. (Only a maximum of 5% of funds can go towards this effort)
 - Installing internet and Wi-Fi infrastructure or providing reduced-cost broadband within a multi-family residential building.
 - Broadband adoption.
 - Training and workforce development.
 - Other uses, including Digital Equity programs by States.

Advantages:

- The BEAD program grants directly address the needs of “unserved” and “underserved” communities, which is the primary target of the improvement efforts that St. Tammany Parish is currently pursuing.
- The BEAD program contains the historically largest amount of a federal funds allocated for the development and enhancement of broadband infrastructure in the United States to date. While highly competitive, it is expected to provide the largest financial opportunity for rural deployment.
- State-level broadband offices better understand the needs of intra-state jurisdictions and make it easier to present a compelling case for a grant.
- Projects awarded BEAD grants will have a 4-year window for completion.

Disadvantages:

- State broadband offices will need to develop local procedures that comply with NTIA guidelines, which are likely to extend further beyond that timeframe.
- Dependence on FCC maps to establish “unserved and underserved” areas, which have historically been inaccurate in the information provided.
- “Buy American” requirements risk supply chain constraints which can delay deployment of the project.
- Grants favor “fiber optic deployment” projects and might disregard fixed wireless broadband deployment projects.
- Any potential funding for fixed wireless is limited to just “licensed spectrum” which has limited availability and is mostly allocated to larger providers.

Connect America Fund (CAF)

Granting Organization(s): US Federal Communications Commission (FCC)

Status: Awarded

Description:

The Connect America Fund (or CAF) is an FCC sponsored program for the purpose of expanding access to voice and broadband services to areas where it is unavailable. The latest version is CAF Phase II, which is a multiyear program (that ran from 2015 to 2020) that offered two (2) stages of funding. The first was funds offered to larger telecom carriers to bring service to unserved and underserved areas. The second were funds offered to other ISPs, including electric co-ops, wireless ISPs, and Satellite providers, for areas where the offers in the first stage were declined. CAF Phase II fund allocation has been completed, and it is unknown if any additional phases will take place. Areas within the Parish that have been awarded CAF funding are displayed in green in Figure 9.1.

Available Funding:

\$1,776,732.60 was awarded to Allen's T.V. Cable Service, Inc in Louisiana

\$2,873,229.70 was awarded to Viasat, Inc. in Louisiana

Requirements:

- For CAF Phase 2 providers must offer:
 - Broadband speeds of at least 10 Mbps down and 1 Mbps up.
 - Network latency cannot exceed 100 milliseconds round-trip.
 - Must offer at least one (1) plan with minimum usage allowance of 150 GBs per month.
 - Pricing offers must be comparable to urban area rates.
- Requirements are expected to be updated for any new phases.
- FCC determines eligible census blocks based on the National Broadband Map.
- Providers have six (6) years from accepting funds to provide service to targeted areas.
- Program is available for Fixed Wireless Broadband projects, which is ideal for rural communities.

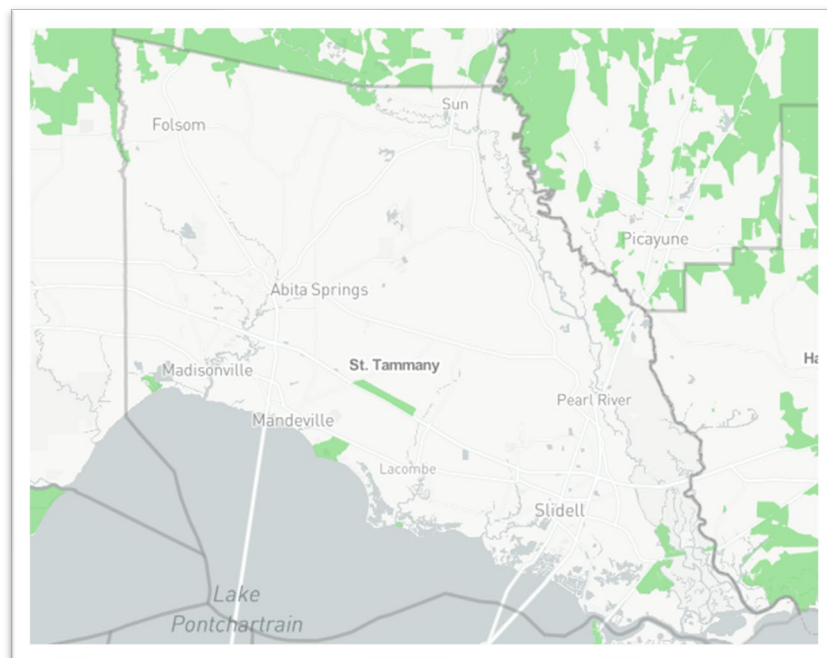


Figure 9.1 Connect American Phase II Awards

ReConnect Loan and Grant Program

Granting Organization(s): U.S. Department of Agriculture (USDA)

Status: Open

Description:

Per Internet for All, the ReConnect Program helps expand high-speed Internet service to rural areas. It provides nearly \$2 billion in loans and grants to help pay capital costs for infrastructure projects. This includes construction and improvements, as well as facilities and equipment.

Available Funding:

ReConnect Program – First Round \$607.88 million

ReConnect Program – Second Round \$808.44 million

ReConnect Program – Third Round \$1.67 billion

ReConnect Program – Fourth Round \$40.22 million to date

Requirements:

- Service providers awarded funds through the ReConnect program must offer a minimum service of 100Mbps symmetrical.
- To be eligible, an area can not be located within a city, town or incorporated area with a population of 20,000 or more.
- An area must lack 100/20Mbps service
- An area must not overlap with areas previously funded by any other Rural Utilities Service telecommunication programs if those areas have sufficient broadband access and must not have any pending applications for USDA Rural Utilities Service programs,
- Eligible Funding Purposes
 - To fund the construction or improvement of facilities required to provide fixed terrestrial broadband service.
 - To fund reasonable pre-application expenses.
 - To fund the acquisition of an existing system that does not currently provide sufficient access to broadband (eligible for 100 percent loan requests only).

Advantages:

- Program helps expand broadband for rural communities.
- Corporations, limited liability companies, cooperatives, and state or local government can apply

Disadvantages:

- A fifth round has not been confirmed or announced.

Granting Unserved Municipalities Broadband Opportunities (GUMBO)

Granting Organization(s): Federal Level – American Rescue Plan/Capital Projects Fund
State Level – Louisiana Office of Broadband Development and Connectivity (ConnectLA)

Status: Awarded

Description:

The GUMBO grant program is funded by the Capital Projects Fund and aims to help applicants facilitate the deployment of broadband service to unserved areas of the state. GUMBO funds broadband infrastructure projects in areas that currently lack access to internet at speeds of 25/3 Mbps and is designed to provide speeds of 100Mbps symmetrical.

Available Funding:

\$6,903,073 was awarded to Charter Communications for St. Tammany Parish

Requirements:

- Projects must meet the following criteria:
 - Requires applicants to provide high-speed Internet at affordable prices for the next five years and provide at least 20% in matching funds, with points given to those that go beyond that threshold.
 - Grants are performance-based. Funds are paid to ISPs as they meet certain thresholds of completion within the project area. This is measured by the number of homes, businesses, etc., that gain access to broadband because of the project.
 - Providers must participate in the Affordable Connectivity Program.
- Charter Communications was awarded \$6,903,073 to build out to 1,356 locations within St. Tammany Parish
- Charter Communications has 24 months or longer to build out to the locations within St. Tammany Parish

RECOMMENDATIONS

Following analysis of options for business models and financing opportunities, and after consulting with parties of interest, a set of key determinations was reached:

- St. Tammany Parish is not actively pursuing operating a broadband network or offering service as a competitor to existing Internet service providers. Their main interest would be collaborating with providers to ensure ubiquitous connectivity for the Parish.
- The Parish would prefer fiber infrastructure be placed underground to prevent outages that may occur during storms.
- The Parish has currently dedicated \$7 million from ARPA funds to be applied to broadband expansion.
- Internet service providers with presence in the Parish have indicated varying degrees of interest in expanding service to the unserved and underserved areas of the Parish.
- Unserved and underserved areas of the region confirm the need for involvement from St. Tammany Parish to solve the lack of adequate broadband options throughout the Parish.
- The projected expense of building a network or extending a current network to all unserved areas of the Parish is too high to be addressed within the Parish's current funds.
- Parish leadership has experienced increased demand from its residents for improved broadband service and has interest in a timely process to promote broadband services to its residents.

With these determinations in mind, it is recommended that St. Tammany Parish opt for the establishment of a public-private partnership model. Should the Parish want to immediately use the \$7 million allotted for broadband infrastructure, the Parish should select the high priority areas and contribute funds to a private ISP to extend their network to those areas. Foresite Group suggests utilizing the fiberhood priority layer as a guide and promoting fiber network expansion above other service types.

In addition to the third-party investment opportunities through a public-private partnership, the Parish and their partner could consider applying for the BEAD grant. To apply for BEAD funding, the Parish would need to partner with an ISP(s) that can deliver on the last mile requirement of the grant application. The Parish and their partner should also consider applying for the ReConnect Program, if an additional application window is announced, in areas where it applies. The proforma included with this report provides a starting point for potential discussions with parties of interest. Alternatively, the funding may be distributed through the State's GUMBO program, so it is important to stay up to date on communication and announcements as more information is released.

Recommendation Alternatives and Additional Considerations

Although the Parish was primarily interested in expanding fiber service through underground fiber infrastructure, the following technologies and solutions could aid in addressing broadband needs until it's viable to extend fiber to all unserved and underserved areas.

The Parish could explore establishing partnerships with fixed wireless providers within the Parish. As the term "fixed" implies, both the transmission point and reception point utilize equipment that is fixed in place and provides a consistent distance for signal delivery. These networks can be useful in remote and rural areas since they forgo the need for installation of physical cable between client and central office, and their fixed nature ensures a consistent level of quality. Fixed wireless networks are limited in service offered by distance and can be impacted by physical barriers to direct line of sight, such as buildings and tree canopy. Many of the Parish areas considered unserved or underserved do have some access to fixed wireless options, but an RFP for establishing partnerships for next steps could also include provisions for increasing capacity of those providers to upgrade their speed offerings.

Another option could be to engage with the electric utility providers in the northern areas of the Parish, such as Washington-St. Tammany Electric Cooperative. The electric cooperative would own the poles needed to extend fiber, enabling an expedited aerial deployment. Even if the electric cooperative was not interested in being an internet service provider or network operator, it could reduce cost and time dramatically if a partnership could be formed with the electric cooperatives to streamline permitting and fiber installation on poles. This type of agreement has been successful as noted in The Delta Electric Power Association case study in the **Business Model and Financing Alternatives** section of this report.

APPENDIX A – GLOSSARY OF TERMS

Asymmetric Digital Subscriber Line (ADSL) - A network that consists of usage of copper cables that are traditionally used to deliver telephone service and can be augmented to offer internet service.

Backbone - Backbone networks move data and internet traffic from Backhaul aggregation locations into neighborhoods and business districts; also known as Middle-mile networks.

Backhaul – Backhaul consists of national and regional networks that aggregate and transport terra-bytes of data through long distance fiber systems. These networks interconnect thousands of data centers, central offices, and internet peering locations around the country.

Bandwidth – the volume of data per unit of time that a transmission medium can handle, the larger the bandwidth, the faster you can move a certain amount of data.

Broadband – a type of high-speed data transmission via copper or fiber optic cable in which a single cable can carry a large amount of data at once. Broadband is usually always on and therefore available for use. Because fiber transmits data much faster than copper, new broadband installations use fiber. However, many US legacy networks include copper cables.

Central Office – a facility where subscriber home and business lines are connected to a local loop.

Coaxial – a network that relies on offering internet service through the same coaxial cables that offer television service in most areas.

Conduit – a tube or trough for protecting wiring.

Copper Cable – data transmission medium made of copper that carries electric signals.

Data Center – a facility where an organization or service provider centralizes their necessary computing resources.

Data transfer – the process of using computing technologies to transmit or transfer electronic or analog data from one computer to another.

Digital Subscriber Line (DSL) – DSL is a wireline transmission technology that transmits electrical data signals over traditional copper telephone lines installed in homes and businesses.

Download – receiving data or a file from the Internet on your computer.

Federal Communications Commission (FCC) – the FCC regulates interstate and international communications by radio, television, wire, satellite, and cable.

Fiber Distribution Hub (FDH) – a physical enclosure that hosts optical splitting equipment and functions as a hub for service distribution.

Fiber Infrastructure – includes fiber optic cable, conduit, vaults, cabinets.

Fiber Optic Cable – high-speed data transmission medium made of glass or plastic filaments that carry light beams.

Fiber to the Home (FTTH) – consists of deployment of entirely fiber-optic cable networks that interconnect customers to a provider’s central office. FTTH networks offer the highest possible speeds and low-latency service via a dedicated connection to a customer’s home.

Fiberhood - a geographic grouping of service points (addresses) and a fiber distribution hub (FDH cabinet).

Fixed Wireless – Fixed wireless technology is a method of delivering broadband speeds without the need for physical wiring into a home or business. Fixed wireless leverages the convenience of cellular signals which require no wiring along with the powerful capacity of fiber or other high capacity backhaul methods.

Frequency – the rate of radio signals per second; typically measured in hertz.

Gbps – Gbps stands for gigabits per second and is a measure of internet bandwidth. 1 Gbps is equal to 1,000 Mbps.

Hybrid Fiber Coax (HFC) - A HFC network utilizes fiber optic cables for the headend and feeder distribution systems and coaxial cables for the customer’s end connection.

High-Level Design (HLD) – Preliminary design of a fiber network created at a market-wide level that identifies potential path and design elements.

Hub - Gathering point of a particular element within a fiber network. Hubs are present in all tiers of a network.

Hut - A small, free-standing structure that allows for the storage of active equipment to serve a fiber network; a group of Fiberhoods.

Internet of Things (IoT) – network of connected devices that communicate and exchange data. This can include anything from vehicles to home appliances and on-street sensors.

Internet Service Provider (ISP) – a company that provides access to the Internet to customers which can be any combination of individuals, companies, government entities and non-profit organizations.

Last-mile – Last-mile networks are smaller telecommunication cables located inside neighborhoods or directly outside businesses. Last-mile network includes the service drop cable that enters your home or business.

Mbps – Mbps stands for megabits per second and is a measure of internet bandwidth.

Middle-mile – Middle-mile networks move data and internet traffic from Backhaul aggregation locations into neighborhoods and business districts; also know as backbone networks.

National Telecommunications and Information Administration (NTIA) - located within the Department of Commerce, is the Executive Branch agency that is principally responsible by law for advising the President on telecommunications and information policy issues.

Network – a group of two or more computers linked together with cabling and/or radio waves.

The Office of Broadband Development and Connectivity (ConnectLA) – the broadband resource in Louisiana and is housed in the Louisiana Division of Administration. ConnectLA has a goal of eliminating the digital divide in Louisiana by 2029.

Point of Presence – the location where two or more different communication devices connect to each other; an access point, location, or facility that connects to and helps other devices establish a connection with the Internet.

Proforma - utilizes data and assumptions to show the cost breakdown of a future project.

Request for Proposal (RFP) - a document that communicates requirements and solicits proposals for a desired solution.

Return on Investment (ROI) – a measure used to evaluate the profitability of an investment, the ratio of net profit over the total cost of an investment.

Satellite Internet – Satellite Internet service is a wireless technology that relies on small dish-style antennas to transmit and receive data signals from terrestrial locations to satellites orbiting the earth. Providers use licensed Radio Frequency (RF) spectrum to transmit signals.

Scalability – the capability of a communications network to handle a growing amount of data or its potential to be enlarged to accommodate that growth.

Small Cell – infrastructure that transmits data to and from a wireless device and consists of small radio equipment and antennas that can be placed on structures such as streetlights, sides of buildings or poles.

Spectrum – the radio frequencies allocated to the mobile industry and other sectors for communication over airwaves.

Symmetrical – a symmetric internet connection means the download and upload rates are the same in both directions.

Teleconference – a conference with participants in different locations linked by telecommunications devices.

Telehealth – the provision of healthcare remotely by means of telecommunications technology.

Transmission – the process of sending data over a communication medium to one or more computing, network, communication, or electronic devices.

Upload – sending data or a file from your computer to the Internet.

Video streaming service – an on demand online entertainment source for TV shows, movies and other streaming media.

Wide Area Network (WAN) – a group of two or more computers that extend over a large geographical distance linked together by copper or fiber optic cabling and/or radio waves.

Wi-Fi – wireless technology used to connect computers, tablets, smartphones and other devices to the internet.

Wireless Internet Service Provider (WISP) - a company that provides access to the Internet to customers which can be any combination of individuals, companies, government entities and non-profit organizations by means of wireless networking.

APPENDIX B – DIG ONCE AND OPEN TRENCH POLICY EXAMPLES

Salinas, CA Dig Once Policy

RESOLUTION NO. _____ (N.C.S.)

A RESOLUTION ESTABLISHING A POLICY REDUCING UNDERGROUND EXCAVATION FOR COMMUNICATIONS INFRASTRUCTURE WITHIN THE CITY RIGHT OF WAY

WHEREAS, the city of Salinas desires to comply with all mandates regarding public utilities as imposed upon it by state and federal law; and

WHEREAS, it is determined that there is a need for wireless telecommunication facilities in the city of Salinas, and the city of Salinas chooses to use its police power and land use planning authority to regulate such facilities; and

WHEREAS, the City of Salinas has an interest in preserving its streets and roadways for their intended purpose, while minimizing interruptions to the flow of traffic; and

WHEREAS, the City of Salinas currently regulates the installation of wireless telecommunication facilities proposed above ground to be placed in the public right of way in accordance with Resolution No 20810 (N.C.S.); and

WHEREAS, the proposed requirements for excavation of permits and entitlements relative to such projects respond to recent changes in laws concerning regulation of wireless telecommunication facilities and provide mechanisms for the City to maintain an aesthetically pleasing community environment, protect the safety and welfare of Salinas residents, minimize degradation of the residential character of neighborhoods, streets, and roadways, and require the best available design to eliminate visual impacts while ensure that adequate public services and facilities are constructed to accommodate the needs of Salinas residents; and

WHEREAS, pursuant to the California Environmental Quality Act (“CEQA”), the proposed requirements for wireless telecommunication facilities in the public right of way are exempt per section 15061(b)(3), as there is no potential to cause a significant effect on the environment; and

NOW, THEREFORE BE IT RESOLVED by the Salinas City Council that the following policy requirements for all underground communications infrastructure within the public right of way are adopted with the purpose of preserving the health, safety, and welfare of the City’s residents and City property, as follows:

1. The purpose of this Resolution shall be to encourage the growth of underground communications infrastructure facilities while preserving the integrity of the City of Salinas’ (“City”) streets.
2. The City has an obligation to comply with all applicable state and federal authority pertaining to utilities and telecommunications, and intends for this Resolution to be interpreted so as to comply with all such authority.

3. The City has an interest in promoting increased connectivity and emerging technology to its City residents and businesses, as well as to businesses seeking growth opportunities within the City limits.
4. In recognition of the need to provide emerging technology to the historically underserved areas of the City, and in further recognition of the need to minimize public inconvenience and traffic, and to preserve the integrity and lifespan of City streets, all construction, reconstruction, repaving of a City right of way shall include a provision for the installation of a public utility infrastructure, such as conduit, tube, duct, or other device designed for enclosing telecommunications wires, fibers, or cables, wherever practical and feasible. Such infrastructure shall be installed in accordance with City regulations, requirements and specifications, including but not limited to the Salinas Municipal Code, as directed by the Director of Public Works or his/her designee. Such excavation shall not take place more than once on a particular City street within a 5-year period.
5. To the extent feasible, the Director of Public Works or his/her designee shall notify (or require an applicant for such work to notify) all known telecommunications service providers of an impending excavation and afford all such service providers the opportunity to utilize the excavation to install, upgrade, co-locate, repair or improve their telecommunications facilities during such an excavation project. Any such notice shall be provided at least 30 days prior to the commencement of excavation. All service providers utilizing the same excavation shall be responsible for their proportionate share of the excavation costs, including but not limited to the costs of permitting. Such excavation shall not take place more than once on a particular City street within a 5-year period.
6. A permit for excavation shall be required and will be charged based on staff time spent at the rate in effect as established by the duly adopted fee schedule for engineering plan review.
7. The Director of Public Works or his/her designee may exempt projects from these requirements where it is determined that it is not practical or feasible. Requests for an exemption must be made in writing with an explanation as to why the project is not feasible. Cost shall not be the determining factor whether a project is feasible or practical. A determination from the Director of Public Works is the final administrative determination of the matter and is not appealable.
8. The Director of Public Works or his/her designee shall have primary responsibility for enforcement of this policy. Pursuant to the Salinas Municipal Code, excavations not in accordance with this policy shall be considered noncompliant encroachments which have been declared a public nuisance and which are subject to abatement, removal, and enjoinder by the City of Salinas, as well as by any other remedies provided by law.

PASSED AND APPROVED this 15th day of November 2016 by the following vote:

AYES:

NOES:

ABSENT:

ABSTAIN:

Joe Gunter, Mayor

ATTEST:

Patricia M. Barajas, City Clerk

Dig Once Policy For Public Works Projects in Gonzales, CA

Attachment A

DATE: February 1, 2016

FROM: Gonzales City Council

SUBJECT: "Dig Once" Policy for Public Works Projects in Gonzales

1. Unless waived by the Public Works Director on the basis of undue burden, or an unfavorable cost-benefit analysis, or the consideration of other relevant factors, Gonzales will install or have installed communications conduit whenever the City undertakes or authorizes the following types of projects:
 - a. New street, road, sidewalk, bike path, or other transportation infrastructure construction.
 - b. Maintenance, repaving or other significant work on the above infrastructure.
 - c. Excavations for the purpose of installing utilities, including but not limited to communications, electrical, gas, water, waste water, storm drainage.
 - d. Other excavations, or work on public property on in the public right of way that provide a similar opportunity to install conduit for future use at a low additional cost.
2. The Public Works Director will work with other local agencies to establish common standards for the type, size, and number of conduits and associated fixtures to be installed. Until these standards are established, a single conduit will be installed with the following specifications, unless the Public Works Director or Project Manager determines otherwise:
 - a. A minimum inside diameter of 2-inches.
 - b. Made of PVC Schedule 40 material (color orange).
 - c. Laid to a depth of not less than 18 inches below grade in concrete sidewalk areas, and not less than 30 inches below finished grade in all other areas when feasible, or the maximum feasible depth otherwise.
 - d. When feasible, installed so fiber optic cable maintains a minimum bend ratio of 20-times the cable diameter.
 - e. When practicable, furnish with pull tape and an external locate wire no more than 3-inches above the conduit.
3. When determining if a particular specification is feasible or practicable, the Public Works Director or Project Manager will take into account the added cost, the length of the conduit installed (and therefore its potential future value), the impact on the overall project, and other relevant factors.
4. Because communications facilities are needed to monitor, manage, and provide security for Public Works specifically, and to support Public Safety and Economic Development in general, the cost of purchasing, installing, and documenting the conduit may be included in the cost of the overall project. However, other sources of funds may also be used if available.
5. Conduit installed by or on behalf of the City, will be owned by the City.

A record of all City-owned conduits will be maintained, and transferred into a geographic information system (GIS) whenever feasible.

ORDINANCE NO.
ORDINANCE ADDING CHAPTER 12.25 TO SANTA CRUZ COUNTY CODE
RELATING TO TELECOMMUNICATIONS INFRASTRUCTURE IMPROVEMENTS

The Board of Supervisors of the County of Santa Cruz ordains as follows:

SECTION 1

Chapter 12.25 of the Santa Cruz County Code is enacted to read as follows:

TELECOMMUNICATIONS INFRASTRUCTURE IMPROVEMENT ORDINANCE

Sections:

12.25.010 Purpose and Findings.

12.25.015 Definitions.

12.25.020 Telecommunications Infrastructure Improvement.

12.25.025 Implementation.

12.25.030 Exemptions.

12.25.035 Enforcement.

12.25.040 Violations.

12.25.045 Severability.

12.25.050 Effective Date.

12.25.055 No Conflict with Federal or State Law.

12.25.060 Preemption.

12.25.010 Findings and intent.

- A. It is the intent of the County of Santa Cruz, in enacting Chapter 12.25, to streamline and simplify the process of installing and upgrading telecommunications equipment throughout the County, and to encourage improvement and modernization of telecommunications infrastructure.
 - B. Access to modern telecommunications infrastructure is vital for communication, education and economic development.
 - C. It is the desire of the County to foster a fair and level playing field for all market competitors that does not disadvantage or advantage one service provider or technology over another.
 - D. The County seeks to promote widespread access to the most technologically advanced telecommunications services for all County residents and businesses in a nondiscriminatory manner regardless of socioeconomic status.
 - E. It is the responsibility of the County to protect and control access to public rights-of-way.
 - F. The County has a duty to ensure that all service providers utilizing County property, facilities or rights-of-way comply with all applicable state and local health, safety and other laws.
 - G. It is consistent with the County's goals and values to encourage investment in telecommunications infrastructure to help close the digital divide.
 - H. It is necessary to update County policies and practices to recognize the authority of the California Public Utilities Commission as established in state and federal statutes.
- B. It is the desire of the County to assess fees sufficient to recover the actual costs of providing services but not to discourage improvement of necessary infrastructure.

12.25.015 Definitions.

- A. For the purposes of this Chapter, the following definitions apply:
1. "Telecommunications" refers to data, voice, video or other information provided by wire, fiber optic cable or other technology.
 2. "Facilities" and "Infrastructure" refers to wires, cables, conduit, switches, transmission equipment or other equipment for use in transmitting or processing telecommunications services or for providing support or connection to such equipment.
 3. "Rights-of-way" refers to the area upon or adjacent to any County-owned road, highway or rail line or along or across any of the waters or lands owned or controlled by the County.
 4. "Service providers" refers to any person, company, corporation or other entity providing data, voice, cable, video or other information services by wire, fiber optic cable or other technology.
 5. "Excavation" refers to any process which removes material from the ground through digging, drilling, boring or other activity for the purpose of installing utilities, infrastructure or other structures or equipment.
 6. "Conduit" refers to a tube, duct or other device or structure designed for enclosing telecommunication wires or cables.
 7. "Reconstruction" refers to any project which repairs **or** replaces fifty percent or more of an existing road, highway or rail line.

12.25.020 Telecommunications Infrastructure Improvement

In recognition of the need to provide local residents and businesses within the community with the infrastructure required to meet their telecommunications needs, all construction, reconstruction or repaving of a County right-of-way will include provisions for the installation of telecommunications cable, conduit and other related equipment wherever practical and feasible. Where appropriate, telecommunications infrastructure shall be installed in or adjacent to County rights-of-way in conformance with current County standards. County staff will work with contractors to identify most cost-effective approach consistent with County requirements. If a project includes excavation in or adjacent to a County right-of-way, installation of or upgrades to telecommunications cable, conduit or other infrastructure will be included as needed. **All** installations shall conform to the size, shape, location and other specifications as determined by the Director of Public Works.

12.25.025 Implementation.

No less than 60 days before this ordinance takes effect, the County of Santa Cruz shall email, fax, mail or deliver a copy of it to all telecommunications service providers and other affected entities doing business within the unincorporated County of Santa Cruz,

12.25.030 Exemptions.

- A. The Director of Public Works, or the director's designee, may exempt projects from the requirements of this chapter where compliance is found to be not practical or feasible. Requests for an exemption shall be in writing, and the Director's or the director's designee's decision shall be final.
- B. An exemption application shall include all information necessary for the Director of Public Works or the director's designee to make a decision, including but not limited to documentation showing factual support for the requested exemption.
- C. The Director of Public Works or director's designee may approve the exemption application in whole or in part, with or without conditions.

12.25.035 Enforcement.

Enforcement of this ordinance shall be as follows:

- A. The Director of Public Works, or designee, shall have primary responsibility for enforcement of this ordinance and shall have authority to issue citations for violation of this chapter. The Director, or designee, is authorized to establish regulations or administrative procedures to ensure compliance with this chapter.
- B. A person or entity violating or failing to comply with any of the requirements of this chapter shall be guilty of an infraction.
- C. The County of Santa Cruz may seek legal, injunctive, or any other relief to enforce the provisions of this chapter and any regulation or administrative procedure authorized by it.
- D. The remedies and penalties provided in this chapter are cumulative and not exclusive of one another.
- E. The Director of Public Works or designee may inspect the premises of any construction, reconstruction, repaving or excavation project to verify compliance with this ordinance.

12.25.040 Violations.

Violations of this ordinance shall be enforced as follows:

Violation of this chapter is hereby declared to be a public nuisance. Any violation described in the preceding paragraph shall be subject to abatement by the County of Santa Cruz, as well as any other remedies that may be permitted by law for public nuisances, and may be enforced by injunction, upon a showing of violation.

12.25.045 Severability.

If any word, phrase, sentence, part, section, subsection, or other portion of this chapter, or any application thereof to any person or circumstance is declared void, unconstitutional, or invalid for any reason, then such word, phrase, sentence, part, section, subsection, or other portion, or the proscribed application thereof, shall be severable, and the remaining provisions of this chapter, and all applications thereof, not having been declared void, unconstitutional or invalid, shall remain in full force and effect. The County of Santa Cruz hereby declares that It would have passed this title, and each section, subsection, sentence, clause, and phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases had been declared invalid or unconstitutional.

12.25.050 Effective Date.

This ordinance shall become effective three (3) months after the date of final passage by the County of Santa Cruz Board of Supervisors.

12.25.055 No Conflict with Federal or State Law.

Nothing in this ordinance shall be interpreted or applied so as to create any requirement, power, or duty in conflict with any Federal or State law.

12.25.060 Preemption.

The provisions of this chapter shall be null and void if State or Federal legislation, or administrative regulation, takes effect with the same or substantially similar provisions as contained in this chapter. The Board of Supervisors shall determine whether or not identical or substantially similar statewide legislation has been enacted or regulations issued.

SECTION II

This ordinance shall take effect and be in force six months from the date of adoption.

Dig Once Ordinance Town of Breckenridge

I. PURPOSE AND OBJECTIVES

- A. Purpose: to provide principles and procedures for the coordination of construction Excavation within any public Rights of Way, and to protect the integrity of the Rights of Way and road system.
- B. Objectives. Public and private uses of Rights of Way for location of Utilities employed in the provision of public services should, in the interests of the general welfare, be accommodated; however, the Town must insure that the primary purpose of the Rights of Way, namely the safe and efficient passage of pedestrian and vehicular traffic, is maintained to the greatest extent possible. In addition, the value of other public and private installations, Facilities and properties should be protected, competing uses must be reconciled, and the public safety preserved. The use of the Rights of Way corridors for location of Facilities is secondary to these public objectives. This ordinance is intended to assist in striking a balance between the public need for efficient, safe transportation routes and the use of Rights of Way for location of Facilities by public and private entities. It thus has several objectives:
 1. To ensure that public health, safety, and welfare is maintained and that public inconvenience is minimized.
 2. To facilitate work within the Rights of Way through the standardization of regulations.
 3. To conserve and fairly apportion the limited physical capacity of the public Rights of Way held in public trust by the Town of Breckenridge.
 4. To promote cooperation among the Applicants and Permittees (as defined herein) and the Town in the occupation of the public Rights of Way, and work therein, in order to (i) eliminate duplication that is wasteful, unnecessary or unsightly, (ii) lower the Permittee's and the Town's costs of providing services to the public, and (iii) minimize Rights of Way Excavations.

II. DEFINITIONS

For this Chapter the following words shall have the following meanings:

- A. "Applicant" means an owner or duly authorized agent of such owner, who has applied for a Permit to Excavate in the Rights of Way.
- B. "Town" means town of Breckenridge, Colorado.
- C. "Conduit" means a single enclosed raceway for cables, fiber optics or other wires, or a pipe or canal used to convey fluids or gases.

"Developer" means the person, partnership, corporation, or other legal entity who is improving property within Town and who is legally responsible to the Town for the construction of improvements within a subdivision or as a condition of a building permit or other land use or development authorization.

- A. "Town Engineer" means the Town Engineer of the Town or his/her authorized representative.
- B. "Emergency" means any event which may threaten public health or safety, or that results in an interruption in the provision of services, including, but not limited to, damaged or leaking water

or gas conduit systems, damaged, plugged, or leaking sewer or storm drain conduit systems, damaged electrical and communications facilities, and advanced notice of needed repairs is impracticable under the circumstances.

- C. "Excavate" or "Excavation" means any Work in the surface or subsurface of the Rights of Way, including, but not limited to opening the Rights of Way; installing, servicing, repairing, or modifying any Facility(ies) in or under the surface or subsurface of the Rights of Way, and restoring the surface and subsurface of the Rights of Way.
- D. "Facilities" means, including, without limitation, any pipes, conduits, wires, cables, amplifiers, transformers, fiber optic lines, antennae, poles, ducts, fixtures and appurtenances and other like equipment used in transmitting, receiving, distributing, offering, and providing broadband, utility and other services.
- E. "Landscaping" means materials, including without limitation, grass, ground cover, shrubs, vines, hedges, or trees and nonliving natural materials commonly used in landscape development, as well as attendant irrigation systems.
- F. "Major Work" means any reasonably foreseeable Excavation that will affect the Rights of Way for more than five (5) consecutive calendar days.
- G. "Owner" means any Person, including the Town, who owns any Facilities that are or are proposed to be installed or maintained in the Rights of Way.
- H. "Permit" means any authorization for use of the Rights of Way granted in accordance with the terms of this ordinance, and other applicable laws and policies of the Town.
- I. "Permittee" means the holder of a valid Permit issued pursuant to this Chapter and other applicable provisions of applicable law for Excavation in the Rights of Way.
- J. "Person" means any person, firm, partnership, special, metropolitan, or general district, association, corporation, company, or organization of any kind.
- K. "Rights of Way" means any public street, road, way, place, alley, sidewalk or easement, that is owned, held or otherwise dedicated to the Town for public use. "Work" means any labor performed on, or any use or storage of equipment or materials, including but not limited to, construction of streets and all related appurtenances, fixtures, improvements, sidewalks, driveway openings, street lights, and traffic signal devices. It shall also mean construction, maintenance, and repair of all underground structures such as pipes, conduit, ducts, tunnels, manholes, vaults, buried cable, wire, or any other similar Facilities located below surface, and installation of overhead poles used for any purpose.
- L. "Work" means any labor performed on, or any use or storage of equipment or materials, including but not limited to, construction of streets and all related appurtenances, fixtures, improvements, sidewalks, driveway openings, street lights, and traffic signal devices. It shall also mean construction, maintenance, and repair of all underground structures such as pipes, conduit, ducts, tunnels, manholes, vaults, buried cable, wire, or any other similar Facilities located below surface, and installation of overhead poles used for any purpose.
- M. "Fee per Access Line" means the Right-of-Way compensation methodology that is replacing the percent of gross revenue formula historically used in franchise/rental agreements for local exchange Internet Service Providers where a fee is assessed per access line.
- N. "Flat Annual Fee" means Right-of-Way compensation to ensure a known revenue amount annually. A yearly escalator or inflation factor to adjust the annual fee for increases in service provided or leased by the Town

- O. “Franchise Agreement” means an agreement executed to manage the occupant of public right-of-way. This ordinance included the rules, rights, and fees associated with using public property for private purpose and are applicable for those right-of-way occupants that provide service(s) to the Town’s jurisdictions.
- P. “In-kind Service” means services received by the Town that can be negotiated in addition to or in lieu of cash to be used over a period, or infrastructure to be specified and installed.
 - 1. *Types of In-Kind Services*
 - 1. “Wireline” means Fiber optic conduit, inner ducts, dark fiber, equipment to “light” the fiber, equipment maintenance and/or upgrading; operations of communications equipment, future upgrades, cost-free or reduced fee communications services etc.
 - 2. “Wireless” means space on private towers for equipment, installation of public sector antennas, construction of equipment sheds and installation of support equipment, back-up service or redundancy, wireless call box installation, cost-free or reduced fee communications services on private system etc.
- Q. “Linear Foot Fee” means a compensation methodology that is utilized when rights-of-way occupants require space along a specific route or for a limited purposed with the Town’s rights-of-way.

III. TOWN OF BRECKENRIDGE PROJECTS

- A. Unless waived by the Town Engineer based on undue burden, or an unfavorable cost benefit analysis, or the consideration of other relevant factors, The Town of Breckenridge will install or have installed communications conduit whenever the town undertakes or authorizes the following types of projects:
 - 1. New street, road, sidewalk, bike path, or other transportation infrastructure construction.
 - 2. Major maintenance, repaving, or other significant work on the above infrastructure.
 - 3. Excavations for repairing or installing utilities, including but not limited to communications, electrical, gas, water, storm drainage.
 - 4. Other excavations, or work on public property on in the public right of way that provide a similar opportunity to install conduit for future use at a low additional cost.
 - 5. When determining if a specification is feasible or practicable, the Town Engineer will take into account the added cost, the length of the conduit installed (and therefore its potential future value), the impact on the overall project, and other relevant factors.
- B. Because communications facilities are needed to monitor, manage, and provide security for Town to support Public Safety and Economic Development in general, the cost of purchasing, installing, and documenting the conduit may be included in the cost of the overall project. However, other sources of funds may also be used if available.
- C. Conduit installed by or on behalf of the Town, will be owned by the Town.

A record of all Town-owned conduits will be maintained the Public Works Department, and transferred into the Town’s geographic information system (GIS).

IV. SPECIFICATIONS

- A. The Town will work with local agencies to establish common standards for the type, size, and number of conduits and associated fixtures to be installed. Until these standards are established, a single conduit will be installed. The “Dig Once Conduit specification” can be obtained from the Town Engineer.

1.

V. POLICE POWERS

- A. Permittee's rights hereunder are subject to the police powers of the Town, which include the power to adopt and enforce ordinances, including amendments to this ordinance, and regulations necessary to the safety, health, and welfare of the public. A Permittee shall comply with all applicable ordinances and regulations enacted, or hereafter enacted, by the Town or any other legally constituted governmental unit having lawful jurisdiction over the subject matter hereof. The Town reserves the right to exercise its police powers, notwithstanding anything in this ordinance or any Permit to the contrary. Any conflict between the provisions of the ordinance or a Permit and any other present or future lawful exercise of the Town's police powers shall be resolved in favor of the latter.
-

VI. JOINT PLANNING AND CONSTRUCTION; COORDINATION OF PLANNED EXCAVATIONS

- A. Excavations in the Town's Rights of Way disrupt and interfere with the public use of those Rights of Ways and can damage the pavement and Landscaping. The purpose of this section is to reduce this disruption, interference, and damage by promoting better coordination among Applicants and Permittees making excavations in Town's Rights of Way and between these Persons and the Town. Better coordination will assist in minimizing the number of Excavations being made wherever feasible, and will ensure the Excavations in Town's Rights of Way are, to the maximum extent possible, performed before, rather than after, the resurfacing of the Rights of Way by the Town.
- B. Any Permittee owning, operating, or installing facilities in Town Rights of Way, providing water, sewer, gas, electric, broadband, communication, video or other utility or utility-like services, coordinate with the Town Engineer. If the town has an interest in install conduit in the same location the permittee shall charge the town the direct cost associated with install conduit as described in section IV. Failure to coordinate with the Town Engineer will compromise the Permittee's ability to work in the right of way.
- C. The Town Engineer shall review the major excavation plan and identify conflicts and opportunities for coordination of Excavations. The Town Engineer shall notify affected Owners and Permittees of such conflicts and opportunities to the extent necessary to maximize coordination of Excavation. Each Applicant for a Permit shall coordinate, to the extent practicable, with each potentially affected Owner and Permittee to minimize disruption in the Rights of Way.
- D. The Town may disclose information contained in a Permittee's excavation plan to any public or private entity planning on conducting Excavation activities in the Rights of Way only on a need-to-know basis in order to facilitate coordination among excavators and to avoid unnecessary Excavation in the Rights of Way. To the maximum extent permissible under the Colorado Open Records Act, as amended, the Town shall not otherwise disclose to the public any information contained in a excavation plan submitted by a Permittee that is proprietary, trade secret or is otherwise protected from disclosure; provided, however that the Town shall have no duty to decline to disclose any information that the Permittee has not identified on its face as proprietary, trade secret or otherwise protected from disclosure. The Town shall notify a Permittee of any request for inspection of public records that calls for disclosure of any excavation plan on which any information has been identified as proprietary, trade secret or otherwise protected from disclosure. The Town shall consult with its legal counsel regarding any such request and shall inform the affected Permittee either that the Town will refuse to

disclose the protected information or, if there is no proper basis for such refusal, that the Town intends to disclose the requested information unless ordered otherwise by a court.

- E. In performing location of Facilities in the Rights of Way in preparation for construction under a Permit, Permittee shall compile all information obtained regarding its or any other Facilities in the Rights of Way related to a Permit, and shall make that information available to the Town in a written and verified format acceptable to the Town Engineer. If the Permittee fails to provide the locate information requested by the Town, the Town may obtain this information and charge the Permittee the actual costs for obtaining the information.

VII. **JOINT EXCAVATION**

- A. Public Entity and Special Districts Excavators. Whenever two or more public entity excavators propose Major Work in the same block within a year, such Work shall be performed by one public entity excavator when practical. The participants to the excavation shall pay their pro rata share of the Work, or as otherwise agreed to by the affected public entities. For purposes of this subsection, the public entity excavators shall be treated as a single Permit Applicant and shall submit one application.
- B. Private Entity Excavators. Whenever two or more private entity excavators propose Major Work in the same block, such Work shall be performed by one private entity excavator. For purposes of this subsection, the private entity excavators shall be treated as a single Permit applicant and shall submit one application. If the town has an interest in install conduit in the same location the permittee shall charge the town the direct cost associated with install conduit as described in section IV.
- C. Public Entity Excavator and Private Entity Excavator. Whenever a public entity excavator(s) and a private entity excavator(s) propose Major Work in the same block the Department shall condition Permits for such Work in a manner that maximizes coordination and minimizes the total period of construction. If the town has an interest in install conduit in the same location the permittee shall charge the town the direct cost associated with install conduit as described in section IV.

VIII. **CONSTRUCTION OF NEW STREETS**

- A. Intent. The intent of this section is to provide for the construction of infrastructure sufficient to allow broadband communications entities desiring to deploy Facilities in the future to do so by pulling the same through the conduit and appurtenances installed pursuant to this section and without Excavating within the Rights of Way. This section is not intended to require Owners of broadband Facilities or other conduit to install additional ducts or conduit in existing Rights of Way; rather, it is intended to require those constructing public streets, including the Town and Developers, to provide and install such conduit and appurtenances as may be necessary to accommodate future broadband needs within the Rights of Way without further Excavation.
- B. Requirements—Adoption of Standards. Whenever any new public street is constructed, whether by the Town as a public works project or by a Developer or other private party in conjunction with development, the following shall be required:
 - 1. In all new local streets serving or abutting residential development a minimum of two 2" conduit shall be installed by the party constructing the street as described in section IV.
 - 2. In all new collector or arterial streets serving or abutting residential development, and in all new streets serving or abutting nonresidential development, a minimum of four 2" shall be

installed by the party constructing the street; provided however that at the discretion of the Town Engineer, the number and size of the conduit and spacing of pull box may be modified to address the reasonably known plans and/or demand for broadband capacity in these locations.

3. In addition to installing conduit, the party constructing the street will be required to install such vaults and other appurtenances as may be necessary to accommodate installation and connection of broadband Facilities within the conduit.
 4. All construction and installation shall be accomplished according to construction standards adopted by the Town. The construction standards shall be adopted with due consideration given to existing and anticipated technologies and consistent with industry standards.
 5. All Facilities installed by Developers or other private parties pursuant to this section shall be conveyed and dedicated to the Town with the dedication and conveyance of the public street and/or Rights of Way.
 6. All installation costs shall be the responsibility of the party constructing the public street.
- C. Fees. The Town reserve the right to charge reasonable fees for the use of conduit installed pursuant to this section, to the extent consistent with and as limited by federal and state laws. Any such fees shall be established by resolution or ordinance.

This Ordinance shall take effect immediately upon [insert language appropriate in accordance with City policy]

INTRODUCED, READ, ADOPTED ON FIRST READING AND ORDERED PUBLISHED, as provided by law, by the Town Council of the Town of Breckenridge at its regular meeting held on the day of , 201 .

Name and Title

ATTEST:

Town Clerk

READ, ADOPTED ON SECOND READING, AND APPROVED this day of , 201

APPENDIX C – ST. TAMMANY PARISH MAKE READY SUMMARY

Make Ready Engineering

Make Ready Engineering (MRE) is the process of evaluating all poles along a pole line to determine what rearrangements are needed before new attachments can be added to each pole. MRE will be required for all pole lines identified for potential placement of aerial facilities and will include identifying ownership status of poles, assessment of viability of poles including cost/benefit analysis, field data collection, and engineering to determine proposed attachment heights. MRE also involves the completion and submission of all required application forms according to each pole owner's joint use request process.

Once a pole line has been identified for potential aerial placement, an assessment will be needed to verify the conditions make this preferable to underground placement. Issues that would make aerial placement cost prohibitive may include:

- Multiple poles identified as needing replacement
- Extensive need for Electric Make Ready/adjustment of power facilities
- Additional pole placement needed along route

Conditions that would require long lead permits like multiple highway, water, or railroad crossings should also be considered as well as application process times of poles owned by communication companies since they tend to not be as expedient as power companies. This would negate the advantage of being faster to deploy than an aerial design typically has over an underground one.

Local environment

During analysis, ownership status of poles should be verified so all joint use requests are submitted to the proper permitting entity. Owners can be identified via official company maps/records or through field inspection for ownership tags. Joint use agreements must be in place between the pole owner and the applicant before attachment permits can be submitted. Additionally, letters of authorization may be required if the authority applying for attachments utilizes subcontractors during the MRE process.

In St. Tammany Parish, three pole owners have been identified:

- Washington-St. Tammany Electric Cooperative, Inc (WSTE)
- Cleco Power
- AT&T

WSTE owns most utility poles in the Parish, especially in the area covered by Foresite Group's proposed design. Their poles are in relatively good condition and only contain one or two telecommunications attachments with ample space between the telecommunications and power space. This is probably a byproduct of Charter Communications/Spectrum and AT&T's dominant market share in the Parish. WSTE poles are readily available throughout the Parish especially along the highway system. In neighborhood streets, WSTE poles are prevalent but typically smaller, and AT&T opts for underground placement even in areas near wetlands. Cleco poles generally cover the more densely populated areas of Covington and Slidell and contain more attachments, but those areas already have available broadband service and have been excluded by the proposed design. These conditions would strongly suggest aerial placement as the preferred construction method for a new fiber network in the Parish. It would be more cost effective and faster to deploy especially if a high-quality partnership can be established with WSTE's Joint Use department.

Additional Consideration

Although utility poles in St Tammany Parish are in relatively good condition, major recent weather events may be the reason with a large portion of poles having been installed recently. SE Louisiana has been directly hit by four major (category 2 or greater) hurricanes in the last two decades. In 2021 Hurricane Ida made landfall as a Category 4 storm and was still recording 120 winds when it reached St. Tammany Parish. Cleco and WSTE reported approximately half of their customers within the Parish were without power. Many utility poles were damaged and had to be replaced in the aftermath of storms of this magnitude. Fortifying against these weather events by placing the fiber network underground would offset the added cost and time. AT&T already seems to have taken this path so it should be a strong consideration for the St Tammany Parish broadband network as well. Even if with the benefits of aerial placement enhanced by a great partnership with the pole owner, the security that comes with an underground infrastructure will have to be a major factor in the network's design.

APPENDIX D – ST. TAMMANY PARRISH PERMIT JURISDICTION SUMMARY

The following is a summary of the Permitting Jurisdictions that a proposed broadband network buildout would be expected to have to deal with within the footprint of St. Tammany Parish. Broadband deployment is mainly conducted in the public Right-of-Way and permit application and review typically falls under the jurisdiction of government entities at the local, state, and federal levels. This review examines two categories of permit review: Standard Right-of-Way (ROW) Permit review and Long Lead Permit review.

Standard Right-of-Way (ROW) Permits

Standard Right-of-Way Permits are typically handled by local city and county governments who own and maintain public ROWs within a jurisdiction. Private and public utilities are typically required to obtain construction permits from these entities for any project that involves construction in the ROW. These entities tend to deal with a large amount of these applications, they often have departments set up that help to optimize and expedite the review process. As a result, these types of permits are “standard” with shorter review windows and more limited complications. Projects within St. Tammany Parish will be expected to deal with the following jurisdictions:

City of Covington

Right-of-Way construction permits in the city of Covington are managed by the city’s Department of Public Works (DPW). All construction within public property in the public ROW requires a permit be filed and approved by the DPW before and during any construction project. Requirements for city of Covington’s ROW Permit are relatively standard and should not provide any major complications to any telecom construction effort.

Town of Abita Springs

The town of Abita Springs does not currently have any officially defined permitting process as part of their code of ordinances. It is not clear if they have their own process or if they defer to the parish.

Village of Sun

The village of Sun does not currently have any officially defined permitting process. It is not clear if they have their own process or if they defer to the parish.

Town of Pearl River

The town of Pearl River does not currently have any officially defined permitting process as part of their code of ordinances. It is not clear if they have their own process or if they defer to the parish.

Village of Folsom

The village of Folsom requires that all construction within the public Right-of-Way that requires excavation must have a permit from either the street commissioner and/or the mayor. The village does not have a clearly outlined process for this permit application effort, but construction requirements are relatively standard and should not provide any major complications to any telecom construction effort.

City of Slidell

The city of Slidell requires that all construction within the public Right-of-Way that requires excavation must have a permit from the city building official. The city does not have a clearly outlined process for this permit application and would most likely be handled by the same department that handles building permits. Construction requirements are relatively standard and should not provide any major complications to any telecom construction effort.

St. Tammany Parish

St. Tammany parish has jurisdiction over any public Right-of-Way that is either outside of incorporated city jurisdiction or a state route managed by the Louisiana Dept. of Transportation and Development. St. Tammany parish does not have a clearly established process for right-of-way or utility construction permits but reserves the rights to do so. Construction requirements are relatively standard and should not provide any major complications to any telecom construction effort.

Long-Lead Permits

Long-lead permits refers to permit applications that tend to have prolonged review periods and requirements that can add significant durations to an overall project. Long-lead permits traditionally involve organizations that can have large intake of applications at a time and can have more complicated or extraneous review requirements. These permits are typical granted by state or federal agencies or private entities with national reach, including State Departments of Transportation (DOTs), Federal and State Environmental Agencies, Railroad companies, and Oil Pipeline owners. Projects within St. Tammany Parish may encounter the following long-lead permits:

Louisiana Department of Transportation and Development Utility Permit (LDOTD)

The Louisiana Department of Transportation and Development have full administration rights over the Right-of-Way of all state routes within the state of Louisiana. These are typically larger capacity roads, including state highways and interstates, that cover long distances throughout the state. State routes are normally numbered, and ROW authority remains with the DOTD, even in situations where the states routes are within incorporated city limits. All utility installation efforts, both aerial and buried, within the Right-of-Way will require their review and permit. State DOTs review process can be a bit stricter and take longer amount of time than standard ROW permits. Additionally, permanent use of their ROW may involve recurring usage fees on a year-to-year basis and can add additional costs to any proposed network's maintenance.

Norfolk Southern Railroad (NS)

St. Tammany Parish has a major railroad route which runs along the east side through the City of Slidell. This railroad ROW is owned and maintained by Norfolk Southern. NS requires ROW Use agreements for utility construction within this ROW for both longitudinal installations and perpendicular crossings. Typically, longitudinal installations have longer review periods and longer costs associated with them. NS handles ROW Use applications from across the country and due to the high value can have significant durations for review.

Coastal Use Permit (CUP)

The southern portion of the state of Louisiana is designated as the Coastal Zone Boundary (CZB) and has strict management of resources and impact on coastal waters. This zone is managed by the Louisiana Department of Natural Resources (DNR) and construction work that impacts their coverage area requires a Coastal Use Permit. While not all projects would have direct impact that would require a CUP the DNR still recommends all projects within their jurisdiction should have applications filed for review by the DNR and determine impact. Reviews that rule out requirements for a permit can take as little as a single week. St. Tammany Parish has a Local Coastal Management Program (LCMP) that handles CUP reviews on behalf of the DNR. Due to the size of the CZB within St. Tammany Parish is its very likely that CUPs will be required as part of any proposed, parish-wide buildout.

CWA Section 404 Permit

Under the Federal Clean Water Act (CWA) Section 404, all construction effort which involves dredge or fill material potentially being discharged into waters of the United States (WOTUS) will require permission from the US Army Corp. of Engineers (USACE). This includes both navigable waters and wetlands, as defined by the USACE. The State of Louisiana has not accepted responsibility in managing CWA Section 404 permit review and defers responsibility to USACE directly. St. Tammany Parish contains a large amount of terrain that could be categorized as wetlands. Because the elements that define a wetland vary a wetlands determination may need to be requested from the USACE. Construction work that involves ground alterations within a wetland or near a navigable water body (such as a river or lake) may require application for a CWA Section 404 permit. The review process related to these is far more extensive than standard ROW construction permit review and may have durations that extend multiple months.

APPENDIX E – BILL OF MATERIALS



St. Tammany Parish Broadband Solution - Bill of Materials
BACKBONE

TOTAL \$ 12,663,062.64

AERIAL CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
AR-01	Install Strand & All Associated Pole Line Hardware	Per Cable Strand Ft.	9,643	\$ 0.99	\$ -	\$ 0.99	\$ 9,546.57
AR-11	New Build Aerial, Fiber Plant (DF/AF)-1st 2 cables PRI	Per Cable Strand Ft.	9,643	\$ 1.39	\$ -	\$ 1.39	\$ 13,403.77
MA-02	6 M Strand (Material Only)	Per foot	10,608	\$ -	\$ 1.36	\$ 1.36	\$ 14,426.88
MA-03	Poles Attached (For Framing Hardware and labor)	Each	49	\$ -	\$ 13.72	\$ 13.72	\$ 672.28
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL AERIAL CONSTRUCTION							\$ 38,049.50

UNDERGROUND CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
MU-24	Large Vault, HDPE up to 36"x76"x42"	Per Vault	336	\$ -	\$ 1,664.20	\$ 1,664.20	\$ 559,171.20
UG-43	Install Large Vault, HDPE up to 36"x76"x42"	Per Vault	336	\$ 941.71	\$ -	\$ 941.71	\$ 316,414.56
MU-45	STANDARD CABLE MARKER - POST TYPE	Per	873	\$ -	\$ 61.94	\$ 61.94	\$ 54,073.62
MU-01	2" Conduit	Per foot	479,610	\$ -	\$ 5.49	\$ 5.49	\$ 2,633,058.90
UG-02	Directional Bore, 2" diameter Conduit	Per Cable Trench Ft.	436,009	\$ 11.42	\$ -	\$ 11.42	\$ 4,979,222.78
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL UNDERGROUND CONSTRUCTION							\$ 8,541,941.06

FIBER

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
FU-01	Install Fiber Cable in Conduit PRI	Per Cable Trench Ft.	436,009	\$ 3.50	\$ -	\$ 3.50	\$ 1,526,031.50
MF-08	864 Fiber Cable	Per foot	462,851	\$ -	\$ 4.64	\$ 4.64	\$ 2,147,628.64
MF-31	50'/100' AF/DF Slack Loop (either side of splice)	Each	332	\$ -	\$ 99.00	\$ 99.00	\$ 32,868.00
MF-25	Fiber Enclosure 450-D	Per Enclosure	35	\$ -	\$ 665.27	\$ 665.27	\$ 23,284.45
FI-23	Fiber Enclosure Installation 450-D (One at FDH + 432 & 288 splices)	Per Enclosure	35	\$ 200.00	\$ 384.29	\$ 584.29	\$ 20,450.15
FI-41	Fiber Acceptance & Validation Testing -- See Description	Each	40,531	\$ 5.00	\$ -	\$ 5.00	\$ 202,655.00
FI-06	Fusion splice optical fiber Ribbon(433-864)	Per Ribbon	3,378	\$ 38.53	\$ -	\$ 38.53	\$ 130,154.34
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL FIBER CONSTRUCTION							\$ 4,083,072.08

St. Tammany Parish Broadband Solution - Bill of Materials
HUT 1: FOLSOM

TOTAL \$ 29,252,846.39

AERIAL CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
AR-11	New Build Aerial, Fiber Plant (DF/AF)-1st 2 cables PRI	Per Cable Strand Ft.	80,436	\$ 1.00	\$ -	\$ 1.00	\$ 80,436.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL AERIAL CONSTRUCTION							\$ 80,436.00

UNDERGROUND CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
MU-21	MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	3,355	\$ -	\$ 63.38	\$ 63.38	\$ 212,639.90
MU-22	Small Vault, HDPE up to 17"x30"x24"	Per Vault	405	\$ -	\$ 860.53	\$ 860.53	\$ 348,514.65
UG-41	Install Small Vault, HDPE up to 17"x30"x24"	Per Vault	405	\$ 473.50	\$ -	\$ 473.50	\$ 191,767.50
MU-01	2" Conduit	Per foot	1,115,726	\$ -	\$ 5.49	\$ 5.49	\$ 6,125,335.74
UG-02	Directional Bore, 2" diameter Conduit	Per Cable Trench Ft.	1,014,296	\$ 11.42	\$ -	\$ 11.42	\$ 11,583,260.32
MU-45	STANDARD CABLE MARKER - POST TYPE	Per	1,352	\$ -	\$ 61.94	\$ 61.94	\$ 83,742.88
UG-40	Install MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	3,355	\$ 50.00	\$ -	\$ 50.00	\$ 167,750.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL UNDERGROUND CONSTRUCTION							\$ 18,713,010.99

FIBER

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
FU-01	Install Fiber Cable in Conduit PRI	Per Cable Trench Ft.	1,978,170	\$ 3.50	\$ -	\$ 3.50	\$ 6,923,595.00
MF-02	24 Fiber Cable	Per foot	283,999	\$ -	\$ 0.83	\$ 0.83	\$ 235,719.42
MF-03	48 Fiber Cable	Per foot	116,205	\$ -	\$ 1.12	\$ 1.12	\$ 130,149.04
MF-04	72 Fiber Cable	Per foot	56,588	\$ -	\$ 0.50	\$ 0.50	\$ 28,294.00
MF-09	96 Fiber Cable	Per foot	56,097	\$ -	\$ 1.98	\$ 1.98	\$ 111,071.66
MF-05	144 Fiber Cable	Per foot	110,237	\$ -	\$ 2.44	\$ 2.44	\$ 268,978.28
MF-06	288 Fiber Cable	Per foot	94,438	\$ -	\$ 5.22	\$ 5.22	\$ 492,966.36
MF-07	432 Fiber Cable	Per foot	44,224	\$ -	\$ 6.92	\$ 6.92	\$ 306,030.08
MF-41	SPL 4 MST Fiber (150')	Each	125	\$ -	\$ 197.16	\$ 197.16	\$ 24,645.00
MF-42	SPL 4 MST Fiber (250')	Each	55	\$ -	\$ 236.53	\$ 236.53	\$ 13,009.15
MF-43	SPL 4 MST Fiber (500')	Each	200	\$ -	\$ 755.08	\$ 755.08	\$ 151,016.00
MF-44	SPL 4 MST Fiber (750')	Each	148	\$ -	\$ 260.17	\$ 260.17	\$ 38,504.42
MF-45	SPL 4 MST Fiber (1000')	Each	193	\$ -	\$ 462.31	\$ 462.31	\$ 89,225.83
MF-46	SPL 4 MST Fiber (1500')	Each	350	\$ -	\$ 619.00	\$ 619.00	\$ 216,650.00
MF-81	SPL 8 MST Fiber (150')	Each	20	\$ -	\$ 213.28	\$ 213.28	\$ 4,265.50
MF-82	SPL 8 MST Fiber (250')	Each	11	\$ -	\$ 321.10	\$ 321.10	\$ 3,532.10
MF-83	SPL 8 MST Fiber (500')	Each	31	\$ -	\$ 1,271.24	\$ 1,271.24	\$ 39,408.44
MF-84	SPL 8 MST Fiber (750')	Each	35	\$ -	\$ 329.28	\$ 329.28	\$ 11,524.63
MF-85	SPL 8 MST Fiber (1000')	Each	39	\$ -	\$ 582.51	\$ 582.51	\$ 22,717.89
MF-86	SPL 8 MST Fiber (1500')	Each	106	\$ -	\$ 765.05	\$ 765.05	\$ 81,095.30
MF-91	SPL 12 MST Fiber (150')	Each	6	\$ -	\$ 251.67	\$ 251.67	\$ 1,510.02
MF-92	SPL 12 MST Fiber (250')	Each	4	\$ -	\$ 424.02	\$ 424.02	\$ 1,696.08
MF-93	SPL 12 MST Fiber (500')	Each	8	\$ -	\$ 1,476.62	\$ 1,476.62	\$ 11,812.96
MF-95	SPL 12 MST Fiber (750')	Each	8	\$ -	\$ 589.52	\$ 589.52	\$ 4,716.16
MF-96	SPL 12 MST Fiber (1000')	Each	11	\$ -	\$ 710.30	\$ 710.30	\$ 7,813.30
MF-97	SPL 12 MST Fiber (1500')	Each	14	\$ -	\$ 909.43	\$ 909.43	\$ 12,732.02
AR-99	aerial Lash MST	Per foot	42,464	\$ 1.39	\$ -	\$ 1.39	\$ 59,024.54
MF-25	Fiber Enclosure 450-D	Per Enclosure	446	\$ -	\$ 665.27	\$ 665.27	\$ 296,710.42
FI-03	Fusion splice optical fiber Ribbon (1-144)	Per Ribbon	7,440	\$ 57.07	\$ -	\$ 57.07	\$ 424,600.80
FI-41	Fiber Acceptance & Validation Testing - See Description	Each	89,277	\$ 5.00	\$ -	\$ 5.00	\$ 446,385.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL FIBER CONSTRUCTION							\$ 10,459,399.40

St. Tammany Parish Broadband Solution - Bill of Materials

HUT 2: BLOND

TOTAL \$ 22,574,292.13

AERIAL CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
AR-01	Install Strand & All Associated Pole Line Hardware	Per Cable Strand Ft.	7,453	\$ 0.99	\$ -	\$ 0.99	\$ 7,378.47
MA-02	6 M Strand (Material Only)	Per foot	8,199	\$ -	\$ 1.36	\$ 1.36	\$ 11,150.64
AR-11	New Build Aerial, Fiber Plant (DF/AF)-1st 2 cables PRI	Per Cable Strand Ft.	23,928	\$ 1.00	\$ -	\$ 1.00	\$ 23,928.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL AERIAL CONSTRUCTION							\$ 42,457.11

UNDERGROUND CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
MU-21	MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	2,517	\$ -	\$ 63.38	\$ 63.38	\$ 159,527.46
MU-22	Small Vault, HDPE up to 17"x30"x24"	Per Vault	280	\$ -	\$ 860.53	\$ 860.53	\$ 240,948.40
UG-41	Install Small Vault, HDPE up to 17"x30"x24"	Per Vault	280	\$ 473.50	\$ -	\$ 473.50	\$ 132,580.00
MU-23	Medium Vault, HDPE up to 30"x48"x36"	Per Vault	3	\$ -	\$ 1,454.93	\$ 1,454.93	\$ 4,364.79
UG-42	Install Medium Vault, HDPE up to 30"x48"x36"	Per Vault	3	\$ 1,355.49	\$ -	\$ 1,355.49	\$ 4,066.47
MU-01	2" Conduit	Per foot	843,287	\$ -	\$ 5.49	\$ 5.49	\$ 4,629,645.63
UG-02	Directional Bore, 2" diameter Conduit	Per Cable Trench Ft.	766,625	\$ 11.42	\$ -	\$ 11.42	\$ 8,754,857.50
MU-45	STANDARD CABLE MARKER - POST TYPE	Per	1,022	\$ -	\$ 61.94	\$ 61.94	\$ 63,302.68
UG-40	Install MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	2,517	\$ 50.00	\$ -	\$ 50.00	\$ 125,850.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL UNDERGROUND CONSTRUCTION							\$ 14,115,142.93

FIBER

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
FU-01	Install Fiber Cable in Conduit PRI	Per Cable Trench Ft.	1,517,416	\$ 3.50	\$ -	\$ 3.50	\$ 5,310,956.00
MF-02	24 Fiber Cable	Per foot	154,937	\$ -	\$ 0.83	\$ 0.83	\$ 128,597.30
MF-03	48 Fiber Cable	Per foot	102,004	\$ -	\$ 1.12	\$ 1.12	\$ 114,243.92
MF-04	72 Fiber Cable	Per foot	45,117	\$ -	\$ 0.50	\$ 0.50	\$ 22,558.50
MF-09	96 Fiber Cable	Per foot	28,127	\$ -	\$ 1.98	\$ 1.98	\$ 55,691.26
MF-05	144 Fiber Cable	Per foot	158,982	\$ -	\$ 2.44	\$ 2.44	\$ 387,916.08
MF-06	288 Fiber Cable	Per foot	95,904	\$ -	\$ 5.22	\$ 5.22	\$ 500,618.88
MF-07	432 Fiber Cable	Per foot	60,205	\$ -	\$ 6.92	\$ 6.92	\$ 416,618.60
MF-41	SPL 4 MST Fiber (150')	Each	94	\$ -	\$ 197.16	\$ 197.16	\$ 18,533.04
MF-42	SPL 4 MST Fiber (250')	Each	42	\$ -	\$ 236.53	\$ 236.53	\$ 9,934.26
MF-43	SPL 4 MST Fiber (500')	Each	165	\$ -	\$ 755.08	\$ 755.08	\$ 124,588.20
MF-44	SPL 4 MST Fiber (750')	Each	124	\$ -	\$ 260.17	\$ 260.17	\$ 32,260.46
MF-45	SPL 4 MST Fiber (1000')	Each	147	\$ -	\$ 462.31	\$ 462.31	\$ 67,959.57
MF-46	SPL 4 MST Fiber (1500')	Each	261	\$ -	\$ 619.00	\$ 619.00	\$ 161,559.00
MF-81	SPL 8 MST Fiber (150')	Each	22	\$ -	\$ 213.28	\$ 213.28	\$ 4,692.05
MF-82	SPL 8 MST Fiber (250')	Each	4	\$ -	\$ 321.10	\$ 321.10	\$ 1,284.40
MF-83	SPL 8 MST Fiber (500')	Each	29	\$ -	\$ 1,271.24	\$ 1,271.24	\$ 36,865.96
MF-84	SPL 8 MST Fiber (750')	Each	41	\$ -	\$ 329.28	\$ 329.28	\$ 13,500.28
MF-85	SPL 8 MST Fiber (1000')	Each	38	\$ -	\$ 582.51	\$ 582.51	\$ 22,135.38
MF-86	SPL 8 MST Fiber (1500')	Each	62	\$ -	\$ 765.05	\$ 765.05	\$ 47,433.10
MF-91	SPL 12 MST Fiber (150')	Each	1	\$ -	\$ 251.67	\$ 251.67	\$ 251.67
MF-93	SPL 12 MST Fiber (500')	Each	2	\$ -	\$ 1,476.62	\$ 1,476.62	\$ 2,953.24
MF-96	SPL 12 MST Fiber (1000')	Each	3	\$ -	\$ 710.30	\$ 710.30	\$ 2,130.90
MF-97	SPL 12 MST Fiber (1500')	Each	6	\$ -	\$ 909.43	\$ 909.43	\$ 5,456.58
AR-99	aerial Lash MST	Per foot	13,332	\$ 1.39	\$ -	\$ 1.39	\$ 18,532.13
MF-25	Fiber Enclosure 450-D	Per Enclosure	301	\$ -	\$ 665.27	\$ 665.27	\$ 200,246.27
FI-03	Fusion splice optical fiber Ribbon (1-144)	Per Ribbon	6,058	\$ 57.07	\$ -	\$ 57.07	\$ 345,730.06
FI-41	Fiber Acceptance & Validation Testing -- See Description	Each	72,689	\$ 5.00	\$ -	\$ 5.00	\$ 363,445.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL FIBER CONSTRUCTION							\$ 8,416,692.09

St. Tammany Parish Broadband Solution - Bill of Materials
HUT 3: FIRE DISTRICT 9

TOTAL \$ 17,878,149.11

UNDERGROUND CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
MU-21	MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	2,040	\$ -	\$ 63.38	\$ 63.38	\$ 129,295.20
MU-22	Small Vault, HDPE up to 17"x30"x24"	Per Vault	260	\$ -	\$ 860.53	\$ 860.53	\$ 223,737.80
UG-41	Install Small Vault, HDPE up to 17"x30"x24"	Per Vault	260	\$ 473.50	\$ -	\$ 473.50	\$ 123,110.00
MU-23	Medium Vault, HDPE up to 30"x48"x36"	Per Vault	3	\$ -	\$ 1,454.93	\$ 1,454.93	\$ 4,364.79
UG-42	Install Medium Vault, HDPE up to 30"x48"x36"	Per Vault	3	\$ 1,355.49	\$ -	\$ 1,355.49	\$ 4,066.47
MU-01	2" Conduit	Per foot	668,923	\$ -	\$ 5.49	\$ 5.49	\$ 3,672,387.27
UG-02	Directional Bore, 2" diameter Conduit	Per Cable Trench Ft.	608,112	\$ 11.42	\$ -	\$ 11.42	\$ 6,944,639.04
MU-45	STANDARD CABLE MARKER - POST TYPE	Per	811	\$ -	\$ 61.94	\$ 61.94	\$ 50,233.34
UG-40	Install MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	2,040	\$ 50.00	\$ -	\$ 50.00	\$ 102,000.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL UNDERGROUND CONSTRUCTION							\$ 11,253,833.91

FIBER

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
FU-01	Install Fiber Cable in Conduit PRI	Per Cable Trench Ft.	1,199,313	\$ 3.50	\$ -	\$ 3.50	\$ 4,197,595.50
MF-02	24 Fiber Cable	Per foot	146,621	\$ -	\$ 0.83	\$ 0.83	\$ 121,695.10
MF-03	48 Fiber Cable	Per foot	78,743	\$ -	\$ 1.12	\$ 1.12	\$ 88,191.60
MF-04	72 Fiber Cable	Per foot	43,448	\$ -	\$ 0.50	\$ 0.50	\$ 21,724.00
MF-09	96 Fiber Cable	Per foot	115,393	\$ -	\$ 1.98	\$ 1.98	\$ 228,478.54
MF-05	144 Fiber Cable	Per foot	127,446	\$ -	\$ 2.44	\$ 2.44	\$ 310,968.24
MF-06	288 Fiber Cable	Per foot	49,844	\$ -	\$ 5.22	\$ 5.22	\$ 260,185.68
MF-07	432 Fiber Cable	Per foot	29,723	\$ -	\$ 6.92	\$ 6.92	\$ 205,683.16
MF-41	SPL 4 MST Fiber (150')	Each	96	\$ -	\$ 197.16	\$ 197.16	\$ 18,927.36
MF-42	SPL 4 MST Fiber (250')	Each	29	\$ -	\$ 236.53	\$ 236.53	\$ 6,859.37
MF-43	SPL 4 MST Fiber (500')	Each	136	\$ -	\$ 755.08	\$ 755.08	\$ 102,690.88
MF-44	SPL 4 MST Fiber (750')	Each	114	\$ -	\$ 260.17	\$ 260.17	\$ 29,658.81
MF-45	SPL 4 MST Fiber (1000')	Each	120	\$ -	\$ 462.31	\$ 462.31	\$ 55,477.20
MF-46	SPL 4 MST Fiber (1500')	Each	170	\$ -	\$ 619.00	\$ 619.00	\$ 105,230.00
MF-81	SPL 8 MST Fiber (150')	Each	11	\$ -	\$ 213.28	\$ 213.28	\$ 2,346.03
MF-82	SPL 8 MST Fiber (250')	Each	4	\$ -	\$ 321.10	\$ 321.10	\$ 1,284.40
MF-83	SPL 8 MST Fiber (500')	Each	30	\$ -	\$ 1,271.24	\$ 1,271.24	\$ 38,137.20
MF-84	SPL 8 MST Fiber (750')	Each	21	\$ -	\$ 329.28	\$ 329.28	\$ 6,914.78
MF-85	SPL 8 MST Fiber (1000')	Each	27	\$ -	\$ 582.51	\$ 582.51	\$ 15,727.77
MF-86	SPL 8 MST Fiber (1500')	Each	55	\$ -	\$ 765.05	\$ 765.05	\$ 42,077.75
MF-92	SPL 12 MST Fiber (250')	Each	1	\$ -	\$ 424.02	\$ 424.02	\$ 424.02
MF-93	SPL 12 MST Fiber (500')	Each	2	\$ -	\$ 1,476.62	\$ 1,476.62	\$ 2,953.24
MF-95	SPL 12 MST Fiber (750')	Each	1	\$ -	\$ 589.52	\$ 589.52	\$ 589.52
MF-96	SPL 12 MST Fiber (1000')	Each	1	\$ -	\$ 710.30	\$ 710.30	\$ 710.30
MF-97	SPL 12 MST Fiber (1500')	Each	5	\$ -	\$ 909.43	\$ 909.43	\$ 4,547.15
MF-25	Fiber Enclosure 450-D	Per Enclosure	266	\$ -	\$ 665.27	\$ 665.27	\$ 176,961.82
FI-03	Fusion splice optical fiber Ribbon (1-144)	Per Ribbon	4,940	\$ 57.07	\$ -	\$ 57.07	\$ 281,925.80
FI-41	Fiber Acceptance & Validation Testing -- See Description	Each	59,270	\$ 5.00	\$ -	\$ 5.00	\$ 296,350.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL FIBER CONSTRUCTION							\$ 6,624,315.20

St. Tammany Parish Broadband Solution - Bill of Materials

HUT 4: ABITA SPRINGS

TOTAL \$ 18,060,394.02

AERIAL CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
AR-11	New Build Aerial, Fiber Plant (DF/AF)-1st 2 cables PRI	Per Cable Strand Ft.	15,976	\$ 1.00	\$ -	\$ 1.00	\$ 15,976.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL AERIAL CONSTRUCTION							\$ 15,976.00

UNDERGROUND CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
MU-21	MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	2,280	\$ -	\$ 63.38	\$ 63.38	\$ 144,506.40
MU-22	Small Vault, HDPE up to 17"x30"x24"	Per Vault	216	\$ -	\$ 860.53	\$ 860.53	\$ 185,874.48
UG-41	Install Small Vault, HDPE up to 17"x30"x24"	Per Vault	216	\$ 473.50	\$ -	\$ 473.50	\$ 102,276.00
MU-23	Medium Vault, HDPE up to 30"x48"x36"	Per Vault	2	\$ -	\$ 1,454.93	\$ 1,454.93	\$ 2,909.86
UG-42	Install Medium Vault, HDPE up to 30"x48"x36"	Per Vault	2	\$ 1,355.49	\$ -	\$ 1,355.49	\$ 2,710.98
MU-01	2" Conduit	Per foot	701,549	\$ -	\$ 5.49	\$ 5.49	\$ 3,851,504.01
UG-02	Directional Bore, 2" diameter Conduit	Per Cable Trench Ft.	637,772	\$ 11.42	\$ -	\$ 11.42	\$ 7,283,356.24
MU-45	STANDARD CABLE MARKER - POST TYPE	Per	850	\$ -	\$ 61.94	\$ 61.94	\$ 52,649.00
UG-40	Install MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	2,280	\$ 50.00	\$ -	\$ 50.00	\$ 114,000.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL UNDERGROUND CONSTRUCTION							\$ 11,739,786.97

FIBER

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
FU-01	Install Fiber Cable in Conduit PRI	Per Cable Trench Ft.	1,217,112	\$ 3.50	\$ -	\$ 3.50	\$ 4,259,893.05
MF-02	24 Fiber Cable	Per foot	183,795	\$ -	\$ 0.83	\$ 0.83	\$ 152,549.85
MF-03	48 Fiber Cable	Per foot	78,234	\$ -	\$ 1.12	\$ 1.12	\$ 87,622.08
MF-04	72 Fiber Cable	Per foot	49,312	\$ -	\$ 0.50	\$ 0.50	\$ 24,656.00
MF-09	96 Fiber Cable	Per foot	19,939	\$ -	\$ 1.98	\$ 1.98	\$ 39,479.22
MF-05	144 Fiber Cable	Per foot	81,063	\$ -	\$ 2.44	\$ 2.44	\$ 197,793.72
MF-06	288 Fiber Cable	Per foot	56,002	\$ -	\$ 5.22	\$ 5.22	\$ 292,330.44
MF-07	432 Fiber Cable	Per foot	19,785	\$ -	\$ 6.92	\$ 6.92	\$ 136,912.20
MF-41	SPL 4 MST Fiber (150')	Each	56	\$ -	\$ 197.16	\$ 197.16	\$ 11,040.96
MF-42	SPL 4 MST Fiber (250')	Each	16	\$ -	\$ 236.53	\$ 236.53	\$ 3,784.48
MF-43	SPL 4 MST Fiber (500')	Each	101	\$ -	\$ 755.08	\$ 755.08	\$ 76,263.08
MF-44	SPL 4 MST Fiber (750')	Each	92	\$ -	\$ 260.17	\$ 260.17	\$ 23,935.18
MF-45	SPL 4 MST Fiber (1000')	Each	96	\$ -	\$ 462.31	\$ 462.31	\$ 44,381.76
MF-46	SPL 4 MST Fiber (1500')	Each	183	\$ -	\$ 619.00	\$ 619.00	\$ 113,277.00
MF-81	SPL 8 MST Fiber (150')	Each	11	\$ -	\$ 213.28	\$ 213.28	\$ 2,346.03
MF-82	SPL 8 MST Fiber (250')	Each	8	\$ -	\$ 321.10	\$ 321.10	\$ 2,568.80
MF-83	SPL 8 MST Fiber (500')	Each	32	\$ -	\$ 1,271.24	\$ 1,271.24	\$ 40,679.68
MF-84	SPL 8 MST Fiber (750')	Each	20	\$ -	\$ 329.28	\$ 329.28	\$ 6,585.50
MF-85	SPL 8 MST Fiber (1000')	Each	28	\$ -	\$ 582.51	\$ 582.51	\$ 16,310.28
MF-86	SPL 8 MST Fiber (1500')	Each	46	\$ -	\$ 765.05	\$ 765.05	\$ 35,192.30
MF-91	SPL 12 MST Fiber (150')	Each	8	\$ -	\$ 251.67	\$ 251.67	\$ 2,013.36
MF-92	SPL 12 MST Fiber (250')	Each	1	\$ -	\$ 424.02	\$ 424.02	\$ 424.02
MF-93	SPL 12 MST Fiber (500')	Each	15	\$ -	\$ 1,476.62	\$ 1,476.62	\$ 22,149.30
MF-95	SPL 12 MST Fiber (750')	Each	12	\$ -	\$ 589.52	\$ 589.52	\$ 7,074.24
MF-96	SPL 12 MST Fiber (1000')	Each	22	\$ -	\$ 710.30	\$ 710.30	\$ 15,626.60
MF-97	SPL 12 MST Fiber (1500')	Each	19	\$ -	\$ 909.43	\$ 909.43	\$ 17,279.17
AR-99	aerial Lash MST	Per foot	7,193	\$ 1.39	\$ -	\$ 1.39	\$ 9,997.63
MF-25	Fiber Enclosure 450-D	Per Enclosure	227	\$ -	\$ 665.27	\$ 665.27	\$ 151,016.29
FI-03	Fusion splice optical fiber Ribbon (1-144)	Per Ribbon	4,369	\$ 57.07	\$ -	\$ 57.07	\$ 249,338.83
FI-41	Fiber Acceptance & Validation Testing -- See Description	Each	52,422	\$ 5.00	\$ -	\$ 5.00	\$ 262,110.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL FIBER CONSTRUCTION							\$ 6,304,631.05

St. Tammany Parish Broadband Solution - Bill of Materials

HUT 5: FIRE DISTRICT 7

TOTAL \$ 7,187,950.38

AERIAL CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
AR-11	New Build Aerial, Fiber Plant (DF/AF)-1st 2 cables PRI	Per Cable Strand Ft.	16,285	\$ 1.00	\$ -	\$ 1.00	\$ 16,285.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL AERIAL CONSTRUCTION							\$ 16,285.00

UNDERGROUND CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
MU-21	MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	453	\$ -	\$ 63.38	\$ 63.38	\$ 28,711.14
MU-22	Small Vault, HDPE up to 17"x30"x24"	Per Vault	85	\$ -	\$ 860.53	\$ 860.53	\$ 73,145.05
UG-41	Install Small Vault, HDPE up to 17"x30"x24"	Per Vault	85	\$ 473.50	\$ -	\$ 473.50	\$ 40,247.50
MU-23	Medium Vault, HDPE up to 30"x48"x36"	Per Vault	1	\$ -	\$ 1,454.93	\$ 1,454.93	\$ 1,454.93
UG-42	Install Medium Vault, HDPE up to 30"x48"x36"	Per Vault	1	\$ 1,355.49	\$ -	\$ 1,355.49	\$ 1,355.49
MU-01	2" Conduit	Per foot	299,305	\$ -	\$ 5.49	\$ 5.49	\$ 1,643,184.45
UG-02	Directional Bore, 2" diameter Conduit	Per Cable Trench Ft.	272,096	\$ 11.42	\$ -	\$ 11.42	\$ 3,107,336.32
MU-45	STANDARD CABLE MARKER - POST TYPE	Per	363	\$ -	\$ 61.94	\$ 61.94	\$ 22,484.22
UG-40	Install MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	453	\$ 50.00	\$ -	\$ 50.00	\$ 22,650.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL UNDERGROUND CONSTRUCTION							\$ 4,940,569.10

FIBER

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
FU-01	Install Fiber Cable in Conduit PRI	Per Cable Trench Ft.	404,057	\$ 3.50	\$ -	\$ 3.50	\$ 1,414,200.20
MF-02	24 Fiber Cable	Per foot	143,965	\$ -	\$ 0.83	\$ 0.83	\$ 119,490.70
MF-03	48 Fiber Cable	Per foot	30,797	\$ -	\$ 1.12	\$ 1.12	\$ 34,492.98
MF-04	72 Fiber Cable	Per foot	8,589	\$ -	\$ 0.50	\$ 0.50	\$ 4,294.50
MF-09	96 Fiber Cable	Per foot	6,536	\$ -	\$ 1.98	\$ 1.98	\$ 12,940.69
MF-05	144 Fiber Cable	Per foot	110,924	\$ -	\$ 2.44	\$ 2.44	\$ 270,654.56
MF-06	288 Fiber Cable	Per foot	5,597	\$ -	\$ 5.22	\$ 5.22	\$ 29,216.34
MF-07	432 Fiber Cable	Per foot	5,823	\$ -	\$ 6.92	\$ 6.92	\$ 40,295.16
MF-41	SPL 4 MST Fiber (150')	Each	27	\$ -	\$ 197.16	\$ 197.16	\$ 5,323.32
MF-42	SPL 4 MST Fiber (250')	Each	14	\$ -	\$ 236.53	\$ 236.53	\$ 3,311.42
MF-43	SPL 4 MST Fiber (500')	Each	24	\$ -	\$ 755.08	\$ 755.08	\$ 18,121.92
MF-44	SPL 4 MST Fiber (750')	Each	23	\$ -	\$ 260.17	\$ 260.17	\$ 5,983.80
MF-45	SPL 4 MST Fiber (1000')	Each	23	\$ -	\$ 462.31	\$ 462.31	\$ 10,633.13
MF-46	SPL 4 MST Fiber (1500')	Each	54	\$ -	\$ 619.00	\$ 619.00	\$ 33,426.00
MF-81	SPL 8 MST Fiber (150')	Each	3	\$ -	\$ 213.28	\$ 213.28	\$ 639.83
MF-82	SPL 8 MST Fiber (250')	Each	4	\$ -	\$ 321.10	\$ 321.10	\$ 1,284.40
MF-83	SPL 8 MST Fiber (500')	Each	3	\$ -	\$ 1,271.24	\$ 1,271.24	\$ 3,813.72
MF-84	SPL 8 MST Fiber (750')	Each	7	\$ -	\$ 329.28	\$ 329.28	\$ 2,304.93
MF-85	SPL 8 MST Fiber (1000')	Each	1	\$ -	\$ 582.51	\$ 582.51	\$ 582.51
MF-86	SPL 8 MST Fiber (1500')	Each	7	\$ -	\$ 765.05	\$ 765.05	\$ 5,355.35
MF-93	SPL 12 MST Fiber (500')	Each	1	\$ -	\$ 1,476.62	\$ 1,476.62	\$ 1,476.62
MF-95	SPL 12 MST Fiber (750')	Each	1	\$ -	\$ 589.52	\$ 589.52	\$ 589.52
MF-97	SPL 12 MST Fiber (1500')	Each	2	\$ -	\$ 909.43	\$ 909.43	\$ 1,818.86
AR-99	aerial Lash MST	Per foot	3,577	\$ 1.39	\$ -	\$ 1.39	\$ 4,971.86
MF-25	Fiber Enclosure 450-D	Per Enclosure	95	\$ -	\$ 665.27	\$ 665.27	\$ 63,200.65
FI-03	Fusion splice optical fiber Ribbon (1-144)	Per Ribbon	1,219	\$ 57.07	\$ -	\$ 57.07	\$ 69,568.33
FI-41	Fiber Acceptance & Validation Testing -- See Description	Each	14,621	\$ 5.00	\$ -	\$ 5.00	\$ 73,105.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL FIBER CONSTRUCTION							\$ 2,231,096.28

St. Tammany Parish Broadband Solution - Bill of Materials

HUT 6: 6TH WARD ELM

TOTAL \$ 13,549,290.63

AERIAL CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
AR-01	Install Strand & All Associated Pole Line Hardware	Per Cable Strand Ft.	305	\$ 0.99	\$ -	\$ 0.99	\$ 301.95
MA-02	6 M Strand (Material Only)	Per foot	335	\$ -	\$ 1.36	\$ 1.36	\$ 455.60
AR-11	New Build Aerial, Fiber Plant (DF/AF)-1st 2 cables PRI	Per Cable Strand Ft.	1,885	\$ 1.00	\$ -	\$ 1.00	\$ 1,885.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL AERIAL CONSTRUCTION							\$ 2,642.55

UNDERGROUND CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
MU-21	MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	1,886	\$ -	\$ 63.38	\$ 63.38	\$ 119,534.68
MU-22	Small Vault, HDPE up to 17"x30"x24"	Per Vault	165	\$ -	\$ 860.53	\$ 860.53	\$ 141,987.45
UG-41	Install Small Vault, HDPE up to 17"x30"x24"	Per Vault	165	\$ 473.50	\$ -	\$ 473.50	\$ 78,127.50
MU-23	Medium Vault, HDPE up to 30"x48"x36"	Per Vault	1	\$ -	\$ 1,454.93	\$ 1,454.93	\$ 1,454.93
UG-42	Install Medium Vault, HDPE up to 30"x48"x36"	Per Vault	1	\$ 1,355.49	\$ -	\$ 1,355.49	\$ 1,355.49
MU-01	2" Conduit	Per foot	506,206	\$ -	\$ 5.49	\$ 5.49	\$ 2,779,070.94
UG-02	Directional Bore, 2" diameter Conduit	Per Cable Trench Ft.	460,187	\$ 11.42	\$ -	\$ 11.42	\$ 5,255,335.54
MU-45	STANDARD CABLE MARKER - POST TYPE	Per	613	\$ -	\$ 61.94	\$ 61.94	\$ 37,969.22
UG-40	Install MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	1,886	\$ 50.00	\$ -	\$ 50.00	\$ 94,300.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL UNDERGROUND CONSTRUCTION							\$ 8,509,135.75

FIBER

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
FU-01	Install Fiber Cable in Conduit PRI	Per Cable Trench Ft.	956,233	\$ 3.50	\$ -	\$ 3.50	\$ 3,346,815.15
MF-02	24 Fiber Cable	Per foot	87,276	\$ -	\$ 0.83	\$ 0.83	\$ 72,439.16
MF-03	48 Fiber Cable	Per foot	64,233	\$ -	\$ 1.12	\$ 1.12	\$ 71,940.96
MF-04	72 Fiber Cable	Per foot	36,489	\$ -	\$ 0.50	\$ 0.50	\$ 18,244.50
MF-09	96 Fiber Cable	Per foot	15,052	\$ -	\$ 1.98	\$ 1.98	\$ 29,802.56
MF-05	144 Fiber Cable	Per foot	117,901	\$ -	\$ 2.44	\$ 2.44	\$ 286,214.44
MF-06	288 Fiber Cable	Per foot	28,370	\$ -	\$ 5.22	\$ 5.22	\$ 148,091.40
MF-07	432 Fiber Cable	Per foot	31,003	\$ -	\$ 6.92	\$ 6.92	\$ 214,540.76
MF-41	SPL 4 MST Fiber (150')	Each	43	\$ -	\$ 197.16	\$ 197.16	\$ 8,477.88
MF-42	SPL 4 MST Fiber (250')	Each	15	\$ -	\$ 236.53	\$ 236.53	\$ 3,547.95
MF-43	SPL 4 MST Fiber (500')	Each	61	\$ -	\$ 755.08	\$ 755.08	\$ 46,059.88
MF-44	SPL 4 MST Fiber (750')	Each	78	\$ -	\$ 260.17	\$ 260.17	\$ 20,292.87
MF-45	SPL 4 MST Fiber (1000')	Each	69	\$ -	\$ 462.31	\$ 462.31	\$ 31,899.39
MF-46	SPL 4 MST Fiber (1500')	Each	112	\$ -	\$ 619.00	\$ 619.00	\$ 69,328.00
MF-81	SPL 8 MST Fiber (150')	Each	22	\$ -	\$ 213.28	\$ 213.28	\$ 4,692.05
MF-82	SPL 8 MST Fiber (250')	Each	5	\$ -	\$ 321.10	\$ 321.10	\$ 1,605.50
MF-83	SPL 8 MST Fiber (500')	Each	36	\$ -	\$ 1,271.24	\$ 1,271.24	\$ 45,764.64
MF-84	SPL 8 MST Fiber (750')	Each	38	\$ -	\$ 329.28	\$ 329.28	\$ 12,512.45
MF-85	SPL 8 MST Fiber (1000')	Each	28	\$ -	\$ 582.51	\$ 582.51	\$ 16,310.28
MF-86	SPL 8 MST Fiber (1500')	Each	69	\$ -	\$ 765.05	\$ 765.05	\$ 52,788.45
MF-91	SPL 12 MST Fiber (150')	Each	2	\$ -	\$ 251.67	\$ 251.67	\$ 503.34
MF-92	SPL 12 MST Fiber (250')	Each	3	\$ -	\$ 424.02	\$ 424.02	\$ 1,272.06
MF-93	SPL 12 MST Fiber (500')	Each	4	\$ -	\$ 1,476.62	\$ 1,476.62	\$ 5,906.48
MF-95	SPL 12 MST Fiber (750')	Each	5	\$ -	\$ 589.52	\$ 589.52	\$ 2,947.60
MF-96	SPL 12 MST Fiber (1000')	Each	5	\$ -	\$ 710.30	\$ 710.30	\$ 3,551.50
MF-97	SPL 12 MST Fiber (1500')	Each	10	\$ -	\$ 909.43	\$ 909.43	\$ 9,094.30
AR-99	aerial Lash MST	Per foot	1,877	\$ 1.39	\$ -	\$ 1.39	\$ 2,609.36
MF-25	Fiber Enclosure 450-D	Per Enclosure	170	\$ -	\$ 665.27	\$ 665.27	\$ 113,095.90
FI-03	Fusion splice optical fiber Ribbon (1-144)	Per Ribbon	3,393	\$ 57.07	\$ -	\$ 57.07	\$ 193,638.51
FI-41	Fiber Acceptance & Validation Testing -- See Description	Each	40,705	\$ 5.00	\$ -	\$ 5.00	\$ 203,525.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL FIBER CONSTRUCTION							\$ 5,037,512.33

St. Tammany Parish Broadband Solution - Bill of Materials
Fiberhood 1-A

TOTAL \$ 2,587,898.04

UNDERGROUND CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
MU-21	MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	185	\$ -	\$ 63.38	\$ 63.38	\$ 11,725.30
MU-22	Small Vault, HDPE up to 17"x30"x24"	Per Vault	41	\$ -	\$ 860.53	\$ 860.53	\$ 35,281.73
UG-41	Install Small Vault, HDPE up to 17"x30"x24"	Per Vault	41	\$ 473.50	\$ -	\$ 473.50	\$ 19,413.50
MU-01	2" Conduit	Per foot	103,123	\$ -	\$ 5.49	\$ 5.49	\$ 566,145.27
UG-02	Directional Bore, 2" diameter Conduit	Per Cable Trench Ft.	93,748	\$ 11.42	\$ -	\$ 11.42	\$ 1,070,602.16
MU-45	STANDARD CABLE MARKER - POST TYPE	Per	125	\$ -	\$ 61.94	\$ 61.94	\$ 7,742.50
UG-40	Install MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	185	\$ 50.00	\$ -	\$ 50.00	\$ 9,250.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL UNDERGROUND CONSTRUCTION							\$ 1,720,160.46

FIBER

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
FU-01	Install Fiber Cable in Conduit PRI	Per Cable Trench Ft.	183,160	\$ 3.50	\$ -	\$ 3.50	\$ 641,059.65
MF-02	24 Fiber Cable	Per foot	38,724	\$ -	\$ 0.83	\$ 0.83	\$ 32,141.17
MF-03	48 Fiber Cable	Per foot	11,412	\$ -	\$ 1.12	\$ 1.12	\$ 12,781.34
MF-04	72 Fiber Cable	Per foot	6,175	\$ -	\$ 0.50	\$ 0.50	\$ 3,087.50
MF-09	96 Fiber Cable	Per foot	2,627	\$ -	\$ 1.98	\$ 1.98	\$ 5,200.48
MF-05	144 Fiber Cable	Per foot	4,706	\$ -	\$ 2.44	\$ 2.44	\$ 11,482.64
MF-06	288 Fiber Cable	Per foot	4,508	\$ -	\$ 5.22	\$ 5.22	\$ 23,531.76
MF-41	SPL 4 MST Fiber (150')	Each	16	\$ -	\$ 197.16	\$ 197.16	\$ 3,154.56
MF-42	SPL 4 MST Fiber (250')	Each	4	\$ -	\$ 236.53	\$ 236.53	\$ 946.12
MF-43	SPL 4 MST Fiber (500')	Each	16	\$ -	\$ 755.08	\$ 755.08	\$ 12,081.28
MF-44	SPL 4 MST Fiber (750')	Each	7	\$ -	\$ 260.17	\$ 260.17	\$ 1,821.16
MF-45	SPL 4 MST Fiber (1000')	Each	8	\$ -	\$ 462.31	\$ 462.31	\$ 3,698.48
MF-46	SPL 4 MST Fiber (1500')	Each	28	\$ -	\$ 619.00	\$ 619.00	\$ 17,332.00
MF-81	SPL 8 MST Fiber (150')	Each	2	\$ -	\$ 213.28	\$ 213.28	\$ 426.55
MF-83	SPL 8 MST Fiber (500')	Each	2	\$ -	\$ 1,271.24	\$ 1,271.24	\$ 2,542.48
MF-84	SPL 8 MST Fiber (750')	Each	2	\$ -	\$ 329.28	\$ 329.28	\$ 658.55
MF-86	SPL 8 MST Fiber (1500')	Each	7	\$ -	\$ 765.05	\$ 765.05	\$ 5,355.35
MF-95	SPL 12 MST Fiber (750')	Each	1	\$ -	\$ 589.52	\$ 589.52	\$ 589.52
MF-25	Fiber Enclosure 450-D	Per Enclosure	45	\$ -	\$ 665.27	\$ 665.27	\$ 29,937.15
FI-03	Fusion splice optical fiber Ribbon (1-144)	Per Ribbon	512	\$ 57.07	\$ -	\$ 57.07	\$ 29,219.84
FI-41	Fiber Acceptance & Validation Testing -- See Description	Each	6,138	\$ 5.00	\$ -	\$ 5.00	\$ 30,690.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL FIBER CONSTRUCTION							\$ 867,737.58

St. Tammany Parish Broadband Solution - Bill of Materials

Fiberhood 1-B

TOTAL \$ 2,264,535.70

UNDERGROUND CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
MU-21	MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	281	\$ -	\$ 63.38	\$ 63.38	\$ 17,809.78
MU-22	Small Vault, HDPE up to 17"x30"x24"	Per Vault	35	\$ -	\$ 860.53	\$ 860.53	\$ 30,118.55
UG-41	Install Small Vault, HDPE up to 17"x30"x24"	Per Vault	35	\$ 473.50	\$ -	\$ 473.50	\$ 16,572.50
MU-01	2" Conduit	Per foot	91,847	\$ -	\$ 5.49	\$ 5.49	\$ 504,240.03
UG-02	Directional Bore, 2" diameter Conduit	Per Cable Trench Ft.	83,498	\$ 11.42	\$ -	\$ 11.42	\$ 953,547.16
MU-45	STANDARD CABLE MARKER - POST TYPE	Per	111	\$ -	\$ 61.94	\$ 61.94	\$ 6,875.34
UG-40	Install MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	281	\$ 50.00	\$ -	\$ 50.00	\$ 14,050.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL UNDERGROUND CONSTRUCTION							\$ 1,543,213.36

FIBER

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
FU-01	Install Fiber Cable in Conduit PRI	Per Cable Trench Ft.	137,611	\$ 3.50	\$ -	\$ 3.50	\$ 481,639.55
MF-02	24 Fiber Cable	Per foot	26,261	\$ -	\$ 0.83	\$ 0.83	\$ 21,796.85
MF-03	48 Fiber Cable	Per foot	13,436	\$ -	\$ 1.12	\$ 1.12	\$ 15,048.77
MF-04	72 Fiber Cable	Per foot	2,355	\$ -	\$ 0.50	\$ 0.50	\$ 1,177.50
MF-05	144 Fiber Cable	Per foot	4,109	\$ -	\$ 2.44	\$ 2.44	\$ 10,025.96
MF-06	288 Fiber Cable	Per foot	9,163	\$ -	\$ 5.22	\$ 5.22	\$ 47,830.86
MF-41	SPL 4 MST Fiber (150')	Each	15	\$ -	\$ 197.16	\$ 197.16	\$ 2,957.40
MF-42	SPL 4 MST Fiber (250')	Each	6	\$ -	\$ 236.53	\$ 236.53	\$ 1,419.18
MF-43	SPL 4 MST Fiber (500')	Each	26	\$ -	\$ 755.08	\$ 755.08	\$ 19,632.08
MF-44	SPL 4 MST Fiber (750')	Each	9	\$ -	\$ 260.17	\$ 260.17	\$ 2,341.49
MF-45	SPL 4 MST Fiber (1000')	Each	27	\$ -	\$ 462.31	\$ 462.31	\$ 12,482.37
MF-46	SPL 4 MST Fiber (1500')	Each	29	\$ -	\$ 619.00	\$ 619.00	\$ 17,951.00
MF-83	SPL 8 MST Fiber (500')	Each	4	\$ -	\$ 1,271.24	\$ 1,271.24	\$ 5,084.96
MF-84	SPL 8 MST Fiber (750')	Each	1	\$ -	\$ 329.28	\$ 329.28	\$ 329.28
MF-85	SPL 8 MST Fiber (1000')	Each	1	\$ -	\$ 582.51	\$ 582.51	\$ 582.51
MF-86	SPL 8 MST Fiber (1500')	Each	1	\$ -	\$ 765.05	\$ 765.05	\$ 765.05
MF-25	Fiber Enclosure 450-D	Per Enclosure	35	\$ -	\$ 665.27	\$ 665.27	\$ 23,284.45
FI-03	Fusion splice optical fiber Ribbon (1-144)	Per Ribbon	487	\$ 57.07	\$ -	\$ 57.07	\$ 27,793.09
FI-41	Fiber Acceptance & Validation Testing -- See Description	Each	5,836	\$ 5.00	\$ -	\$ 5.00	\$ 29,180.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL FIBER CONSTRUCTION							\$ 721,322.34



St. Tammany Parish Broadband Solution - Bill of Materials

Fiberhood 1-C

TOTAL \$ 3,359,444.63

UNDERGROUND CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
MU-21	MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	337	\$ -	\$ 63.38	\$ 63.38	\$ 21,359.06
MU-22	Small Vault, HDPE up to 17"x30"x24"	Per Vault	47	\$ -	\$ 860.53	\$ 860.53	\$ 40,444.91
UG-41	Install Small Vault, HDPE up to 17"x30"x24"	Per Vault	47	\$ 473.50	\$ -	\$ 473.50	\$ 22,254.50
MU-01	2" Conduit	Per foot	131,622	\$ -	\$ 5.49	\$ 5.49	\$ 722,604.78
UG-02	Directional Bore, 2" diameter Conduit	Per Cable Trench Ft.	119,656	\$ 11.42	\$ -	\$ 11.42	\$ 1,366,471.52
MU-45	STANDARD CABLE MARKER - POST TYPE	Per	160	\$ -	\$ 61.94	\$ 61.94	\$ 9,910.40
UG-40	Install MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	337	\$ 50.00	\$ -	\$ 50.00	\$ 16,850.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL UNDERGROUND CONSTRUCTION							\$ 2,199,895.17

FIBER

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
FU-01	Install Fiber Cable in Conduit PRI	Per Cable Trench Ft.	193,635	\$ 3.50	\$ -	\$ 3.50	\$ 677,721.45
MF-02	24 Fiber Cable	Per foot	28,487	\$ -	\$ 0.83	\$ 0.83	\$ 23,644.46
MF-03	48 Fiber Cable	Per foot	14,677	\$ -	\$ 1.12	\$ 1.12	\$ 16,437.74
MF-04	72 Fiber Cable	Per foot	5,563	\$ -	\$ 0.50	\$ 0.50	\$ 2,781.50
MF-09	96 Fiber Cable	Per foot	3,157	\$ -	\$ 1.98	\$ 1.98	\$ 6,251.25
MF-05	144 Fiber Cable	Per foot	31,071	\$ -	\$ 2.44	\$ 2.44	\$ 75,813.24
MF-06	288 Fiber Cable	Per foot	13,214	\$ -	\$ 5.22	\$ 5.22	\$ 68,977.08
MF-07	432 Fiber Cable	Per foot	10,936	\$ -	\$ 6.92	\$ 6.92	\$ 75,677.12
MF-41	SPL 4 MST Fiber (150')	Each	18	\$ -	\$ 197.16	\$ 197.16	\$ 3,548.88
MF-42	SPL 4 MST Fiber (250')	Each	5	\$ -	\$ 236.53	\$ 236.53	\$ 1,182.65
MF-43	SPL 4 MST Fiber (500')	Each	29	\$ -	\$ 755.08	\$ 755.08	\$ 21,897.32
MF-44	SPL 4 MST Fiber (750')	Each	19	\$ -	\$ 260.17	\$ 260.17	\$ 4,943.14
MF-45	SPL 4 MST Fiber (1000')	Each	26	\$ -	\$ 462.31	\$ 462.31	\$ 12,020.06
MF-46	SPL 4 MST Fiber (1500')	Each	40	\$ -	\$ 619.00	\$ 619.00	\$ 24,760.00
MF-81	SPL 8 MST Fiber (150')	Each	3	\$ -	\$ 213.28	\$ 213.28	\$ 639.83
MF-83	SPL 8 MST Fiber (500')	Each	2	\$ -	\$ 1,271.24	\$ 1,271.24	\$ 2,542.48
MF-84	SPL 8 MST Fiber (750')	Each	3	\$ -	\$ 329.28	\$ 329.28	\$ 987.83
MF-85	SPL 8 MST Fiber (1000')	Each	5	\$ -	\$ 582.51	\$ 582.51	\$ 2,912.55
MF-86	SPL 8 MST Fiber (1500')	Each	6	\$ -	\$ 765.05	\$ 765.05	\$ 4,590.30
MF-93	SPL 12 MST Fiber (500')	Each	1	\$ -	\$ 1,476.62	\$ 1,476.62	\$ 1,476.62
MF-97	SPL 12 MST Fiber (1500')	Each	1	\$ -	\$ 909.43	\$ 909.43	\$ 909.43
AR-99	aerial Lash MST	Per foot	1,499	\$ 1.39	\$ -	\$ 1.39	\$ 2,084.03
MF-25	Fiber Enclosure 450-D	Per Enclosure	46	\$ -	\$ 665.27	\$ 665.27	\$ 30,602.42
FI-03	Fusion splice optical fiber Ribbon (1-144)	Per Ribbon	830	\$ 57.07	\$ -	\$ 57.07	\$ 47,368.10
FI-41	Fiber Acceptance & Validation Testing -- See Description	Each	9,956	\$ 5.00	\$ -	\$ 5.00	\$ 49,780.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL FIBER CONSTRUCTION							\$ 1,159,549.46

St. Tammany Parish Broadband Solution - Bill of Materials
Fiberhood 2-A

TOTAL \$ 3,290,396.23

UNDERGROUND CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
MU-21	MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	324	\$ -	\$ 63.38	\$ 63.38	\$ 20,535.12
MU-22	Small Vault, HDPE up to 17"x30"x24"	Per Vault	31	\$ -	\$ 860.53	\$ 860.53	\$ 26,676.43
UG-41	Install Small Vault, HDPE up to 17"x30"x24"	Per Vault	31	\$ 473.50	\$ -	\$ 473.50	\$ 14,678.50
MU-01	2" Conduit	Per foot	123,565	\$ -	\$ 5.49	\$ 5.49	\$ 678,371.85
UG-02	Directional Bore, 2" diameter Conduit	Per Cable Trench Ft.	112,332	\$ 11.42	\$ -	\$ 11.42	\$ 1,282,831.44
MU-45	STANDARD CABLE MARKER - POST TYPE	Per	150	\$ -	\$ 61.94	\$ 61.94	\$ 9,291.00
UG-40	Install MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	324	\$ 50.00	\$ -	\$ 50.00	\$ 16,200.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL UNDERGROUND CONSTRUCTION							\$ 2,048,584.34

FIBER

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
FU-01	Install Fiber Cable in Conduit PRI	Per Cable Trench Ft.	196,251	\$ 3.50	\$ -	\$ 3.50	\$ 686,877.10
MF-02	24 Fiber Cable	Per foot	25,039	\$ -	\$ 0.83	\$ 0.83	\$ 20,782.70
MF-03	48 Fiber Cable	Per foot	22,469	\$ -	\$ 1.12	\$ 1.12	\$ 25,165.55
MF-04	72 Fiber Cable	Per foot	3,281	\$ -	\$ 0.50	\$ 0.50	\$ 1,640.50
MF-09	96 Fiber Cable	Per foot	2,338	\$ -	\$ 1.98	\$ 1.98	\$ 4,629.61
MF-05	144 Fiber Cable	Per foot	6,699	\$ -	\$ 2.44	\$ 2.44	\$ 16,345.56
MF-06	288 Fiber Cable	Per foot	29,100	\$ -	\$ 5.22	\$ 5.22	\$ 151,902.00
MF-07	432 Fiber Cable	Per foot	25,504	\$ -	\$ 6.92	\$ 6.92	\$ 176,487.68
MF-41	SPL 4 MST Fiber (150')	Each	10	\$ -	\$ 197.16	\$ 197.16	\$ 1,971.60
MF-42	SPL 4 MST Fiber (250')	Each	3	\$ -	\$ 236.53	\$ 236.53	\$ 709.59
MF-43	SPL 4 MST Fiber (500')	Each	18	\$ -	\$ 755.08	\$ 755.08	\$ 13,591.44
MF-44	SPL 4 MST Fiber (750')	Each	9	\$ -	\$ 260.17	\$ 260.17	\$ 2,341.49
MF-45	SPL 4 MST Fiber (1000')	Each	15	\$ -	\$ 462.31	\$ 462.31	\$ 6,934.65
MF-46	SPL 4 MST Fiber (1500')	Each	26	\$ -	\$ 619.00	\$ 619.00	\$ 16,094.00
MF-81	SPL 8 MST Fiber (150')	Each	4	\$ -	\$ 213.28	\$ 213.28	\$ 853.10
MF-82	SPL 8 MST Fiber (250')	Each	1	\$ -	\$ 321.10	\$ 321.10	\$ 321.10
MF-83	SPL 8 MST Fiber (500')	Each	2	\$ -	\$ 1,271.24	\$ 1,271.24	\$ 2,542.48
MF-84	SPL 8 MST Fiber (750')	Each	6	\$ -	\$ 329.28	\$ 329.28	\$ 1,975.65
MF-85	SPL 8 MST Fiber (1000')	Each	9	\$ -	\$ 582.51	\$ 582.51	\$ 5,242.59
MF-86	SPL 8 MST Fiber (1500')	Each	11	\$ -	\$ 765.05	\$ 765.05	\$ 8,415.55
MF-97	SPL 12 MST Fiber (1500')	Each	1	\$ -	\$ 909.43	\$ 909.43	\$ 909.43
MF-25	Fiber Enclosure 450-D	Per Enclosure	31	\$ -	\$ 665.27	\$ 665.27	\$ 20,623.37
FI-03	Fusion splice optical fiber Ribbon (1-144)	Per Ribbon	645	\$ 57.07	\$ -	\$ 57.07	\$ 36,810.15
FI-41	Fiber Acceptance & Validation Testing -- See Description	Each	7,729	\$ 5.00	\$ -	\$ 5.00	\$ 38,645.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL FIBER CONSTRUCTION							\$ 1,241,811.89

St. Tammany Parish Broadband Solution - Bill of Materials

Fiberhood 2-B

TOTAL \$ 2,973,013.86

AERIAL CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
AR-11	New Build Aerial, Fiber Plant (DF/AF)-1st 2 cables PRI	Per Cable Strand Ft.	5,056	\$ 1.00	\$ -	\$ 1.00	\$ 5,056.10
AR-01	Install Strand & All Associated Pole Line Hardware	Per Cable Strand Ft.	5,056	\$ 0.99	\$ -	\$ 0.99	\$ 5,005.54
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL AERIAL CONSTRUCTION							\$ 10,061.64

UNDERGROUND CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
MU-21	MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	295	\$ -	\$ 63.38	\$ 63.38	\$ 18,697.10
MU-22	Small Vault, HDPE up to 17"x30"x24"	Per Vault	41	\$ -	\$ 860.53	\$ 860.53	\$ 35,281.73
UG-41	Install Small Vault, HDPE up to 17"x30"x24"	Per Vault	41	\$ 473.50	\$ -	\$ 473.50	\$ 19,413.50
MU-23	Medium Vault, HDPE up to 30"x48"x36"	Per Vault	1	\$ -	\$ 1,454.93	\$ 1,454.93	\$ 1,454.93
UG-42	Install Medium Vault, HDPE up to 30"x48"x36"	Per Vault	1	\$ 1,355.49	\$ -	\$ 1,355.49	\$ 1,355.49
MU-01	2" Conduit	Per foot	117,358	\$ -	\$ 5.49	\$ 5.49	\$ 644,295.42
UG-02	Directional Bore, 2" diameter Conduit	Per Cable Trench Ft.	106,689	\$ 11.42	\$ -	\$ 11.42	\$ 1,218,388.38
MU-45	STANDARD CABLE MARKER - POST TYPE	Per	142	\$ -	\$ 61.94	\$ 61.94	\$ 8,795.48
UG-40	Install MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	295	\$ 50.00	\$ -	\$ 50.00	\$ 14,750.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL UNDERGROUND CONSTRUCTION							\$ 1,962,432.03

FIBER

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
FU-01	Install Fiber Cable in Conduit PRI	Per Cable Trench Ft.	180,477	\$ 3.50	\$ -	\$ 3.50	\$ 631,670.55
MF-02	24 Fiber Cable	Per foot	33,011	\$ -	\$ 0.83	\$ 0.83	\$ 27,398.88
MF-03	48 Fiber Cable	Per foot	6,275	\$ -	\$ 1.12	\$ 1.12	\$ 7,027.72
MF-04	72 Fiber Cable	Per foot	6,946	\$ -	\$ 0.50	\$ 0.50	\$ 3,473.00
MF-09	96 Fiber Cable	Per foot	5,487	\$ -	\$ 1.98	\$ 1.98	\$ 10,863.90
MF-05	144 Fiber Cable	Per foot	7,648	\$ -	\$ 2.44	\$ 2.44	\$ 18,661.12
MF-06	288 Fiber Cable	Per foot	3,329	\$ -	\$ 5.22	\$ 5.22	\$ 17,377.38
MF-07	432 Fiber Cable	Per foot	10,325	\$ -	\$ 6.92	\$ 6.92	\$ 71,449.00
MF-41	SPL 4 MST Fiber (150')	Each	15	\$ -	\$ 197.16	\$ 197.16	\$ 2,957.40
MF-42	SPL 4 MST Fiber (250')	Each	4	\$ -	\$ 236.53	\$ 236.53	\$ 946.12
MF-43	SPL 4 MST Fiber (500')	Each	26	\$ -	\$ 755.08	\$ 755.08	\$ 19,632.08
MF-44	SPL 4 MST Fiber (750')	Each	20	\$ -	\$ 260.17	\$ 260.17	\$ 5,203.30
MF-45	SPL 4 MST Fiber (1000')	Each	21	\$ -	\$ 462.31	\$ 462.31	\$ 9,708.51
MF-46	SPL 4 MST Fiber (1500')	Each	37	\$ -	\$ 619.00	\$ 619.00	\$ 22,903.00
MF-81	SPL 8 MST Fiber (150')	Each	3	\$ -	\$ 213.28	\$ 213.28	\$ 639.83
MF-83	SPL 8 MST Fiber (500')	Each	5	\$ -	\$ 1,271.24	\$ 1,271.24	\$ 6,356.20
MF-84	SPL 8 MST Fiber (750')	Each	3	\$ -	\$ 329.28	\$ 329.28	\$ 987.83
MF-85	SPL 8 MST Fiber (1000')	Each	5	\$ -	\$ 582.51	\$ 582.51	\$ 2,912.55
MF-86	SPL 8 MST Fiber (1500')	Each	8	\$ -	\$ 765.05	\$ 765.05	\$ 5,120.40
AR-99	aerial Lash MST	Per foot	11,017	\$ 1.39	\$ -	\$ 1.39	\$ 15,313.31
MF-25	Fiber Enclosure 450-D	Per Enclosure	47	\$ -	\$ 665.27	\$ 665.27	\$ 31,267.69
FI-03	Fusion splice optical fiber Ribbon (1-144)	Per Ribbon	749	\$ 57.07	\$ -	\$ 57.07	\$ 42,745.43
FI-41	Fiber Acceptance & Validation Testing -- See Description	Each	8,981	\$ 5.00	\$ -	\$ 5.00	\$ 44,905.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL FIBER CONSTRUCTION							\$ 1,000,520.19

St. Tammany Parish Broadband Solution - Bill of Materials
Fiberhood 5-A

TOTAL \$ 3,087,298.31

UNDERGROUND CONSTRUCTION

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
MU-21	MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	287	\$ -	\$ 63.38	\$ 63.38	\$ 18,190.06
MU-22	Small Vault, HDPE up to 17"x30"x24"	Per Vault	42	\$ -	\$ 860.53	\$ 860.53	\$ 36,142.26
UG-41	Install Small Vault, HDPE up to 17"x30"x24"	Per Vault	42	\$ 473.50	\$ -	\$ 473.50	\$ 19,887.00
MU-23	Medium Vault, HDPE up to 30"x48"x36"	Per Vault	1	\$ -	\$ 1,454.93	\$ 1,454.93	\$ 1,454.93
UG-42	Install Medium Vault, HDPE up to 30"x48"x36"	Per Vault	1	\$ 1,355.49	\$ -	\$ 1,355.49	\$ 1,355.49
MU-01	2" Conduit	Per foot	132,941	\$ -	\$ 5.49	\$ 5.49	\$ 729,846.09
UG-02	Directional Bore, 2" diameter Conduit	Per Cable Trench Ft.	120,855	\$ 11.42	\$ -	\$ 11.42	\$ 1,380,164.10
MU-45	STANDARD CABLE MARKER - POST TYPE	Per	161	\$ -	\$ 61.94	\$ 61.94	\$ 9,972.34
UG-40	Install MST Pedestal 10x10x10 (MST not in vault) May be put in on DF	Per unit	287	\$ 50.00	\$ -	\$ 50.00	\$ 14,350.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL UNDERGROUND CONSTRUCTION							\$ 2,211,362.27

FIBER

Job Code	Work Function Description	UOM	Est. QTY	Labor Cost	Material Cost	Per Unit	Extended
FU-01	Install Fiber Cable in Conduit PRI	Per Cable Trench Ft.	162,122	\$ 3.50	\$ -	\$ 3.50	\$ 567,425.25
MF-02	24 Fiber Cable	Per foot	34,206	\$ -	\$ 0.83	\$ 0.83	\$ 28,390.57
MF-03	48 Fiber Cable	Per foot	18,297	\$ -	\$ 1.12	\$ 1.12	\$ 20,492.12
MF-04	72 Fiber Cable	Per foot	7,942	\$ -	\$ 0.50	\$ 0.50	\$ 3,971.00
MF-09	96 Fiber Cable	Per foot	3,414	\$ -	\$ 1.98	\$ 1.98	\$ 6,760.69
MF-05	144 Fiber Cable	Per foot	6,530	\$ -	\$ 2.44	\$ 2.44	\$ 15,933.20
MF-06	288 Fiber Cable	Per foot	5,597	\$ -	\$ 5.22	\$ 5.22	\$ 29,216.34
MF-07	432 Fiber Cable	Per foot	5,823	\$ -	\$ 6.92	\$ 6.92	\$ 40,295.16
MF-41	SPL 4 MST Fiber (150')	Each	8	\$ -	\$ 197.16	\$ 197.16	\$ 1,577.28
MF-42	SPL 4 MST Fiber (250')	Each	9	\$ -	\$ 236.53	\$ 236.53	\$ 2,128.77
MF-43	SPL 4 MST Fiber (500')	Each	15	\$ -	\$ 755.08	\$ 755.08	\$ 11,326.20
MF-44	SPL 4 MST Fiber (750')	Each	13	\$ -	\$ 260.17	\$ 260.17	\$ 3,382.15
MF-45	SPL 4 MST Fiber (1000')	Each	15	\$ -	\$ 462.31	\$ 462.31	\$ 6,934.65
MF-46	SPL 4 MST Fiber (1500')	Each	30	\$ -	\$ 619.00	\$ 619.00	\$ 18,570.00
MF-81	SPL 8 MST Fiber (150')	Each	2	\$ -	\$ 213.28	\$ 213.28	\$ 426.55
MF-82	SPL 8 MST Fiber (250')	Each	1	\$ -	\$ 321.10	\$ 321.10	\$ 321.10
MF-83	SPL 8 MST Fiber (500')	Each	1	\$ -	\$ 1,271.24	\$ 1,271.24	\$ 1,271.24
MF-84	SPL 8 MST Fiber (750')	Each	6	\$ -	\$ 329.28	\$ 329.28	\$ 1,975.65
MF-85	SPL 8 MST Fiber (1000')	Each	1	\$ -	\$ 582.51	\$ 582.51	\$ 582.51
MF-86	SPL 8 MST Fiber (1500')	Each	6	\$ -	\$ 765.05	\$ 765.05	\$ 4,590.30
MF-93	SPL 12 MST Fiber (500')	Each	1	\$ -	\$ 1,476.62	\$ 1,476.62	\$ 1,476.62
MF-95	SPL 12 MST Fiber (750')	Each	1	\$ -	\$ 589.52	\$ 589.52	\$ 589.52
MF-97	SPL 12 MST Fiber (1500')	Each	2	\$ -	\$ 909.43	\$ 909.43	\$ 1,818.86
MF-25	Fiber Enclosure 450-D	Per Enclosure	42	\$ -	\$ 665.27	\$ 665.27	\$ 27,941.34
FI-03	Fusion splice optical fiber Ribbon (1-144)	Per Ribbon	671	\$ 57.07	\$ -	\$ 57.07	\$ 38,293.97
FI-41	Fiber Acceptance & Validation Testing -- See Description	Each	8,049	\$ 5.00	\$ -	\$ 5.00	\$ 40,245.00
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
				\$ -	\$ -	\$ -	\$ -
TOTAL FIBER CONSTRUCTION							\$ 875,936.04

APPENDIX F – DATA DICTIONARY

Address – File Geodatabase Feature Class

Name: Address
Alias: Address
Feature Dataset: HLD
Feature Type: Simple
Geometry Type: Point
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
TYPE	TYPE	Text	TRUE	Address_Type		50
COMMENTS	COMMENTS	Text	TRUE			200
STATUS	STATUS	Text	TRUE	Address_Status		50
WOID	WO_ID	Text	TRUE			50
UNITNUMBER	UNIT_NUMBER	Text	TRUE			50
CITY	CITY	Text	TRUE			50
STATE	STATE	Text	TRUE			50
ZIPCODE	ZIP_CODE	Text	TRUE			50
FGID	FG_ID	Text	TRUE			50
GlobalID	GlobalID	Global ID	FALSE			
FULLADDRESS	FULL_ADDRESS	Text	TRUE			300
STREETNUMBER	STREET_NUMBER	Text	TRUE			50
STREETNAME	STREET_NAME	Text	TRUE			125
STREETSUFFIX	STREET_SUFFIX	Text	TRUE			15
LANDUSE	LAND_USE	Text	TRUE			125
SHAPE	SHAPE	Geometry	TRUE			
UNITCOUNT	UNITCOUNT	Short	TRUE			
NUMFIBERS	NUMFIBERS	Short	TRUE			
LONGITUDE	LONGITUDE	Double	TRUE			
LATITUDE	LATITUDE	Double	TRUE			
CUSTOM1	CUSTOM1	Text	TRUE			255
CUSTOM2	CUSTOM2	Text	TRUE			50
CUSTOM3	CUSTOM3	Double	TRUE			

HLDFiber– File Geodatabase Feature Class

Name: HLDFiber
Alias: HLDFiber
Feature Dataset: HLD
Feature Type: Simple
Geometry Type: Point
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
PLACEMENT	NAME	Text	TRUE	Type_Name		50
CATEGORY	CABLE_CATEGORY	Text	TRUE	Cable_Category		50
COMMENTS	COMMENTS	Text	TRUE			200
SIZE	SIZE	Short	TRUE	Fibercount		
CUSTOM1		Text	TRUE			300
CUSTOM2		Text	TRUE			300
CUSTOM3		Long	TRUE			
created_user		Text	TRUE			255
created_date		Date	TRUE			
last_edited_user		Text	TRUE			255
last_edited_date		Date	TRUE			
SHAPE	SHAPE	Geometry	TRUE			
STATUS	STATUS	Text	TRUE	Physical_Status		50
SHAPE_Length		Double	TRUE			

HLDHUB – File Geodatabase Feature Class

Name: HLDHUB
Alias: HLDHUB
Feature Dataset: HLD
Feature Type: Simple
Geometry Type: Point
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
NAME	HUBNAME	Text	TRUE			50
LATITUDE	LATITUDE	Double	TRUE			
LONGITUDE	LONGITUDE	Double	TRUE			
COMMENTS	COMMENTS	Text	TRUE			300
TYPE	TYPE	Text	TRUE	HUB_Type		50
SHAPE	SHAPE	Geometry	TRUE			
GLOBALID	GLOBALID	Guid	TRUE			
RING	HUBRING	Text	TRUE			50

HLDRoute – File Geodatabase Feature Class

Name: HLDRoute
Alias: HLDRoute
Feature Dataset: HLD
Feature Type: Simple
Geometry Type: Line
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
CATEGORY	NETWORKTYPE	Text	TRUE	Cable_Category		100
STATUS	STATUS	Text	TRUE	Physical_Status		50
GLOBALID	GLOBALID	Guid	TRUE			
COMMENTS	COMMENTS	Text	TRUE			500
CONDUITSIZE	CONDUITSIZE	Text	TRUE			50
PLACEMENT	PLACEMENT	Text	TRUE	Type_Name		15
SHAPE	SHAPE	Geometry	TRUE			
CUSTOM1	CUSTOM1	Text	TRUE			50
CUSTOM2	CUSTOM2	Text	TRUE			50
CUSTOM3	CUSTOM3	Double	TRUE			
SHAPE_Length		Double	TRUE			

HLDSpliceClosure– File Geodatabase Feature Class

Name: HLDSpliceClosure
Alias: HLDSpliceClosure
Feature Dataset: HLD
Feature Type: Simple
Geometry Type: Point
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
NAME	NAME	Text	TRUE			50
PLACEMENT	PLACEMENT	Text	TRUE	Type_Name		50
TYPE	TYPE	Text	TRUE	SPLICE_USE		50
COMMENTS	COMMENTS	Text	TRUE			300
CUSTOM1		Text	TRUE			300
CUSTOM2		Text	TRUE			300
CUSTOM3		Long	TRUE			
created_user		Text	TRUE			255
created_date		Date	TRUE			
last_edited_user		Text	TRUE			255
last_edited_date		Date	TRUE			
SHAPE	SHAPE	Geometry	TRUE			
LATITUDE	LATITUDE	Double	TRUE			
LONGITUDE	LONGITUDE	Double	TRUE			
GLOBALID	GLOBALID	Guid	TRUE			

HLDStructure – File Geodatabase Feature Class

NameHLDStructure
Alias HLDStructure
Feature DatasetHLD
Feature Type Simple
Geometry Type Point
HasZ No
HasMNo
Attachments No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
SIZE	SIZE	Text	TRUE			50
STATUS	STATUS	Text	TRUE	Physical_Status		50
PLACEMENT	PLACEMENT	Text	TRUE			50
COMMENTS	COMMENTS	Text	TRUE			50
GLOBALID	GLOBALID	Guid	TRUE			
CUSTOM1		Text	TRUE			300
CUSTOM2		Text	TRUE			300
CUSTOM3		Long	TRUE			
created_user		Text	TRUE			255
created_date		Date	TRUE			
last_edited_user		Text	TRUE			255
last_edited_date		Date	TRUE			
SHAPE	SHAPE	Geometry	TRUE			
LATITUDE	LATITUDE	Double	TRUE			
LONGITUDE	LONGITUDE	Double	TRUE			

CROArea – File Geodatabase Feature Class

Name: CROArea
Alias: CROArea
Feature Dataset: CRO
Feature Type: Simple
Geometry Type: Polygon
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
NAME	NAME	Text	TRUE			50
COMMENTS	COMMENTS	Text	TRUE			500
GlobalID	GlobalID	Global ID	FALSE			
created_user	created_user	Text	TRUE			255
created_date	created_date	Date	TRUE			
last_edited_user	last_edited_user	Text	TRUE			255
last_edited_date	last_edited_date	Date	TRUE			
SHAPE	SHAPE	Geometry	TRUE			
CUSTOM1	CUSTOM1	Text	TRUE			255
CUSTOM2	CUSTOM2	Text	TRUE			255
CUSTOM3	CUSTOM3	Double	TRUE			
SHAPE_Length		Double	TRUE			
SHAPE_Area		Double	TRUE			

CRONotesLine – File Geodatabase Feature Class

Name: CRONotesLine
Alias: CRONotesLine
Feature Dataset: CRO
Feature Type: Simple
Geometry Type: Line
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
COMMENTS	COMMENTS	Text	TRUE			1000
GlobalID	GlobalID	Global ID	FALSE			
created_user	created_user	Text	TRUE			255
created_date	created_date	Date	TRUE			
last_edited_user	last_edited_user	Text	TRUE			255
last_edited_date	last_edited_date	Date	TRUE			
SHAPE	SHAPE	Geometry	TRUE			
INVESTIGATIONNEEDED	INVESTIGATIONNEEDED	Text	TRUE	Yes/ No		50
DESIGNREVIEWNEEDED	DESIGNREVIEWNEEDED	Text	TRUE	Yes/ No		50
TYPE	TYPE	Text	TRUE			50
CUSTOM1	CUSTOM1	Text	TRUE			255
CUSTOM2	CUSTOM2	Text	TRUE			255
CUSTOM3	CUSTOM3	Double	TRUE			
SHAPE_Length		Double	TRUE			

CRONotesPoint – File Geodatabase Feature Class

Name: CRONotesPoint
Alias: CRONotesPoint
Feature Dataset: CRO
Feature Type: Simple
Geometry Type: Line
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
COMMENTS	COMMENTS	Text	TRUE			750
TYPE	TYPE	Text	TRUE			50
GlobalID	GlobalID	Global ID	FALSE			
created_user	created_user	Text	TRUE			255
created_date	created_date	Date	TRUE			
last_edited_user	last_edited_user	Text	TRUE			255
last_edited_date	last_edited_date	Date	TRUE			
SHAPE	SHAPE	Geometry	TRUE			
INVESTIGATIONNEEDED	INVESTIGATIONNEEDED	Text	TRUE	Yes/ No		50
DESIGNREVIEWNEEDED	DESIGNREVIEWNEEDED	Text	TRUE	Yes/ No		50
OFFSET	OFFSET	Double	TRUE			
PLACEMENT	PLACEMENT	Text	TRUE			50
SURVEYSTATUS	SURVEYSTATUS	Text	TRUE			50
TIEDOWNSTATION	TIEDOWNSTATION	Double	TRUE			
OFFSETFROM	OFFSETFROM	Text	TRUE			50
TIEDOWNPOINT	TIEDOWNPOINT	Text	TRUE			50
CUSTOM1	CUSTOM1	Text	TRUE			255
CUSTOM2	CUSTOM2	Text	TRUE			255
CUSTOM3	CUSTOM3	Double	TRUE			
LATITUDE	LATITUDE	Double	TRUE			
LONGITUDE	LONGITUDE	Double	TRUE			

CRONotesPolygon – File Geodatabase Feature Class

Name: CRONotesPolygon
Alias: CRONotesPolygon
Feature Dataset: CRO
Feature Type: Simple
Geometry Type: Polygon
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
COMMENTS	COMMENTS	Text	TRUE			750
GlobalID	GlobalID	Global ID	FALSE			
created_user	created_user	Text	TRUE			255
created_date	created_date	Date	TRUE			
last_edited_user	last_edited_user	Text	TRUE			255
last_edited_date	last_edited_date	Date	TRUE			
SHAPE	SHAPE	Geometry	TRUE			
INVESTIGATIONNEEDED	INVESTIGATIONNEEDED	Text	TRUE	Yes/ No		50
DESIGNREVIEWNEEDED	DESIGNREVIEWNEEDED	Text	TRUE	Yes/ No		50
TYPE	TYPE	Text	TRUE			50
CUSTOM1	CUSTOM1	Text	TRUE			255
CUSTOM2	CUSTOM2	Text	TRUE			255
CUSTOM3	CUSTOM3	Double	TRUE			
SHAPE_Length		Double	TRUE			
SHAPE_Area		Double	TRUE			

CROStructure – File Geodatabase Feature Class

Name: CROStructure
Alias: CROStructure
Feature Dataset: CRO
Feature Type: Simple
Geometry Type: Point
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
TYPE	TYPE	Text	TRUE	CRO_TYPE		50
STATUS	STATUS	Text	TRUE	Physical_Status		50
PLACEMENT	PLACEMENT	Text	TRUE	CRO_PLACEMENT		50
COMMENTS	COMMENTS	Text	TRUE			500
GlobalID	GlobalID	Global ID	FALSE			
created_user	created_user	Text	TRUE			255
created_date	created_date	Date	TRUE			
last_edited_user	last_edited_user	Text	TRUE			255
last_edited_date	last_edited_date	Date	TRUE			
SURVEYSTATUS	SURVEY_STATUS	Text	TRUE	Address_Status		20
SHAPE	SHAPE	Geometry	TRUE			
SUBTYPE	SUBTYPE	Text	TRUE			50
OWNER	OWNER	Text	TRUE			50
INROAD	INROAD	Text	TRUE	Yes/ No		50
OFFSET	OFFSET	Double	TRUE			
OFFSETFROM	OFFSETFROM	Text	TRUE			50
TIEDOWNSTATION	TIEDOWNSTATION	Double	TRUE			
TIEDOWNPOINT	TIEDOWNPOINT	Text	TRUE			50
CUSTOM1	CUSTOM1	Text	TRUE			255
CUSTOM2	CUSTOM2	Text	TRUE			255
CUSTOM3	CUSTOM3	Double	TRUE			
LATITUDE	LATITUDE	Double	TRUE			
LONGITUDE	LONGITUDE	Double	TRUE			

Permit_Polygons – File Geodatabase Feature Class

Name: Permit
Alias: Permit_Polygons
Feature Dataset: Telecom
Feature Type: Simple
Geometry Type: Polygon
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
FGID	ID	Text	TRUE			50
WORKORDERID	WO_ID	Text	TRUE			50
STATUS	STATUS	Text	TRUE	Permit_Status		50
PERMITID	PERMIT_ID	Text	TRUE			50
PERMITNAME	PERMIT_NAME	Text	TRUE			50
PERMITTYPE	PERMIT_TYPE	Text	TRUE			50
PERMITENTITY	PERMIT_ENTITY	Text	TRUE			50
TOTALMILEAGE	TOTAL_MILEAGE	Short	TRUE			
COMMENTS	COMMENTS	Text	TRUE			300
CUSTOM1	CUSTOM1	Text	TRUE			300
CUSTOM2	CUSTOM2	Text	TRUE			300
CUSTOM3	CUSTOM3	Double	TRUE			
created_user	created_user	Text	TRUE			255
created_date	created_date	Date	TRUE			
last_edited_user	last_edited_user	Text	TRUE			255
last_edited_date	last_edited_date	Date	TRUE			
GlobalID	GlobalID	Global ID	FALSE			
SHAPE	SHAPE	Geometry	TRUE			
SHAPE_Length		Double	TRUE			
SHAPE_Area		Double	TRUE			

PLAN_Boundaries – File Geodatabase Feature Class

Name: PlanningBoundary

Alias: PLAN_Boundaries

Feature Dataset: Telecom

Feature Type: Simple

Geometry Type: Polygon

HasZ: No

HasM: No

Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
FGID	FG_ID	Text	TRUE			50
TYPE	TYPE	Text	TRUE	PLAN_TYPE		50
TOTALADDRESS	TOTAL_ADDRESS	Short	TRUE			
TOTALMXU	TOTAL_MXU	Short	TRUE			
TOTALSFU	TOTAL_SFU	Short	TRUE			
COMMENTS	COMMENTS	Text	TRUE			250
CUSTOM1	CUSTOM1	Text	TRUE			300
CUSTOM2	CUSTOM2	Text	TRUE			300
CUSTOM3	CUSTOM3	Long	TRUE			
created_user	created_user	Text	TRUE			255
created_date	created_date	Date	TRUE			
last_edited_user	last_edited_user	Text	TRUE			255
last_edited_date	last_edited_date	Date	TRUE			
GlobalID	GlobalID	Global ID	FALSE			
SHAPE	SHAPE	Geometry	TRUE			
WORKORDERID	WO_ID	Text	TRUE			50
SHAPE_Length	SHAPE_Length	Double	TRUE			
SHAPE_Area	SHAPE_Area	Double	TRUE			

Pole – File Geodatabase Feature Class

Name: Pole
Alias: Pole
Feature Dataset: Telecom
Feature Type: Simple
Geometry Type: Point
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
FGID	ID	Text	TRUE			50
WORKORDERID	WO_ID	Text	TRUE			50
PHYSICALSTATUS	STATUS	Text	TRUE	Physical_Status		50
POLEID	POLE_ID	Text	TRUE			50
SURVEYSTATUS	SURVEY_STATUS	Text	TRUE	Survey_Status		50
SURVEYTYPE	SURVEY_TYPE	Text	TRUE			50
FIELDER	FIELDER	Text	TRUE			50
DESIGNER	DESIGNER	Text	TRUE			50
SEQUENCENO	SEQUENCE_NO	Double	TRUE			
HEIGHT	HEIGHT_FT	Double	TRUE			
CLASS	CLASS	Double	TRUE			
MATERIAL	MATERIAL	Text	TRUE			50
COMMENTS	COMMENTS	Text	TRUE			300
TOPOFPOLE	TOP_OF_POLE	Double	TRUE			
TRANSFORMER	TRANSFORMER	Text	TRUE	Yes/ No		50
BASECIRCUMFERENCE	BASE_CIRCUMFERENCE	Double	TRUE			
LOWESTPWRTYPE	LOWEST_PWR_TYPE	Text	TRUE	Elec_Type		50
LOWESTPWRHEIGHT	LOWEST_PWR_HEIGHT	Double	TRUE			
PROLOWESTPWR	PROP_LOWEST_PWR	Text	TRUE			50
PWRRISER	PWR_RISER	Double	TRUE			
PROPPWRRISER	PROP_PWR_RISER	Text	TRUE			50
PWRANCHOR	PWR_ANCHOR	Double	TRUE			
PROPPWRANCHOR	PROP_PWR_ANCHOR	Text	TRUE			50
PWRGUY	PWR_GUY	Double	TRUE			
PROPPWRGUY	PROP_PWR_GUY	Text	TRUE			50
DRIPLOOP	DRIP_LOOP	Double	TRUE			
PROPDRILOOP	PROP_DRIP_LOOP	Text	TRUE			50
STLIGHTHEIGHT	STREETLIGHT_HEIGHT	Double	TRUE			
PROPSTLIGHT	PROP_STREETLIGHT	Text	TRUE			50
STLIGHTLOOP	ST_LIGHT_LOOP	Double	TRUE			
PROPSTLIGHTLOOP	PROP_ST_LIGHT_LOOP	Text	TRUE			50
POA1_TYPE	POA1_TYPE	Text	TRUE	POA_TYPE		50

POA1_HEIGHT	POA1_HEIGHT	Double	TRUE			
PROP_POA1	PROP_POA1	Text	TRUE			50
POA1_COMMENT	POA1_COMMENT	Text	TRUE			200
POA2_TYPE	POA2_TYPE	Text	TRUE	POA_TYPE		50
POA2_HEIGHT	POA2_HEIGHT	Double	TRUE			
PROP_POA2	PROP_POA2	Text	TRUE			50
POA2_COMMENT	POA2_COMMENT	Text	TRUE			200
POA3_TYPE	POA3_TYPE	Text	TRUE	POA_TYPE		50
POA3_HEIGHT	POA3_HEIGHT	Double	TRUE			
PROP_POA3	PROP_POA3	Text	TRUE			50
POA3_COMMENT	POA3_COMMENT	Text	TRUE			200
POA4_TYPE	POA4_TYPE	Text	TRUE	POA_TYPE		50
POA4_HEIGHT	POA4_HEIGHT	Double	TRUE			
PROP_POA4	PROP_POA4	Text	TRUE			50
POA4_COMMENT	POA4_COMMENT	Text	TRUE			200
POA5_TYPE	POA5_TYPE	Text	TRUE	POA_TYPE		50
POA5_HEIGHT	POA5_HEIGHT	Double	TRUE			
PROP_POA5	PROP_POA5	Text	TRUE			50
POA5_COMMENT	POA5_COMMENT	Text	TRUE			200
POA6_TYPE	POA6_TYPE	Text	TRUE	POA_TYPE		50
POA6_HEIGHT	POA6_HEIGHT	Double	TRUE			
PROP_POA6	PROP_POA6	Text	TRUE			50
POA6_COMMENT	POA6_COMMENT	Text	TRUE			200
POA7_TYPE	POA7_TYPE	Text	TRUE	POA_TYPE		50
POA7_HEIGHT	POA7_HEIGHT	Double	TRUE			
PROP_POA7	PROP_POA7	Text	TRUE			50
POA7_COMMENT	POA7_COMMENT	Text	TRUE			200
POA8_TYPE	POA8_TYPE	Text	TRUE	POA_TYPE		50
POA8_HEIGHT	POA8_HEIGHT	Double	TRUE			
PROP_POA8	PROP_POA8	Text	TRUE			50
POA8_COMMENT	POA8_COMMENT	Text	TRUE			200
RISERPRESENT	RISER_PRESENT	Text	TRUE	Yes/ No		50
RISERTYPE	RISER_TYPE	Text	TRUE			50
RISERCOUNT	RISER_COUNT	Double	TRUE			
RISEROWNER	RISER_OWNER	Text	TRUE			50
RISERCOMMENTS	RISER_COMMENTS	Text	TRUE			200
BONDEXIST	BOND_EXIST	Text	TRUE	Bond_Exist		50
ATTACHSIDE	ATTACH_SIDE	Text	TRUE	Attach_side		50
CLAMPSTYPE	CLAMP_TYPE	Text	TRUE	Clamp_Type		50
POLETILT	POLE_TILT	Double	TRUE			
LAT	LAT	Double	TRUE			
LONG	LONG	Double	TRUE			

NEARESTADDRESS	NEAREST_ADDRESS	Text	TRUE		200
EQFKEY	EQ_FKEY	Text	TRUE		50
LOWESTPWRLABEL	LOWEST_PWR_LABEL	Double	TRUE		
PWRRISERLABEL	PWR_RISER_LABEL	Double	TRUE		
DRIPLOOPLABEL	DRIP_LOOP_LABEL	Double	TRUE		
STREETLIGHTLABEL	STREETLIGHT_LABEL	Double	TRUE		
POA1LABEL	POA1_LABEL	Text	TRUE		50
POA2LABEL	POA2_LABEL	Text	TRUE		50
POA3LABEL	POA3_LABEL	Text	TRUE		50
POA4LABEL	POA4_LABEL	Text	TRUE		50
POA5LABEL	POA5_LABEL	Text	TRUE		50
POA6LABEL	POA6_LABEL	Text	TRUE		50
POA7LABEL	POA7_LABEL	Text	TRUE		50
POA8LABEL	POA8_LABEL	Text	TRUE		50
CUSTOM1	CUSTOM1	Text	TRUE		300
CUSTOM2	CUSTOM2	Text	TRUE		300
CUSTOM3	CUSTOM3	Long	TRUE		
created_user	created_user	Text	TRUE		255
created_date	created_date	Date	TRUE		
last_edited_user	last_edited_user	Text	TRUE		255
last_edited_date	last_edited_date	Date	TRUE		
GlobalID	GlobalID	Global ID	FALSE		
SHAPE	SHAPE	Geometry	TRUE		
OWNER	OWNER	Text	TRUE		50

SlackLoops – File Geodatabase Feature Class

Name: SlackLoop
Alias: SlackLoops
Feature Dataset: Telecom
Feature Type: Simple
Geometry Type: Point
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
FGID	FG_ID	Text	TRUE			50
WORKORDERID	WO_ID	Text	TRUE			50
PLACEMENT	PLACEMENT	Text	TRUE	Type_Name		50
FIBERCOUNT	FIBERCOUNT	Short	TRUE	Fibercount		
LENGTH	LENGTH	Short	TRUE	SlackLoop		
LENGTHLABEL	LENGTH_LABEL	Double	TRUE			
CABLENAME	CABLE_NAME	Text	TRUE			50
STRFKEY	STR_FKEY	Text	TRUE			50
CABLEFKEY	CABLE_FKEY	Text	TRUE			50
CUSTOM1	CUSTOM1	Text	TRUE			300
CUSTOM2	CUSTOM2	Text	TRUE			300
CUSTOM3	CUSTOM3	Long	TRUE			
created_user	created_user	Text	TRUE			255
created_date	created_date	Date	TRUE			
last_edited_user	last_edited_user	Text	TRUE			255
last_edited_date	last_edited_date	Date	TRUE			
GlobalID	GlobalID	Global ID	FALSE			
SHAPE	SHAPE	Geometry	TRUE			

BOC – File Geodatabase Feature Class

Name: BOC
Alias: BOC
Feature Dataset: Basemap
Feature Type: Simple
Geometry Type: Line
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
CUSTOM1	CUSTOM1	Text	TRUE			50
CUSTOM2	CUSTOM2	Text	TRUE			50
CUSTOM3	CUSTOM3	Double	TRUE			
DATA_SOURCE	UTILITY_SOURCE	Text	TRUE			50
SHAPE	SHAPE	Geometry	TRUE			
SHAPE_Length		Double	TRUE			

Building Outline – File Geodatabase Feature Class

Name: Building_Outline
Alias: Building Outline
Feature Dataset: Basemap
Feature Type: Simple
Geometry Type: Line
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
CUSTOM1	CUSTOM1	Text	TRUE			50
CUSTOM2	CUSTOM2	Text	TRUE			50
CUSTOM3	CUSTOM3	Double	TRUE			
DATA_SOURCE	UTILITY_SOURCE	Text	TRUE			50
SHAPE	SHAPE	Geometry	TRUE			
SHAPE_Length		Double	TRUE			

City Boundary– File Geodatabase Feature Class

Name: City_Boundary
Alias: City Boundary
Feature Dataset Basemap
Feature Type: Simple
Geometry Type: Polygon
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
NAME	NAME	Text	TRUE			50
CUSTOM1	CUSTOM1	Text	TRUE			50
CUSTOM2	CUSTOM2	Text	TRUE			50
CUSTOM3	CUSTOM3	Long	TRUE			
DATA_SOURCE	DATA_SOURCE	Text	TRUE			50
SHAPE	SHAPE	Geometry	TRUE			
SHAPE_Length		Double	TRUE			
SHAPE_Area		Double	TRUE			

County Boundary– File Geodatabase Feature Class

Name: County_Boundary
Alias: County Boundary
Feature Dataset Basemap
Feature Type: Simple
Geometry Type: Polygon
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
NAME	NAME	Text	TRUE			50
CUSTOM1	CUSTOM1	Text	TRUE			50
CUSTOM2	CUSTOM2	Text	TRUE			50
CUSTOM3	CUSTOM3	Long	TRUE			
DATA_SOURCE	DATA_SOURCE	Text	TRUE			50
SHAPE	SHAPE	Geometry	TRUE			
SHAPE_Length		Double	TRUE			
SHAPE_Area		Double	TRUE			

Easement– File Geodatabase Feature Class

Name: Easement
Alias: Easement
Feature Dataset: Basemap
Feature Type: Simple
Geometry Type: Polygon
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
TYPE	TYPE	Text	TRUE			50
CUSTOM1	CUSTOM1	Text	TRUE			50
CUSTOM2	CUSTOM2	Text	TRUE			50
CUSTOM3	CUSTOM3	Long	TRUE			
DATA_SOURCE	DATA_SOURCE	Text	TRUE			50
SHAPE	SHAPE	Geometry	TRUE			
SHAPE_Length		Double	TRUE			
SHAPE_Area		Double	TRUE			

EOP– File Geodatabase Feature Class

Name: EOP
Alias: EOP
Feature Dataset: Basemap
Feature Type: Simple
Geometry Type: Line
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
CUSTOM1	CUSTOM1	Text	TRUE			50
CUSTOM2	CUSTOM2	Text	TRUE			50
CUSTOM3	CUSTOM3	Double	TRUE			
DATA_SOURCE	UTILITY_SOURCE	Text	TRUE			50
SHAPE	SHAPE	Geometry	TRUE			
SHAPE_Length		Double	TRUE			

Parcel– File Geodatabase Feature Class

Name: Parcel
Alias: Parcel
Feature Dataset: Basemap
Feature Type: Simple
Geometry Type: Polygon
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
FIPS	FIPS	Double	TRUE			
PARCEL_ID	PARCEL_ID	Text	TRUE			50
PARCEL_ADDR	PARCEL_ADD	Text	TRUE			150
PARCEL_CITY	PARCEL_CITY	Text	TRUE			50
PARCEL_ZIP	PARCEL_ZIP	Text	TRUE			50
PARCEL_STATE	PARCEL_STATE	Text	TRUE			50
OWNER	OWNER	Text	TRUE			50
OWNER_ADDR	OWNER_ADDR	Text	TRUE			150
OWNER_CITY	OWNER_CITY	Text	TRUE			50
OWNER_ZIP	OWNER_ZIP	Text	TRUE			50
OWNER_STATE	COMMENT	Text	TRUE			50
COMMENT	COMMENT	Text	TRUE			250
CUSTOM1	DATA_SOURCE	Text	TRUE			50
CUSTOM2	CUSTOM2	Text	TRUE			50
CUSTOM3	CUSTOM3	Double	TRUE			
DATA_SOURCE	DATA_SOURCE	Text	TRUE			50
SHAPE	SHAPE	Geometry	TRUE			
SHAPE_Length		Double	TRUE			
SHAPE_Area		Double	TRUE			

Railroad– File Geodatabase Feature Class

Name: Railroad
Alias: Railroad
Feature Dataset: Basemap
Feature Type: Simple
Geometry Type: Line
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
NAME	Name	Text	TRUE			50
CUSTOM1	CUSTOM1	Text	TRUE			50
CUSTOM2	CUSTOM2	Text	TRUE			50
CUSTOM3	CUSTOM3	Double	TRUE			
DATA_SOURCE	DATA_SOURCE	Text	TRUE			50
SHAPE	SHAPE	Geometry	TRUE			
SHAPE_Length		Double	TRUE			

Street– File Geodatabase Feature Class

Name: Street
Alias: Street
Feature Dataset: Basemap
Feature Type: Simple
Geometry Type: Line
HasZ: No
HasM: No
Attachments: No Attachments

Field Name	Alias	Data Type	Allow Null	Domain	Default Value	Length
OBJECTID	OBJECTID	Object ID	FALSE			
NAME	NAME	Text	TRUE			50
CUSTOM1	CUSTOM1	Text	TRUE			50
CUSTOM2	CUSTOM2	Text	TRUE			50
CUSTOM3	CUSTOM3	Long	TRUE			
DATA_SOURCE	DATA_SOURCE	Text	TRUE			50
SHAPE	SHAPE	Geometry	TRUE			
SHAPE_Length		Double	TRUE			

Addresses – Domain

Name: Address_Status

Field Type: Text

Domain Type: Coded Value

Code	Description
Verified	Verified
Not Verified	Not Verified

Name: Address_Type

Field Type: Text

Domain Type: Coded Value

Code	Description
SFU	Single Family Unit
Duplex	Duplex
Triplex	Triplex
Quadplex	Quadplex
MDU	Multi-Dwelling Unit
SBU	Single Business Unit
MBU	Multi-Business Unit
School	School
Church	Church

HLDFiber – Domain

Name: Type_Name
Field Type: Text
Domain Type: Coded Value

Code	Description
AERIAL	AERIAL
BURIED	BURIED

Name: Cable_Category
Field Type: Text
Domain Type: Coded Value

Code	Description
Drop	Drop
MST	Multiport Service Terminal Tail
Distribution	Distribution
Feeder	Feeder
Backbone	Backbone

Name: Fibercount
Field Type: Short
Domain Type: Coded Value

Code	Description
12	12
24	24
48	48
72	72
96	96
144	144
192	192
216	216
288	288
360	360
432	432
576	576
864	864
1	1

Name: Physical_Status
Field Type: Text
Domain Type: Coded Value

Code	Description
Proposed	Proposed
Existing	Existing
Removed	Removed
Leased	Leased

HLDHUB – Domain

Name: HUB_Type
Field Type: Text
Domain Type: Coded Value

Code	Description
HUB	HUB
CO	CENTRAL OFFICE
POP	POINT OF PRESENCE

HLDRoute – Domain

Name: Cable_Category
Field Type: Text
Domain Type: Coded Value

Code	Description
Drop	Drop
MST	Multiport Service Terminal Tail
Distribution	Distribution
Feeder	Feeder
Backbone	Backbone

Name: Physical_Status
Field Type: Text
Domain Type: Coded Value

Code	Description
Proposed	Proposed
Existing	Existing
Removed	Removed
Leased	Leased

Name: Type_Name
Field Type: Text
Domain Type: Coded Value

Code	Description
AERIAL	AERIAL
BURIED	BURIED

HLDSpliceClosure – Domain

Name: Type_Name
Field Type: Text
Domain Type: Coded Value

Code	Description
AERIAL	AERIAL
BURIED	BURIED

Name: SPLICE_USE
Field Type: Text
Domain Type: Coded Value

Code	Description
RE	REEL END
MCA	MID CABLE ACCESS
VIRTUAL	VIRTUAL

HLDDStructure – Domain

Name: Physical_Status
Field Type: Text
Domain Type: Coded Value

Code	Description
Proposed	Proposed
Existing	Existing
Removed	Removed
Leased	Leased

CRONotesLine – Domain

Name: Yes/ No
Field Type: Text
Domain Type: Coded Value

Code	Description
Yes	Yes
No	No

CRONotesPoint – Domain

Name: Yes/ No
Field Type: Text
Domain Type: Coded Value

Code	Description
Yes	Yes
No	No

CRONotesPolygon – Domain

Name: Yes/ No
Field Type: Text
Domain Type: Coded Value

Code	Description
Yes	Yes
No	No

CROStructure – Domain

Name: CRO_TYPE
Field Type: Text
Domain Type: Coded Value

Code	Description
Telecom	Telecom
Gas	Gas
Electric	Electric
Water	Water
Pole	Pole
Other	Other
Service_Side	Service Side

Name: Physical_Status
Field Type: Text
Domain Type: Coded Value

Code	Description
Proposed	Proposed
Existing	Existing
Removed	Removed
Leased	Leased

Name:CRO_PLACEMENT
Field Type: Text
Domain Type:Coded Value

Code	Description
Grass	Grass
Concrete	Concrete

Name: Address_Status
Field Type: Text
Domain Type:Coded Value

Code	Description
Verified	Verified
Not Verified	Not Verified

Name: Yes/ No
Field Type: Text
Domain Type:Coded Value

Code	Description
Yes	Yes
No	No

Permit_Polygons – Domain

Name: Permit_Status
Field Type: Text
Domain Type:Coded Value

Code	Description
Not Started	Not Started
In Production	In Production
Check Request	Check Request
Ready for Submission	Ready for Submission
Entity Review	Entity Review
Respond to Entity Review	Respond to Entity Review
Permitted	Permitted
Complete – Move to CDs	Complete – Move to CDs
On Hold	On Hold
Canceled	Canceled

PLAN_Boundaries – Domain

Name: PLAN_TYPE
Field Type: Text
Domain Type: Coded Value

Code	Description
CABLE	CABLE
NAP	NAP
FAP	FAP

Pole – Domain

Name: Physical_Status
Field Type: Text
Domain Type: Coded Value

Code	Description
Proposed	Proposed
Existing	Existing
Removed	Removed
Leased	Leased

Name: Survey_Status
Field Type: Text
Domain Type: Coded Value

Code	Description
NOT STARTED	NOT STARTED
ON HOLD	ON HOLD
COMPLETE	COMPLETE

Name: Yes/ No
Field Type: Text
Domain Type: Coded Value

Code	Description
Yes	Yes
No	No

Name: Elec_Type
Field Type: Text
Domain Type: Coded Value

Code	Description
SECONDARY	SECONDARY
NEUTRAL	NEUTRAL
PRIMARY	PRIMARY
CROSSARM	CROSSARM
SECONDARY CROSSARM	SECONDARY CROSSARM
3 SPOOL RACK	3 SPOOL RACK

Name: POA_TYPE
Field Type: Text
Domain Type: Coded Value

Code	Description
TELCO	TELCO
CATV	CATV
FIBER	FIBER
DROP	DROP
AF	AF
ATT	ATT
OTHER	OTHER
CLIENT	CLIENT

Name: Bond_Exist
Field Type: Text
Domain Type: Coded Value

Code	Description
Yes	Yes
No	No
Multiple	Multiple

Name: Attach_side
Field Type: Text
Domain Type: Coded Value

Code	Description
Roadside	Roadside
Interior	Interior

Name: Clamp_Type
Field Type: Text
Domain Type: Coded Value

Code	Description
CC-1	CC-1
DD-1	DD-1
FDE-1	FDE-1
FGA-3-18"	FGA-3-18"
FGA-3-24"	FGA-3-24"
FGA-3-36"	FGA-3-36"
FOS	FOS
FOS-AG	FOS-AG
FOS-T	FOS-T
MSS-1	MSS-1
SD-3	SD-3
SD-4	SD-4
VANG	VANG

SlackLoops – Domain

Name: Type_Name
Field Type: Text
Domain Type: Coded Value

Code	Description
AERIAL	AERIAL
BURIED	BURIED

Name: Fibercount
Field Type: Short
Domain Type: Coded Value

Code	Description
12	12
24	24
48	48
72	72
96	96
144	144
192	192
216	216
288	288
360	360
432	432
576	576
864	864
1	1

Name: SlackLoop
Field Type: Text
Domain Type: Coded Value

Code	Description
25	25
50	50

APPENDIX G – NETWORK ARCHITECTURE HANDBOOK

PART 1 – PROJECT OVERVIEW

1.1 – GENERAL INFORMATION

This Broadband Engineering Architecture Handbook is provided for personnel and contractors as a guideline to the engineering, construction, and fiber optic links placement/test acceptance. No one document can be all-inclusive and personnel and contractors are expected to use industry standards and sound judgement to conduct all operations herein.

1.2 – PROJECT ARCHITECTURE SUMMARY

- Network Architecture: N/A
- Architecture Split: N/A
- Hierarchy Tiers: 2

TIER 1 – FEEDER (F1)	
Feeder Hub(s):	Central Office(s)
Hub Capacity:	10,000 user per Hub
Cable Size(s):	144ct, 288ct, 432ct, 864ct
Spare Fiber Count:	48 fibers
Cables Taper:	Yes

TIER 2 – DISTRIBUTION (F2)	
Distribution Hub(s)	N/A
Hub Capacity:	N/A
Tier 2 Hub Split?:	N/A
Hub Split Ratio:	N/A
Spare Port(s):	N/A
Unsplit Port(s):	N/A
Cable Size(s):	48ct
Spare Fiber Count:	12% cable size fibers
Cables Taper:	No
Parallel Cable Threshold:	1000 ft

1.2.1 – Design Considerations

- OSP Network Architecture (Part 2 of this document)
- OSP Design Guidelines (Part 3 of this document)

1.3 – PROJECT COMPONENTS SUMMARY

1.3.1 – Fiber Cable

Material	Description
48 ct FOC	
144 ct FOC	
288 ct FOC	
432 ct FOC	
864 ct FOC	

1.3.2 – Conduits

Material	Description
1.25 in. dia.	
2 in. dia.	
4 in. dia.	

1.3.3 – Handholes/Manholes

Material	Description
24" x 36" x 24" HH	
30" x 48" x 24" HH	
30" x 60" x 30" HH	
36" x 60" x 36" HH	
36" x 76" x 42" HH	
48" x 48" x 48" MH	
48" x 72" x 72" MH	
48" x 96" x 96" MH	

1.3.4 – Poles

Material	Description
35 – C3	

1.3.5 – Strand

Material	Description
6.6M	¼" EHS Suspension Strand
10M	3/8" EHS Suspension Strand
16M	7/16" EHS Suspension Strand
25M	½" EHS Suspension Strand

1.3.6 – Splice Closure

Material	Description
TE FOSC 450B	
TE FOSC 450C	
TE FOSC 450D	
TE FOSC 600D	

1.3.7 – Slack Loops

Material	Description
50'	@ underground/buried splice locations and all 90deg changes in route
75'	@ aerial splice locations and one side of all 3 lane or greater road crossings in aerial and underground environments
100'	@ aerial splice locations and slack placement every 1500' along route in aerial and underground environments

1.3.10 – Miscellaneous Components

Material	Description
Locate Wire	
Marker Poles	
Risers	
Guys & Anchors	

PART 2 – OSP NETWORK ARCHITECTURE

2.1 – NETWORK TOPOLOGY

2.1.1 – Network Topology Overview

The proposed network is based on a Middle Mile Optical Network technology that follows the ITU Telecommunication Standardization Sector (ITU-T) G.984.x specification. The topology references the Central Office as the “start” of the network and progresses to demand points or Premise at the “end” of the network. When referring to signal flow or component placement, the term “upstream” is defined as closer to the Central Office and “downstream” as closer to the Premise or “end” of the network.

For deployment, outside plant network components have a preferred buried/underground placement for Feeder (F1) and Distribution (F2) segments of the network. Underground storage structures are placed for all transitions between cable sizes, splice locations, transitions at 90° intersections, and at other strategic locations where future access is required. Buried placement will consist of placement of new underground conduits, handholes and manholes. Any aerial placement will primarily consist of existing pole routes with power and/or telecom cable routes present. Installation of new strand will be used. New pole placement will be the next preferred option where terrain conditions permit it.

The primary route of the Feeder (F1) will consist of an 864ct fiber FOC along the entirety of the route with a 432ct FOC cable stub placed at predetermined splice locations. The Distribution (F2) segments of the network will access the Feeder (F1) via the 432ct FOC cable stub.

2.1.2 – Network Hierarchy

To understand the organization and layout of the proposed fiber network more easily, hierarchies are used to characterize it based on tiers of service. These tiers are sequential from the highest-level (Tier 1) down to the lowest, most individual level (Tier 2). The characteristics of each tier are elaborated upon below.

2.1.2.2 – Tier 1 or Feeder (F1) Hierarchy

Tier 1, or Feeder hierarchy, is the next level of hierarchy directly below the network backbone. This tier acts as the primary arterial tier for the fiber network and connects a single Central Office/Feeder Hub to various Distribution Hubs that are served by it. Tier 1 sub-divides the entire network into coverage “boundary areas” with one Central Office or Feeder Hub set as its center. A network of Distribution Hubs, which serve as the end point of Tier 1 hierarchy and starting point of Tier 2 hierarchy, are laid out within the coverage area of this boundary. A network of fiber cable and outside plant elements connects each of these Distribution Hubs back to the CO/FH for its service area. Fiber cables in this tier are still in the “pre-split” portion of the network and a single fiber strand can carry data to serve as many as 32 subscribers.

2.1.2.3 – Tier 2 or Distribution (F2) Hierarchy

Tier 2, or Distribution hierarchy, is the next level of hierarchy directly below the Feeder level. As its name implies, it functions as the distribution arm of the network, distributing service from centralized hub points to delivery points near the subscriber locations. Tier 2 further subdivides the boundary areas from Tier 1 into Distribution Areas, with a single Distribution Hub set as its center. Distribution Hubs are the first point of split for a distributed split network and only point of split for a centralized split network. Each Distribution Hub Area has a network of local distribution points, known as Terminal Hubs, which serve as the end point of Tier 2 hierarchy and the starting point of Tier 3 hierarchy. A network of fiber cable and outside plant elements connect each of these Terminal Hubs back to the Distribution Hub for its service area.

2.2 – NETWORK ELEMENTS & STRUCTURES

Chapter 2.2 of this manual further defines the individual elements and structures that make up the fiber network. It provides detailed descriptions of each component and specific naming conventions used to identify the component. The name is used to uniquely identify several attributes about the component.

In many cases, an Element or Structure can be placed in multiple sections of the network. Additional placement rules, guidelines and recommendations are covered in [Chapter 3.3](#) of this manual.

Please note that not all Elements or Structures in the network require a name.

2.2.1 – Feeder Hub

The Feeder Hub is the highest-level element of the entire fiber network. They are specialized facilities providing conditioned space to house both passive gear and active electronics providing connectivity between the local market and a remote POP or other distant optical transport backbone. These facilities provide co-location space to host multiple network providers, internet service providers (ISPs), or network tenants. It may also support direct point-to-point fiber networks from routers, switches, or other active equipment. Feeder Hubs can have different names based on their use and size of coverage areas, such Central Office (CO), Point of Presence (POP) and Fiber Hut. The Feeder Hub functions as the main component of the Tier 1-Feeder hierarchy and one or multiple of them are interconnected with each other to serve an entire market area. They also

function as the initial point of the Tier 1-Feeder hierarchy. Each Fiber Hub has a coverage area, referred to as a Feeder Hub Boundary (FHB).

2.2.1.1 – Central Office (CO)

Large Feeder Hubs are often classified as Central Offices or COs. COs are often their own individual buildings or part of a larger building and can serve the largest number of subscribers within a network. Depending on its size, a single market can be served by just one or multiple COs, and each CO has its own coverage area, referred to as a Feeder Hub Boundary (FHB).

2.2.1.2 – Point of Presence (POP)

A Point of Presence, or POP, is a specific type of CO within the fiber network which hosts equipment that directly connects the fiber network to other networks and the national backbone. A fiber network requires at least one POP site present but multiple POPs may also be used for markets of greater size of subscribers and to provide redundancy in the case of severe outages.

2.2.1.3 – Fiber Hut

A Fiber Hut, sometimes also referred to as a Remote, acts as a smaller-scale Central Office. Like COs, they are often their own individual building but are much smaller in size and can provide enough equipment to serve a smaller number of subscribers than a CO. Fiber Huts are often used in addition to the CO in markets where the subscriber counts exceed the capacity of the CO but the surplus does not merit an additional CO.

2.2.3 – Fiber Optic Cable

Fiber optic cables of varying types and capacity are used in all tiers of the fiber network and are used for various uses including back-office support, distribution, and client service. The fiber count within a single cable varies by design and can be as small as single (1) fiber to serve a single client or multiple fibers, usually designed in bundles of 12, which are commonly referred to as “Ribbons.” The most common fiber cables are sized in multiples of 12 and the most common sizes are:

- 12
- 24
- 48
- 72
- 96
- 144
- 288
- 432
- 864

Fiber cables for each tier are described below.

2.2.3.3 – Tier 2 or Distribution Fiber Cable

Fiber optic cables in the Distribution tier are meant to provide a connection between a Tier 1 Feeder Cable and an end user structure such as fire stations and county or city services buildings. Cable sizing in this tier will be set 48ct to maintain sufficient building entry for ring services (data transfer and backup), point to point services(telephone/internet), and to maintain sufficient future spare count.

- Cables used in this tier will be: 48ct, 96ct, 144ct, 288ct, 432ct.
- Can be installed in either aerial or underground environments.
- Splice Enclosures are used along the length of (MCAs) or at the end of Reel-Ends (REs) cable legs and allow connection to cable extensions and laterals.

2.2.3.4 – Tier 1 or Feeder Fiber Cable

Fiber optic cables in the Feeder tier are meant to link the CO to Tier 2 Distribution cables and access points along the network. These cables are generally large count ribbon fiber such as 864, 432, 288, and 144. The fiber quantity can taper along the Tier 1 route as fiber is allocated to each building or access location.

- Cables used in this tier: 864ct.
- Can be installed in either aerial or underground environments.
- Each leg can have smaller lateral cables that taper off from the main cable and can extend the coverage area of a single cable leg.

2.2.4 – Splice Enclosures

Splice Enclosures are prefabricated casings that act as “joint points” for a fiber cable network. They allow for the protection of fiber cables that have become exposed to the environments after going through fusion splicing of fibers. They are generally weather resistant and can be used in both indoor and outdoor environments. Splice Enclosures mark points on a cable where two or more fiber cables are spliced together and are a part of the first three tiers (F0, F1 and F2) of the fiber network.

Splice Enclosures come in different sizes depending on the location to be used and size and quantity of cables to share a single enclosure.

Splice Enclosures can be installed in both aerial and underground environments. Aerial Enclosures are attached to an aerial strand on a pole line and are physically exposed to the elements. Underground Enclosures should always be installed in a protected environment, such as a handhole.

Splice Enclosures are classified as either Reel-End (RE) enclosures or Mid-Cable Access (MCA) enclosures. Both types and their uses are elaborated below.

2.2.4.1 – Reel-End (RE)

Splice Enclosures classified as “Reel-End (RE)” are enclosures that connect 2 or more fiber cables at the end point of each cable. They are primarily used with long haul cable installations where full cable reel lengths are insufficient to cover the full length of the route and a secondary cable needs to be used to complete the run. Cables spliced together at REs can be the same size or can involve downsizing of cable sizes if demand has tapered down by the point they happen. REs can be found in all tiers (F1 and F2) of the fiber network.

- Tier 1 (Feeder, F1) & Tier 2 (Distribution, F2) – REs is used for extending F1 cables where cable reel length is not enough for a route. They also allow for tapering down cable sizes and connecting to lateral cables when needed.

2.2.4.2 – Mid-Cable Access (MCA)

Splice Enclosures classified as “Mid-Cable Access (MCA)” are any enclosures used along any length of a single cable. They are used when cuts into a cable, commonly referred to as “Ring Cuts,” are performed in order to access and splice fibers in that cable at locations other than reel-ends. In addition to accessing the cable, one (1) or more additional cables can be spliced into the primary cable at this point. MCAs can be found in both the F1-Feeder and F2-Distribution tiers of the fiber network.

- Tier 1 (Feeder, F1) – MCAs are used at Tier 2 locations along F1 cable routes and are used to splice together F1 fibers to their assigned Tier 2 location.
- Tier 2 (Distribution, F2) – MCAs are used along F2 cable routes to allow the connection of laterals to primary cables.

2.2.6 – Slack Loops

Slack Loops, while categorized as their own separate element, are physically part of the fiber cable element of the network. A Slack Loop, also referred to as a coil or storage loop, is the coiling of defined footage of fiber cable in order to give the cable “slack.” Slack on a cable loosens it and lowers the tension that occurs during installation. Slack loops serve multiple uses within a fiber network such as adding extra cable length for maintenance and for allowing access to the fiber cable for fiber splicing purposes.

- Slack Loops are used on cables of all sizes in the 2 tiers of the network (F1 and F2).
- Slack Loops can be installed in both aerial and underground environments.
- Slack Loops in underground environments should be installed in protected environments, such as handholes or vaults.

2.2.7 – Conduits

Conduits are hollowed out plastic tubes that are installed in underground environments. Commonly made of either PVC or HDPE, conduits allow for the installation of fiber cables within them and protect the cable from the physical environment. Conduits come in varying sizes and can allow for the installation of 1 or multiple cables depending on the cable sizes. All underground cables shall be installed within conduits.

2.2.8 – Underground Storage Structures

Underground Storage Structures are a network element that provides physical protection for outside plant equipment in underground environments. This generally consists of a protected, enclosed cavity in the ground that has room for the storing of equipment like fiber cable storage loops and splice enclosures. Storage Structures are normally placed at the end point of conduit routes and serve multiple purposes, including storing equipment, providing “pull points” for fiber cable installation and access for emergency maintenance. Two primary types of Underground Storage Structures (Handholes and Manholes) are used. Their name varies depending on its use as defined below.

2.2.8.1 – Handholes

Handholes are Underground Storage Structures that are large enough to store equipment but do not allow a person full entry into the enclosed space. Handholes are generally prefabricated structures that come in a variety of pre-designed sizes and provide protection from the underground environment around it. As the

name indicates “handholes” generally only have enough room for worker hands to enter and any work performed on plant equipment stored in it must be removed and performed outside of it.

Prefabricated Handhole lids are also custom designed and offer varying levels of protection depending on its type. The most common are:

- Light Duty: These lids are the lightest and are for use in areas that see no vehicular traffic and only pedestrian traffic might be involved. It should be used in grassy areas where limited foot traffic is expected.
- Tier 15: These lids are primarily used in locations where non-deliberate heavy vehicular traffic occurs only occasionally. Should be used for handholes installed on green strips or sidewalks that primarily see pedestrian traffic and very rare, non-incident vehicular traffic.
- Tier 22: These lids are primarily used in locations where non-deliberate heavy vehicular traffic might occur more commonly than Tier 15 locations. It should be used for handholes on driveways or within parking lots.
- H-20: Traffic Rated lids that allow for active vehicle traffic. Should be used for any construction within a motorized roadway.

Handholes are a more economical storage structure option and are easier to install and design.

2.2.8.2 – Manholes

Manholes are Underground Storage Structures that are large enough to both store equipment and allow a person full entry into the enclosed space. Manholes are much larger in size than Handholes and are normally more rigid structures, typically made of reinforced concrete. At their largest, Manholes can have “room-size” enclosed storage space. Manholes can be prefabricated or cast-in-place depending on situations and are more costly to install than Handholes. Manhole lids are most commonly Traffic Rated (H-20).

2.3 – NETWORK NAMING CONVENTIONS

Chapter 2.3 of this manual defines the naming schemes used by various elements of the fiber network. Naming schemes are designed to be unique for each element of the plant and maintain a hierarchical logic in associating components in whatever tier they are a part of. Naming schemes used as part of the architecture are expanded upon below.

2.3.1.1 – Feeder Hub Naming

Feeder Hubs are identified by a common identifier for the market and a sequential number for each Hub.

ABT[Sequential Number]

- Examples:
 - ABTA01
 - ABTA02

2.3.1.2 – Feeder Hub Boundary Area Naming

Feeder Hub Boundary Areas will share the same name as their Feeder Hub.

ABT[Sequential Number]

- Examples:
 - ABTA01
 - ABTA02

2.3.2 – Tier 1 – Feeder Tier (F1) Naming

Elements in the Feeder tier are primarily defined by either the Feeder Hub Name or the FDH Name.

2.3.2.1 – F1 Fiber Cable Naming

Fiber cables in the Feeder Tier will be identified by the name of the Feeder Hub they egress from and an ID callout that identifies it as a Feeder Cable along with a sequential cable number.

[Feeder Hub Name]-FE[Sequential Cable Number]

- Examples:
 - ABT01-FE01
 - ABT02-FE03
- All cables within a Feeder Hub Area Boundary share the same Feeder Hub name.
- “FE” is a general ID that identifies it as a Feeder cable.
- Each main leg has a sequential number that starts at “01.”
- Lateral cables that diverge from a main cable have a decimal value after the cable’s sequential number.
- Examples of Lateral Cables:
 - ABT01-FE01.01
 - ABT01-FE01.02
 - (Both cables are laterals of cable ABT01-FE01)

2.3.2.2 – F1 Splice Enclosure Naming

Fiber Enclosures in the Feeder Tier will be identified by the Cable name and an Enclosure type ID with a sequential number.

[F1 Cable Name]-RE/MCA[Sequential Number]

- Examples:
 - ABT01-FE02-MCA02
 - ABT01-FE01-RE01
- Splice Enclosures should be named after the primary cable at the splicing point.
- RE & MCA are ID callouts that identifies the splice closure as either a Reel-End or a Mid-Cable Access.
- Sequential Number starts at “01” and max out at the total number of enclosures along the same cable name.
- Each named cable should have a sequential number, starting at “01” and capping out at the max number of terminals.

2.3.3 – Tier 2 – Distribution Tier (F2) Naming

2.3.3.1 – F2 Fiber Cable Naming

Fiber cables in the Distribution Tier will be identified by the name of the Splice Closure they egress from and an ID callout that identifies it as a Distribution Cable along with a sequential cable number.

DT[Sequential Cable Number]

- Example:
 - ABT01-FDH01-DT02
- “DT” is a general ID that identifies it as a Distribution cable.
- Each main leg has a sequential number that starts at “01.”
- Lateral cables that diverge from a main cable have a decimal value after the cable’s sequential number.
- Examples of Lateral Cables:
 - ABT01-DT01.01
 - ABT01-DT01.02
 - (Both cables are laterals of cable ABT01-DT01)

2.3.3.2 – F2 Splice Enclosure Naming

Fiber Enclosures in the Distribution Tier will be identified by the cable name and an Enclosure type ID with a sequential number.

[F2 Cable Name]-RE/MCA[Sequential Number]

- Examples:
 - ABT01-FDH02-DT01-MCA03
 - ABT01-FDH01-DT02-RE01
- Splice Enclosures should be named after the primary cable at the splicing point.
- RE & MCA are ID callouts that identifies the splice closure as either a Reel-End or a Mid-Cable Access.
- Sequential Number starts at “01” and max out at the total number of enclosures along the same cable name.
- Each named cable should have a sequential number that starts at “01.”

2.3.6 – Underground Structure Naming

Underground Structure naming is independent of most other previous elements and they are defined by being either part of Tier 1 or Tier 2.

2.3.6.2 – All Other (F1 & F2) Tier Structure Naming

Structures in all other tiers are associated with the Feeder Hub Area Boundary they fall within. identified by a Feeder Hub Area Boundary name an ID callout identifying the structure type, along with a sequential number.

[Feeder Hub Area Boundary Name]-HH/MH[Sequential Cable Number]

- Examples:
 - ABT01-HH0002
 - ABT02-MH0003
- All Structures, not part of the Backbone tier, that are within a Feeder Hub Area Boundary share the same Boundary name.
- “HH/MH” are ID callouts that identify the structure as either a Handhole or a Manhole.
- The Sequential numbers for each type structure are 4-digit, start at “0001” and cover the entire fiber market.
- Manholes and Handholes sequence numbers are independent of each other.

2.3.7 – Conduit

Conduits are identified by the name of the 2 structures a conduit segment is connecting and a general ID identifier with a sequential number.

[Structure Name #1]-[Structure Name #2]-CD[Sequential Number]

- Examples:
 - ABT01-HH0002-ABT01-HH0003-CD02
 - BB-MH0001-BB-MH0002-CD01
- Backbone tier structures should not interact with all other tier structures.
- “CD” is an ID callout that identifies the segment as a conduit.
- The Sequential number for each conduit starts at “01” and caps out at the max number of conduits sharing the same segment between 2 structures.
- All conduits are assumed to “break” at each structure for the purpose of inventory tracking.

2.3.8 – Slack Loop

Slack loops are identified by the name of the cable only.

[Fiber Cable Name]

- Examples:
 - ABT01-ABT02-BB
 - ABT01-FE03
 - ABT01-FDH01-DT03.1

2.3.9 – Poles

Poles are identified by an ID callout identifying them as a pole and a pole number.

P-[Pole Number]

- Examples:
 - P-254892
 - P-UNK001
- Pole numbers should refer to existing field pole numbers as reference.
- Poles that do not have existing numbers should be demarked with “UNK” for unknown and sequential numbers starting at “001.”

2.4 – Demand Allocation

Chapter 2.4 of this manual covers the rules governing demand allocation within the network. Demand Allocation refers to the potential subscribers identified by address and service type. Each identified demand point has varying fiber needs associated to it. Demand points are given anticipated fiber allocation requirements at the High-Level Design level to best account for proper distribution of an entire network. Demand points, identified as address types, and their requirements are further elaborated on below.

2.4.1 – Subscriber Address Type Definitions

- Government Buildings (GB) – GBs are any city/county-operated buildings that provide services to the public, such as police stations, fire stations, schools, libraries, and government office buildings. GBs will be allocated a minimum of 48ct FOC for first entry in design.
- Cell Tower Sites (CTS) – CTSs are any vertical structure supporting a cellular, wi-fi, or microwave antennae, such as monopole, guyed towers, water towers, buildings, etc. CTSs will be allocated a minimum 48ct FOC for first entry in design, with sizing based on a minimum service provider occupancy of 3, and 8 fiber strands per service provider.

2.5– Glossary & Terms

Chapter 2.5 of this manual provides a listing of the most common terms discussed within the network architecture and defines them.

Active E – Active Ethernet. A network topology that uses active equipment and maintains dedicated fiber strands from central office to subscribers.

Bore Pit – A hole dug in the ground at the start and end points of directional boring activities.

Cabinet – Physical cabinet for storage of fiber equipment. See also: FDH.

CD – Construction Drawing. Plan drawings that show proposed outside plant design elements and instructs construction contractors on how these elements should be built.

CO – Central Office. Free-Standing structure that hosts active equipment that provides internet connectivity service to subscribers using fiber network.

Conduit – Hollow tubes installed underground that provide protection to buried fiber cable.

CRO – Construction Ride Out. The process of field evaluating proposed design routes and elements to validate proposed path, identify obstacles and recommend alternatives.

dB – Decibels. A measure of the signal strength of a signal travelling through a fiber optic strand.

Directional Bore – Underground construction method that allows for guided tunneling underneath the earth and permits curving movements to avoid obstacles. It has movement control but involves a large setup footprint.

DPLX – Duplex. A multi-dwelling unit that has 2 separate dwelling units sharing the same structure.

Drop Cable – Fiber cable specifically designed to connect subscribers to the fiber network through terminal points.

F0 – Fiber Network Tier 0 – Portion of fiber network that covers Backbone level elements.

F1 – Fiber Network Tier 1 – Portion of fiber network that covers Feeder Hub level elements

F2 – Fiber Network Tier 2 – Portion of fiber network that covers Distribution Hub level elements

F3 – Fiber Network Tier 3 – Portion of fiber network that covers Terminal Hub level elements.

F4 – Fiber Network Tier 4 – Portion of fiber network that covers Drop Hub level elements.

FDH – Fiber Distribution Hub – Physical enclosure that hosts optical splitting equipment and functions as a hub for service distribution.

Fielding – Process of physically gathering detailed information of existing field conditions.

FOC – Fiber Optic Cable. Multiple fiber optic strands bundled together within a plastic casing which protects them from the environments.

Fiber Optic Strand – A single strand of glass (optical fiber) which allows for the transmission of data through light travelling in both directions.

GB – Government Building. Buildings that house government-operated services for the public, such as police stations, fire stations, schools, and hospitals.

GPON – Gigabit Passive Optic Network. A network topology that uses passive equipment to split data signals emitted from an active site into various signals that can serve multiple subscribers from a single fiber. This network type has the capability of delivering 1 Gbps data as a dedicated service.

HH – Handhole. Underground Storage Structure that can store fiber equipment in a protected environment but is not large enough to allow personal entry into the enclosed space.

HLD – High Level Design. Preliminary design of a fiber network created at a market-wide level that identifies potential path and design elements. See also Schematic-Level Design.

HOA – Homeowners Association.

Hub – Gathering point of a particular element within a fiber network. Hubs are present in all tiers of a network.

Hut – Small, free-standing structure that allows for the storing of active equipment to serve a fiber network, similar to a Central Office.

ISP – Internet Service Provider. A company or entity that provides access to the internet for both residential and business customers.

LBU – Large Building Unit – A commercial or office structure or structures that host 11 or more units.

Make-Ready – Process of preparing a utility pole to receive a new attachment.

MDU – Multi-Dwelling Unit. Two (2) or more individual dwelling units that share a single structure and premise.

MH – Manhole. Underground Storage Structure that can store fiber equipment in a protected environment and is large enough to allow personal entry into the structure.

Micro Trench – Underground construction method that involves shallow-depth trenching of 1 or 2 inches in width and can be applied in various environments.

Missile Bore – Underground construction method that involves underground, linear tunnelling using a pneumatic or hydrological bore-head. Has a small setup footprint but lacks directional control.

MRA – Make Ready Assessment. The preliminary evaluation of existing utility poles to determine feasibility of aerial construction.

MRE – Make Ready Engineering. The evaluation and design of new/proposed attachments to utility poles for compliance with structural, safety, and NESC requirements. PLA is a component of MRE.

MST – Multiport Service Terminal. Prefabricated, fiber access enclosure that has multiple, physical access ports that allow mechanical connection of individual drop cables.

MST Tail – Prefabricated fiber cable attached to an MST that can be spliced to the fiber cable network and comes at manufactured lengths.

Network Architecture – The rules, topology and network elements that define and govern a fiber optical network.

OH – Overhead. Any installation that uses aerial outside plant environment.

OLT – Optical Line Terminal. Endpoint hardware device in a passive optic network, located on the service provider side.

Open Trench – Underground construction method involving digging linearly along a proposed path at a fixed depth and leaving enough space for conduit or fiber cable installation within the created trench. Cable and conduit need to be installed by being laid in the trench after cutting.

Optical Split – The physical act of splitting the light-transmitted data travelling through a single optical fiber strand.

Optical Splitter – Device that uses a prism to physically split light-transmitted data from a single optical fiber strand into various, equally weaker signals.

OSP – Outside Plant. Physical elements of a fiber network built in the public right-of-way and connecting Central Offices to subscribers.

Pass-through – The act of bypassing a structure or equipment.

Pass-through Fiber – Fiber optic strand that bypasses an optical splitter and maintains signal strength.

PD – Permit Drawing. Plan drawings that show proposed outside plant design elements for the purpose of requesting construction permits from applicable, permit-granting jurisdictions. PDs should be tailored to the requirements of each individual jurisdiction.

PLA – Pole Loading Analysis. Evaluation of the impact of cable and messenger strand tension forces on the structural integrity of a pole. PLA also requires evaluation of wind, storm and snow loading on poles in addition to loads from cables, strand, and other equipment (transformers, cross messengers, etc.).

Plow – Underground construction method involving simultaneous trenching and installation of cable or conduit. Plowing involves using a vibrating blade to split the ground and cut a narrow slit that gets packed as the plow moves along quickly.

PON – Passive Optic Network. A network topology that uses passive equipment to split data signals emitted from an active site into various signals that can serve multiple subscribers from a single fiber.

POP – Point of Presence. Central Office within a fiber network that acts as a connection point between a local network and other networks or the national internet backbone.

Pre-Connectorized – Also referred to as “pre-terminated.” A term used to refer to fiber optic cable that has factory manufactured components with connectors already attached that would eliminate the need for splicing. These most often included modular terminals and mechanical connectors for drops.

Remote – Other term for a Hut. (See Hut)

Ribbon – Ubiquitous term that represents a bundle of 12 fibers within a fiber optic cable, regardless of being loose-tube or ribbonized.

RSB – Religious Service Building. Building that offers religious services, such as churches, mosques or synagogues.

SBU – Small Business Unit. A commercial or office structure that hosts between 1 and 10 units.

Schematic-Level Design – Basic design that includes only the most basic and essential components at a simplistic level of detail. See also HLD.

SFU – Single-family Unit. A single dwelling unit that occupies a detached structure.

Slack – Minimizing tension on cable or messenger wire.

Slack Loop – A coil of fiber cable placed along cable routes for future access, maintenance, or expansion purposes. Can be placed on both aerial and underground environments.

Slack Span – A segment of aerial messenger and/or cable installed between 2 poles with reduced tension applied at the poles.

Splice Enclosure – Prefabricated, weatherproof encasement used to protect stripped fiber optic cable and fiber optic splices from the environment.

Splice Sheets – A document that details fiber splicing information at individual splice points.

Splice Tray – A tray designed to provide a place to store the fiber cables and splices and prevent them from becoming damaged or being misplaced.

Subscriber – Potential clients within a fiber network that have fiber requirements defined by their address type.

Tension – Linear installation that has force being applied on both ends.

Virtual CRO – High-level Construction Ride-Out performed from a desktop environment.

TH – Townhouse. Single or multi-storied houses that share one or two walls with adjacent properties but have their own entrance.

UG – Underground. Any installation that uses underground outside plant environment.

Underground Storage Structure – Enclosed underground space that allows for the storage of fiber equipment and protects it from the environment.

Utility Pole – A tall pole with the capability to carry electrical and telecom wirelines and equipment above the ground.

VL – Vacant Lot. A predefined parcel of land that does not have a current use.

PART 3 – OSP DESIGN GUIDELINES

3.1 – High-Level Design (HLD)

Chapter 3.1 of this manual provides a detailed explanation of the High-Level Design component of the Fiber Network Design process. A High-level Design is the preliminary step of the design process and involves a market-wide evaluation of design rules and market conditions to provide a “schematic-level” design which includes the most essential and basic elements of the network. This chapter will provide a definition of the requirements of what constitutes a High-level Design, as well as provide general guidelines for its creation and final delivery.

3.1.1 – High-Level Design Definition & Requirements

The High-Level Design, or HLD, is the first iteration of the proposed fiber optic network. As the name implies it involves a “high-level” review of the entire market and creation of a basic blueprint to be used during the more detailed steps further along in the design process. The HLD should be prepared as a first step taking into consideration the entire market and all interconnected elements. Once approved, it should provide the general template to be followed for all subsequent phases. After an HLD has been approved, any additional network elements or extensions will require its own HLD be created and approved before being incorporated into the in-progress design.

The final product of an HLD should incorporate the following requirements:

- **Real Estate Review** – An initial Real Estate Review of the market is needed in order to determine available locations for the placement of data centers, central offices or other key components of the fiber network. The main goal is the establishment of Central Office sites, which serve as the heart of the fiber network design. These are components that need to be constructed outside the public right-of-way and often involve the leasing of or purchasing of private property for this particular use. Another goal is to establish the location of outside plant (OSP) equipment, such as cabinets and wireless antennas that can be placed in public rights-of-way, utility easements, private property or attached to joint use poles. The size of the equipment, ease of ingress and egress and public safety would need to be considered to determine the locations of the outside plant equipment.

- **Market Structure Inventory Assessment** – A Market Structure Inventory Assessment is a review of existing outside plant network infrastructure elements within the market footprint. It is important to assess existing aerial and underground infrastructure when conducting preliminary route design, as it helps to minimize the overall cost of a proposed fiber network.

- **Preliminary Design** – Preliminary Design is the primary component of the High-Level Design phase. This phase incorporates the information collected in the three phases above and develops a preliminary route and equipment roadmap for the fiber network at a market-wide level. The formal fiber network preliminary design requires the following components:
 - Identification of all potential subscribers as “subscriber points” within entire network market footprint.
 - Identification of Feeder Hub/Central Offices locations and establishing Feeder Hub Coverage Area Boundaries for each.
 - Design of preliminary fiber path based on shortest path to serve all subscribers in the coverage area and to determine the preferred design environment (aerial vs underground).
 - Preliminary sizing of fiber cables in Tiers F1, F2 and F3 to meet market demand needs.
 - Design of preliminary locations and sizing of FDH cabinet locations and establishment of FDH Coverage Area Boundaries for each.
 - Design of preliminary locations for splice enclosure and MSTs along the design path.

- **Preliminary CRO** – A Preliminary Construction Ride Out is a high-level “Virtual CRO” conducted from a desktop environment, such as Google Street View. Preliminary CRO is used to verify the validity of proposed fiber path and determine if constructability of either aerial or underground environments. This step aims to minimize potential adjustments or full redesigns to the path after field surveys at a later stage.

- **Make-Ready Assessment** – A Make-Ready Assessment (MRA) is a high-level visual review of the utility poles to verify their economic viability for new attachments. At this stage, MRA is meant to provide a cost assessment of the aerial routes. This step aims to identify viable pole routes, while avoiding pole routes that will require costly power and/or communication rearrangements and/or pole changeouts.

- **Preliminary Cost Assessment** – A Preliminary Cost Assessment evaluates the elements of all phases above and establishes an estimated cost of labor and materials to build out the fiber network. This preliminary estimate won’t be a final number and should be conservative to provide enough room to address unforeseen circumstances.

PART 4 - CONSTRUCTION METHODS

4.1 Underground/Buried Installation

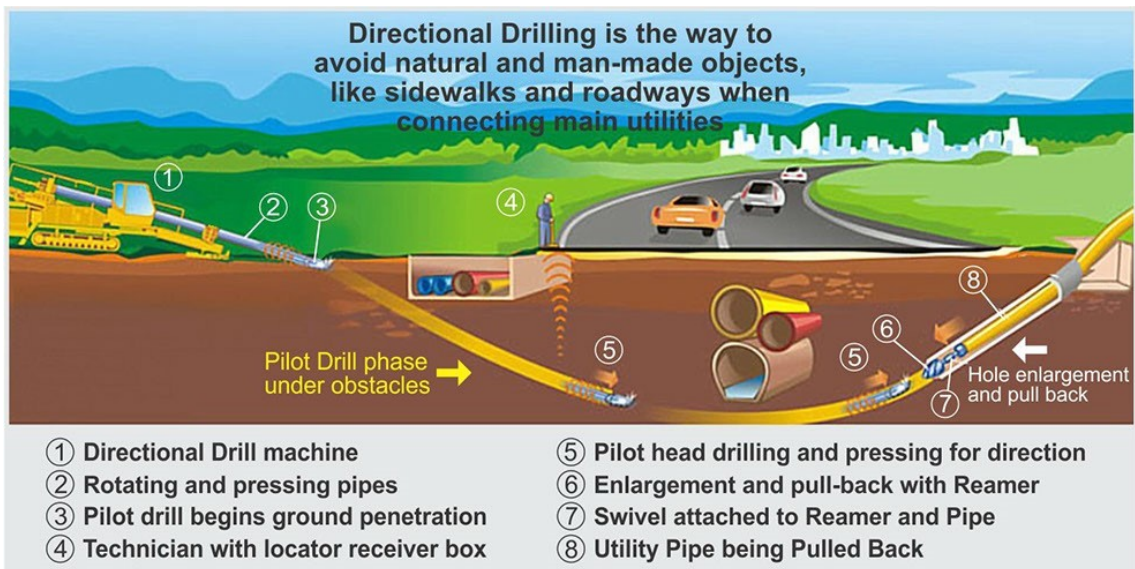
4.1.1 Directional boring



Boring or Horizontal directional drilling is used in the installation of utility pipelines and conduits.

A pilot borehole is drilled along a pre-determined bore path from the surface with minimum disturbance. Directional Boring is mainly used for making crossings under rivers, roads, and existing structures, with the purpose of installing pipes and conduits to transport different types of fluids and materials.

Directional Boring is a way to get utilities from one point to another without destroying the existing ground or obstacles that are in between the two points. Directional drilling goes above and beyond traditional trenching; connecting utilities and services in places that traditional trenching is impossible.



4.1.2 Open Cut Trenching

Open cut trench excavation is the traditional and most popular method for utility construction, repair, or replacement. Open cut trench excavation consists of opening up the surface of the ground to the required depth for installing a pipe; typically, a minimum of 36" depth below grade is recommended. This method is usually the least expensive method if the pipe is located under non-pavement areas. If the open cut trench excavation is in a non-pavement area, the excavation can be backfilled with soil and surface vegetation restored by seed or sod. When the open cut trench excavation is located under pavement the existing pavement must be saw cut and removed, the excavation filled with granular backfill (compacted stone or sand to prevent settlement), and the pavement must be replaced and the end of the pipe repair or replacement.

4.1.3 Cable (Conduit) Plowing

Plowing is another method utilized in the installation of utility cables and conduits.



Plowing uses a plow blade that is pulled through the ground using a strong wire cable attached to a tracked towing unit. The blade runs through the ground at a pre-set depth to create a trench in which the cable or pipe is placed immediately after, before the soil has time to fill the trench.

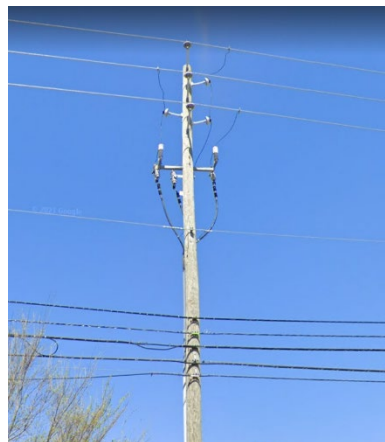
Although plowing has a greater surface disturbance than Directional Boring, it has less disturbance than Open Cut Trenching. In addition, Plowing is an efficient and cost-effective method of cable or conduit placement in more rural or less densely populated environments. Due to fewer below ground obstructions to the cable/plow path the plowing method allows for faster placement and less surface repair once the cable/conduit has been placed.

4.2 Aerial Installation

- Aerial fiber installation is recommended in locations where poles are existing and for difficult underground crossings. The aerial fiber is supported between poles by being lashed to a wire messenger strand.

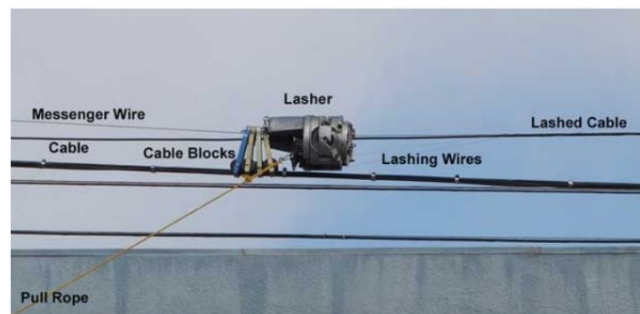
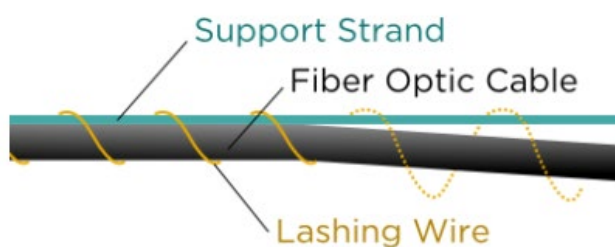
Aerial attachments must adhere to the National Electric Safety Code (NESC) in order to preserve structural integrity of the pole and to protect public safety. Traditionally, communications cables are attached in an area of the pole below the lowest power attachment with a minimum separation of 40 inches. This requirement can vary based on the voltage of the lowest power attachment or specific standards of the power owner. These requirements apply to minimum separation between attachments on the pole (power, comms, lighting, etc.), midspan clearances between poles, anchoring and guying, etc. If the poles are owned by private utility companies (Entergy and AT&T), the Parish would need to negotiate pole attachment agreements with the utilities and apply to attach to the poles.

- Typical positioning of communications cables on a joint-use pole with the top portion occupied by a power provider. In the image below the communications cables are the bottom five attachments.



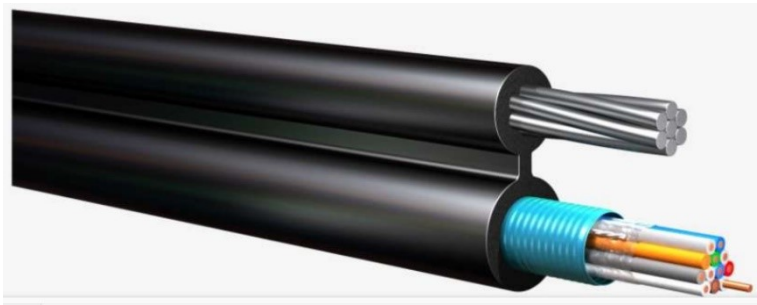
4.2.1 Lashed Cable

Typical aerial cable placement involves attaching a messenger strand or wire between poles and securing the cable to the messenger strand with a lashing wire. Using the lashed cable method allows for future placement of additional cables on an individual messenger strand. The size of the messenger strand, existing field conditions and the size of the new cable will determine if the existing messenger strand can support additional cables.



4.2.2 Self-Supporting Cable

Self-supporting cable does not require a separate messenger strand as the strand is included in the cable sheath construction. Placement of aerial cable using self-support allows for faster placement since the cable and messenger strand are placed at the same time. However, self-supporting cables are limited in size and do not allow for “overlapping” new cables. Additional cable placements would require a separate pole attachment of a new messenger strand or new self-support cable.



4.3 Underground vs Aerial Installations (Pros and Cons)

Aerial fiber installation is one of the most cost-effective methods of deployment to the customer when existing pole infrastructure can be utilized. This avoids digging up roads to bury cables and conduit. However, aerial fiber cable is exposed to the weather and will strain and break if exposed to extreme wind and large temperature variation and ice loading. Once pole attachment agreements are in place, Make Ready Engineering (MRE) would have to be completed. MRE is the process of assessing the pole and attachment conditions and identifying the relocation of any existing attachments required to create space for the new fiber placement and adhere to minimum separation requirements. It is one of the biggest hurdles in aerial construction because it can create massive delays as the utility requesting a new attachment must wait for each telecommunication utility with existing attachments to respond to the make-ready request.

Buried fiber deployments are virtually immune to wind and ice damage because they are buried below the layer where the soil freezes. In the long term, underground deployments are often more reliable, especially where poor weather is common. The disadvantages of buried installations are the high cost of underground construction and potential damages by other utilities while digging in the area. These future damages and costs can be reduced by maintaining an accurate database of the network, as well as complying with line locate requests when other utilities propose new construction.

APPENDIX H – VENDOR ASSESSMENT

As a defining principle, Foresite Group is vendor agnostic and simply seek out the highest quality products and services appropriate for a unique deployment. Foresite Group has compiled the following list of vendors and contacts, categorized by product and/or service to assist the Parish in assessing options supporting any program needs.

Backhaul Interconnect Services

Vexus: www.vexusfiber.com/business/wholesale

Hunter McAllister

985-310-1032

Hunter.McAllister@vexusfiber.com

Uniti: www.uniti.com/wholesale/wholesale-ip-transit

Conterra: www.conterra.com/network-solutions/dark-fiber

Active Electronic Equipment Manufacturers

Nokia: www.networks.nokia.com

Fujitsu: www.us.fujitsu.com

Ciena: www.ciena.com

Adtran: www.adtran.com

Juniper: www.juniper.net

Infrastructure Materials (e.g., fiber, splice cases, fiber Distribution HUBs, vaults, etc.)

Material Distributors

Graybar: www.graybar.com

Brandon Knee

817-213-1395

Brandon.Knee@graybar.com

Power & Tel Supply: www.ptsupply.com

Lisa Stanley

901-866-3232

Lisa.Stanley@ptsupply.com

WESCO: www.wesco.com

Josh Bailey

(205) 951-4601

jobailey@wesco.com

Walker & Associates: www.walkerfirst.com

Fiber Cable Manufacturers

Corning: www.corning.com

Zachary Chiz

601-317-8111

ChizZT@corning.com

AFL: www.aflglobal.com

Splice Case Manufacturers

CommScope: www.commscope.com

Craig Tindle

334-275-8601

craig.tindle@commscope.com

Corning: www.corning.com

Zachary Chiz

601-317-8111

ChizZT@corning.com

Preformed Line Products-PLP: www.preformed.com

JR Smith, Sales Mgr, Broadband Eng

417-205-0415

jrsmith@preformed.com

Channell: www.channell.com

Philip Goebel (SouthEast Rep)

423-805-0866

pgoebel@channell.com

Fiber Serving Terminal Manufacturers

Corning: www.corning.com

Zachary Chiz

601-317-8111

ChizZT@corning.com

CommScope: www.commscope.com

Craig Tindle

334-275-8601

craig.tindle@commscope.com

AFL: www.aflglobal.com

Distribution HUBs Manufacturers

Distribution HUBs Manufacturers

CommScope: www.commscope.com

Craig Tindle

334-275-8601

craig.tindle@commscope.com

AFL: www.aflglobal.com

Conduit Manufacturers

Duraline: www.duraline.com

United Poly Systems: www.unitedpolysystems.com

Blue Diamond: www.bdiky.com

Vault Manufacturers

Channell: www.channell.com

Philip Goebel (SouthEast Rep)

423-805-0866

pgoebel@channell.com

Charles Industries: www.charlesindustries.com

Old Castle: www.oldcastleinfrastructure.com

Aerial Construction Hardware

Preformed Line Products-PLP: www.preformed.com

JR Smith, Sales Mgr, Broadband Eng

417-205-0415

jrsmith@preformed.com

Construction Contractors: Aerial Construction, Underground Construction and Splicing

Future Infrastructure: www.prim.com

Ervin Cable Construction: www.ervincable.com

Cable East: www.cable-east.com

Adam Rickabaugh, Program Mgr

470-499-5001

adam.rickabaugh@cable-east.com

Mears: www.mears.net

Bonfire Infrastructure Group: www.bonfireig.com

Network Operators

Vexus: www.vexusfiber.com

Hunter McAllister

985-310-1032

Hunter.McAllister@vexusfiber.com

Conterra: www.conterra.com

Data Service Providers

AT&T: www.att.com

Spectrum: www.spectrum.com

Vexus: www.vexusfiber.com

Conterra: www.conterra.com

Swyft Connect: www.swyftconnect.com

IoT (Internet of Things) Services and Vendors

Siemens: www.siemens.com

Sensing and monitoring systems for all utilities. In-Building solutions include automation, energy, fire safety, compliance, integration and monitoring services, and security services.

Hexagon: www.hexagongeospatial.com

Software for City Management, 911 Emergency Solutions, Lidar Solutions, Sensors

Advanced Kiosks: www.advancedkiosks.com

Interactive & Wayfinding Indoor/Outdoor Kiosk Manufacturer with Multi-Market Solutions

Eaton: www.eaton.com

Smart lighting and controls, EV charging, Utility and Grid Solutions

Wireless Providers

Nokia: www.networks.nokia.com

Equipment provider

CommScope: www.commscope.com

Equipment provider, anaged Wi-Fi services through Arris

Calix: www.calix.com

Managed in-building Wi-Fi

Verizon: www.verizon.com

AT&T: www.att.com

Spectrum: www.spectrum.com