

Discovery Phase Final Report



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PREPARED FOR

**City of Fulshear, TX &
Fulshear Economic
Development Corporations**

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Executive Summary

The discovery phase of the City of Fulshear’s Broadband Assessment had a specific and intentionally limited focus to determine the current state of broadband service and broadband policies in the City. Before assessing strategy for improvement, it is important to understand what the community’s baseline is in terms of existing broadband coverage, capabilities, and infrastructure, which was the focus of this initial phase of work.

Methodology

To assess the current broadband circumstances in Fulshear, the Economic Development Corporations selected four tasks:

1. Local Broadband and Telecommunications Market Assessment - Attachment A

A Market Assessment provides a baseline of industry reported coverage information and statistics. Providers are required to report coverage data which shows what infrastructure each uses, what percent of the area they cover, etc.

2. Community Engagement (including survey) - Attachment B

There is important and useful information in the industry reported data that provides a base of knowledge. But, because of delays in reporting cycles and possible data or reporting inaccuracies, it is important to gain feedback from businesses, residents, public sector leaders and other community stakeholders. Information they provide either verifies or contradicts the provider information and fills in any gaps of knowledge that develop. That verification work is accomplished in Community Engagement and Identifying Public Sector Needs.

The COVID-19 pandemic occurred just as the community engagement portion of this project was getting into full swing, and we faced several challenges of getting data, making alternative arrangements for meetings, etc. We did not receive the number of responses that we expected, but with a good base of data, through meetings we were able to supplement what was received. The Economic Development team did an outstanding job of leading those adjustments, and consequently, the findings in this report are clear and well supported even given the changed context.

3. Public Sector Needs Identification

Many City functions either utilize broadband or interact with broadband deployment. The leaders of City departments have connectivity needs to fulfill their current work and plans for the future. They also have unique insight into the processes, interactions and challenges presented by broadband and its deployment. Other stakeholders also provide important insight. Developers can relate the impact that broadband has in recruitment to lease their spaces, identify areas that they know are underserved and help identify how providers impact their projects and schedules. Also, regional entities also help clarify broadband impacts and trends.

4. City Policy Review and Recommendations – Attachment C

Given the rate of growth in Fulshear and the ongoing level of public investment in infrastructure improvements, a review of current policies, and recommendations for strengthening policies, was important to prepare the City for any broadband opportunities that might arise and to provide tools to manage broadband densification.

Defining ‘Broadband’

An important starting point in establishing and assessing a baseline is having a set definition of “broadband.” In 2015, the Federal Communications Commission (FCC) defined the minimum broadband benchmark speeds as 25 megabits per second (Mbps) for downloads (receiving things from the internet) and 3 Mbps for uploads (sending things from your computer over the internet), or, 25/3.¹

This FCC definition provides a helpful benchmark for defining minimum standards by which something may be classified as ‘broadband;’ but there are other factors that are important considerations in evaluating broadband services based on community-specific standards, requirements, and expectations.

Some of these differentiating factors include:

- **Speed** – Given the importance of connectivity and the increasing demands, there are discussions that the 25/3 standard needs to be increased from the 2015 benchmark;
- **Reliability** – Many businesses and institutions consider reliability to be one of the most important factors in defining how good their broadband is. Losing connectivity can be a critical issue for continuance of operations;
- **Affordability** – Access and use can be limited by costs;
- **Future-proof capacity** – the mode that broadband is delivered over will often determine what is currently available and what will be accessible in the future. Broadband can currently be provided over fiber, cable, DSL, point-to-point (wireless), and satellite. Fiber provides the most capacity and speed (impacted by the equipment that it is attached to) and lowest latency (the time needed for data to travel). Upgrades to cable platforms have enabled cable to provide greater speeds, but fiber provides the greatest present and future distance, capacity, lowest latency and future possibilities.

The Primary Question – Is There A Broadband Problem in Fulshear?

As the Discovery phase concludes, a central question is whether or not the work from the initial tasks indicates existing problems or concerns with broadband services and availability in Fulshear. The findings show the following pros and cons regarding the current state of Fulshear’s broadband infrastructure. These will be discussed in greater detail as this report progresses.

Pros:

- There are multiple providers in a significant portion of the City
- Feedback does not indicate widespread complaints of lack of broadband amongst respondents
- Providers are investing in fiber in Fulshear
- There are providers on the boundaries of Fulshear and providers who have fiber going through Fulshear

Potential concerns:

- Connectivity, speed and capacity do vary greatly by location and there are areas that do not have good connectivity options, particularly downtown
- Lack of broadband management, especially pockets of underserved areas, creates limitations for both community and economic development
- Fulshear has discussed creating new programs like an Innovation Hub downtown. Current service and infrastructure availability would greatly limit these plans
- There is a lack of redundancy in most of the City, including most municipal facilities
- The City currently has little to no control over broadband infrastructure and densification
- Right of Way management is a concern
- Growth has pointed out the need to coordinate and plan broadband improvements more

¹ FCC website: <https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2015-broadband-progress-report>

comprehensively – City leadership has shown great creativity in making things work with current network availability, but without upgrades in capacity and speed, continued City service improvements will likely be impacted

Probably due at least partly to Fulshear’s location and growth, providers have invested in some fiber in the City. It is common to focus on speed and price as the most critical factors in broadband, but mode of delivery is also very important (particularly for future capacity and applications). Therefore, amount of fiber and future plans for fiber investment are important. Again, there is some fiber in Fulshear and future investment is something to explore in subsequent phases.

In this report, the pros and cons regarding current broadband in Fulshear will be explored further. There are steps that can be taken to address the concerns that will be discussed in the Recommendations section.

Key Findings

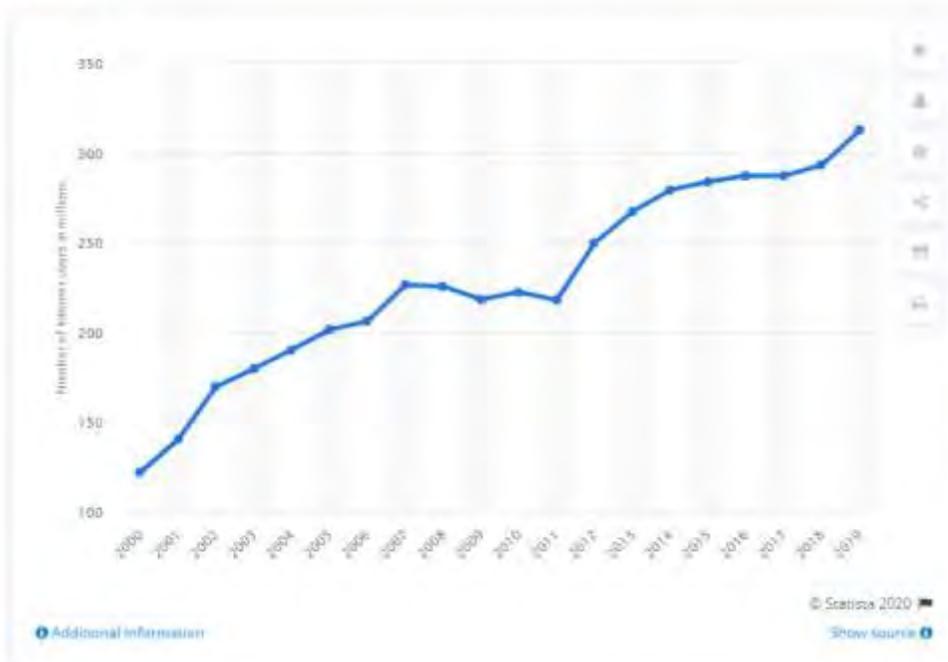
The Importance of Broadband

As is widely known and discussed, the importance of broadband continues to grow. The COVID-19 pandemic has made the necessity for robust and reliable connectivity even more clear. As the below graph shows, the number of internet users in the United States has continued to grow and those trends are consistent.²

Chart 1 – Number of Internet Users in the United States

Number of internet users in the United States from 2000 to 2019

(in millions)



According to Broadbandsearch.net, from 2000 to 2019, the usage of the internet increased by 1,157%.³

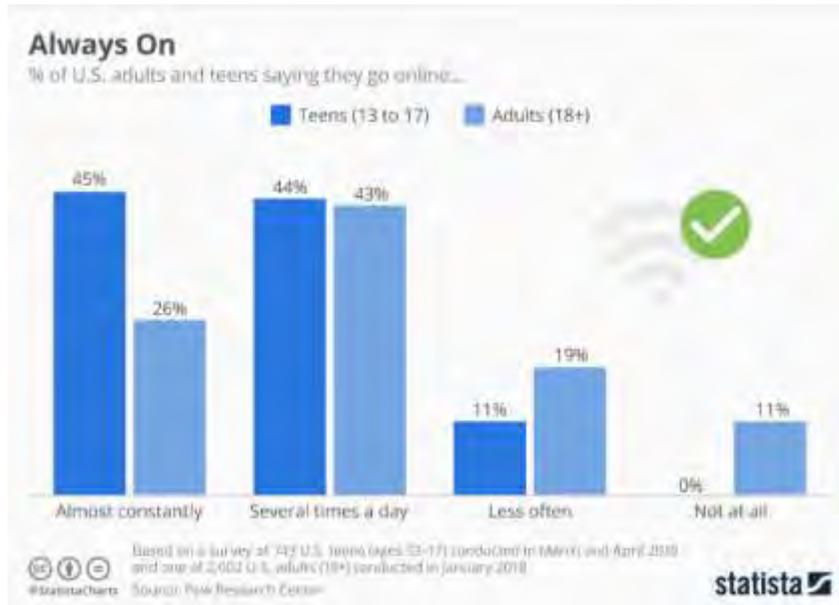
Additionally, the amount of time people in the United States access the internet is also increasing, to the level where many people consider themselves to be almost constantly connected.⁴

² Statista, <https://www.statista.com/statistics/276445/number-of-internet-users-in-the-united-states/>

³ <https://www.broadbandsearch.net/blog/internet-statistics#post-navigation-5>

⁴ Statista, <https://www.statista.com/topics/2237/internet-usage-in-the-united-states/#dossierSummary>

Chart 2 – Frequency of U.S. Teens and Adults Accessing the Internet



Ecommerce has also increased dramatically (defined as purchases made over the internet).⁵

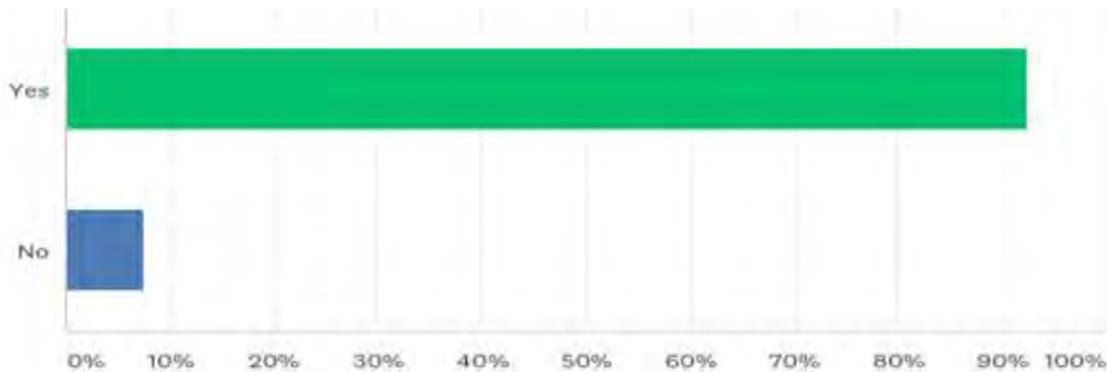
Ecommerce Statistics

- In 2018, **global ecommerce (online store) sales totaled 653 billion United States dollars.**
- **96% of Americans shop** with online stores at least once per year.
- By 2021, **mobile ecommerce sales** will account for 72.9% of all online purchases, totaling 3.56 trillion dollars.

Results in Fulshear

The understanding of the importance of broadband holds true in Fulshear. When asked if the respondent considered internet to be an essential service similar to water, electricity and roads, over 90% responded that it was.

Chart 3 - Percent of Respondents who Answered Internet is an Essential Service



⁵ <https://www.broadbandsearch.net/blog/internet-statistics#post-navigation-5>

Because this survey was done partially during the pandemic, reliance on the internet may have been expressed even more acutely, with the increased demands of remote work and remote education for many residents.

For example, a question in the survey asked, “Does anyone in your home currently telecommute (work from home)?” Again, this may have been tied to the pandemic, but over 80% responded affirmatively.

Chart 4 – Number of Households with Someone Telecommuting



Even if the high number of people telecommuting was tied to the pandemic, it will be interesting to see how many companies either make this a standard practice, or at least offer it more frequently as an option, now that the technology and practices have been put into place on such a large scale. Nationally, in a study reported June 2, 2020 by GlobalWorkplaceAnalytics.com, 97% of United States respondents said they were working at home during the pandemic. 67% answered that this was a new experience. 82% also responded that they would like to continue to work from home after the pandemic.⁶ This also has implications for education and remote medicine.

Demonstrating the growing reliance on broadband and internet in Fulshear, a question to residents asked, “How many devices do you have in your home that connect to the internet (include computers, laptops, smart phones, tablets and any other home device that have a connection)?” The results in Fulshear were:

Chart 5 – Number of Connected Devices per Household



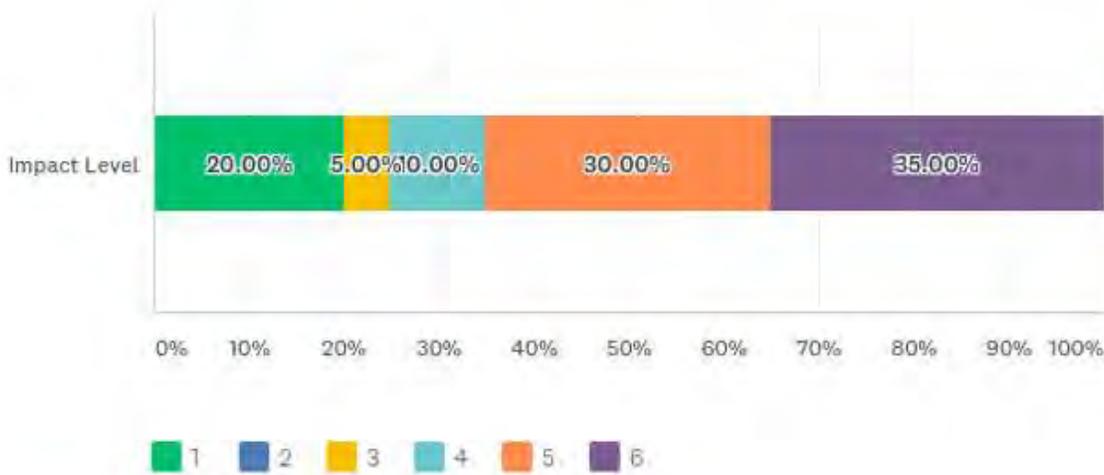
Responses in Fulshear of number of connected devices per home match the national average. In an article in Variety Magazine, Todd Spangler reported, “Today, U.S. households own an average of 11 connected devices...a study from Deloitte found. Going forward, the rollout of 5G across the U.S. by AT&T, Verizon and T-Mobile will

⁶ Kate Lister - <https://globalworkplaceanalytics.com/brags/news-releases>

produce “a significant increase in connected devices,” said Kevin Westcott, vice chairman and U.S. telecom and media entertainment leader at Deloitte.”⁷ The need for good broadband will continue to increase, underscoring the need for future prof infrastructure.

In looking at how the importance of broadband is perceived in the business community, the question was asked to businesses, “What impact does the availability of high-speed, broadband internet service have...on your plans for growing or expanding your business?” In the chart below, one represents “No Impact” and six is “Significant Impact”.

Chart 6 – Impact of Broadband on Business’ Growth and Expansion Plans



Seventy-five percent of businesses acknowledge that broadband has some impact on plans for growth and expansion, with thirty-five percent thinking those impacts will be significant.

Evaluating adequacy of broadband in Fulshear – Industry Data

The two ways to determine and understand the adequacy of broadband in Fulshear is from the industry Market Assessment data and through direct responses from constituents in Fulshear (businesses, citizens, stakeholders, and public sector representatives).

Industry data paints a mixed picture. According to the Market Assessment, currently, there appear to be multiple broadband options in most of Fulshear. There are nine carriers providing services to residents in Fulshear and eight providing services to businesses. Of those, seven of the nine providing services to resident report providing services above the national definition of broadband. For businesses, six of the eight report speeds above the national definition.⁸ As mentioned previously, there are questions as to whether the FCC minimum speeds (25/3) are adequate, but they provide a benchmark from which to measure.

Perhaps more importantly, there are three providers who report providing 1 Gbps (1,000 Mbps) service to residents and businesses in the City. And, there is a fourth that reports speeds very close to 1 Gbps (987 Mbps).⁹

From industry reported data, connectivity appears to be fairly good in the aggregate. “The average download speed in Fulshear is 115.66 Mbps. This is 94.9% faster than the average in Texas and 52.1% faster than the

⁷ Variety, Todd Spangler, December 10, 2019, <https://variety.com/2019/digital/news/u-s-householdshave-an-average-of-11-connected-devices-and-5g-should-push-that-even-higher-1203431225/>

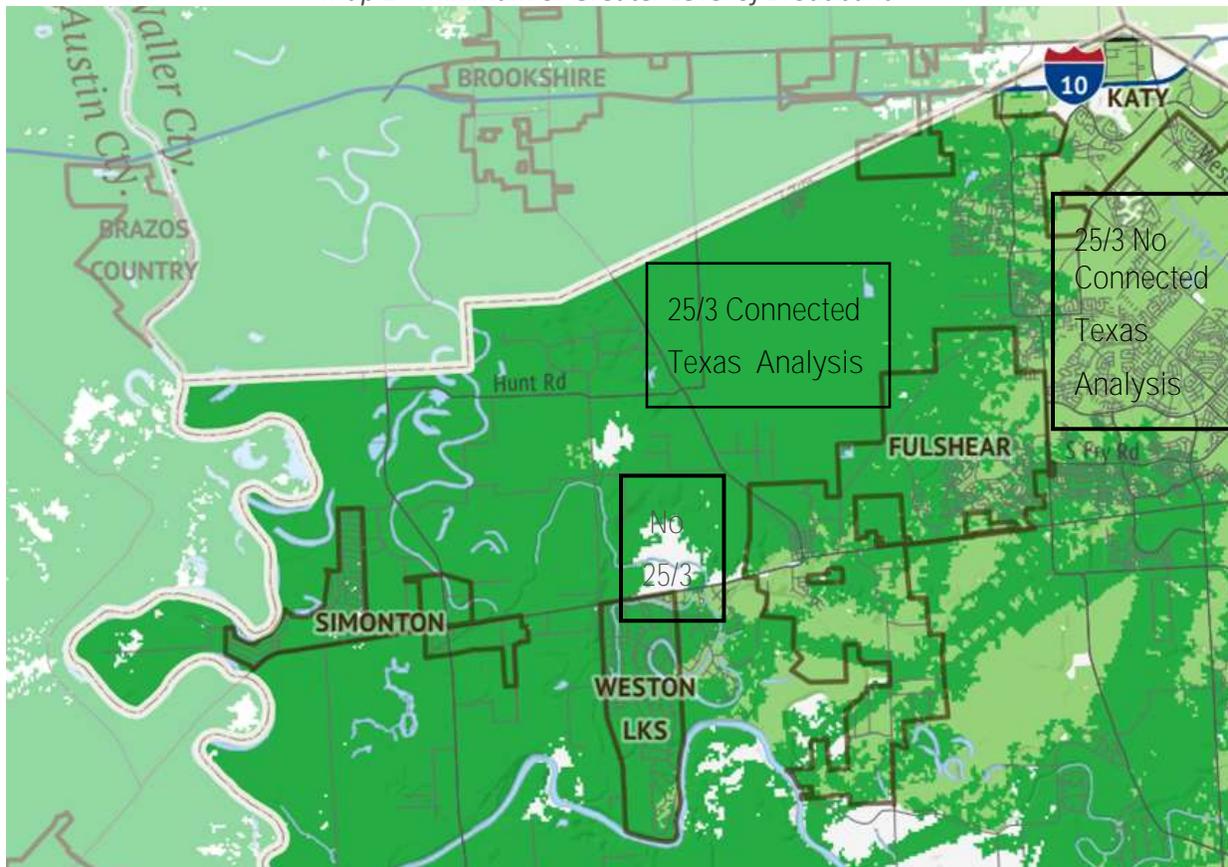
⁸ Industry data reporting company Broadband Now – www.broadbandnow.com

⁹ Industry data reporting company Broadband Now – www.broadbandnow.com

national average.”¹⁰

The below map from Connected Texas shows what areas meet or exceed the FCC minimum accepted level of broadband in green. The darker green represents where providers supplied coverage data and Connected Texas performed some review. The lighter green shows where only FCC Form 477 information was used. White shows where 25/3 is not available. Again, this is industry reported information – later in the report will be findings of what Fulshear stakeholders indicate their connectivity to be.

Map 1 - Minimum or Greater Level of Broadband¹¹



This map shows that most of Fulshear and the surrounding areas have the minimum speeds to be considered broadband. Some of this data has been reviewed by Connected Texas (darker green) and some has not (lighter green). There are areas that do not have even these minimum speeds, though. Also, this data is on a more aggregate scale, thus differences on a micro level are not shown.

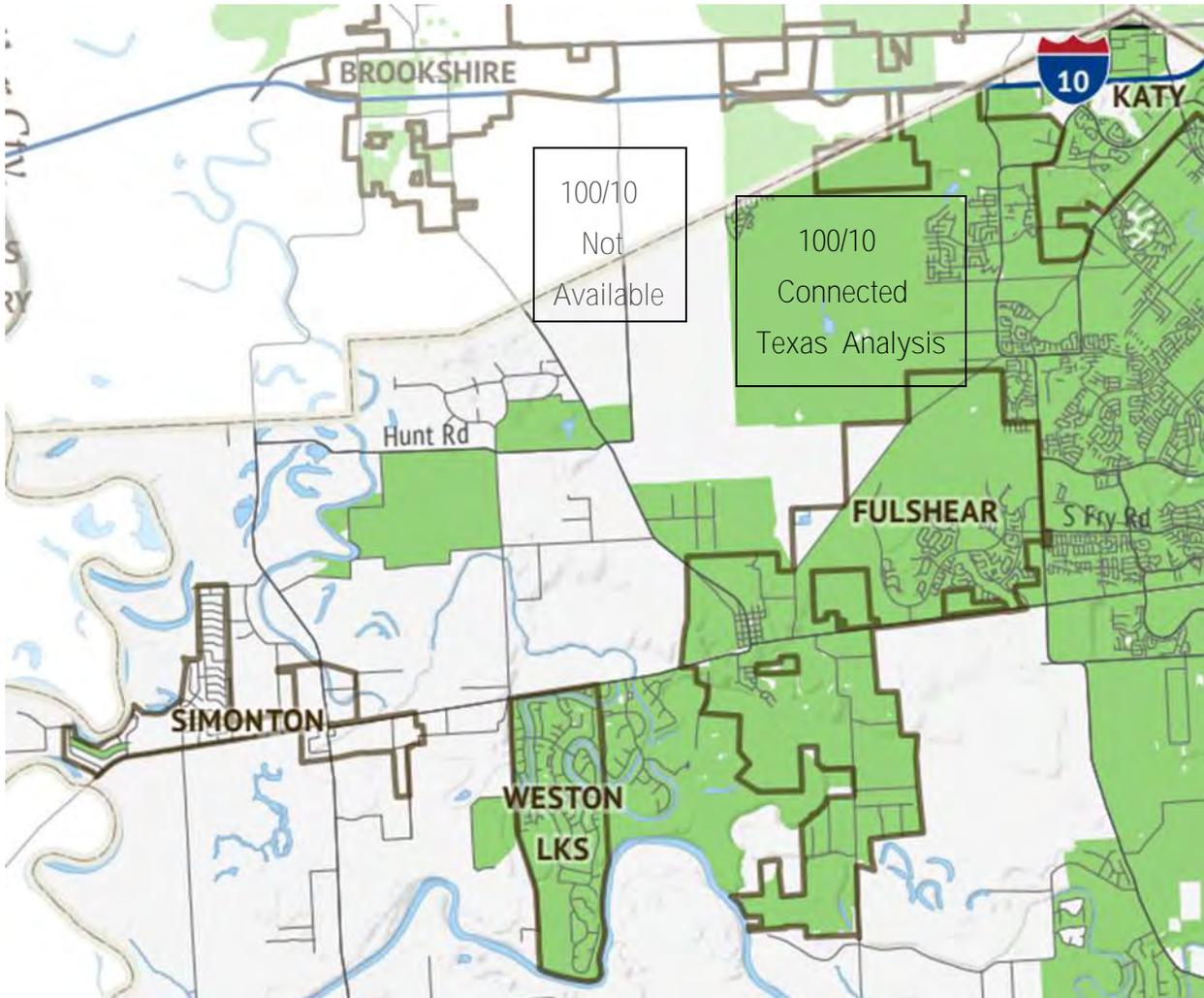
The FCC is currently receiving questions and comments regarding whether the minimum standard of 25/3 is remains adequate for the needs of todays users. The 25/3 standard was enacted in 2015.

The following map shows current 100/10 coverage in Fulshear.

¹⁰ Industry data reporting company Broadband Now – www.broadbandnow.com

¹¹ Connected Texas - https://cn-maps.hatfieldmedia.com/US/TX/v2/tx_fort-bend-county_25x3.pdf

Map 2 – Connected Texas 100/10 Broadband Coverage¹²



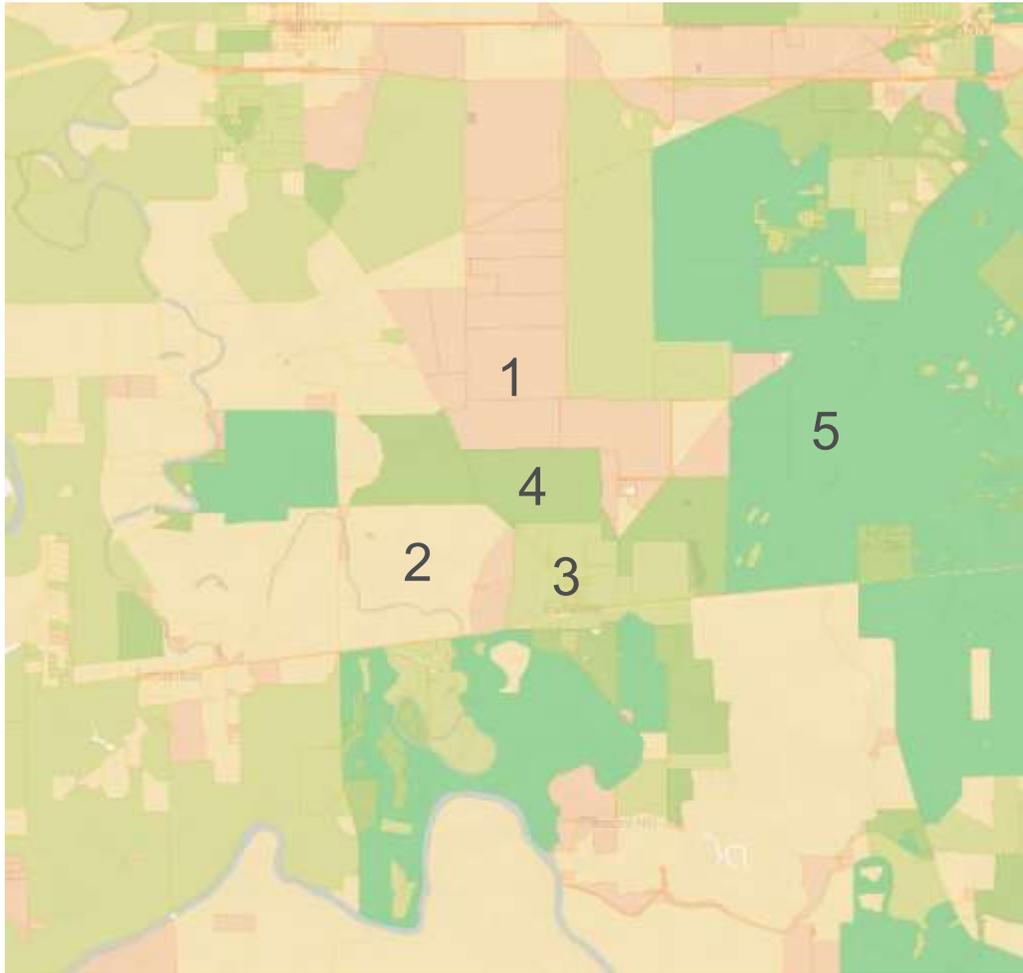
The dark green shows where 100/10 is reported as available and Connected Texas performed some level of review.

As with Map 1 (showing 25/3), this data is more aggregate, with difference on the micro level not shown. However, it provides a clearer general understanding of areas of service.

When looking at broadband coverage at the macro level, Fulshear appears to have good coverage in some areas, but also areas that are underserved. The below map looks more at competition, showing the number of providers who offer services over fiber, DSL, Cable and Fixed Wireless (all modes except satellite and cellular).

¹² Connected Texas – https://cn-maps.hatfieldmedia.com/US/TX/vs/Tx_fort-bend-county_100x10.pdf
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Map 3 - Number of Providers¹³



In this map:

- The darkest green represents 5 or more providers
- Medium green represents 4 providers
- Light green represents 3 providers
- Yellow/tan represents 2 providers
- Rose/pink represents 1 provider

This map shows that all areas within the City and its ETJ have at least one source of internet available. Several areas have multiple providers. It also points out that a significant corridor between the City and Interstate 10 has only one provider as of the data available for this map.

Since these maps are based off of provider reporting, the data can be one to two years old due to the reporting and publication process. To fully understand the data, it is important to know that the FCC represents coverage within a Census Block. This means that if there is one address in a Census Block that has a certain speed, the entire Census Block is recorded to have that speed.

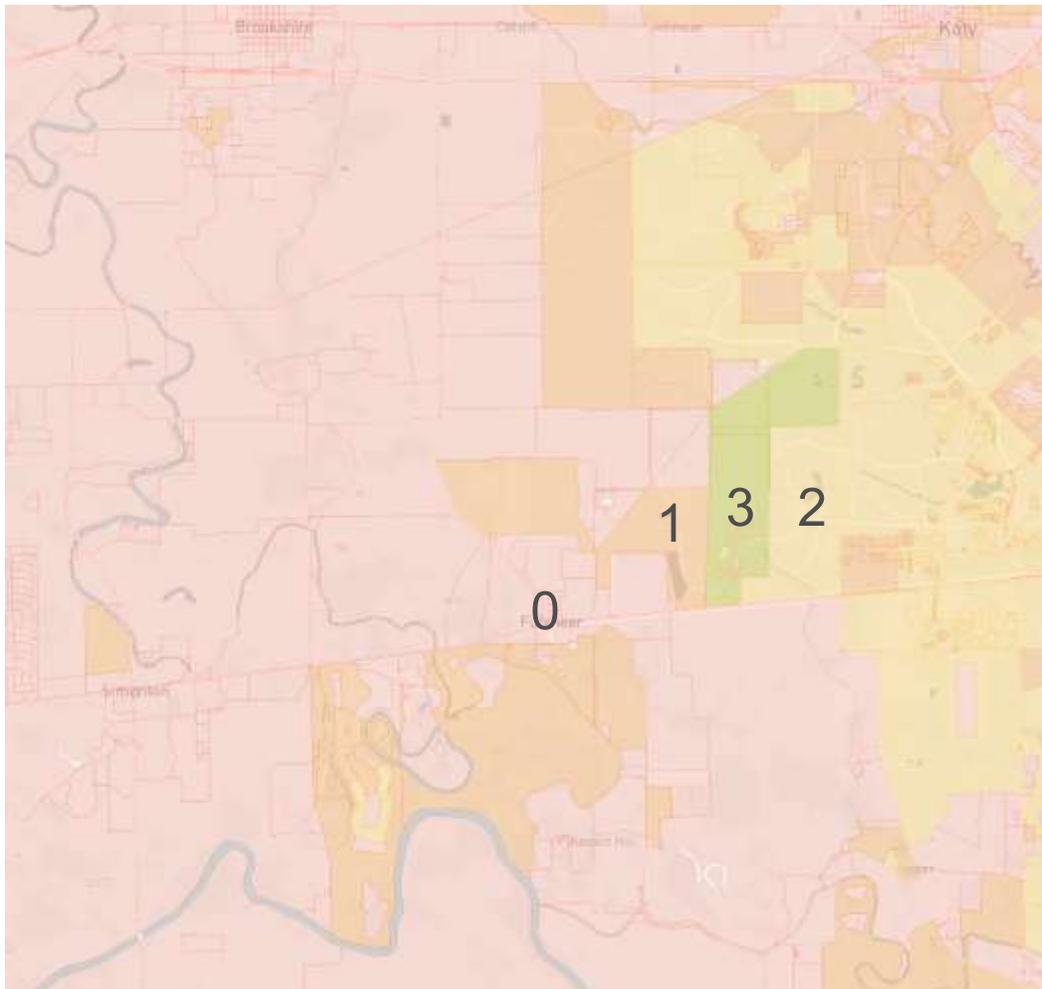
Another important way of analyzing an area is to look at what type of infrastructure is in place. This is significant to determine what type of capacity is available and how future proof the infrastructure is. DSL loses signal strength over distance. Cable can be upgraded with equipment, but it has limitations. Point to point wireless

¹³ www.Broadbandnow.com

has to have line of sight and any impediments can impact the signal. Depending on how it is connected, point to point can also have capacity limitations. Satellite can be useful when other options are too expensive, but the signal can be affected by several things and the number of people using it at the same time (and what they are using it for) can significantly affect performance.

Fiber has the highest capacity and lowest latency. Therefore, the proliferation of fiber can show how prepared the infrastructure is for growth and upcoming technology needs. The capacity of fiber can be limited by the equipment on the ends, number of strands and number of splices, but fiber has the greatest possibilities.

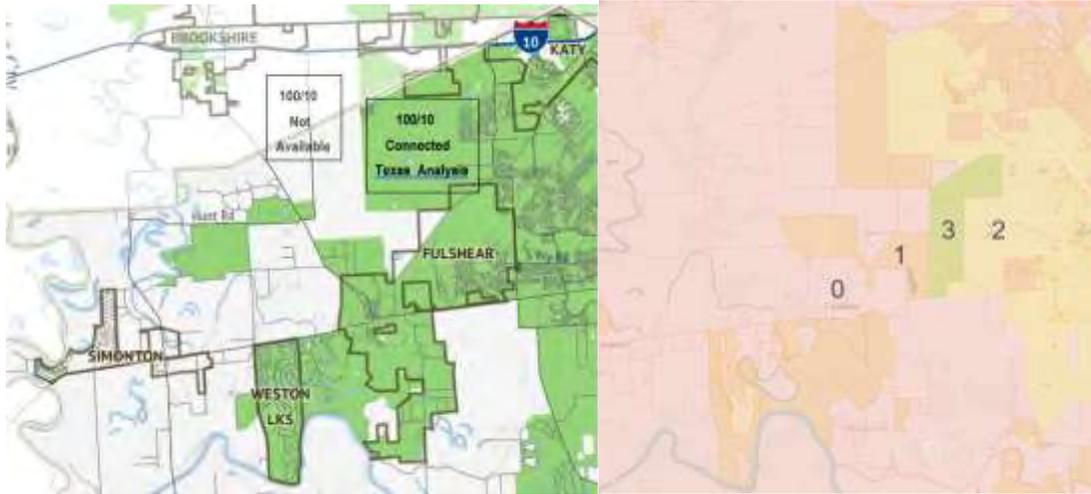
Map 3 - Number of Providers with Fiber Connectivity¹⁴



Green = 3 providers with fiber | Yellow/Lighter Tan = 2 | Darker Tan = 1 | Rose = 0

When we compare the broadband coverage map (left) with the map of the number of providers offering fiber (right), we get a better picture of what services are available in Fulshear.

Map 4 – 100/10 Service Coverage Compared to Number of Providers with Fiber



The comparison of these maps appears to show a strong correlation between number of providers with fiber and level of service. Where there are multiple providers, particularly with fiber, there is better broadband. This data is likely a year or two old, but it is important in understanding the future capacity of existing infrastructure.

The next two tables show the provider-reported data on services offered in Fulshear. According to industry information and additional research, the businesses in Fulshear have eight choices for connectivity. These eight might not be available in all parts of Fulshear and the ETJ. The below table shows the percentage of the Fulshear area that each provider reports covering. As mentioned previously, this data could be up to two years old, but it is a good indication of how much infrastructure providers have in Fulshear and what their mode of service delivery is.

Table 1 – Provider Business Connectivity¹⁵

Connectivity for Businesses from Industry Data

Provider	Type of Service	Download Speeds (Mbps)	Coverage	Cost/Month Low to High	Customer Satisfaction (1-5) 1 Low
AT&T	Fiber and DSL	Fiber: 1 Gbps DSL: 25 – 100 Mbps	25 – 50% 100%	\$85/mo. + \$50/mo. +	2.5
enTouch Business	Fiber	1 Gbps	27.2%+	Not Avail.	2
Consolidated Communications	Fiber	1 Gbps	6.8%+	\$95.38 - \$215.98/mo.	3
Comcast Business	Cable	987 Mbps	61%+	\$69.95 - \$499.95/mo.	2.5
CenturyLink Business	Copper	45 Mbps	6.3%+	Varies	2

¹⁵ BroadbandNow statistics tables: www.broadbandnow.com and Decision Now statistics tables: <https://decisiondata.org/tv-internet-by-zip/77406-internet/>

TPx Communications	Fiber	50 Mbps	.6%+	Not Avail.	2.5
Rise Broadband	Fixed Wireless	15 Mbps	100%	\$69.95/mo.+	2
Skynet Communications	Fixed Wireless	15 Mbps	58.9%+	Not Avail.	Not Avail.

The data in Table 1 presents a mixed picture. On the positive side, there are multiple providers in the Fulshear area. Moreover, there are multiple providers who have invested in fiber infrastructure in the Fulshear area. And, there are multiple providers who report offering a Gig (or very close). Because of that, Fulshear can be considered a Gig city.

A deeper analysis points out some connectivity issues for the City to consider.

- **Multiple provider coverage:** The Fulshear area has multiple providers. However, in looking at their coverage percentages (and compared with the coverage map), there are many areas that provide limited competition.

There is some interpretation needed in Rise Broadband’s reported coverage and download speed. Several fixed wireless companies have made reporting mistakes on a national basis, but it appears that Rise Broadband has reported accurately. The challenge that fixed wireless providers have in reporting is that, as long as they can have a line of sight, they technically CAN have 100% coverage. But, given that their connectivity is point-to-point wireless, they are not necessarily connecting 100% of the customers in their coverage area. If they did connect every customer in the area, they would have to add a lot of infrastructure to provide any level of speed and capacity. Therefore, how to report can be confusing. One of the best ways to bridge those competing factors is to show that coverage can be 100%, but provide a speed that is realistic for either what they are providing or that shows that they would have to increase infrastructure to connect more customers, which appears to be what Rise has done with the data above. Using 15 Mbps would not interfere with grant possibilities, which are often based on the FCC 25/3 standard.

- **Fiber:** As previously discussed, there are multiple providers with fiber, but their coverages were all fairly low through this reporting cycle. It is positive that multiple providers have fiber in the Fulshear area.
- **DSL and Fixed Wireless:** The two modes of delivery that have, by far, the greatest coverage are DSL and fixed wireless. Those both have significant concerns. DSL has signal loss over distance and fixed wireless can be constrained by impediments and how it is connected. Those constraints are reflected in the download speeds that they provide.
- **Coaxial Cable:** The next highest level of coverage is cable. Comcast reports 987 Mbps download. With improvements that vendors have made in cable equipment and platforms in recent years, that is possible. The reported data does not make clear how much of the 61% of the area receives 987 Mbps download speeds.
- **Gig City:** This designation applies to communities that have 1 Gig service available. Being a Gig City can be good for community identity/branding and economic development. Currently, most businesses and residents do not need a Gig download or upload to accomplish the tasks they do. For those that do, a “Gig City” designation could be a significant draw to Fulshear. It is important to understand where ‘Gig’

services are available, to ensure that a prospective business with capacity needs does not locate somewhere it is not available.

GHZ Wireless was also listed in some of the industry information¹⁶. They appear to be from Austin, TX. They are a fixed wireless company that is in the area. But, it is difficult to determine where their infrastructure is and what specific areas they cover. On their website, they offer transport, redundancy and backhaul fiber.¹⁷

A Comcast representative confirmed that the company has been installing fiber in the Fulshear area. Their new construction has been either mainly or all fiber.

According to industry information and other research, the residences in Fulshear have nine choices for connectivity (including satellite providers). These nine might not be available in all parts of Fulshear and the ETJ. The below table shows the percentage of the Fulshear area that each reports covering. As mentioned previously, this data could be as much as two years old, but it is a good indication of how much infrastructure each has in Fulshear and what their mode of delivery is.

Table 2 – Provider Residential Connectivity¹⁸

Connectivity for Residents from Industry Data

Provider	Type of Service	Download Speeds (Mbps)	Coverage	Cost/Month Low to High	Customer Satisfaction (1-5) 1 Low
AT&T	Fiber and DSL	Fiber: 1 Gbps DSL: 25 Mbps	50%+ 86%	\$49.99/mo+	2.5
enTouch	Fiber and Cable	1 Gbps 115Mbps	20.4%+ 20.4%	\$25.95/mo.	Not Avail.
Earthlink	Fiber and DSL	Fiber: 1 Gbps DSL: 25 Mbps	50% 85.9%	\$49.99/mo. \$14.99/mo.	Not Avail.
Consolidated Communications	Fiber	1 Gbps	6.8%+	Varies	Not Avail.
Comcast Xfinity	Cable	987 Mbps	81% - 95%	\$19.99 - \$84.99/mo.	2.5
SkyNet	Fixed Wireless	15 Mbps	9.9%+	Not Avail.	Not Avail.
Rise Broadband	Fixed Wireless	15 Mbps	100%	\$29.95/mo.+	2
Viasat	Satellite	100 Mbps	100%	\$50.00/mo.+	Not Avail.
HughesNet	Satellite	25 Mbps	100%	\$39.95/mo.+	Not Avail.

¹⁶ BroadbandNow provider lists – www.broadbandnow.com

¹⁷ GHZ website: <http://www.ghzwireless.com/live/pages/about-us>

¹⁸ BroadbandNow statistics tables: www.broadbandnow.com and Decision Now statistics tables: <https://decisiondata.org/tv-internet-by-zip/77406-internet/>

The residential industry data for connectivity is very similar to the business data. There are multiple providers, but not ubiquitous coverage. There are multiple providers for residences who have fiber, but it was limited as of this reporting cycle. There is an additional provider, Earthlink, in the residential providers that is not in the business provider data. Earthlink provides fiber for 50% of the Fulshear area and DSL for 85.9%.

The residence provider data also lists two satellite providers: Viasat and HughesNet. Satellite is affected by impediments (like storms) in which connectivity can be lost. It can also be impacted by the number of people using it at any given time. It would not be typical for satellite to provide a consistent 100 Mbps in 100% of the Fulshear area. If the City was going to pursue grants, this would need to be tested and examined as this reporting (and HughesNet statistics) would eliminate Fulshear from many grant possibilities. A large number of grants are conditioned on the FCC broadband maps, with any areas showing the minimum speeds of 25/3 not eligible for grants.

Additional Statistics

The below statistics are derived from industry reported data. Therefore, they should be fairly accurate as of the latest reporting cycle. If anything does not look correct, further research may be warranted to correct it, because this is the information that the public could see (including companies that the City might want to attract through Economic Development efforts).

- The average download speed in Fulshear is 133.61 Mbps. This is 111.2% faster than the average in Texas and 56.1% faster than the national average.
- Competition in the zip codes in the Fulshear area are more competitive than the average US zip codes.
- Fulshear is the 377th most connected city in Texas ahead of Brookshire and Wallis, but behind Katy, Richmond, and Rosenberg. Katy is the 94th most connected City in Texas.
- 100% of residents in Fort Bend County have access to fixed wireless internet service.
- Approximately 95% of Fulshear residents are serviced by multiple wired providers.
- In Fort Bend County, approximately 33,000 people do not have access to 25Mbps wired broadband.
- Residential fiber service is available to 59% of people living in Fulshear.
- The majority of residents in the Fulshear area zip codes have several options, but other parts of the area may have one or no options for wired internet service at their homes.¹⁹

Evaluating Adequacy of Broadband in Fulshear – Stakeholder Input

The industry data provides a mixed picture of coverage and delivery mode. Getting input from Fulshear businesses, citizens and public sector leaders is intended to either validate or question the industry data and offer a clearer picture of actual circumstances. To further validate commercially available data, the study included a residential and a business survey. These surveys were conducted from March 2020 and July 2020. The information below provides further insight on the data collected.

Business responses

To understand the important of certain aspects of broadband connectivity, one question asked the importance of the below categories with 1 = unimportant, 2 = mostly unimportant, 3 = somewhat unimportant, 4 = somewhat important, 5 = mostly important and 6 = very important. Service reliability can be defined as being increased by having multiple providers with stable modes of delivery and with redundant paths.

¹⁹ Statistics from BroadbandNow www.broadbandnow.com and Decision Now <https://decisiondata.org/tv-internet-by-zip/77406-internet/>

Chart 7 – Importance of Broadband Factors



With light blue, orange and purple indicating some level of importance, it is clear all these factors are important to businesses in Fulshear. Service reliability did not have any responses indicating lack of importance, nor did speed. There were no responses indicating anything less than reliability and speed being at least somewhat important.

With this delineation of importance, the graphic below shows responses indicating the level of satisfaction in four specific categories (1 being Very Unsatisfied and 6 being Very Satisfied).

Chart 8 – Satisfaction of Four Important Factors to Business

	1	2	3	4	5	6	WEIGHTED AVERAGE
Service reliability	5.00%	5.00%	5.00%	25.00%	40.00%	20.00%	4.50
Speed as advertised	5.00%	5.00%	10.00%	25.00%	35.00%	20.00%	4.40
Price or value for services received	5.00%	10.00%	35.00%	10.00%	30.00%	10.00%	3.80
Customer and technical support	5.00%	10.00%	20.00%	15.00%	45.00%	5.00%	4.00
Relevant service offerings	10.00%	15.00%	25.00%	25.00%	20.00%	5.00%	3.45

1 = Very Unsatisfied | 6 = Very Satisfied

In general, these numbers are fairly average. They are not overly bad or overly good.

Price and service availability are the two most problematic areas for businesses indicated in responses.

With reliability being the aspect of broadband that was rated to be of the greatest importance, respondents provided the following detail. When asked how often their service was interrupted, they responded:

Chart 9 - Frequency of Service Outages

ANSWER CHOICES	RESPONSES
Never	35.00%
1 hour or less per month	45.00%
1 hour or less per week	20.00%
1 hour or less per day	0.00%
More frequently than 1 hour per day	0.00%

Twenty percent of respondents indicating they have service interruptions weekly is indicative of service reliability issues. In public sector meetings (discussed later), several stakeholders indicated that they understood their main sources of loss of broadband to either be because of cut lines in construction projects (indicating a lack of redundancy) or because of power failures (not caused by broadband infrastructure or broadband providers).

There are three pieces of data regarding reliability that do not necessarily correlate:

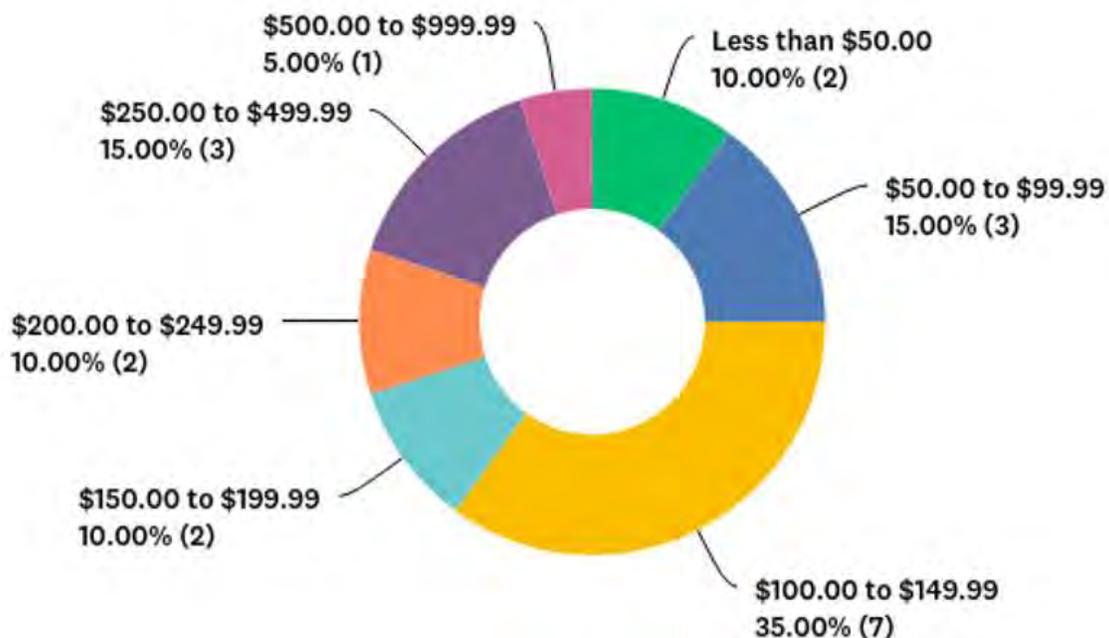
1. Reliability was ranked as having the highest importance
2. It was given a 4.5 weighted average out of 6 for satisfaction among business owners
3. Twenty percent responded having service interruptions weekly and forty-five percent reported service interruptions monthly.

There are possible explanations for this variation in responses (from service improvements over time to perceptions within questions), however, the data indicates that although there are service reliability concerns, business owners do not seem to think they are overly problematic currently.

Reliability, price and options can be a function of several factors. Two of the most common components that determine all three of those are infrastructure and competition.

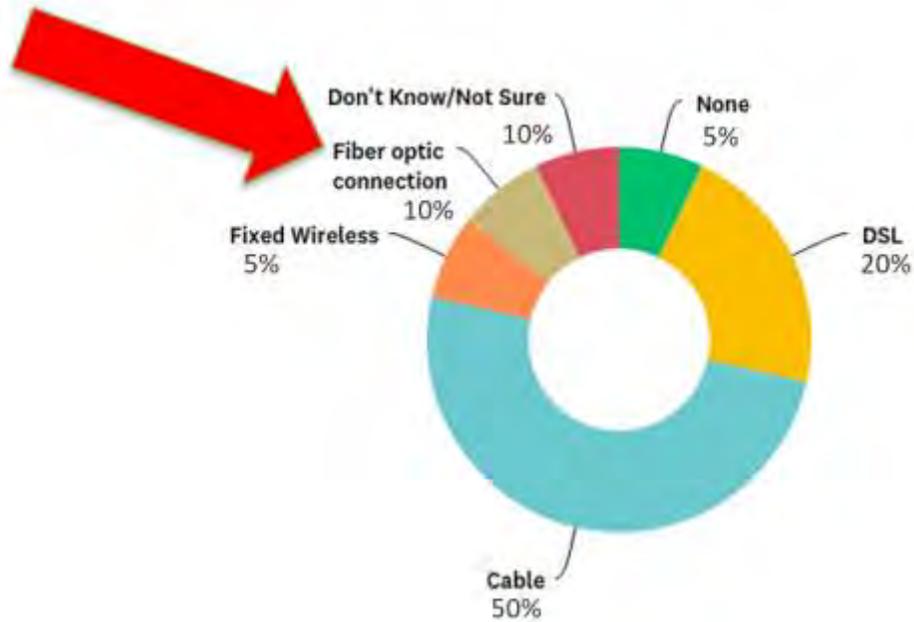
Exploring the two specific areas that scored lower (price and service availability), when asked how much was paid for broadband, the responses were:

Chart 10 - Business Broadband Expenditures per Month



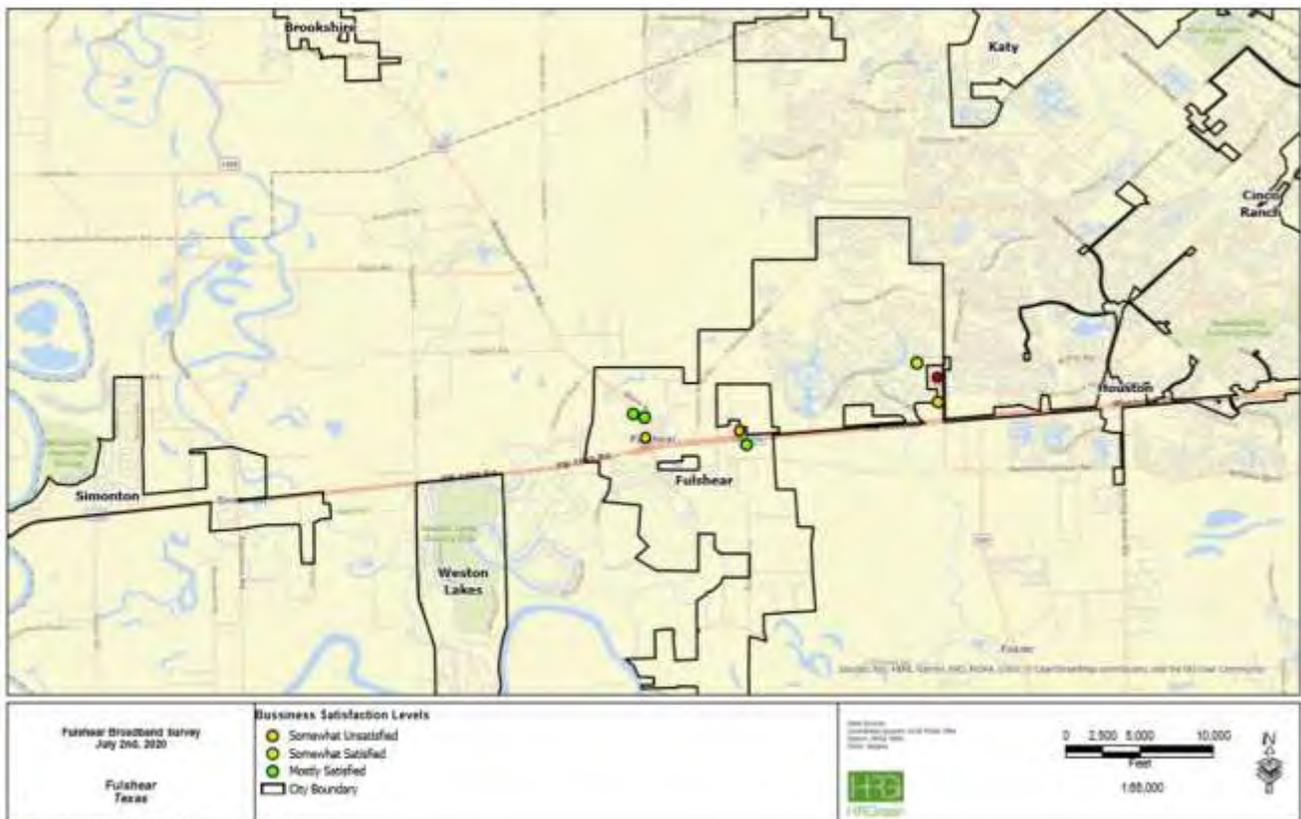
Businesses respondents also specified their mode of broadband delivery as shown in the below chart.

Chart 11 - Mode of Broadband Delivery



The following map depicts clusters of business responses and their service satisfaction level.

Map 5 - Clusters of Business Responses of Overall Satisfaction with Broadband

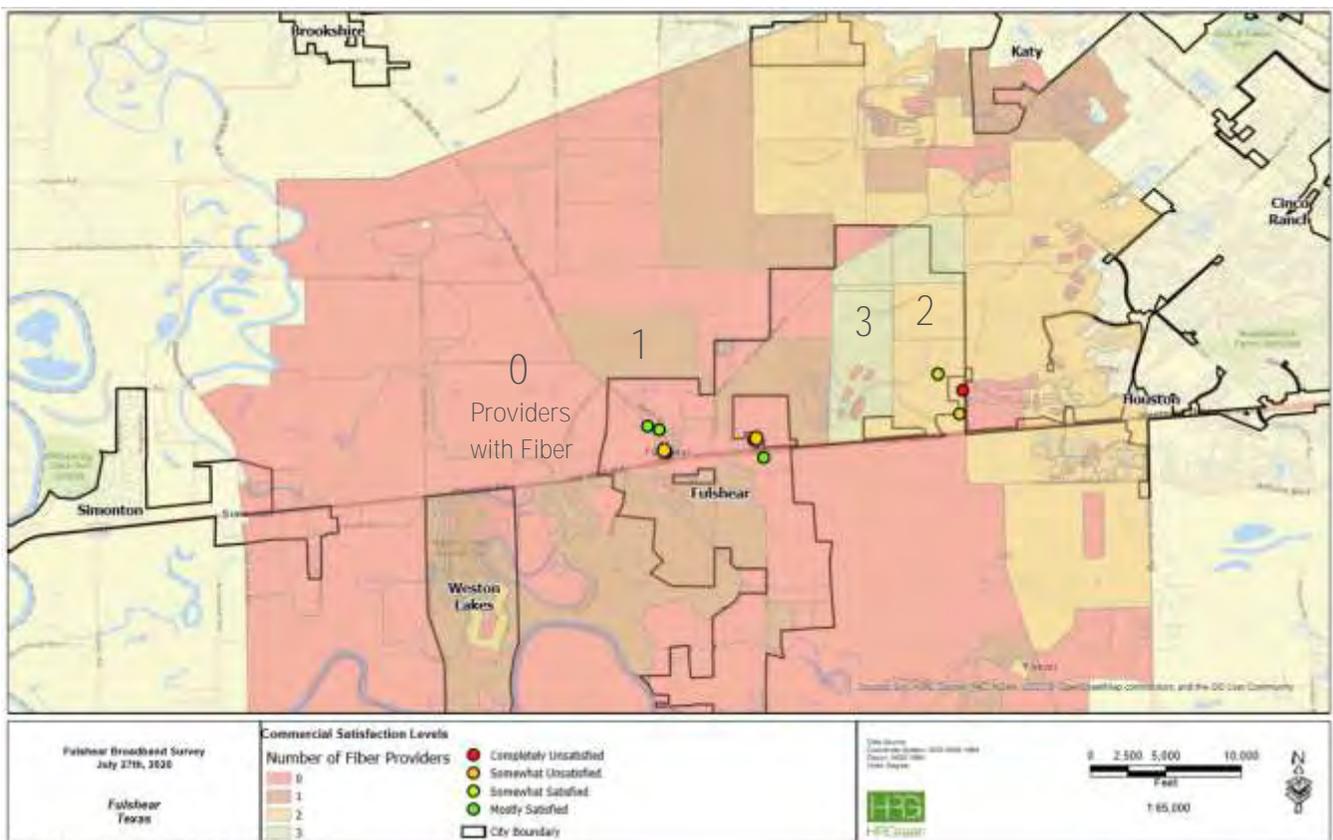


The respondents' answers ranged from Mostly Satisfied to Somewhat Unsatisfied. The majority of the responses fall in the middle of the satisfaction range. There were no Completely Satisfied and a small number of Completely Unsatisfied.

When merged with the map of number of fiber providers, we see a clearer picture. Where there is a small number of providers and little-to-no fiber, it is less predictable what service any specific location will have. For example, if the only available service is DSL, then the businesses closest to the equipment will have better service (DSL service degrades over distance) than those further away.

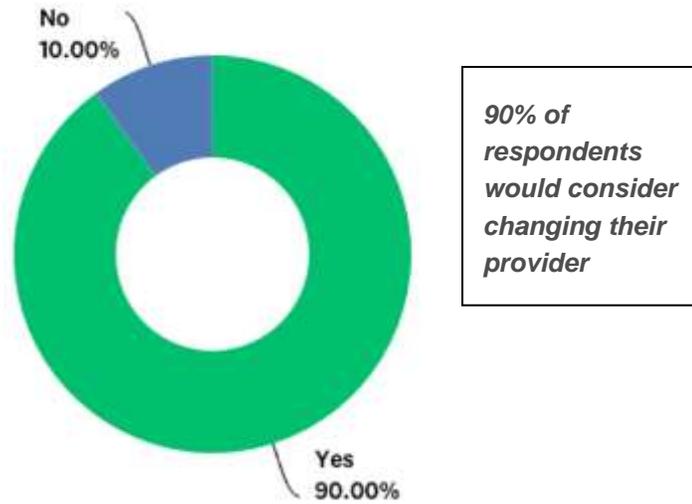
There are possible ways to interpret the less satisfied businesses on the east side of the City boundary. They appear to be in areas with multiple providers and multiple providers with fiber. But, they are on the boundary of a pocket with less providers with fiber. It would take deeper investigation than is included here, to determine the specific cause of this.

Map 6 - Satisfaction Compared to Number of Fiber Providers



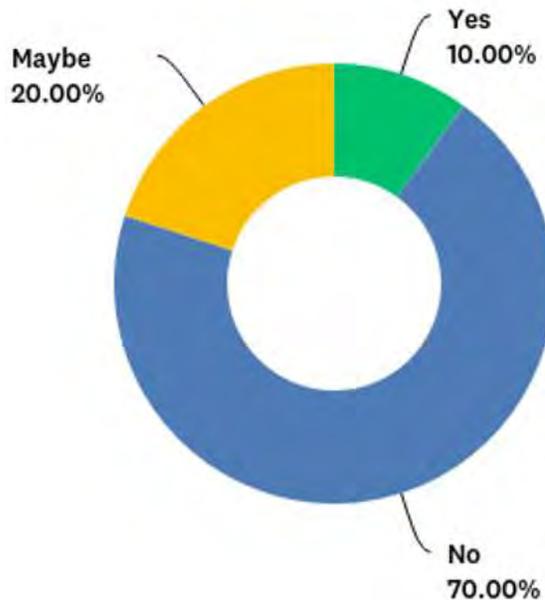
To explore satisfaction in greater detail, a question asked, “If it was available, would you be interested in a broadband service that allowed you to receive internet service with greater reliability and speed for a cost which was comparable (+/- 10%) to your current internet service bill?” This might seem like there is an obvious answer to this question, but it is meant to explore loyalty to a provider. This can offer some insight into the level or depth of satisfaction that a respondent has. The responses were:

Chart 12 – Respondents Who Would Consider Changing Providers



The following charts provide responses to more specific questions about how businesses felt about their connectivity. The first one is an important question about the impact that broadband has on the businesses' ability to stay in Fulshear. The specific wording of the question was, "Have you considered moving or relocating your business as a result of limited access to high-speed, broadband internet services?"

Chart 13 - Businesses That Have Considered Moving Due to Broadband



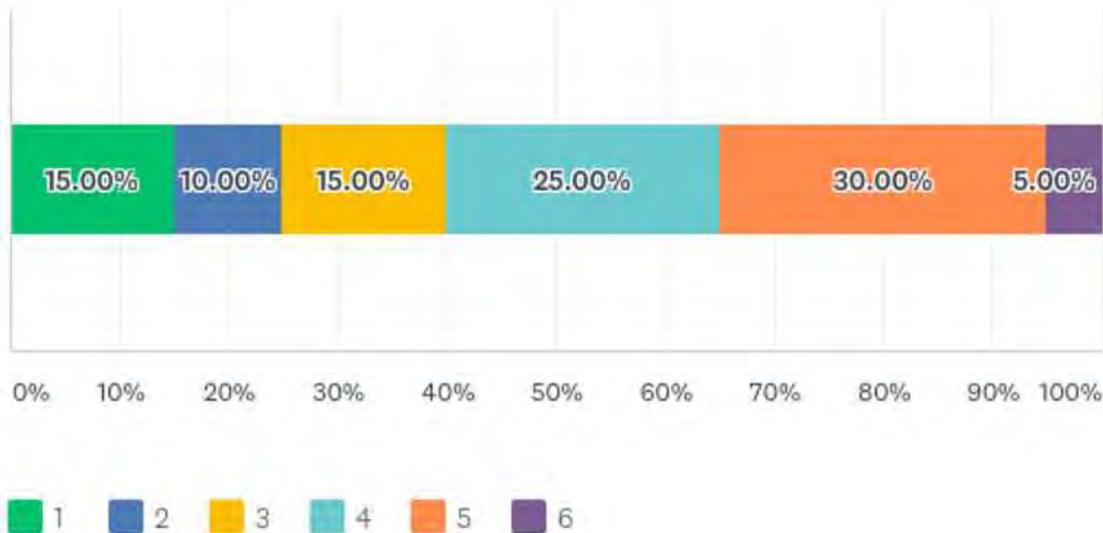
The positive message from these responses is 70% have not considered moving or relocating their business because of broadband. But, 30% of respondents indicating they have either considered or might consider moving or relocating is a high enough percentage to take note of.

The following three bar charts combine to present a summary of how businesses felt about broadband in Fulshear.

The first one is a summary of satisfaction. This question read, “Overall, how satisfied are you with the speeds and options available from local internet providers, including your own? (1 = Very Unsatisfied; 6 = Very Satisfied)”.

Sixty percent of respondents had some level of satisfaction.

Chart 14 - Level of Overall Satisfaction with Broadband Speed and Options



Conversely, when asked, “If the City of Fulshear were to facilitate the development of reliable, high-speed internet services, how likely would you be to switch internet providers? (1 = Very Unlikely; 6 = Very Likely)”.

Eighty-five percent of respondents indicated some level of likelihood that they would switch if the City helped facilitate reliable, high speed internet options. As opposed to previous questions, this question does not mention price – it is based on the issues of reliability and options.

Chart 15 - Likelihood of Changing Providers if the City Facilitated Reliable, High Speed Internet



Lastly, a question focused on the City’s role in facilitating better broadband. Specifically, this question asked, “How strongly do you feel that the City needs to help coordinate better broadband (1 = Not At All; 6 = Strongly feel there is an issue and would like the City to coordinate)”.

80% of business respondents supported the concept of the City helping facilitate better broadband.

Chart 16 - Encouraging the City to Coordinate Better Broadband



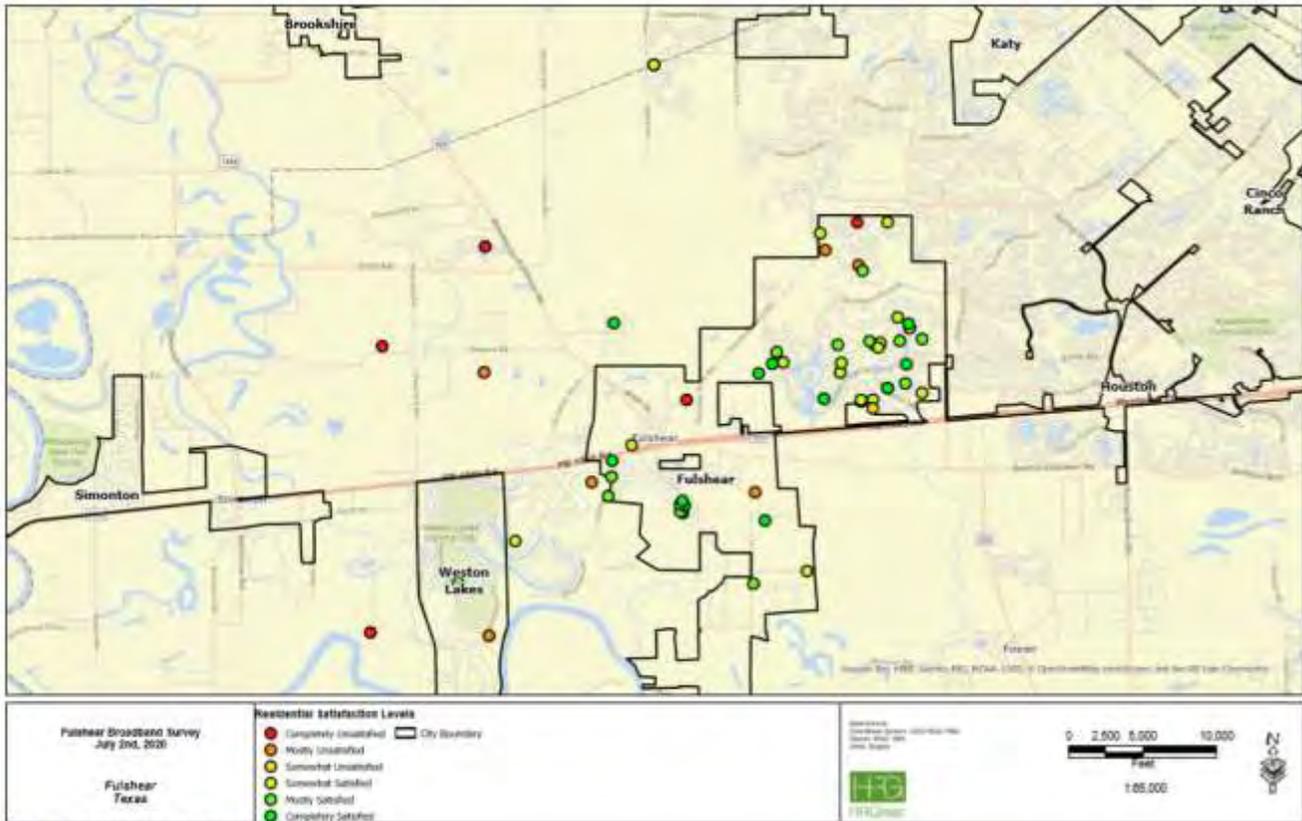
Business Survey Feedback Summary

1. A majority of businesses who responded have made what they have work, at a level that is generally satisfactory, but not extraordinary.
2. Responses also indicate that businesses would like better connectivity with greater reliability and more options.
3. Business responses indicate that where they are located determines what connectivity they have.
4. Businesses are supportive of the City taking a leadership role in work on these issues.

Resident Results

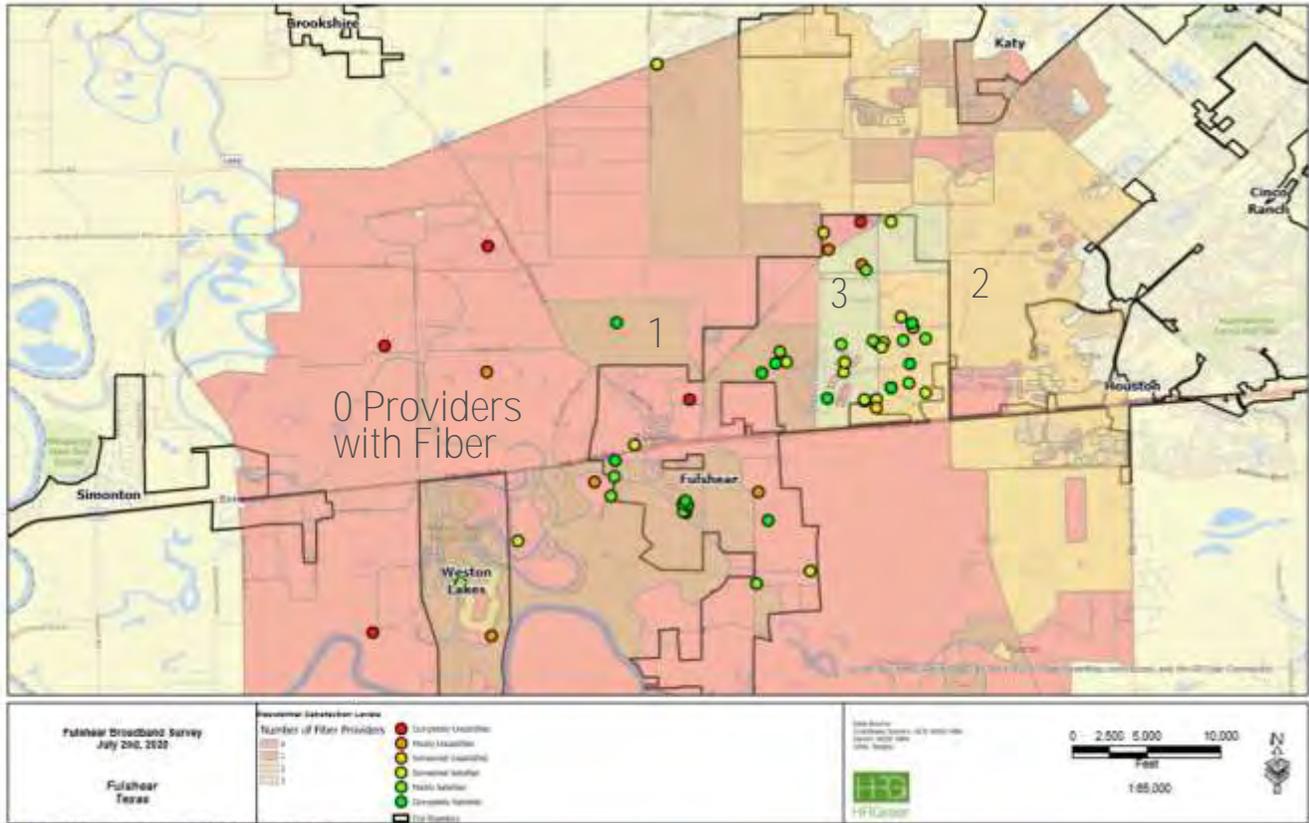
The below map shows clusters of responses from residents along with their overall satisfaction level, which is varied.

Map 7 - Chart of Clusters of Resident Responses



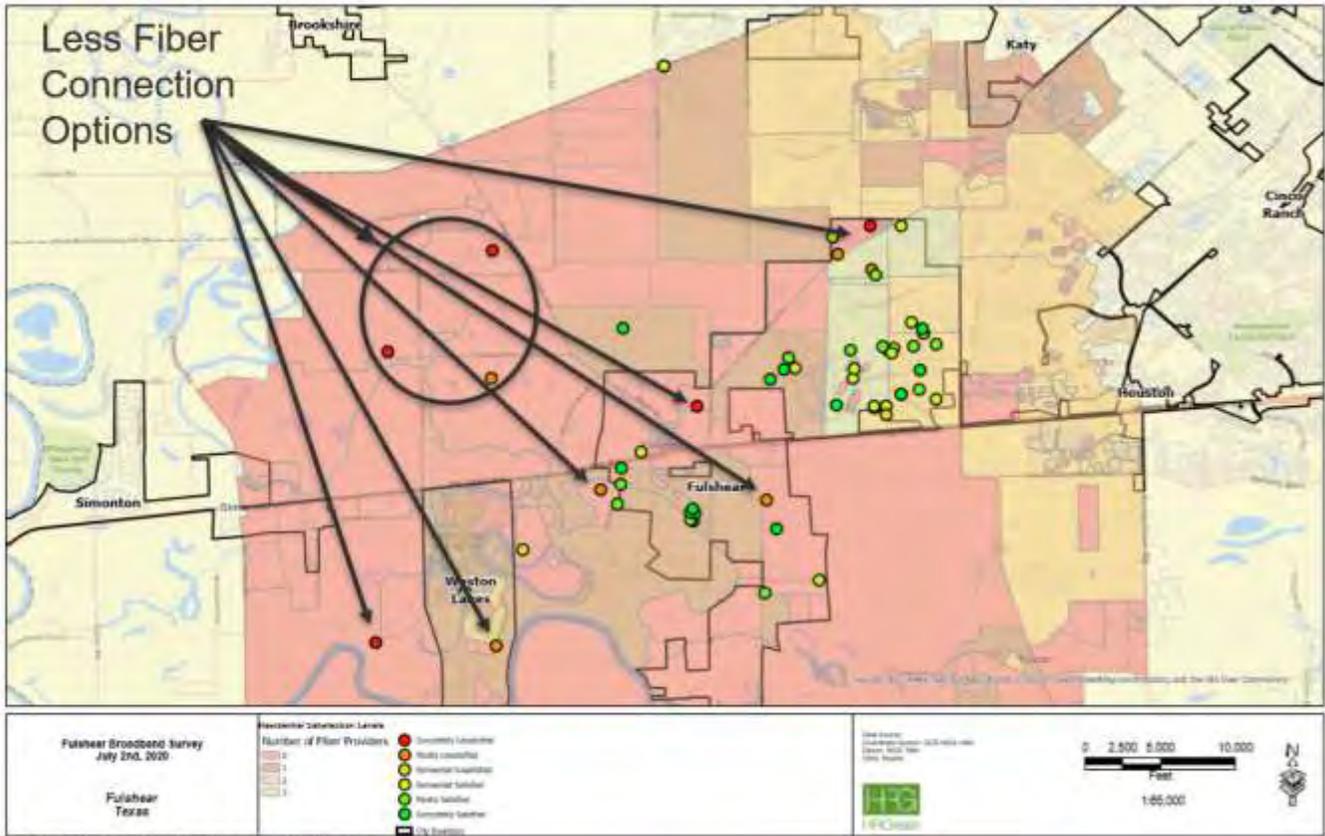
In the next map, we overlay those satisfaction responses on a map showing the number of fiber providers which provides additional insights. Significant patterns appear in this combination of data. These patterns also indicate that the provider data given in the Market Assessment seems to be fairly accurate.

Map 8 – Resident Satisfaction Compared to Number of Providers with Fiber



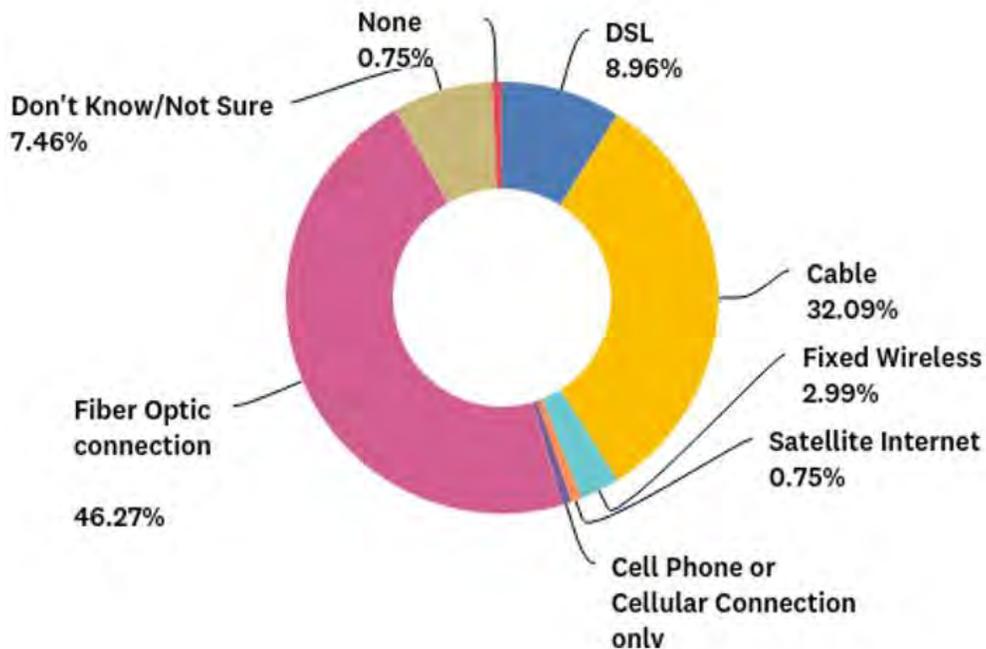
These mapped responses show a clear correlation between the most satisfied residents are in areas that have fiber optic connection options. Where there are less providers with fiber, the less satisfied the customers are.

Map 9 – Less Resident Broadband Satisfaction When Less Providers with Fiber



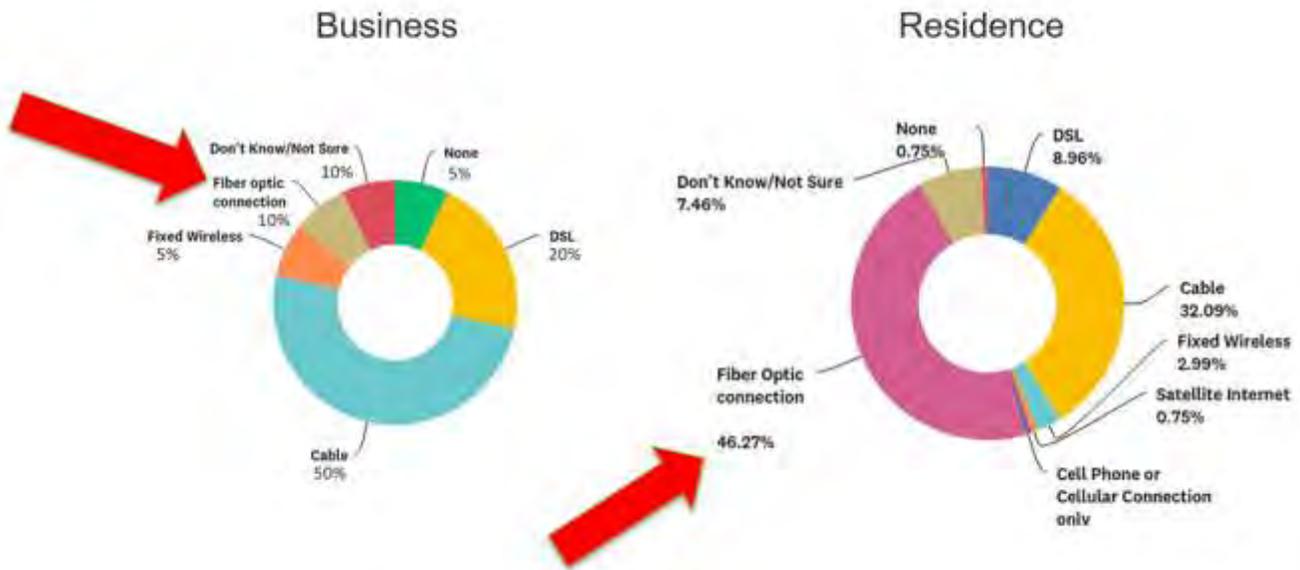
This is underscored by the responses residents provided when asked through what mode they received their broadband.

Chart 17 – Broadband Delivery Mode



These percentages mirror very closely the coverage that was reported from the industry in the table on page 13. When comparing these responses for residences with the number of businesses connected by fiber, there is a disparity amongst the respondents.

Chart 18 - Comparison of Business and Residential Broadband Delivery Mode

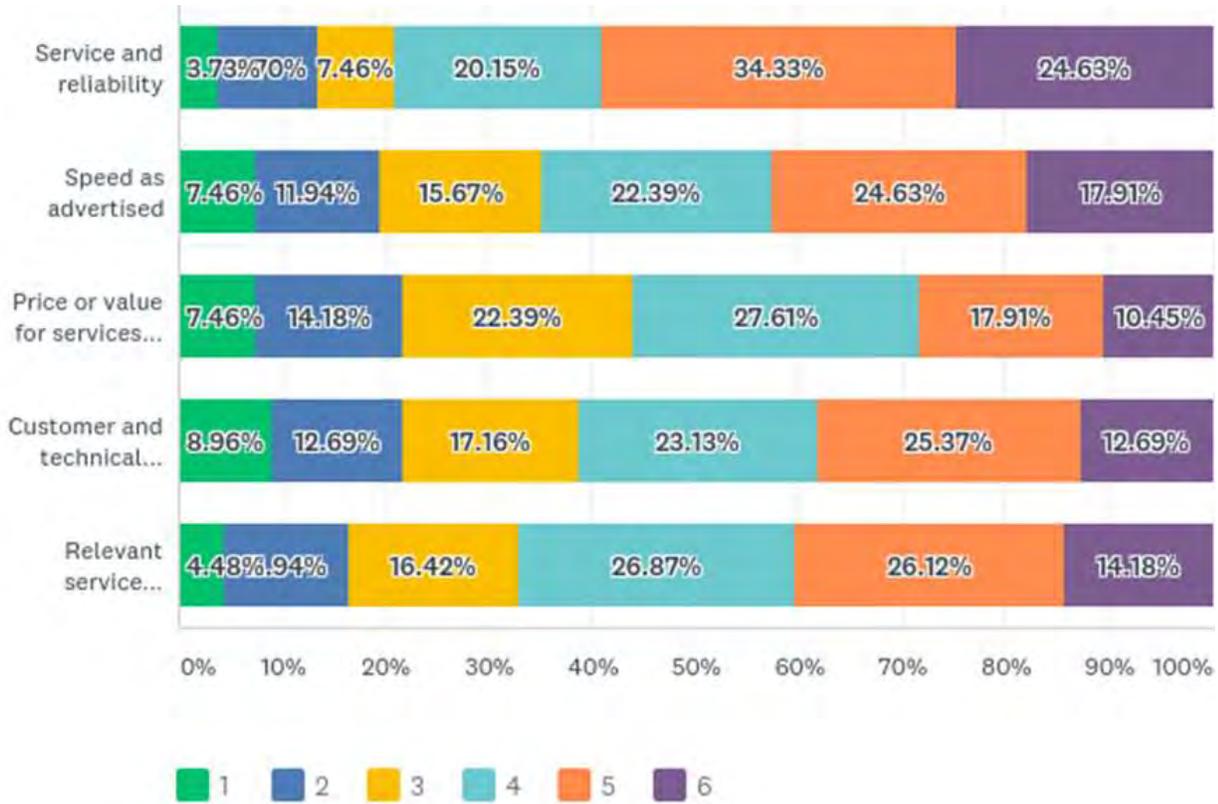


This is something that should be explored in more depth, but on the surface, it appears that fiber is being built out to neighborhoods more than other areas, providing homes with more fiber options than businesses.

As was displayed in the City map (Map 7, page 23), residents appear to be fairly satisfied if they are in areas where fiber is available. The below graph shows their satisfaction by category.

In looking at satisfaction by each category in Chart 19 below, four represents Somewhat Satisfied, five is Mostly Satisfied and Purple is Completely satisfied. These are strong scores. The category with the lowest total satisfaction is price.

Chart 19 - Residents' Satisfaction by Category



In Chart 19, price was given the least satisfaction. The amount that resident respondents reported paying is:

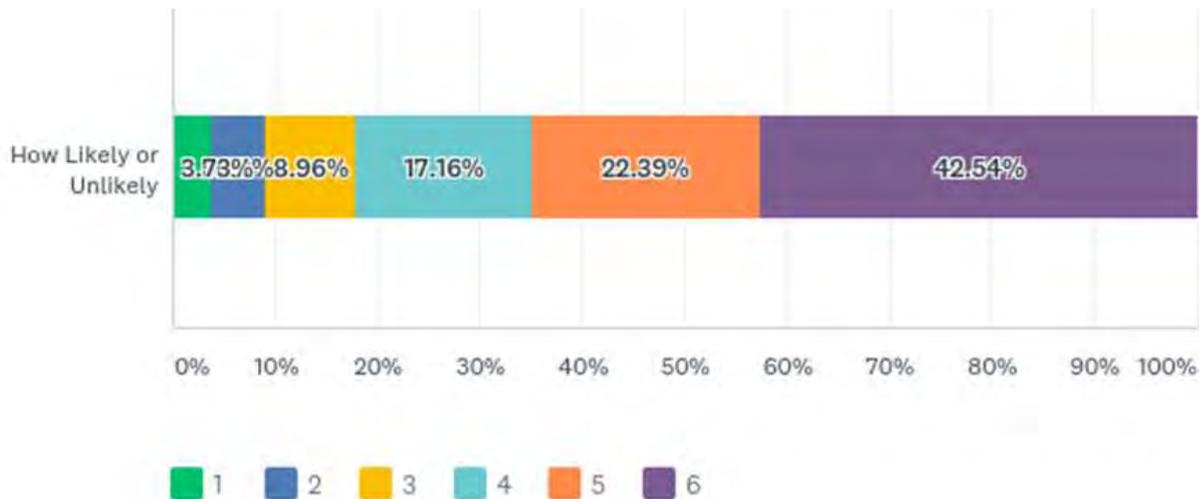
Chart 20 - Resident's Reported Cost for Broadband Services

ANSWER CHOICES	RESPONSES
Less than \$50.00 per month	2.24%
\$50.01 to \$99.99 per month	7.46%
\$100.00 to \$149.99 per month	11.19%
\$150.00 to \$199.99 per month	18.66%
More than \$200.00 per month	60.45%
TOTAL	

With the residents' high satisfaction level, the question was asked, "If the City were able to help facilitate better or more reliable, high-speed internet services, how likely would you be to switch internet providers? (1 = Very

Unlikely; 6 = Very Likely)”. 82% of residents responded that they were at a minimum somewhat likely to switch providers should the City help facilitate a more reliable service:

Chart 21 - Resident’s Desire for City Facilitation of Better Broadband



Public Sector Input and Needs Assessment

Interviews were conducted with the following groups in order to determine their current broadband needs, plans for the future and insights into the processes, interactions and challenges presented by broadband and its deployment. Staff also assisted in reaching out to various private entities whose development experiences might help better inform the situation on the ground in terms of broadband infrastructure availability and deployment and its effect on market viability. Responses are presented in the aggregate below.

Meetings were held with the following:

- City Management
- Economic Development
- City Information Technology services provider
- Fulshear Police Department / Emergency Management
- Public Works and Utilities
- Parks and Recreation
- Finance
- Planning and Development Services

- Fulshear Simonton Fire Department / Emergency Services District No. 4
- Fort Bend County Sheriff's Department in conjunction with Fort Bend County Information Technology

- Fulshear-Katy Area Chamber of Commerce
- Katy Area Economic Development Council
- Various developers who responded to request for interviews

To understand each of the public entity's general connectivity, it might be most useful to view the entities in terms of their broadband interconnectedness. The below graphic displays very generally how the entities are associated via broadband infrastructure.

Chart 22- Graphic of Public Sector Broadband Interconnectedness



The City's facilities are connected via a fiber connection provided in collaboration with Comcast. There are exceptions like the community center.

As is most common, emergency services have made their own arrangements with overlapping coordination needs such as dispatch for emergency responders. Generally, emergency response services have some

redundancy through the use of three different technologies: Building broadband/network connections, radios and cellular.

During the discussions, some consistent and clear themes emerged.

1. **Working with what is available** – City leaders have been creative with making things work. As growth has occurred, they have taken the necessary steps to accomplish what needed to be done. Examples of this are steps like the network connection for City buildings via Comcast; installing software and communications that will work within limitations (and not others that will not); using certain backup systems that have limits based on capacity; working with other similar departments to share services; delaying infrastructure, software, public facing possibilities implementations
2. **Lack of Redundancy** – given that most City offices are on one fiber connection, there is very little redundancy. The main exception to that is the previously mentioned emergency services that use different technologies as fail-safes
3. **Coordination** – growth has made clear several needs for coordination and collaboration. That could be in facilities, location of services, IT implications, infrastructure and ROW coordination – this is covered more below
4. **Improvements** – most departments have plans for technological systems improvements which will require greater capacity, speed and reliability. Without upgrades in connectivity, these improvements will likely be impacted.

Some of the examples that departments mentioned of possible future upgrades are listed below. This is not a complete list, nor is it time sequenced or prioritized. It is meant to show ideas about general future needs under consideration which will require broadband enhancement and coordination:

- **Public Works & Utilities:** AMI meters data, Wi-Fi in public spaces, work order system, traffic management, school zone flasher controls, SCADA data, message signs, warning sensors and systems (like high water)
- **Development Services:** remote ‘real time’ field operations; online permitting submittal/review processes; etc.
- **Police/Emergency Management:** In-house dispatch (future), records management system upgrades, communication with court, in-vehicle communication, internet and cell service coverage, license plate reader upgrades, camera systems, emergency operations center centralization (future), communications and records
- **Information Technology:** Redundancy, capacity for backup, centralize facilities and data, outages (including power), community center building service
- **Finance:** Public facing tools and information, more cloud functions, AMI data (internal and public facing)

A specific finding from the Public Sector meetings was the importance of defining the City’s (and departments within the City’s) ongoing roles in broadband infrastructure development. This should be further clarified and defined so that departments can understand how they might work to positively influence the broadband environment in their specific roles.

Commercial developers interviewed had different approaches to broadband service provision and availability. Some are not involved or aware of it because they already own the buildings and the tenants are responsible for their connections. Others, who are developing new properties expressed the necessity of good broadband in the success of their projects. One developer/property owner in downtown indicated that there are connectivity issues in downtown (lack of fiber), and the lack of fiber availability does limit what type of business/tenant they

can lease to. From a residential perspective, it seems that generally, developers have found private sector solutions to provide for the broadband needs and expectations of their customers.

Generally, the same holds true from an economic development perspective: infrastructure availability (including broadband) is critical for determining the eventual use of a property and can enhance, or detract from marketability to particular industry sectors based on infrastructure availability (no different than water, wastewater, or electric capacity available). For existing businesses, good connectivity (however it is defined by users for their particular circumstances) is critical to continuance of operations and productivity.

Options moving forward

Below is a chart developed by the Brookings Institute that shows different possible roles for City’s in public-private partnership contracts. This chart helps show the many different roles cities can play relative to investment, control and ownership. Ownership and network operation are not seen as operationally feasible or desirable for Fulshear and the chart has been annotated accordingly. However, there are many other levels of involvement and roles that the City could play in partnership with the private sector.

Chart 23 – Private Sector Engagement Options²⁰

DIFFERENT LEVELS OF PRIVATE SECTOR ENGAGEMENT IN PPP CONTRACTS

	Identify Infrastructure Need	Propose Solution	Project Design	Project Financing	Construction	Operation / Maintenance	Ownership
Bid / Build	Public Sector				Private Sector	Public Sector	
Design / Build	Public Sector		Private Sector	Public Sector	Private Sector	Public Sector	
Design / Build / Finance	Public Sector		Private Sector			Public Sector	
Design / Build / Finance Operate / Maintain	Public Sector		Private Sector				Public Sector

Policy Review and Recommendations

Part of this study involved reviewing and proving recommendations for current policies regarding broadband:

- Design Standards
- Policies
- Right of Way congestion management

The first task was to review current policies. Small cell and wireless ordinances were fairly new topics in Fulshear code, so we supplied full code language for specifics that were not in place. Staff provided questions related to our recommendations and those have been answered.

Right of Way congestion management will continue to increase in importance as Fulshear grows. Broadband infrastructure is particularly challenging in ROW because there are multiple providers and it is difficult to oversee. Recommended policy includes classifying road segments by the known congestion, then having in code, certain remedies if a provider requests utilizing segments that are already congested. Below are the suggested categories and recommendations.

²⁰ https://www.brookings.edu/wp-content/uploads/2016/07/BMPP_PrivateCapitalPublicGood.pdf
Page | 31

Chart 24 – Recommended Congested ROW Categories and Remedies

Level	Restriction	City Alternative	ROW Available	ROW Consumed	Provider Impact	Additional Impacts
GREEN	Non Arterials or No Restriction	Non-Issue	Open	Less than 60% is anticipated to be consumed	Per Existing Policies & City Processes	
YELLOW	Moderately Restricted	Limited Options	10 feet or less on one or both sides	60% of Available is consumed or is anticipated	Must show it has taken all reasonable efforts to minimize ROW or creates additional capacity	Permittee or City may request joint trench or conduit sharing
RED	Severely Restricted	Minimal Options	6 Feet or less on one or both sides	75% of Available is consumed or anticipated to be consumed	Must show intended use will not further restrict ROW (Joint Build)	Permittee may be requested or required to conduit share

The above categories and supporting policy will help with future broadband related installations and provide a framework to protect ROW.

The policy recommendations are included in full in Attachment C.

Recommendations

1. Keep Building on Positive Outcomes

Fulshear should be pleased with many of the positive steps that have happened as a result of conducting this study. Notably, the City has seen new relationships begin with providers which can help facilitate future partnerships to create real opportunities for improved service in the community. These possibilities involved both retail providers and “transport and middle mile fiber” providers. With these positive steps acknowledged, and based on the overall findings of the study’s first phase, HR Green offers the following recommendations:

2. Possible Next Steps

- **Conduct a more robust examination of fiber availability for businesses** to gain a more in-depth understanding of the dynamics demonstrated in the data provided in this report. This could be done in conjunction with other steps outlined here, and with a focus on key development areas identified in the City’s plans.
- **Further evaluate downtown fiber.** There appear to be connectivity issues downtown. If the City’s wishes to have an Innovation Hub downtown, and/or to encourage the development of an entrepreneurial ecosystem and associated commercial spaces, this will be severely limited by lack of fiber.
- **Develop consensus on the ongoing role of the City (investments, control, roles) in community broadband infrastructure development.** It will be important for the City to have an understanding and game plan of where investments could come from, how control of infrastructure will be maintained and who within the City will carry what responsibility so that coordinated, proactive strategic steps can begin, and so any potential future investments will be of greatest impact and a win-win for the parties involved.
- **Develop a Fiber and Broadband Master Plan.** City leaders have done well in doing what they could as the City has grown. This is the perfect time to develop and implement a plan for broadband growth that is focused on achieving City broadband goals to provide for future growth and development in the manner the City desires. Organization and coordination can happen now – later it becomes more difficult. A Fiber and Broadband Master Plan would include the following general elements:
 - Clarify consensus goals
 - Identify City needs - current, future and coordination related to capacity, end points, collectors, etc.
 - A work session to define acceptable City control
 - Plan routes and densification while keeping City’s redundancy and capacity needs in focus
 - Right of Way Management
 - Know what is where and possibly build conduit to manage
 - Economic development plans and priorities focused on improvements to key opportunity areas and for potential deployment of future “advanced wireless technologies” such as 5G to enhance competitiveness
- **Codify fiber-friendly public policy in City code** – Attachment C contains policy recommendations for design standards, broadband related policy (specifically small cell and wireless) and for ROW congestion management. Either those recommendations or modifications of them should be approved into City code.
- **Develop a Coordinated Response to Opportunities:** Prepare for a quick response process to take advantage of opportunities. These opportunities could be in having a colocation design when construction is happening, it could be in working with a provider who is considering fiber in town, etc. Having a set team who span the offices needed for quick decisions and who are prepared to take action often determines whether an opportunity can be utilized

- **Identify current or near-term projects and engage possible partners** – but maintain some control/ownership – possibilities could be to build conduit, RFI for co-investment, etc.
- **Continue to build relationships and improve coordination with providers** (including transport and middle mile providers (Attachment D)). There are several ways to coordinate this effort and we recommend this become a focused effort.

One way to consider these recommendations is to compare them to the concerns discussed on Page 1, the tools that the City has to deal with those concerns and the guidance needed from City leadership. The City does have tools to address the potential broadband concerns. To move from concerns, to utilizing the tools to address those concerns, will take leadership.

There are some potential concerns

- Varied levels of service
- Little municipal control
- Lack of redundancy options
- Growth related need to coordinate and plan broadband
- Right of Way management
- Lack of fiber downtown

Tools

- Specific design goals (redundancy, ubiquity, tech zones)
- Fiber Master Plan
- City role - incentives (policy, financial, infrastructure)
- Provider engagement
- Policy

City Leadership

- Guide fiber deployment
- Manage densification
- Guide redundancy
- Coordinate network upgrades
- Manage ROW



ATTACHMENT A
Market Assessment



Broadband Market Assessment



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Houston, TX 77042
Phone: (713) 965-9996

Learn more at HRGreen.com

PREPARED FOR
**City of Fulshear, TX &
Fulshear Economic
Development Corporations**

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March 13, 2020

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Executive Summary

A Market Assessment reports and analyzes the industry information that is available concerning connectivity. Providers are required to report their coverage to the Federal Communications Commission (FCC), thus there is substantial data that can be obtained and analyzed. Through relationships in the industry, it is also possible to gather other information from providers about their plans and infrastructure. One type of infrastructure that can be particularly important is transport fiber (fiber that is installed with excess capacity or installed for later use or sale) and where it runs. Transport fiber companies often post their general routes on the internet, so this information is somewhat available and we have included it in this report.

Fulshear's Unique Circumstances

From a broadband perspective, the City of Fulshear has two main factors that provide some opportunities and possible challenges: growth and location. Census data reports a 927% population increase from 2010 to 2018 (1,169 population to 11,990)²¹. Additionally, according to Fulshear's reported statistics, the City was the fastest growing City in Texas in 2016²².

The opportunity that this type of growth (and the likelihood of that continuing into the future) can provide, is it can potentially create an attractive market for providers to make investments in broadband infrastructure. Findings in this report show that providers are already investing in some infrastructure in Fulshear. This level of growth could encourage providers to install more assets and also lead 5G/Small Cell providers to consider investing in the City.

The challenges of growth for broadband can be:

- There are many communities growing in the State of Texas, and consequently, from a broadband perspective, Fulshear might have to further distinguish itself to continue to attract broadband investment
- The question of when providers decide to fully enter a market. As a community grows, providers often have decisions to make regarding amount of growth that fits their models as they decide when to invest
- How the City can manage broadband infrastructure in a way that incentivizes providers for mutual benefit, that takes advantage of other ongoing projects to include broadband infrastructure when it is most cost effective to do so, and that makes sure broadband infrastructure is managed to protect Right of Way and ensure broadband infrastructure does not slow down other infrastructure projects.

With the new business and residential developments, it will be important to manage the infrastructure and to work with providers, developers and new businesses (all can impact infrastructure decisions and costs). Cohesive connectivity can be challenging when not managed. We would encourage the City to develop a fiber master plan and a 5G/Small Cell master plan. Defining where conduit and fiber will be built and developing a plan for collocation, can greatly improve the connectivity in Fulshear. And, if these are done in collaboration with the providers, organization, coordination and ubiquity can greatly improve.

²¹ United States Census Bureau - <https://www.census.gov/quickfacts/fulshearcitytexas>

²² City of Fulshear's website (Economic Development page - http://www.fulsheartexas.gov/businesses/economic_development/index.php)

Fulshear's location, from a broadband perspective is also an opportunity and can provide some challenges. The City is growing, so the location is attractive for residents and businesses. But, given that the City is not on I10 (although the ETJ extends to I10), where providers choose to run fiber should be monitored. As this Assessment will show, there is transport (also referred to as middle mile or wholesale) fiber that runs through Fulshear, so there could be paths for connectivity, but for some providers to install fiber in Fulshear, they will have to build to the City.

Market Assessment Key Factors

When evaluating the options of connectivity in a Market Assessment, there are some important factors to consider: speed, mode of delivery and price. These are what are included in a Market Assessment. There are other important factors in connectivity: reliability and customer satisfaction. Because those focus on customer experience, they are evaluated in Community Engagement (a separate part of this discovery work).

Speed and price are the factors in broadband that are the most often discussed. Mode of delivery is not highlighted as often, but it is important. The different modes of delivery vary significantly in reliability, capacity and adaptability for future uses.

The options for modes of delivery are: Fiber, cable, fixed wireless, DSL and satellite. That list is in descending order in terms of reliability, capacity and speed. Fiber is considered to be the most reliable, have the greatest capacity and have the lowest latency. There could be a debate between fixed wireless and DSL about which one should come before the other, but both have speed and reliability issues. DSL weakens the farther away it gets from transmitting equipment and fixed wireless can have signal impediment issues along with possible capacity limitations.

Industry Data

It is important to remember this is data from provider reporting to the Federal Communications Commission that is entered and distributed. Therefore, it is helpful, but is best understood when compared with user feedback. Actual experience from end users can confirm or refute industry information. Industry data is known to have flaws, which can be particularly problematic when there are grant possibilities, as this data is what is used to determine eligibility for many grants. Fulshear may not intend to pursue broadband grants, but if the City does, this Market Assessment information would need to be checked against end user experience.

The data is usually not dramatically out of date, but it will only be as current as the last reporting cycle. Because of the reporting process, this information will typically lag actual on the ground conditions by one to two years.

Key Findings

Currently, there appear to be multiple broadband options in most of Fulshear. There are nine carriers

providing services to residents in Fulshear and eight providing services to businesses. Of those, seven of the nine providing services to residents, report providing services above the national definition of broadband (discussed in more detail on Page 3). For businesses, six of the eight report speeds above the national definition.²³

From industry reported data, connectivity appears to be fairly good in the aggregate. “The average download speed in Fulshear is 115.66 Mbps. This is 94.9% faster than the average in Texas and 52.1% faster than the national average.”²⁴

Also important, there are three providers who report providing 1 Gig (1,000 Mbps) service to residents and businesses in the City. And, there is a fourth that reports speeds very close to 1 Gig (987 Mbps).²⁵

What these statistics do not show is providers’ capacity to handle growth. That should be a topic of conversation with providers as the City develops a fiber master plan.

Basic Broadband Coverage

The Federal Communications Commission (FCC) currently defines the minimum accepted speeds of broadband as 25 Megabits Per Second (Mbps) download and 3 Mbps upload. Downloading is bringing something to a device from the internet – for example, streaming a movie. Uploading is when a person sends a file from his or her computer to another destination over the internet.

According to Connected Texas, the below map shows what areas have the minimum accepted level of broadband in green (these areas have the minimum or greater). The darker green represents where providers supplied coverage data and the lighter green is where FCC Form 477 information was used. White indicates where the minimum 25/3 is not available.

²³ Industry data reporting company Broadband Now – www.broadbandnow.com

²⁴ Industry data reporting company Broadband Now – www.broadbandnow.com

²⁵ Industry data reporting company Broadband Now – www.broadbandnow.com

Chart 1 – Minimum or Greater Level of Broadband²⁶

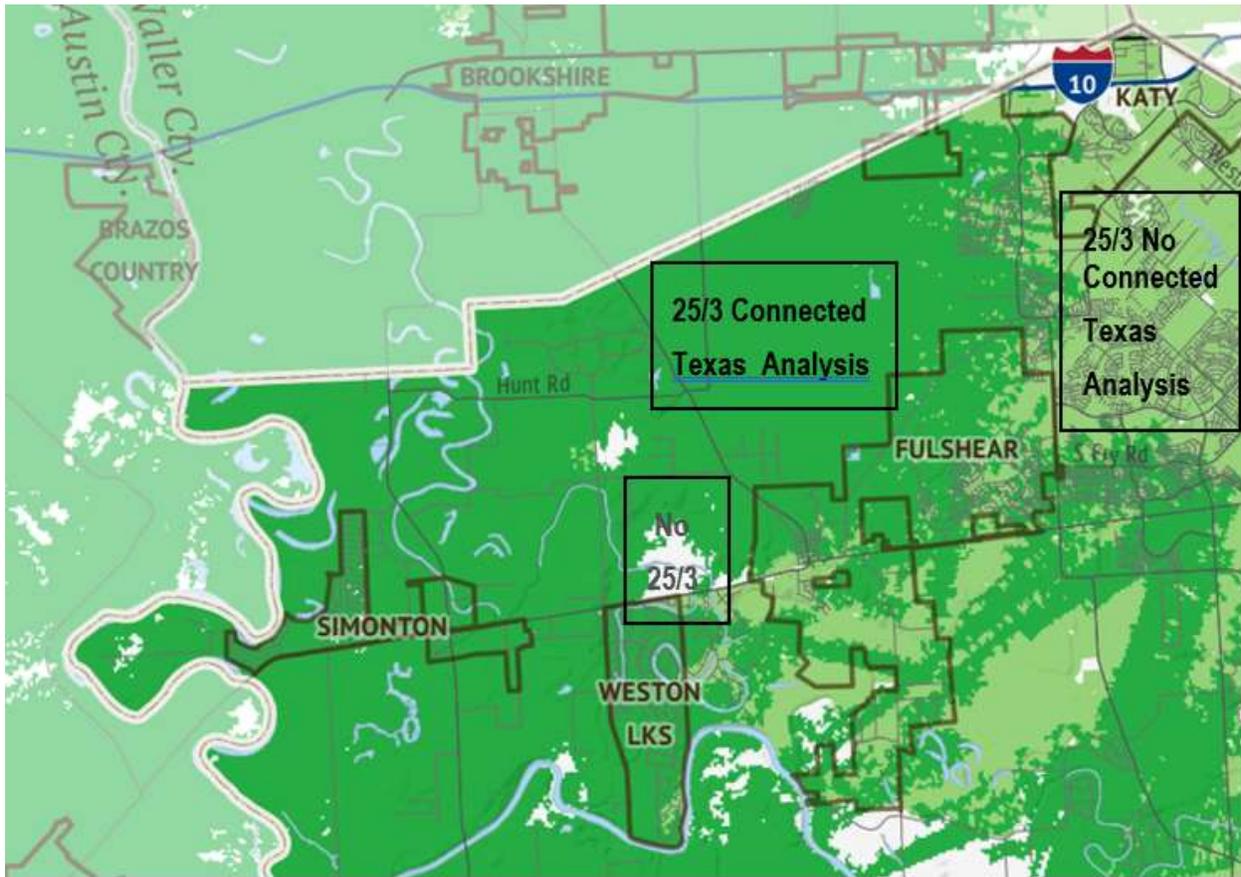
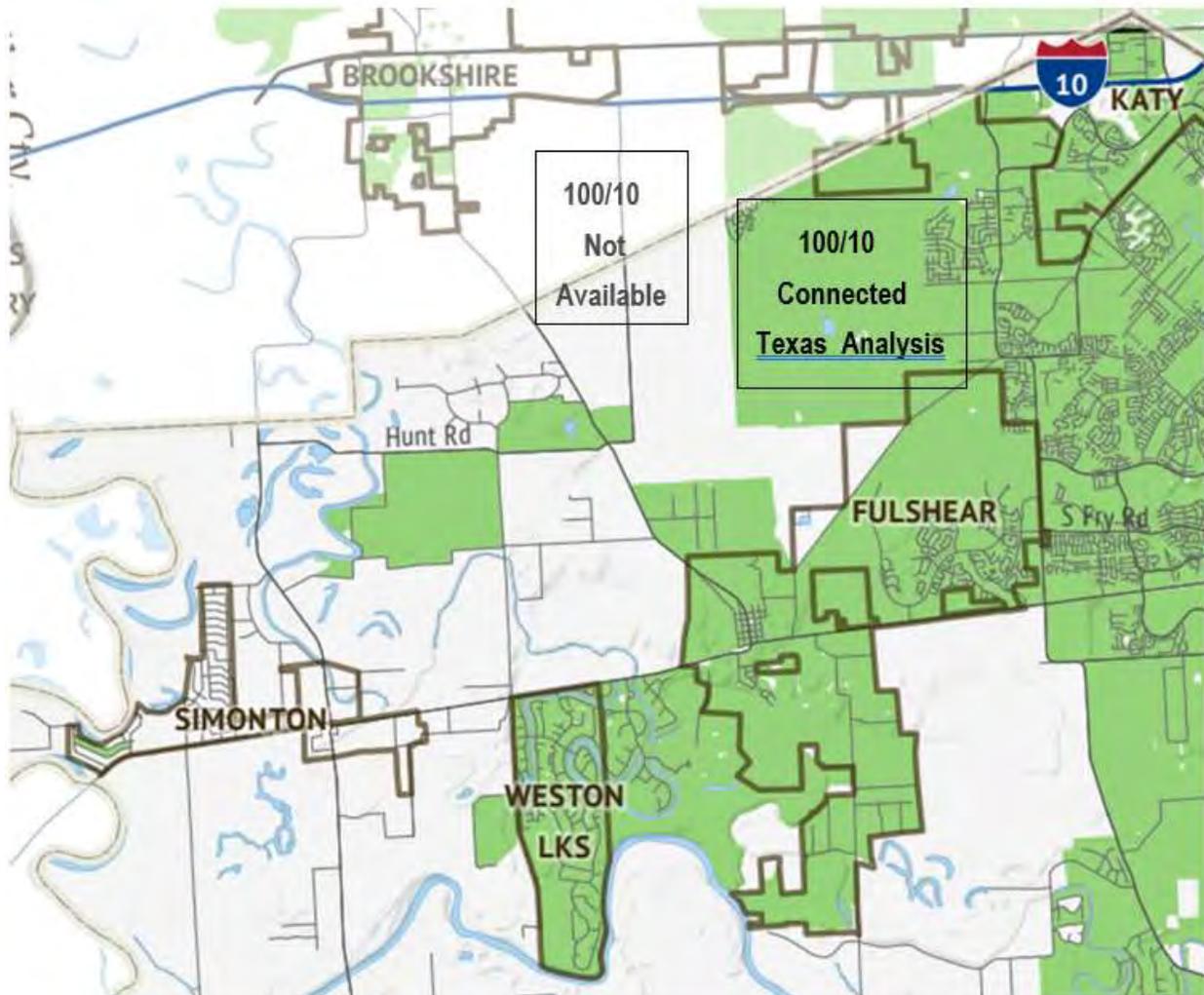


Chart 1 shows that most of Fulshear and the surrounding areas have the minimum speeds to be considered broadband. 25/3 is considered basic broadband, but many businesses and residents find these speeds to be inadequate. The chart also shows areas that do not have even these minimum speeds. These maps do not scale to see very granular data (specific locations and addresses), but they do provide an understanding of coverage.

When looking at Connected Texas data to see 100/10 coverage, a picture emerges that can provide some idea where broadband infrastructure is. Chart 2 below shows Connected Texas 100/10.

²⁶ Connected Texas - https://cn-maps.hatfieldmedia.com/US/TX/v2/tx_fort-bend-county_25x3.pdf

Chart 2 – Connected Texas 100/10 Coverage



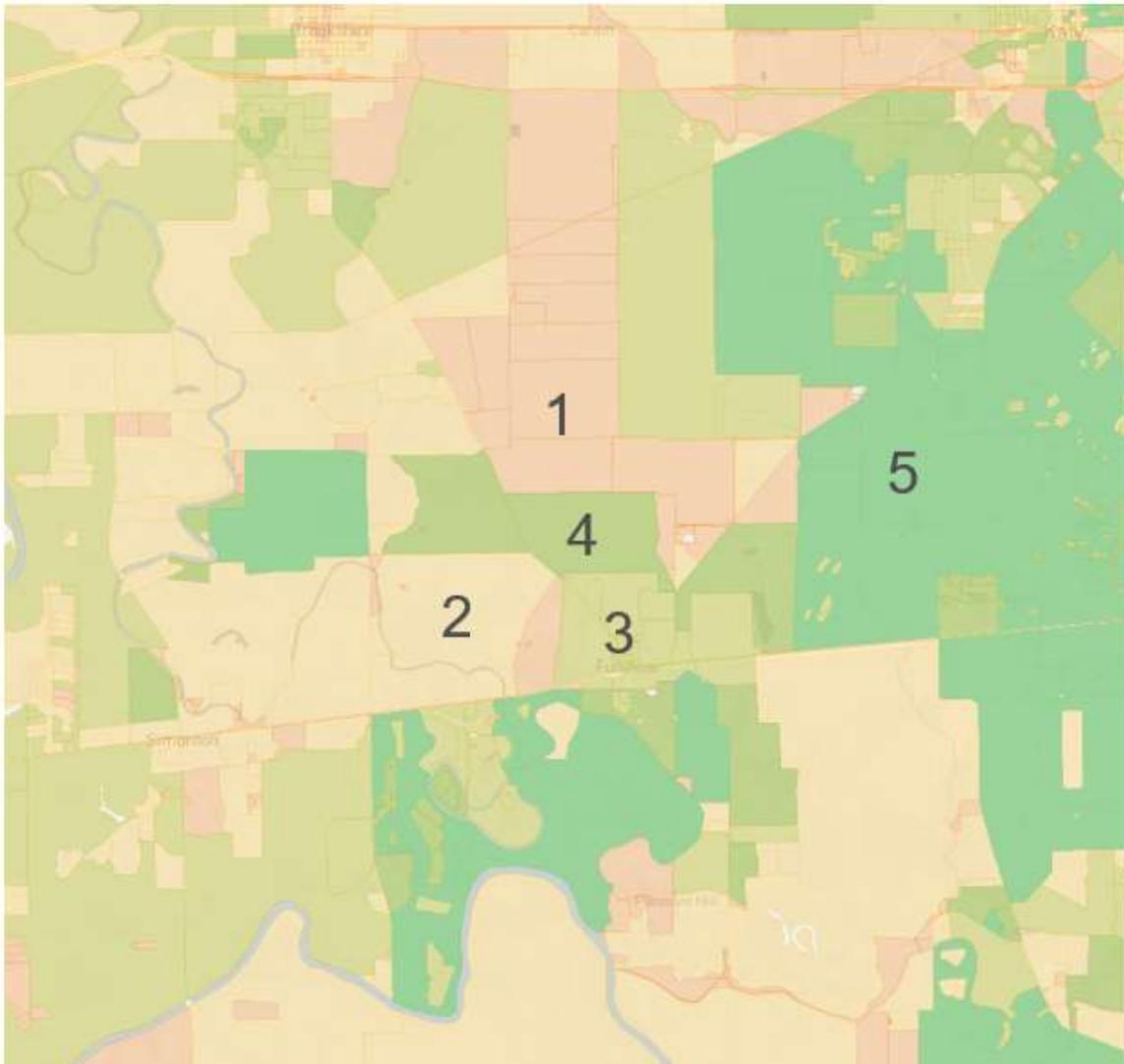
When looking at broadband coverage at the macro level, Fulshear appears to have good coverage in some areas, but also areas that appear to be underserved.

Coverage of the FCC definition of 25/3 minimums appears to include most of Fulshear. However, as speeds increase, the level of coverage in the area decreases.

Average speed is one measure of coverage. Other important ways to understand coverage include numbers of providers (competition) and what infrastructure the providers are using to deliver services.

The below map looks more at competition and is from a different source, BroadbandNow.com. Chart 4 shows the number of providers who offer services over fiber, DSL, Cable and Fixed Wireless.

Chart 3 - Number of Providers²⁷



In this chart:

- The darkest green represents 5 or more providers
- Medium green represents 4 providers
- Lighter green represents 3 providers
- Yellow/tan represents 2 providers
- Rose/pink represents 1 provider

Chart 3 appears to show that all areas of the City and ETJ have at least one source of internet. Several areas have multiple providers. It also points out a significant corridor between the City and I10 that only has one provider as of the data available for this map.

The BroadNow.com maps and information provide the ability to drill down into the FCC data. The following charts explore coverage and speeds using Broadbandnow.com maps. To fully understand these maps, it is important to know how the FCC assigns geography. The FCC generalizes data in census

²⁷ Broadbandnow.com

blocks. If there is one address within the census block that shows a higher speed, then the entire census block is considered that speed. Because of that, it is important to drill down as much as possible and verify user data to get a clear picture of service.

In looking at speeds in Fulshear and the surrounding areas, the broadband maps show an interesting pattern. They also give some indication of what infrastructure may be available in different areas. Taken together, these maps indicate a significant disparity in what is available across the community. Chart 4 below shows the maximum speeds available. The green shows where the maximum speed available is up to 1 Gbps. The pink shows where the maximum speed is 30 Mbps.

Chart 4 - Maximum Speed Available²⁸

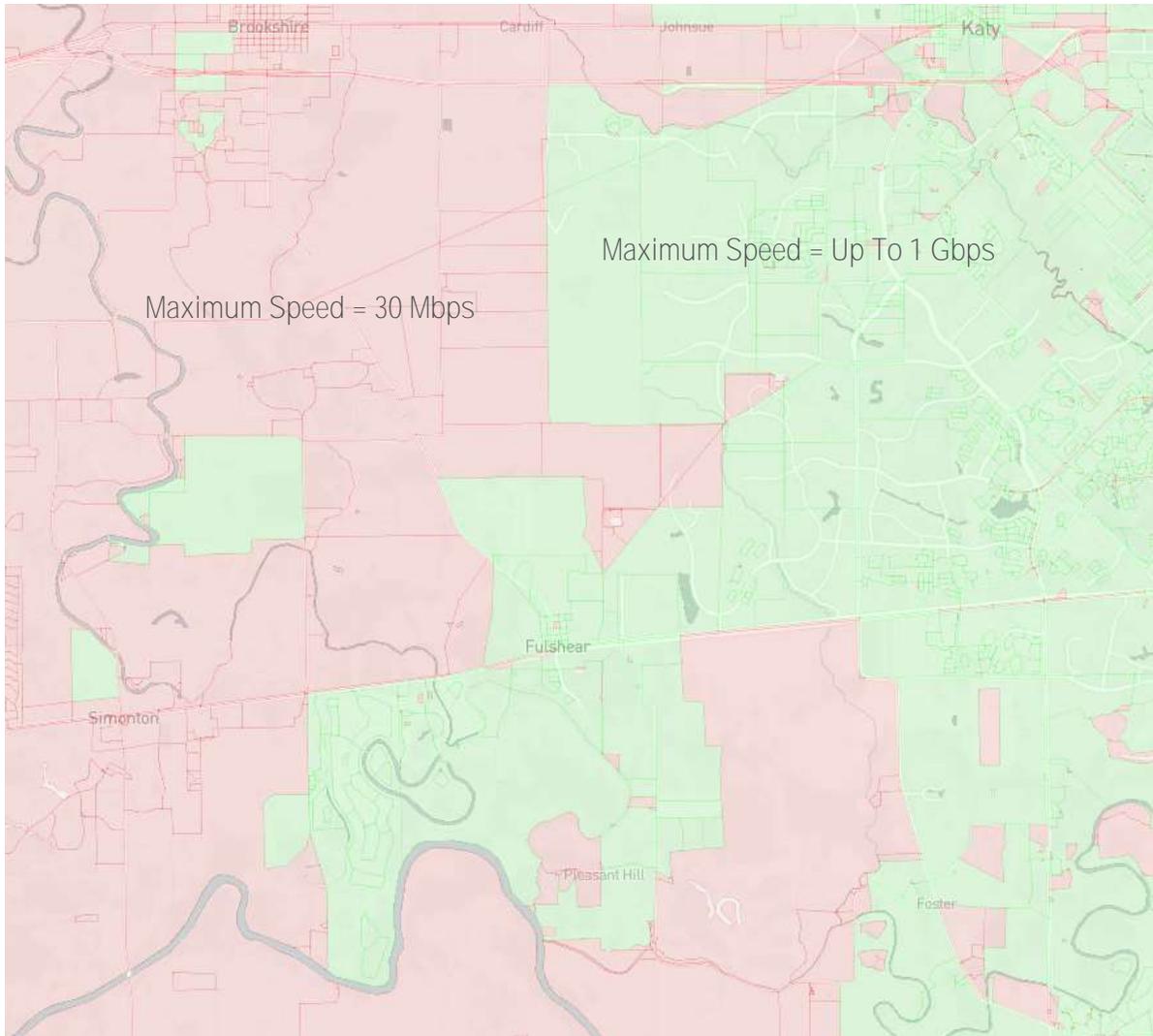


Chart 5 below focuses on the City of Fulshear. The map points out the potential for disparity in service within the City. There are small pockets where the coverage is not as good as the rest of the City. With the “one address generalized to the entire census block” concept, there are likely other areas that have slower speeds. The point in this map is to show that there do appear to be pockets within the City that have slower speeds than others.

²⁸ Ibid

Chart 5 – Pockets of Speed Differences Within the City²⁹

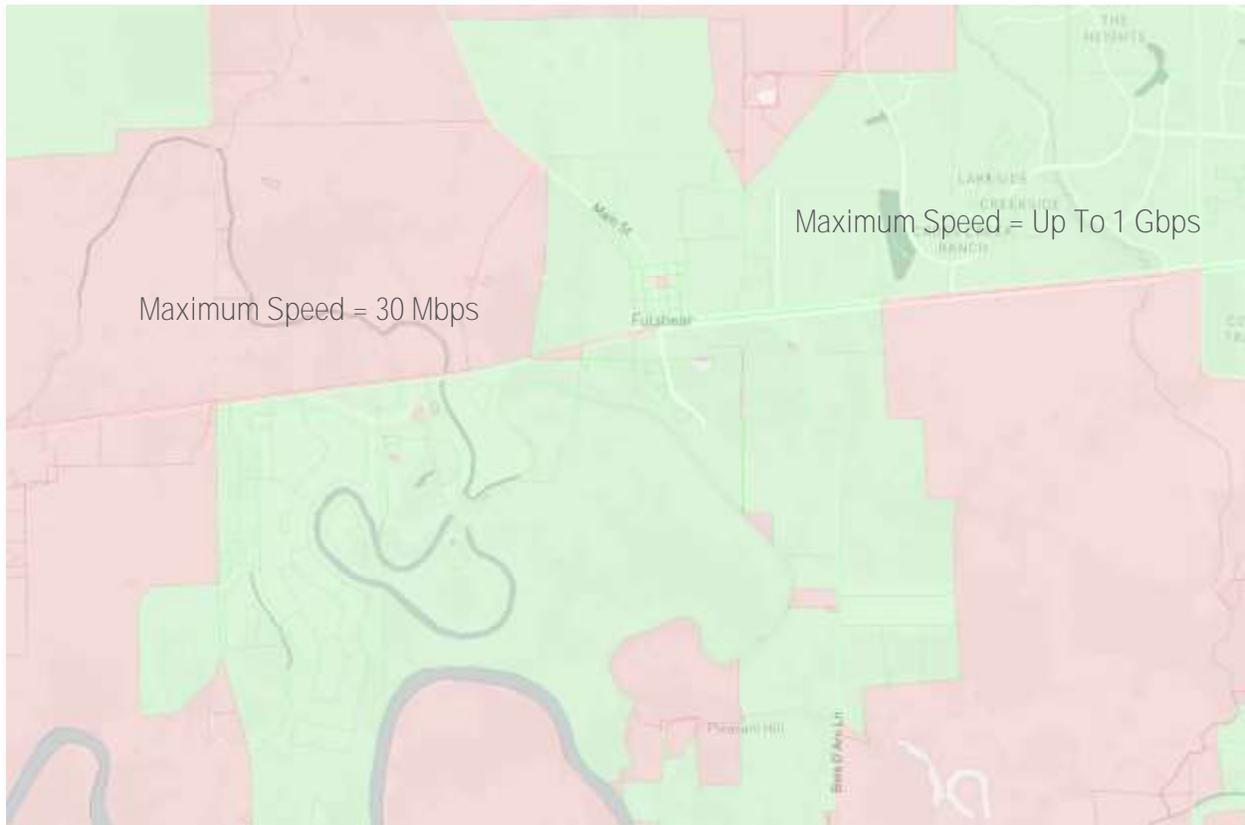


Chart 5 illustrates that there are different levels of service in Fulshear. Furthermore, because of the three factors previously identified (the data is self-reported, it is likely somewhat dated and the generalization of census blocks), it is important to compare this information with user feedback. Typically, there are unserved or underserved areas within the larger connectivity, so Charts 4 and 5 would be typical. To find out the specific, current circumstances requires customer feedback.

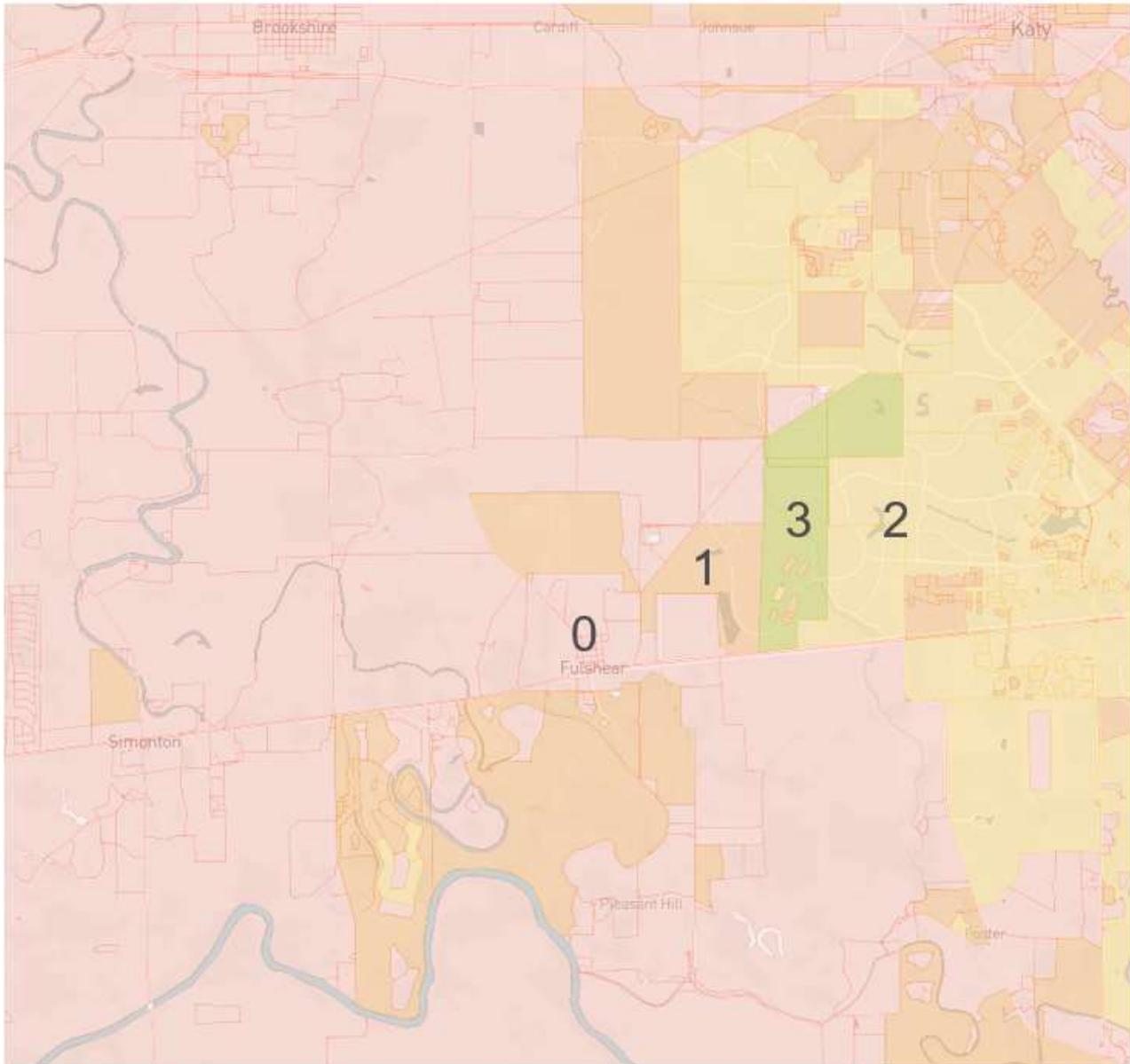
Another important way of analyzing service within an area is to look at what type of infrastructure is in place. This is significant to determine what type of capacity is available and how future proof the infrastructure is. DSL loses signal strength over distance. Cable can be upgraded with equipment, but it has limitations. Point to point wireless has to have line of sight and any impediments can impact the signal. Depending on how it is connected, point to point can also have capacity limitations. Satellite can be useful when other options are too expensive, but the signal can be affected by several things and the number of people using it at the same time (and what they are using it for) can significantly affect performance.

Fiber has the highest capacity and lowest latency. Therefore, the proliferation of fiber can show how prepared the infrastructure is for growth and upcoming technology needs.

Chart 6 shows the number of providers with fiber connectivity in the Fulshear area.

²⁹ Ibid

Chart 6 – Number of Providers With Fiber Connectivity³⁰



In this chart:

- Green represents 3 providers with fiber connectivity by area
- Yellow/lighter tan represents 2 providers with fiber connectivity by area
- Darker tan represents 1 provider with fiber connectivity by area
- Rose/pink represents 0 providers with fiber connectivity by area

Thus far, maps have shown that there appears to be relatively good connectivity (25/3 and 100/10 coverage maps (Charts 1 and 2) and the maximum speed map that showed that there are areas that

³⁰ Ibid

have up to 1 Gbps speeds possible (Chart 4)). Chart 6 makes an important clarification that not much of that connectivity comes from fiber infrastructure.

As stated previously, there is a lag in the FCC information. The data can be up to two years old. So, the information in Chart 6 has likely changed to some degree. BroadbandNow.com will update information if they are given more current data, even outside the FCC reporting cycle. So, if provider information is available and it would be beneficial to the City, the data could be updated.

Even if the data is outdated by one or two years, how much fiber is being installed is important to monitor. Fiber provides a backbone that has the best connectivity and the most options for the future (technological advancements, tech companies, data centers, 5G, etc.).

The other connectivity infrastructures can have their place in providing coverage, but they can be less adaptable for growth. Fiber could be important in Fulshear's growth (business and residential). The map that shows the number of providers with fiber (Chart 6) shows a need for more fiber (currently and for growth). The City will likely want to encourage fiber investment. The City will also want to manage the expansion of broadband infrastructure for five reasons:

- **Right of Way:** The City will want to ensure there is adequate Right of Way and organization within the ROW for connectivity and the other things the City will need in the ROW
- **Ubiquity:** Historically, uncoordinated expansion leaves certain areas unserved or underserved. In working with providers and in planning where fiber routes are built, the City could influence (or incentivize) ubiquitous coverage
- **Economic Development:** The City will likely want to be proactive in coordinating economic development goals with broadband goals. Because economic development typically works to 'set the table' for development (providers' customers), it is in the City's best interest (and also the providers' in the long run) to plan connectivity to strategic development areas. This could include installing conduit, creating expedited permitting paths, etc.
- **Timing:** Installing and moving telecommunications infrastructure is often a cause of delays in road and utility projects. This can become even more pronounced in times of growth. Coordination of and incentivizing efficiency of telecommunications infrastructure can significantly impact these issues for the better
- **Take advantage of opportunities:** Growth brings infrastructure changes. Many of those provide an opportunity for colocation, duct installation, etc. This is often the most cost-effective time for installation of infrastructure; however, it requires planning and coordination.

Business Provider Detail

According to industry information and other research, businesses in Fulshear have eight choices for connectivity. These eight might not be available in all parts of Fulshear and the ETJ. The below table shows the percentage of the Fulshear area that each provider reports covering. As mentioned previously, this data could be up to two years old, but it is a good indication of how much infrastructure each has in Fulshear and what their mode of delivery is.

Table 1 – Provider Business Connectivity³¹

³¹ BroadbandNow statistics tables: www.broadbandnow.com and Decision Now statistics tables: <https://decisiondata.org/tv-internet-by-zip/77406-internet/>

Provider	Type of Service	Download Speeds (Mbps)	Coverage	Cost/Month Low to High	Customer Satisfaction (1-5) 1 Low
AT&T	Fiber and DSL	Fiber: 1 Gbps DSL: 25 – 100 Mbps	25 – 50% 100%	\$85/mo. + \$50/mo. +	2.5
enTouch Business	Fiber	1 Gbps	27.2%+	Not Avail.	2
Consolidated Communications	Fiber	1 Gbps	6.8%+	\$95.38 - \$215.98/mo.	3
Comcast Business	Cable	987 Mbps	61%+	\$69.95 - \$499.95/mo.	2.5
CenturyLink Business	Copper	45 Mbps	6.3%+	Varies	2
TPx Communications	Fiber	50 Mbps	.6%+	Not Avail.	2.5
Rise Broadband	Fixed Wireless	15 Mbps	100%	\$69.95/mo.+	2
Skynet Communications	Fixed Wireless	15 Mbps	58.9%+	Not Avail.	Not Avail.

The data in Table 1 presents a mixed picture. On the positive side, there are multiple providers in the Fulshear area. Moreover, there are multiple providers who have invested in fiber infrastructure in the Fulshear area. And, there are multiple providers who report offering a Gig (or very close). Because of that, Fulshear can be considered a Gig city.

A deeper analysis points out some connectivity issues for the City to consider.

- Multiple provider coverage:** The Fulshear area has multiple providers. However, in looking at their coverage percentages (and compared with Chart 2), there are many areas that provide limited competition. There is some interpretation needed in Rise Broadband’s reported coverage and download speed. Several fixed wireless companies have made reporting mistakes on a national basis, but it appears that Rise Broadband has reported accurately. The challenge that fixed wireless providers have in reporting is that, as long as they can have a line of sight, they CAN have 100% coverage. But, given that their connectivity is point to point wireless, they are not connecting 100% of the customers (they can, but they are not). If they did connect every customer in the area, they would have to add a lot of infrastructure to provide any level of speed can capacity. Therefore, how to report can be confusing. One of the best ways to bridge those competing factors is to show that coverage can be 100%, but provide a speed that is realistic for either what they are providing or that shows that they would have to increase infrastructure to connect more customers. Using 15 Mbps would not interfere with grant possibilities.
- Fiber:** As previously discussed, there are multiple providers with fiber, but their coverages were all fairly low through this reporting cycle. It is positive that multiple providers have fiber in the

Fulshear area, working with them to invest more in fiber in Fulshear could help position the City for the future.

The two modes of delivery that have, by far, the greatest coverage are DSL and fixed wireless. Those both have significant concerns. DSL has signal loss over distance and fixed wireless can be constrained by impediments and how it is connected. Those constraints are reflected in the download speeds that they provide.

The next closest is cable. Comcast reports 987 Mbps download. With improvements to equipment and platforms, that is possible. The reported data does not make clear how much of the 61% of the area receives 987 Mbps download speeds. The Community Engagement survey information can be cross-referenced to see if that is the consistent experience of the end users.

- **Gig City:** This designation can be good for economic development and community identity. Currently, most businesses and residents do not need 1 Gbps download or upload to accomplish the tasks they do. But, some do and, for them, that could be a significant draw to Fulshear. Given that Gig speeds are not available in all of the City and not available in a significant part of the area, it could be important to verify coverage with the Community Engagement. Because differences in coverage do exist, Economic Development might want to verify capacity needs and coverage when talking with existing and potential businesses and work with providers to have the capacity available where needed (and when needed).
As information is verified (through Community Engagement and in conversation with providers), if Gig speeds are available (which it appears they are), the City could promote itself as a Gig City.

On the surface, pricing does not seem problematic. Given that there are several factors that can determine pricing (particularly for businesses), receiving feedback from business customers (including what they are paying and whether they think it is a good value) is an important check against publicized plan pricing.

One other area of concern is the satisfaction ratings. These are not meant to be statistically sound but are based on responses that people volunteered. If these low levels of satisfaction are consistent with results in the Community Engagement, that could become part of discussions with providers.

GHz Wireless was also listed in some of the industry information³². They appear to be from Austin, TX. They are a fixed wireless company that is in the area. But, it is difficult to determine where their infrastructure is and what specific areas they cover. On their website, they offer transport, redundancy and backhaul fiber.³³

A CenturyLink representative confirmed that the company has been installing fiber in the Fulshear area. Their new construction has been either mainly or all fiber.

Residential Provider Detail

According to industry information and other research, the residences in Fulshear have nine choices for connectivity (including satellite providers). These nine might not be available in all parts of Fulshear and the ETJ. The below table shows the percentage of the Fulshear area that each provider reports covering. As mentioned previously, this data could be as much as two years old, but it is a good indication of how much infrastructure each provider has in Fulshear and what their modes of delivery are.

³² BroadbandNow provider lists – www.broadbandnow.com

³³ GHz website: <http://www.ghzwireless.com/live/pages/about-us>

Table 2 – Provider Residential Connectivity³⁴

Provider	Type of Service	Download Speeds (Mbps)	Coverage	Cost/Month Low to High	Customer Satisfaction (1-5) 1 Low
AT&T	Fiber and DSL	Fiber: 1 Gbps DSL: 25 Mbps	50%+ 86%	\$49.99/mo+	2.5
enTouch	Fiber and Cable	1 Gbps 115Mbps	20.4%+ 20.4%	\$25.95/mo.	Not Avail.
Earthlink	Fiber and DSL	Fiber: 1 Gbps DSL: 25 Mbps	50% 85.9%	\$49.99/mo. \$14.99/mo.	Not Avail.
Consolidated Communications	Fiber	1 Gbps	6.8%+	Varies	Not Avail.
Comcast Xfinity	Cable	987 Mbps	81% - 95%	\$19.99 - \$84.99/mo.	2.5
SkyNet	Fixed Wireless	15 Mbps	9.9%+	Not Avail.	Not Avail.
Rise Broadband	Fixed Wireless	15 Mbps	100%	\$29.95/mo.+	2
Viasat	Satellite	100 Mbps	100%	\$50.00/mo.+	Not Avail.
HughesNet	Satellite	25 Mbps	100%	\$39.95/mo.+	Not Avail.

The residential industry data for connectivity is very similar to the business data. There are multiple providers, but not ubiquitous coverage. There are fiber providers for residences, but providers were limited in number who provided fiber and in the amount of fiber they have installed (as of this reporting cycle). There is an additional provider, Earthlink, in the residential providers that is not in the business provider data. Earthlink reports providing fiber for 50% of the Fulshear area and DSL for 85.9%.

The residence provider data also lists two satellite providers: Viasat and HughesNet. Satellite is affected by impediments (like storms) in which connectivity can be lost. It can also be impacted by the number of people using it at any given time. Therefore, it would not be typical for satellite to provide a consistent 100 Mbps in 100% of the Fulshear area. If the City was going to pursue grants, this data should be tested and examined as this reporting (and HughesNet statistics) would eliminate Fulshear from many grant possibilities, due to many grants only being available to census blocks that have less than the FCC definition of minimum broadband (25/3).

Additional Statistics

The below statistics are derived from industry reported data and should be fairly accurate as of the latest reporting cycle. If anything does not look correct, further research may be warranted to correct it, because this is the information that the public could see (including companies that the City might want to attract).

- The average download speed in Fulshear is 133.61 Mbps. This is 111.2% faster than the average

³⁴ BroadbandNow statistics tables: www.broadbandnow.com and Decision Now statistics tables: <https://decisiondata.org/tv-internet-by-zip/77406-internet/>

in Texas and 56.1% faster than the national average.

- Competition in the zip codes in the Fulshear area are more competitive than the average US zip codes.
- Approximately 95% of Fulshear residents are serviced by multiple wired providers.
- Residential fiber service is available to 59% of people living in Fulshear.
- The majority of residents in the Fulshear area zip codes have several provider options, however, there are parts of the area that have one or no options for wired internet service at their homes.³⁵
- Fulshear is the 377th most connected city in Texas ahead of Brookshire and Wallis, but behind Katy, Richmond, and Rosenberg. Katy is the 94th most connected City in Texas.
- 100% of residents in Fort Bend County have access to fixed wireless internet service.
- In Fort Bend County, approximately 33,000 people do not have access to 25mbps wired broadband.

Transport or Middle Mile Fiber

There are several companies that have fiber running close to or through Fulshear. How the fiber is installed can determine what it can be used for. It could be worth checking to see if the fiber can be accessed to be used for transport for other providers (potentially reducing costs), redundancy (for greater reliability) or even for retail services. The below are maps are most often used by people in the industry, but they are publicly available.

These maps are often intentionally vague, but the ones included show middle mile fiber running through or close to Fulshear. Some providers have fiber on I10. There is a least one (and possibly others) that have fiber on 1093.

³⁵ Statistics from BroadbandNow www.broadbandnow.com and Decision Now <https://decisiondata.org/tv-internet-by-zip/77406-internet/>

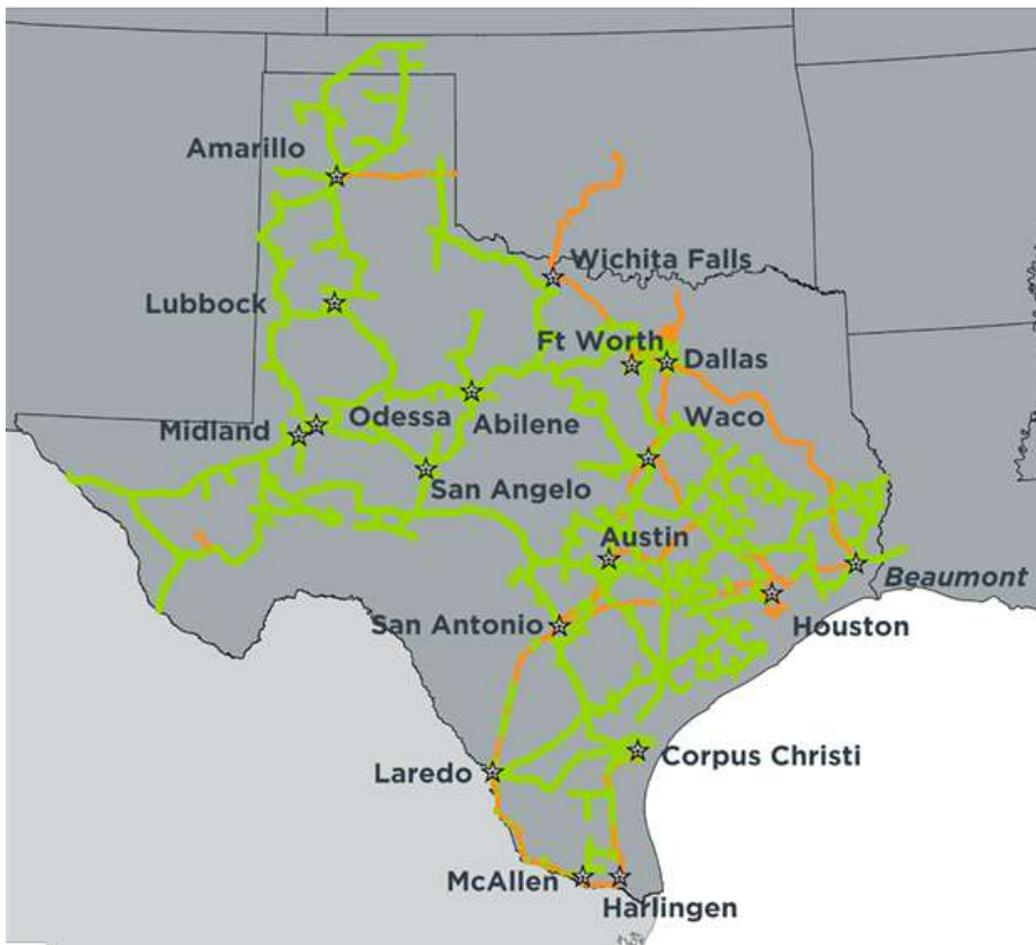
FiberLight

According to their website:

“FiberLight now has 14,000 route miles of fiber in some of the most rapidly expanding metro areas in the United States—and we’re growing by the day. You can find our fiber in Arlington, Atlanta, Austin, Baltimore, Dallas, Fort Worth, Houston, San Antonio, Tampa, and Washington, DC.

With bandwidth options up to 100Gbps, we feature some of the most agile, secure, scalable, reliable, and flexible custom solutions in the industry. FiberLight also provides managed Ethernet, Dedicated Internet Access and Internet Protocol, Dark Fiber, and 100G Long-Haul services over private and diversely constructed fiber backbone rings.³⁶”

Chart 7 – FiberLight Network³⁷



There appears to be some fiber on I10. And, there is some running east/west south of I10. It is difficult to tell if that is on 1093 or 90 or another east/west road. Either way, it seems that it is either running through Fulshear or close to the City.

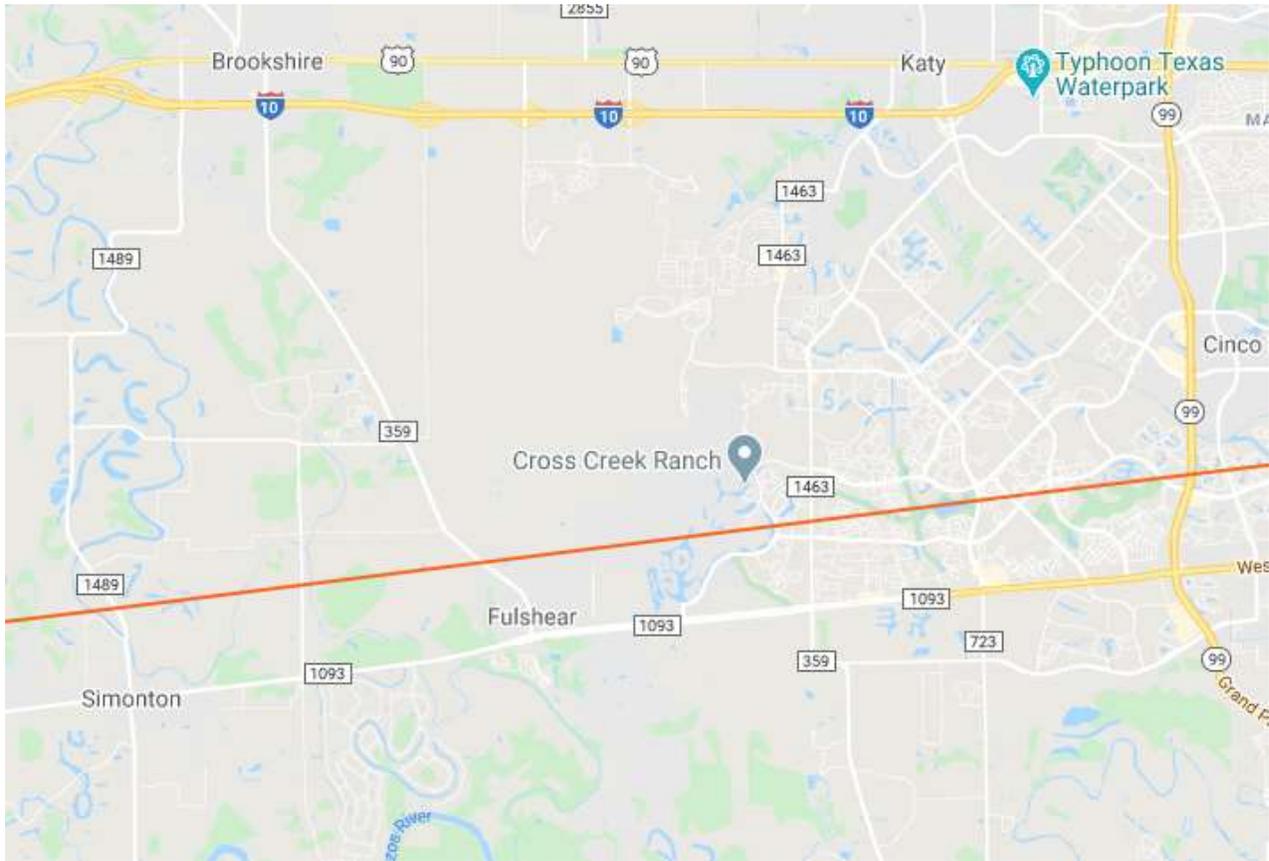
³⁶ <https://www.fiberlight.com/network/>

³⁷ Ibid.

CenturyLink/Level 3

In purchasing Level 3, CenturyLink acquired a great deal of middle mile fiber network, some of which is near Fulshear. This map may not be completely accurate as far as the exact location of the fiber, but it clearly shows fiber very close to Fulshear.

Chart 8 – Level 3/CenturyLink Middle Mile Fiber³⁸



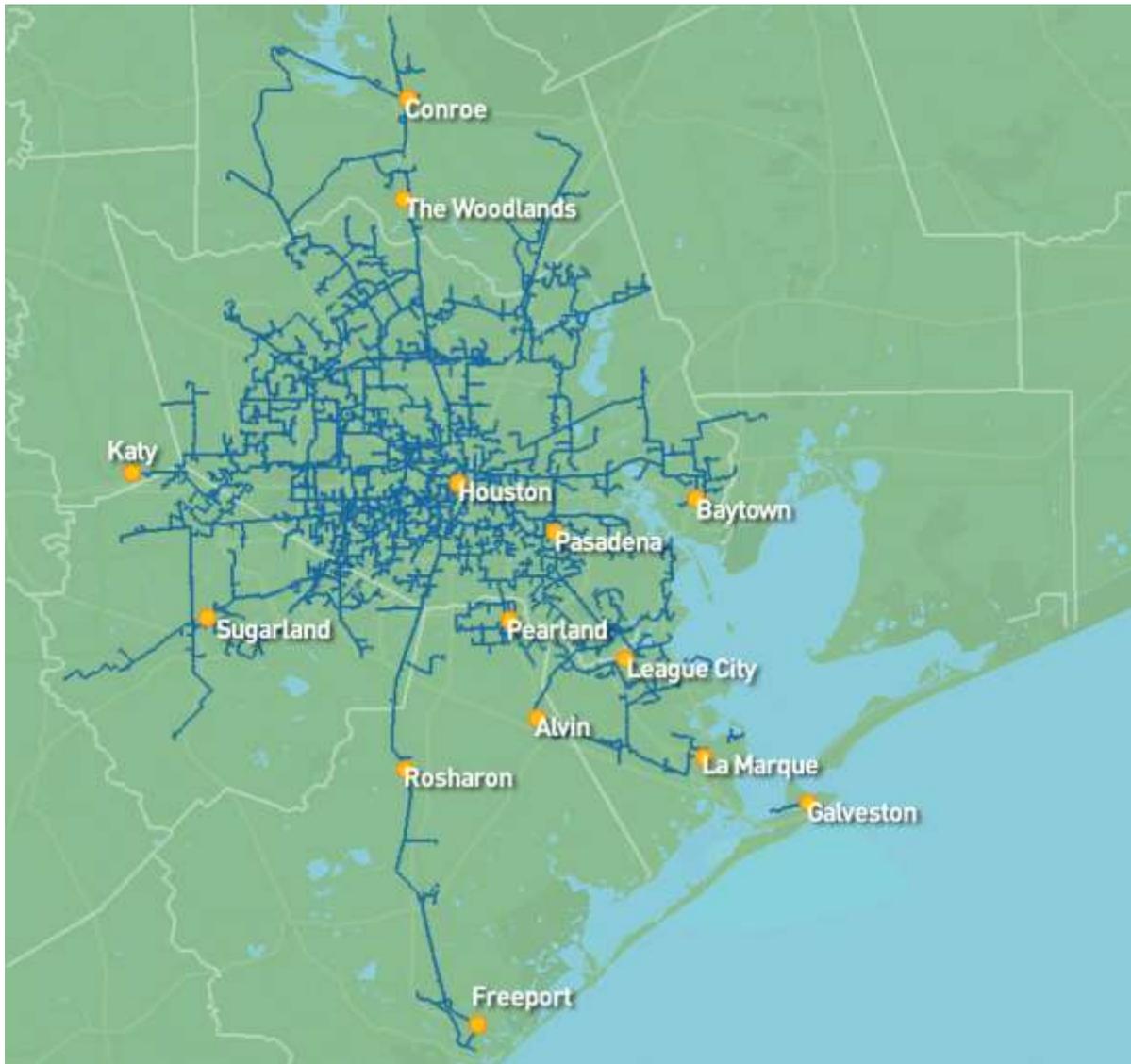
³⁸ <http://www.centurylink-business.com/demos/network-maps.html>

PS LIGHTWAVE

This company is a service provider in the Houston area. From their website, PS LIGHTWAVE describes their network and plans: “PS LIGHTWAVE provides services over a 5,500 route-mile, facilities-based network comprised of our own segments and interconnections with other carriers and partners. We are strategically expanding our network presence in the Greater Houston Metropolitan area based on market growth and customer demand.”³⁹

Their current map is below.

Chart 9 – PS LIGHTWAVE Fiber⁴⁰



³⁹ <https://www.pslightwave.com/about-us/network-footprint.html>

⁴⁰ Ibid.

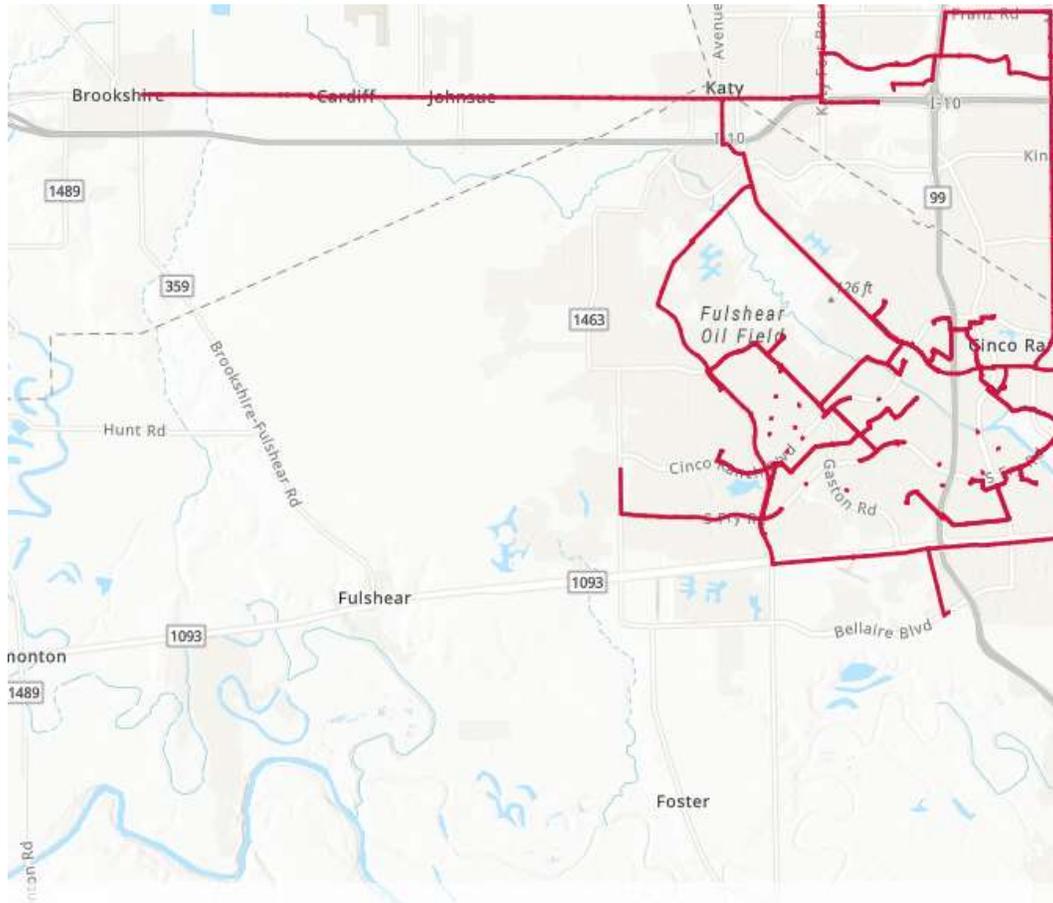
There is fiber south of Katy running west. It is difficult to tell on this map but it appears to be fairly close to Fulshear. They might be a good company to discuss their future plans either for providing services in Fulshear or for collaborating with other providers for middle mile or redundancy.

Crown Castle/Zayo

These are two large companies who have recently combined. When Crown Castle purchased Zayo, they expanded their fiber network. Their presence in the Houston area is significant and they also have fiber that gets fairly close to Fulshear.

From this map, their fiber does not appear to come all the way to Fulshear, but it does appear to be run along FM 1093 and Interstate 10. It could be used to help other providers lower their costs in getting to Fulshear, to provide redundancy, or maybe working with them to extend fiber to the City.

Chart 10 – Crown Castle/Zayo Fiber⁴¹

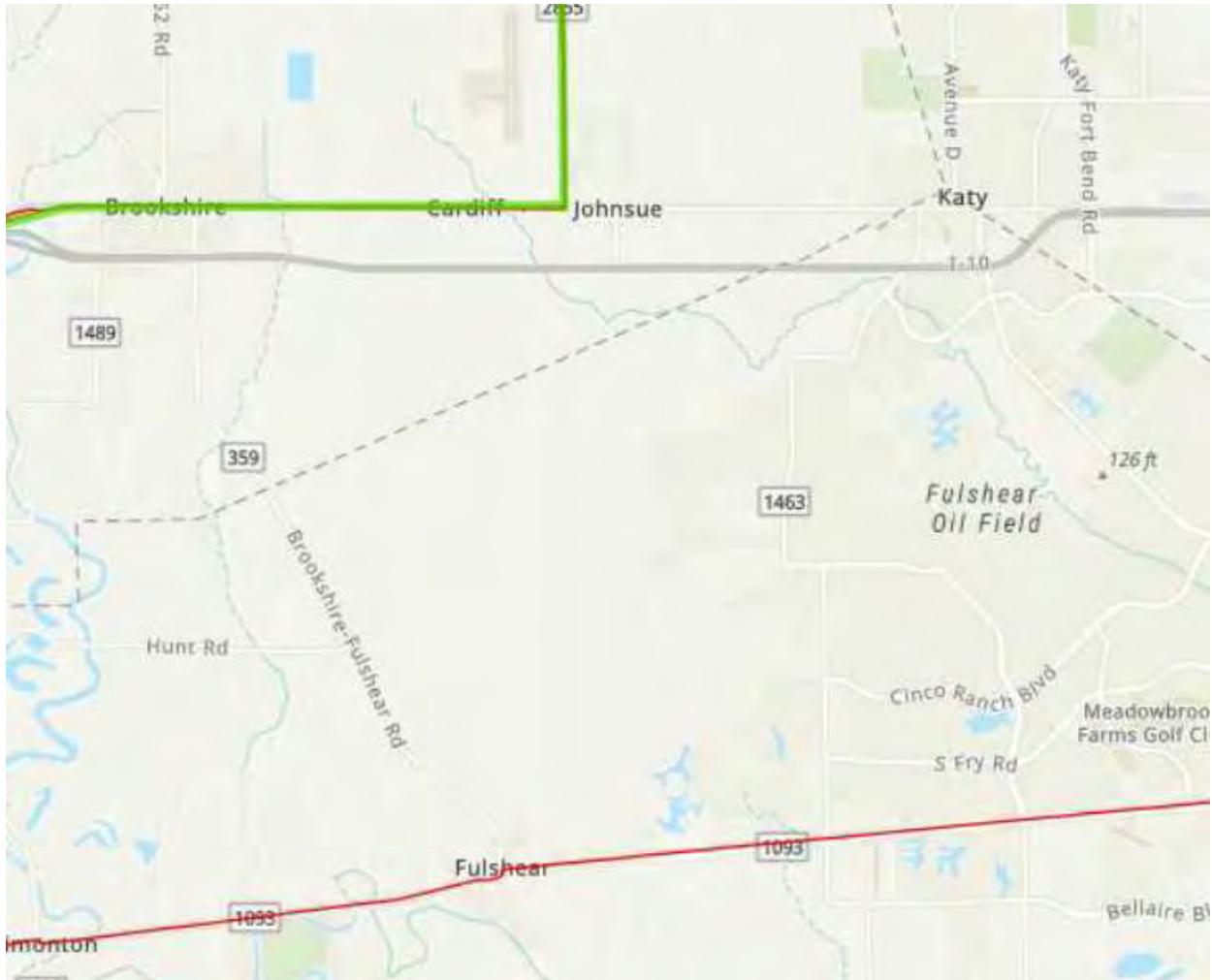


⁴¹ <https://fiber.crowncastle.com/our-network>

Windstream

Windstream has fiber that runs through Fulshear on 1093. In their fiber map below, the green represents their National Core Network and the red shows their Fiber Network. It is not clear what they use their fiber network for, but it runs through Fulshear, so working with them to see how their fiber could benefit the City could be important.

Chart 11 – Windstream Fiber⁴²



⁴² <https://www.windstreamenterprise.com/wholesale/interactive-map/>

Summary

The City of Fulshear appears to be in a good starting position in terms of connectivity:

- There are multiple providers in many areas
 - Speeds in many areas are significantly above the FCC minimums and in the higher levels compared to the State of Texas
 - Some providers have already started investing in fiber
 - There are Gig speeds in several areas
- There is middle mile fiber either in Fulshear or very close to Fulshear

Some steps the City could consider to taking to proactively turn these existing conditions into future-proofed, ubiquitous fiber connectivity are:

- **Ubiquity:** Strategically working with stakeholders (and possibly consider City-provided incentives) to fill in demonstrated gaps in competition, fiber and speed;
- **Managing Rights of Way (ROW):** As the City grows and providers continue to add infrastructure, the City can manage ROW to maintain ROW availability, lessening time delays caused by telecommunications infrastructure moves or installation and providing incentives to accomplish economic development and ubiquity goals. A Broadband Master Plan would help coordinate those efforts.
- **Work with providers:** In talking with a CenturyLink representative, she communicated that there are ways that the City could help providers, namely, that the City help streamline the permitting process. The City could incentivize City goals in the permitting process in ways that work with the providers for win/wins.
- **Policies and Procedures:** Implement policies and processes that coordinate broadband infrastructure investments when it is most cost effective to do so (during other road or utility projects);
- **Be prepared to take advantage of opportunities when they present themselves:** There are and will be many opportunities to install infrastructure, work with providers, work with developers, work with businesses, develop tech ideas, etc. Many of those opportunities will have a short response time. Having the people and processes ready to act on those opportunities will be important. Developing a quick action plan in which the key people are coordinated and ready to act can sometimes be the difference between taking advantage of an opportunity or missing it.
- In 2014, Fort Bend County worked with Connected Texas to create a Technology Action Plan (https://connectednation.org/wp-content/uploads/2019/01/fort_bend_county_texas_technology_action_plan_final.pdf). Although much of it is outdated and may not apply to the City of Fulshear directly, it might be worth reading to see what might still be useful.
 - Page 12 begins a list of providers and organizations in the County that have a broadband tie
 - Page 24 begins a list of their 2014 Action Plan. Some of those ideas could still be relevant (policies, technology summit, technology awareness program, online business services by the government, teleworking and telemedicine)

- On July 10, 2020 the Houston-Galveston Area Council completed a strategy document on high speed internet: <http://www.h-gac.com/gulf-coast-economic-development-district/regional-high-speed-internet.aspx>. In the document summary, they state, “The Strategy delineates steps a community should take to expand broadband, including identifying local leadership, determining existing conditions, redefining policies, examining the options for connectivity, and considering options for financing.”

ATTACHMENT B
Community Engagement
City of Fulshear, TX

Broadband Study – Discovery Phase Community Engagement Plan

Overview

One key component of the discovery phase of the Broadband Study is community engagement. This is important to understand the current connectivity in Fulshear, gaps where stakeholders are not served, gaps where there are organizations or citizens who are underserved (not enough capacity, not enough speed, lack of reliability, too high cost, etc.) and to have real information to compare to the Market Analysis (especially if any grants are possible).

These specific groups and people included (and how they will be geographically organized will be further defined later, but this community engagement plan will include the following groups:

- Businesses (as a primary focus)
- Citizens
- Anchor institutions - Mainly quasi-government: Libraries, Post Office, health and can include key businesses either in Fulshear or thinking about locating to Fulshear
- Public entities
- Developers/landowners
- Chamber of Commerce

In our outreach to these groups, our primary goals are to find out each entity's or household's:

- Current service (provider, capacity, speed, price)
- Satisfaction with their current service
- Concerns with their current service (reliability, capacity, price)
- Anticipated needs for connectivity in the future

The following *Community Engagement Plan* outlines the strategies and tactics we recommend for informing the organizations and households about the study, encouraging their participation and the specific questions we will ask to find out the above information.

The key messages to communicate include:

- The reason why the City is conducting this study and potential benefits to businesses, organizations and citizens.
- Encourage businesses, organizations and residents to take the online survey.
- Encourage stakeholders to attend meetings (given Covid 19, these will be virtual).

Strategies

Business Survey – we will do residential, business and both – Attachment A

- Format:
 - Online survey
 - We will not do printed surveys as they would not likely be effective
 - We will use similar questions as we have used in other communities with any markups

by staff

- Distribution:
 - Distribute as other surveys have been done in the City
 - Survey links will be promoted through social media, through City marketing
- Audience:
 - City businesses
- Outcomes:
 - Current market conditions and deficiencies
 - Which provider businesses use
 - What they currently pay
 - What they like and dislike today
 - Do they have any needs for the future
 - What they do with Internet services
 - Predicted take rate and optimum monthly cost they would be willing to pay – to use to talk with potential provider partners
 - Stakeholder needs
 - Do businesses want the City to be involved in attracting better broadband
 - Demographic questions (where are their offices, headquarters, etc.)

Community Survey

- Format:
 - Online survey
 - We will not do printed surveys as they would not likely be effective
 - We will use similar questions as we have used in other communities with any markups by staff
- Distribution:
 - Distribute as other surveys have been done in the City
 - Survey links will be promoted through social media, through City marketing
- Audience:
 - City residents
- Outcomes:
 - Current market conditions and deficiencies
 - Which provider people use
 - What they currently pay
 - What they like and dislike today or would wish in the future
 - What they do with Internet services Predicted take rate and optimum monthly cost they would be willing to pay – to use to talk with potential provider partners
 - Stakeholder needs
 - Do citizens want the City to be involved in attracting better broadband
 - Demographic questions (where they live, household composition, children, age, do they work from home, etc.)

Public Entity Input (virtual) – Attachment B

- These will be much like the business surveys – looking for their need (present and future), what gaps they have, what they are currently paying, etc.
- The following public entity organizations will be our focus:
 - Fire – Emergency Services District
 - City departments (Administration, Public Works/Engineering, Planning, IT, Finance, Utilities, Economic Development, Parks, Emergency Management, Police)
 - Library as available
 - Schools as available

Other Stakeholder Input (virtual)

- Chamber of Commerce – cover under business surveys
- Business leaders (downtown, 1463, 1093, IT, engineering, work from home, etc.)
- Major developers (as available) – JDC, FFC, FR, Polo Ranch, Cap Retail, Downtown – Feliciano, H7
- These entities can receive surveys and staff will organize virtual meetings

Public Relations

- Press releases – Attachment C
 - Develop press releases about the project and the survey for local news outlets
- Social media blurb with graphic

Social Media

- Develop posts about the study for the City’s Facebook page

Engagement Plan - City of Fulshear Broadband Survey — Businesses

The leadership of the City of Fulshear views broadband as a critical service for our businesses, organizations and citizens. The City, however, does not control the provision of broadband services in Fulshear. The City’s economic development corporations have engaged HR Green to conduct this survey as part of a broader discovery project that will allow the City to gain a better understanding of the access to and availability of broadband services and the desire for different types of services in the community, and also to have a clearer understanding of steps that it might take in the future concerning

the development of broadband infrastructure.

This study will allow City leadership to gain a clearer understanding of what steps may be required to gain and maintain a competitive advantage and do everything possible to make sure that the community's needs are met.

This following survey should take no more than 20 minutes to complete. We thank you for your time, and appreciate your diligence in providing as much detail as possible as it may pertain to your particular situation.

In order to help the City better understand the survey responses, we would like to ask for some basic information. This information will not be provided to anyone without your permission and will be reported only in aggregate form.

1. What is your current business address?
 - a. Is this an at-home business, or stand alone?
2. What is your business name?
3. What is your name & title?
4. May we share your business name and your name with City officials? Yes/No
5. Is your business headquartered in Fulshear? Yes/No
6. What is the primary type of service provided by your business?
 - Retail
 - Other Consumer Products/Services
 - Business Products/Services
 - Government
 - Education
 - Medical
 - Non-Profit
 - Restaurant
 - Professional Services
 - If so, what type?
 - Technology Services
 - Other (please specify)
7. How many people does your company employ?
 - Less than 5
 - 5 to 9
 - 10 to 24
 - 25 to 49
 - 50 to 99
 - 100 to 249
 - 250 to 499
 - More than 500

Now, please tell us about the internet services that you utilize

8. Does your business currently subscribe to internet service? (If "yes," skip to question #10) Yes/No
9. If you answered "no" to the previous question, what are the primary reasons you do not have internet services for your business? (check all that apply)

- Not interested/don't need them
 - Price of service is outside my budget
 - Access necessary services via free WiFi at locations outside my business
 - Services not available in my area
 - Other (please specify)
10. What company do you utilize to provide your internet service?
- AT&T
 - EarthLink
 - Comcast (Xfinity)
 - Consolidated
 - Skynet
 - enTouch
 - Rise Broadband
 - DishNetwork
 - DirecTV
 - Other (please specify)
11. How much do you currently pay per month for the internet portion of your communications bill?
- Less than \$50.00
 - \$50.00 to \$99.99
 - \$100.00 to \$149.99
 - \$150.00 to \$199.00
 - \$200.00 to \$249.99
 - \$250.00 to \$499.99
 - \$500.00 to \$999.99
 - More than \$1,000.00
12. What type of internet service do you currently receive?
- None
 - Dial Up
 - DSL
 - Cable
 - Fixed Wireless
 - Satellite Internet
 - Cell Phone or Cellular Connection only
 - Fiber optic connection
 - Don't Know/Not Sure
13. How important are each of the following to you for your business internet service? (1 = Unimportant; 2 = Mostly unimportant; 3 = Somewhat Important; 4 = Somewhat Important; 5 = Mostly Important; 6 = Very Important)
- | | | | | | | |
|--|---|---|---|---|---|---|
| • Service reliability | 1 | 2 | 3 | 4 | 5 | 6 |
| • Speed as advertised | 1 | 2 | 3 | 4 | 5 | 6 |
| • Price or value for services received | 1 | 2 | 3 | 4 | 5 | 6 |
| • Customer and technical support | 1 | 2 | 3 | 4 | 5 | 6 |
| • Relevant service offerings | 1 | 2 | 3 | 4 | 5 | 6 |
| • Availability of redundant services | | | | | | |

14. Please rate your level of satisfaction with your business internet service (1 = Completely Unsatisfied; 2 = Mostly Unsatisfied; 3 = Somewhat Unsatisfied; 4 = Somewhat Satisfied; 5 = Mostly Satisfied; 6 = Completely Satisfied)
- | | | | | | | |
|--|---|---|---|---|---|---|
| • Service reliability | 1 | 2 | 3 | 4 | 5 | 6 |
| • Speed as advertised | 1 | 2 | 3 | 4 | 5 | 6 |
| • Price or value for services received | 1 | 2 | 3 | 4 | 5 | 6 |
| • Customer and technical support | 1 | 2 | 3 | 4 | 5 | 6 |
| • Relevant service offerings | 1 | 2 | 3 | 4 | 5 | 6 |
15. How frequently is your current internet service unavailable for at least an hour due to interruptions in your connection or slow/inoperable speeds?
- Never
 - 1 hour or less per month
 - 1 hour or less per week
 - 1 hour or less per day
 - More frequently than 1 hour per day
16. Overall, how satisfied are you with the speeds and options available from local internet providers, including your own? (1 = Very Unsatisfied; 5 = Very Satisfied)
- Satisfaction level 1 2 3 4 5
17. If you answer to the previous question was a 1 or 2, what are the key issues you have with your current provider?
18. Upload and download speeds are important to many people. In some cases, providers will advertise "up to" speeds as part of your subscription package. What speeds were you told you would receive when you signed up for your service?
- Less than 10 Megabits (Mb) per second
 - Between 10 Mb and 25 Mb per second
 - Between 26 Mb and 50 Mb per second
 - Between 51 Mb and 100 Mb per second
 - More than 100 Mb per second
 - Don't Know/Not sure
19. Please use the link below to report your internet speed. Once you click the link, you will see a new web browser window appear that goes to speedtest.net. You will see a "Begin Test" icon in the middle of your screen. Click this icon to begin the speed test. Wait a few moments while the test runs and measures your upload and download speeds. Once the test finishes, please record these speeds in the boxes below. <https://www.speedtest.net/>
- Upload Speed
 - Download Speed
20. If it was available, would you be interested in a broadband service that allowed you to receive internet service with greater reliability and speed for a cost which was comparable (+/- 10%) to your current internet service bill? Yes/No
21. Do you feel that the current service would allow you to continue to grow your business in Fulshear?
22. What impact does the availability of high-speed, broadband internet service have for business in Fulshear on your plans for growing or expanding your business? (1 = No Impact; 5 = Significant Impact)
- Impact Level 1 2 3 4 5
23. Have you considered moving or relocating your business as a result of limited access to high-speed, broadband internet services? Yes/No/Maybe
24. What else would you like Fulshear officials to know about your current internet service?

25. If the City of Fulshear were to facilitate the development of reliable, high-speed internet services, how likely would you be to switch internet providers? (1 = Very Unlikely; 5 = Very Likely)
- How Likely or Unlikely 1 2 3 4 5
26. How strongly do you feel that the City needs to help coordinate better broadband (1 = Not At All; 5 = Strongly feel there is an issue and would like the City to coordinate)
- How Strongly 1 2 3 4 5
27. Is there anything else you would like to share with City officials about this subject?
28. May we contact you for further information if required?
- a. Name
 - b. Email
 - c. Phone
 - d. Preferred method of communication

Engagement Plan - City of Fulshear, TX Broadband Survey – Residence

The leadership of the City of Fulshear views broadband as a critical service for our businesses, organizations and citizens. The City, however, does not control the provision of broadband services in Fulshear. The City's economic development corporations have engaged HRGreen to conduct this survey as part of a broader discovery project that will allow the City to gain a better understanding of the access to and availability of broadband services and the desire for different types of services in the community, and also to have a clearer understanding of steps that it might take in the future concerning the development of broadband infrastructure.

This study will allow City leadership to gain a clearer understanding of what steps may be required to gain and maintain a competitive advantage and do everything possible to make sure that the community's needs are met.

This following survey should take no more than 20 minutes to complete. We thank you for your time, and appreciate your diligence in providing as much detail as possible as it may pertain to your particular situation.

In order to help the City better understand the survey responses, we would like to ask for some basic information. This information will not be provided to anyone without your permission and will be reported only in aggregate form.

1. What is your home address?
2. Do you live in Fulshear on a year-around basis?
3. Do you work in Fulshear?
4. How many internet users currently reside in your home?
5. What is the highest level of education completed by the head or heads of your household?
 - Some high school
 - High School Diploma or GED
 - Some College or Associate's Degree
 - Bachelor's Degree
 - Graduate Degree
6. What is the current annual gross income of your household?
 - Below \$20,000
 - \$20,001 to \$40,000
 - \$40,001 to \$60,000
 - \$60,001 to \$80,000
 - \$80,001 to \$100,000
 - Greater than \$100,000
7. Does your home subscribe to each of the following services?
 - Internet Service
 - Telephone (Landline Voice Phone)
 - Cable Television/Video
 - Internet Video (Hulu, Netflix, etc.)
 - Cellular Telephone
 - Cellular Internet Hotspot
 - Radio Services
 - Satellite Cable
8. Do you currently receive all of these services from one provider (a bundled product), or do you pay multiple providers for these services?
 - One provider
 - Multiple providers
9. What company do you utilize to provide your internet service?
 - AT&T
 - EarthLink
 - Comcast (Xfinity)
 - Consolidated
 - Skynet
 - enTouch
 - Rise Broadband

- DishNetwork
 - DirecTV
10. Do you consider internet to be an essential service in the same way you consider water, electricity and roads to be essential services? Yes/No
11. How much do you currently pay per month for on the internet portion of your communications bill? (do not include cellular phone or cellular data services)
- 12.
- Less than \$20.00
 - \$20.00 to \$39.99
 - \$40.00 to \$59.99
 - \$60.00 to \$79.99
 - \$80.00 to \$99.99
 - \$100.00 to \$124.99
 - \$125.00 to \$149.99
 - \$150.00 or more
13. In addition to just internet, what is your current total monthly expenditure on all communications services (phone, television, etc. – including internet)? (do not include cellular phone or cellular data services)
- Less than \$50.00 per month
 - \$50.00 to \$99.00 per month
 - \$100.00 to \$149.99 per month
 - \$150.00 to \$199.99 per month
 - More than \$200.00 per month
14. What type of internet service do you currently receive? (If you answer "None" to this question, skip to Question 12.)
- None
 - Dial Up
 - DSL
 - Cable
 - Fixed Wireless
 - Satellite Internet
 - Cell Phone or Cellular Connection only
 - Fiber Optic connection
 - Don't Know/Not Sure
15. If you answered "none" to the previous question, what are the primary reasons you do not have internet services in your home?
- Not Interested/Don't Need
 - Price
 - Access necessary services via free WiFi at locations outside my home
 - Services are not available in my area
 - Not applicable
16. How many devices do you have in your home that connect to the internet (include computers, laptops, smart phones, tablets, and any other home devices that have a connection)?
- 1
 - 2
 - 3

- 4
- 5
- 6
- 7
- 8
- 9
- 10
- More than 10

17. Do you know how much capacity you use?

- Under 10 Megs
- 11 – 30 Megs
- 31 – 50 Megs
- 51 – 100 Megs
- Over 100 Megs
- Don’ know for sure

18. In what ways does your household use the internet? (check all that apply)

- Streaming TV (Hulu, Netflix, etc.)
- Checking Email
- Downloading Music
- Research Products and Services
- Work from home
- Home Based Business
- Social Networking
- Banking or Bill Paying
- Gaming
- Shopping
- Education
- Home Healthcare
- Internet of Things (IoT devices) such as doorbell, security cameras, appliances, etc.

19. Please rate your level of satisfaction with your home internet service (1 = Completely Unsatisfied; 2 = Mostly Unsatisfied; 3 = Somewhat Unsatisfied; 4 = Somewhat Satisfied; 5 = Mostly Satisfied; 6 = Completely Satisfied)

- | | | | | | | |
|--|---|---|---|---|---|---|
| • Service and reliability | 1 | 2 | 3 | 4 | 5 | 6 |
| • Speed as advertised | 1 | 2 | 3 | 4 | 5 | 6 |
| • Price or value for services received | 1 | 2 | 3 | 4 | 5 | 6 |
| • Customer and technical support | 1 | 2 | 3 | 4 | 5 | 6 |
| • Relevant service offerings | 1 | 2 | 3 | 4 | 5 | 6 |

20. How important is each of the following to you for your home internet service (1 = Unimportant; 6 = Very Important)

- | | | | | | | |
|--|---|---|---|---|---|---|
| • Service and reliability | 1 | 2 | 3 | 4 | 5 | 6 |
| • Speed as advertised | 1 | 2 | 3 | 4 | 5 | 6 |
| • Price or value for services received | 1 | 2 | 3 | 4 | 5 | 6 |
| • Customer and technical support | 1 | 2 | 3 | 4 | 5 | 6 |
| • Relevant service offerings | 1 | 2 | 3 | 4 | 5 | 6 |

21. How frequently is your current internet service unavailable for at least an hour due to interruption in your connection or slow/inoperable speeds?

- Never
 - 1 hour or less per month
 - 1 hour or less per week
 - 1 hour or less per day
 - More frequently than 1 hour per day
22. Overall, how satisfied are you with the speeds and options available from local internet providers, including your own? (1 = Very Unsatisfied; 5 = Very Satisfied)
- Satisfaction level 1 2 3 4 5
23. If your answer to the previous question was a 1 Or 2, what are the key issues you have with your current provider?
24. Upload and download speeds are important to many people. In some cases, providers will advertise "up to" speeds as part of your subscription package. What speeds were you told you would receive when you signed up for your service?
- Less than 10 Megabits (Mb) per second
 - Between 10 Mb and 25 Mb per second
 - Between 26 Mb and 50 Mb per second
 - Between 51 Mb and 100 Mb per second
 - More than 100 Mb per second
 - Don't Know/Not sure
25. Please use the link below to report your internet speed. Once you click the link, you will see a new web browser window appear that goes to speedtest.net. You will see a "Begin Test" icon in the middle of your screen. Click this icon to begin the speed test. Wait a few moments while the test runs and measures your upload and download speeds. Once the test finishes, please record these speeds in the boxes below.
- <https://www.speedtest.net/>
- Upload Speed
 - Download Speed
26. If it was available, would you be interested in a broadband service that allowed you to receive internet service with greater reliability and speed for a cost which was comparable (+/- 10%) to your current internet service bill? Yes/No
27. If the City were able to help facilitate better or more reliable, high-speed internet services, how likely would you be to switch internet providers? (1 = Very Unlikely; 5 = Very Likely)
- How Likely or Unlikely 1 2 3 4 5
28. Does anyone in your home currently telecommute (work from home)? Yes/No
29. If you answered "yes" to the previous question, approximately how many days per month, on average, does that person telecommute?
30. Do you currently have children in your home who need to access the internet to complete homework, research, or other assignments? Yes/No
31. What would you like the city officials to know about your current internet service or anything else about the subject of broadband?
32. If we have additional questions, may we contact you?
- No, I prefer to remain anonymous
 - Yes, you may contact me
 - Phone number
 - Email address:
 - Preferred method of contact:
 - Phone

- Email

Engagement Plan - Public Sector Input Questions

Who is your current provider(s)?

What service(s) do you have (particularly up/down speed and capacity)?

Do you have redundancy that you are comfortable with (and - do you know if your redundancy is on the same fiber as their provider)?

What are your current uses?

Do you feel like their service is reliable?

Do you feel like it is adequate?

Are there any ways that you think your current service is holding you back?

Costs:

- Do you feel like your pricing is fair (are you getting what you pay for)?
- How much are you currently paying?

- What is your contract term (when does it expire)?
- What price point would compel you to make a change?

Are you currently utilizing e-rate?

If so, can you change your e-rate arrangements for another provider?

Are there any uses/applications that you are considering that you think will increase your needs?

Are there any other considerations that you are thinking about with your broadband service?

THERE WILL BE ADAPTATIONS OF THESE QUESTIONS TO SPECIFIC DEPARTMENTS

Engagement Plan - **Press Release**

FOR IMMEDIATE RELEASE

March 9, 2020

FULSHEAR SOLICITING INPUT REGARDING BROADBAND SERVICES FOR RESIDENTS AND BUSINESSES

The City of Fulshear's Economic Development Corporations (EDCs) have initiated a discovery study to gain a clearer understanding of broadband needs in Fulshear. An online survey is now available to gather specific information from residents and businesses. The survey will be available through April 3 and may be accessed at: <XXXXXXXXXXXXXXXXXXXXX>.

The leadership of the City understands that broadband is a critical service for businesses, organizations and citizens. The City, however, does not control the provision of broadband services in Fulshear. This study will allow City leadership to gain a clearer understanding of what steps may be required to gain and maintain a competitive advantage in terms of broadband, and to make sure that the community's needs are met. The initial phase of

the study includes gathering input from City residents, businesses and key stakeholders to compare against industry data.

“We want to take the steps to make sure our citizens and businesses have the connectivity they need to thrive in Fulshear. We also view broadband as a competitive issue in keeping Fulshear as one of the top destinations to work and live,” said Fulshear Mayor Aaron Groff. “To do that, we have to start by having a good picture of what connectivity there currently is and what connectivity issues our citizens and businesses have which will help us determine out what next steps to take.”

“We will be gathering input through the rest of this month and the first week of April,” said Fulshear Economic Development Director, Angela Fritz. “We’d like as many residents and businesses as possible to complete the survey so we have a clear picture of the needs and gaps in service. Our project consultant, HRGreen, will also be interviewing government representatives and leaders from various industries during that time to gather additional information.”

The study and analysis will be completed this spring. The City’s EDCs have contracted with HRGreen, a national engineering firm with offices in Houston and Frisco, to complete this initial discovery phase.

###

Contact: Angela Fritz, Economic Development Director — ecodev@fulsheartexas.gov (281) 346-8874

Survey Summary and Data

Survey data is one component of understanding the broadband coverage in an area. There are several sources of data that must be taken together to have a full understanding:

- Industry data from providers
- Voluntary data from providers
- Survey responses
- Public sector leaders interview responses
- Other stakeholder interview responses (developers, regional leaders, etc.)
- Chamber leader

In addition to the survey, we held thirteen meetings with individual or multiple entities to gain input and data for insight into Fulshear's coverage.

Regarding the survey, our results are enclosed in this Attachment (less any information that we were asked not to provide). While we attempted to collect a statistically valid sample size for either residents or businesses, HR Green and the project sponsors agree that the data which was collected was directionally valuable to provide feedback to city decision makers. We have discussed the data shortfall, which could be attributable to one or more of these reasons:

- Covid 19 – even though many people were home more, having something this significant and potentially dangerous can make taking surveys seem less significant and has led into there being more online activity and more distractions

- Particularly for businesses, as Don McCoy, the President of the Fulshear-Katy Area Chamber of Commerce commented, when businesses are trying to figure out how to make payroll, keep their doors open and see if there are any grants available to them, a broadband survey is not really high on the priority list
- HR Green had a problem in our survey software, which resulted in some respondents being routed incorrectly in the survey. We corrected this and kept the survey open for an extra month to allow any respondents who were affected to be able to complete the survey
- How many people take and/or complete a particular survey is also a measure of the level of how strongly the potential respondents feel about the topic. In our experience, when there are significant broadband problems in a community, citizens and businesses are motivated to respond to surveys to make those issues clearly known.

The key findings from the survey have been highlighted in other sections of this report, but the data below provides the results of all survey questions asked, with the exception of those questions which might be considered demographically sensitive and have been redacted. Our survey findings are well correlated to the other outreach efforts defined above.

SURVEY RESULTS

Fulshear Broadband Survey

Wednesday, July 29, 2020

134

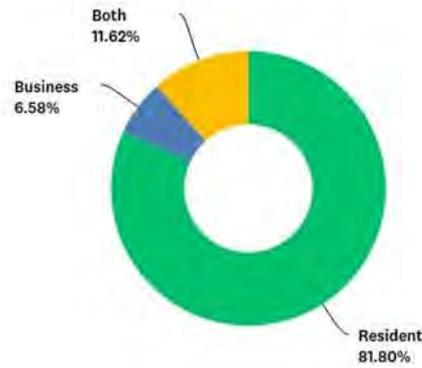
Total Responses

Date Created: Tuesday, March 03, 2020

Complete Responses: 134

Q1: Before we start, are you taking this survey as a resident of Fulshear, a business owner in Fulshear or both?

Answered: 134



Q1: Before we start, are you taking this survey as a resident of Fulshear, a business owner in Fulshear or both?

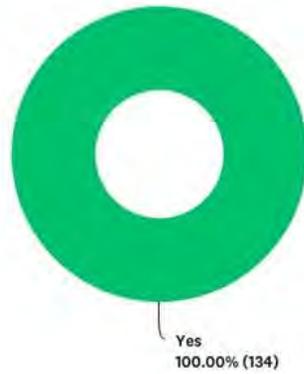
Answered: 134

ANSWER CHOICES	RESPONSES	
Resident	81.80%	110
Business	6.58%	9
Both	11.62%	15
TOTAL		134

[Grab your reader's attention with a great quote from the document or use this space to emphasize a key point. To place this text box anywhere on the page, just drag it.]

Q3: Do you live in Fulshear on a year-around basis?

Answered: 134



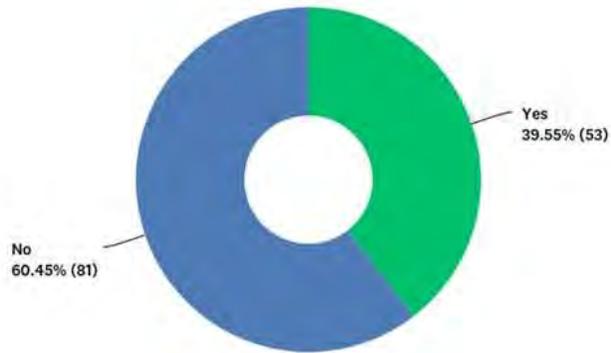
Q3: Do you live in Fulshear on a year-around basis?

Answered: 134

ANSWER CHOICES	RESPONSES	
Yes	100.00%	134
No	0.00%	0
TOTAL		134

Q4: Do you work in Fulshear?

Answered: 134



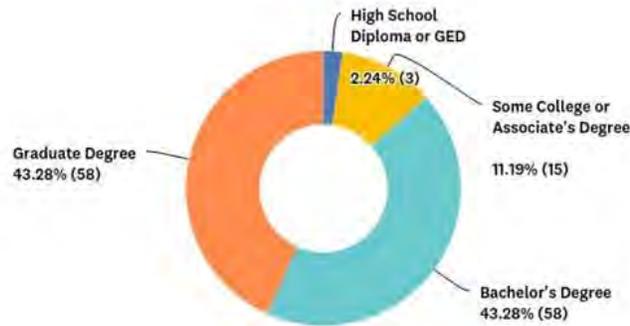
Q4: Do you work in Fulshear?

Answered: 134

ANSWER CHOICES	RESPONSES	
Yes	39.55%	53
No	60.45%	81
TOTAL		134

Q6: What is the highest level of education completed by the head or heads of your household?

Answered: 134



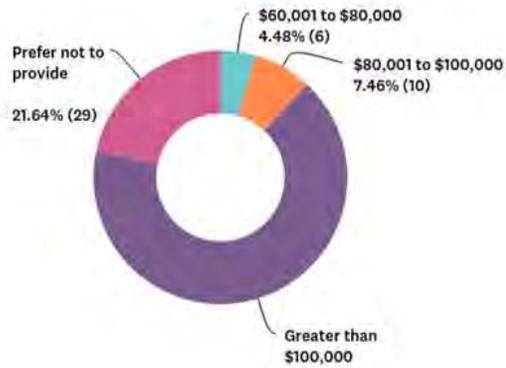
Q6: What is the highest level of education completed by the head or heads of your household?

Answered: 134

ANSWER CHOICES	RESPONSES
Some high school	0.00% 0
High School Diploma or GED	2.24% 3
Some College or Associate's Degree	11.19% 15
Bachelor's Degree	43.28% 58
Graduate Degree	43.28% 58
TOTAL	134

Q7: What is the current annual gross income of your household?

Answered: 134



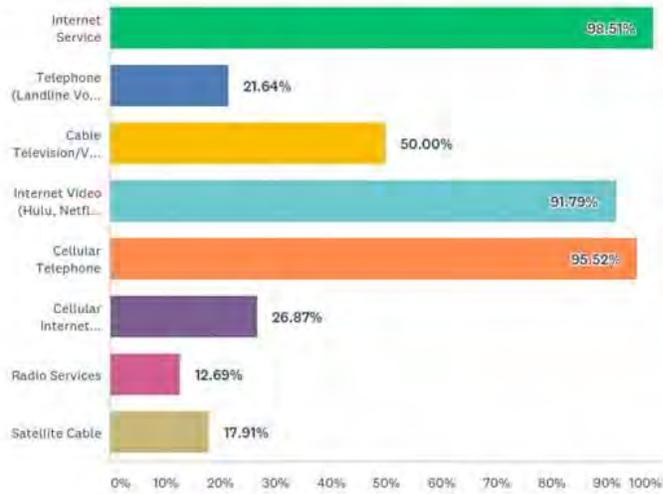
Q7: What is the current annual gross income of your household?

Answered: 134

ANSWER CHOICES	RESPONSES	
Below \$20,000	0.00%	0
\$20,001 to \$40,000	0.00%	0
\$40,001 to \$60,000	0.00%	0
\$60,001 to \$80,000	4.48%	6
\$80,001 to \$100,000	7.46%	10
Greater than \$100,000	66.42%	89
Prefer not to provide	21.64%	29
TOTAL		134

Q8: Next, we'd like to ask you a few questions about your home internet services. Does your home subscribe to any of the following services? (Check all that apply)

Answered: 134



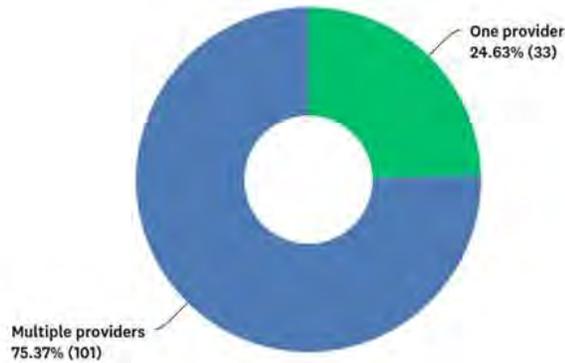
Q8: Next, we'd like to ask you a few questions about your home internet services. Does your home subscribe to any of the following services? (Check all that apply)

Answered: 134

ANSWER CHOICES	RESPONSES	
Internet Service	98.51%	132
Telephone (Landline Voice Phone)	21.64%	29
Cable Television/Video	50.00%	67
Internet Video (Hulu, Netflix, etc.)	91.79%	123
Cellular Telephone	95.52%	128
Cellular Internet Hotspot	26.87%	36
Radio Services	12.69%	17
Satellite Cable	17.91%	24
Total Respondents: 134		

Q9: Do you currently receive all of these services from one provider (a bundled product), or do you pay multiple providers for these services?

Answered: 134



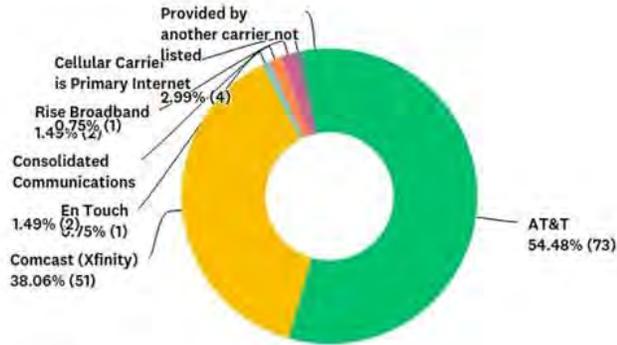
Q9: Do you currently receive all of these services from one provider (a bundled product), or do you pay multiple providers for these services?

Answered: 134

ANSWER CHOICES	RESPONSES	
One provider	24.63%	33
Multiple providers	75.37%	101
TOTAL		134

Q10: Which company do you currently use to provide your internet service?

Answered: 134



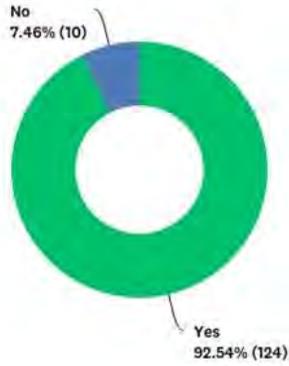
Q10: Which company do you currently use to provide your internet service?

Answered: 134

ANSWER CHOICES	RESPONSES	
AT&T	54.48%	73
EarthLink	0.00%	0
Comcast (Xfinity)	38.06%	51
En Touch	0.75%	1
Consolidated Communications	1.49%	2
SkyNet	0.00%	0
Rise Broadband	1.49%	2
DishNetwork	0.00%	0
DirecTV	0.00%	0
Cellular Carrier is Primary Internet	0.75%	1
Provided by another carrier not listed	2.99%	4
TOTAL		134

Q11: Do you consider internet to be an essential service similar to water, electricity and roads?

Answered: 134



Q11: Do you consider internet to be an essential service similar to water, electricity and roads?

Answered: 134

ANSWER CHOICES	RESPONSES	
Yes	92.54%	124
No	7.46%	10
TOTAL		134

Q12: How much do you currently pay per month for only the internet portion of your communications bill? (Do not include cellular phone or cellular data services.)

Answered: 134



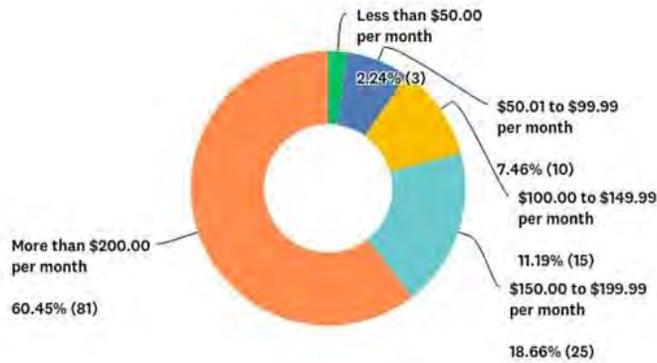
Q12: How much do you currently pay per month for only the internet portion of your communications bill? (Do not include cellular phone or cellular data services.)

Answered: 134

ANSWER CHOICES	RESPONSES	
Less than \$20.00	1.49%	2
\$20.00 to \$39.99	5.97%	8
\$40.00 to \$59.99	16.42%	22
\$60.00 to \$79.99	25.37%	34
\$80.00 to \$99.99	23.13%	31
\$100.00 to \$124.99	12.69%	17
\$125.00 to \$149.99	4.48%	6
\$150.00 or more	10.45%	14
TOTAL		134

Q13: What is your current total monthly expenditure on all communications services (phone, television, etc.) including internet? (Do not include cellular phone or cellular data services.)

Answered: 134



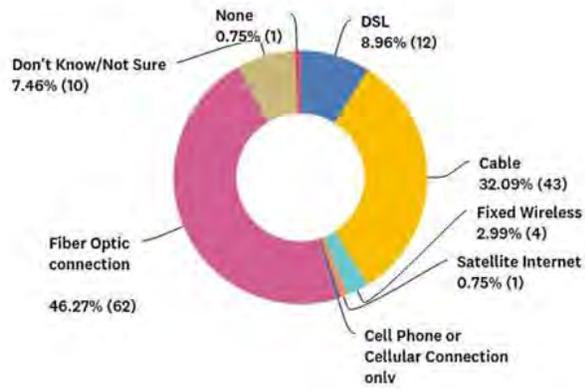
Q13: What is your current total monthly expenditure on all communications services (phone, television, etc.) including internet? (Do not include cellular phone or cellular data services.)

Answered: 134

ANSWER CHOICES	RESPONSES	
Less than \$50.00 per month	2.24%	3
\$50.01 to \$99.99 per month	7.46%	10
\$100.00 to \$149.99 per month	11.19%	15
\$150.00 to \$199.99 per month	18.66%	25
More than \$200.00 per month	60.45%	81
TOTAL		134

Q14: What type of internet service do you currently receive?

Answered: 134



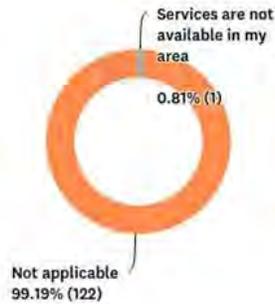
Q14: What type of internet service do you currently receive?

Answered: 134

ANSWER CHOICES	RESPONSES	
Dial Up	0.00%	0
DSL	8.96%	12
Cable	32.09%	43
Fixed Wireless	2.99%	4
Satellite Internet	0.75%	1
Cell Phone or Cellular Connection only	0.75%	1
Fiber Optic connection	46.27%	62
Don't Know/Not Sure	7.46%	10
None	0.75%	1
TOTAL		134

Q15: If you answered "None" to the previous question, what are the primary reasons you do not have internet services in your home?

Answered: 123



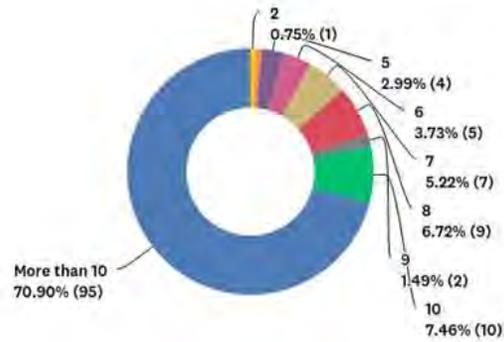
Q15: If you answered "None" to the previous question, what are the primary reasons you do not have internet services in your home?

Answered: 123

ANSWER CHOICES	RESPONSES
Not interested/Don't Need	0.00% 0
Price	0.00% 0
Access necessary services via free WiFi at locations outside my home	0.00% 0
Services are not available in my area	0.81% 1
Not applicable	99.19% 122
TOTAL	123

Q16: How many devices do you have in your home that connect to the internet? (include computers, laptops, smart phones, tablets and any other home devices that have a connection.)

Answered: 134



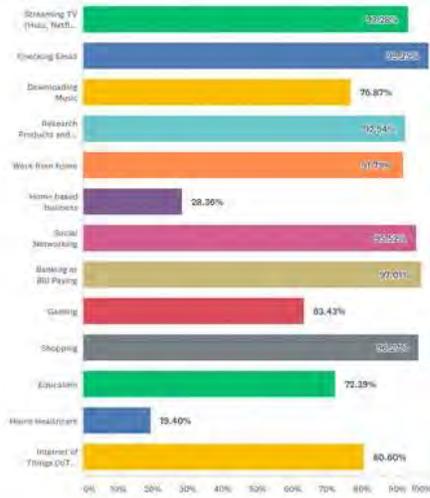
Q16: How many devices do you have in your home that connect to the internet? (include computers, laptops, smart phones, tablets and any other home devices that have a connection.)

Answered: 134

ANSWER CHOICES	RESPONSES	
0	0.00%	0
1	0.00%	0
2	0.75%	1
3	0.00%	0
4	0.75%	1
5	2.99%	4
6	3.73%	5
7	5.22%	7
8	6.72%	9
9	1.49%	2
10	7.46%	10
More than 10	70.90%	95
TOTAL		134

Q17: In what ways does your household use the internet? (Check all that apply)

Answered: 134



Q17: In what ways does your household use the internet? (Check all that apply)

Answered: 134

ANSWER CHOICES	RESPONSES
Streaming TV (Hulu, Netflix, etc.)	93.28% 125
Checking Email	99.25% 133
Downloading Music	76.87% 103
Research Products and Services	92.54% 124
Work from home	91.79% 123
Home based business	28.36% 38
Social Networking	95.52% 128
Banking or Bill Paying	97.01% 130
Gaming	63.43% 85
Shopping	96.27% 129
Education	72.39% 97
Home Healthcare	19.40% 26
Internet of Things (IoT devices) such as doorbell, security cameras, appliances, etc.	80.60% 108
Total Respondents: 134	

Q18: Please rate your level of satisfaction with your home internet service 1 = Completely Unsatisfied; 2 = Mostly Unsatisfied; 3 = Somewhat Unsatisfied; 4 = Somewhat Satisfied; 5 = Mostly Satisfied; 6 = Completely Satisfied

Answered: 134



Q18: Please rate your level of satisfaction with your home internet service 1 = Completely Unsatisfied; 2 = Mostly Unsatisfied; 3 = Somewhat Unsatisfied; 4 = Somewhat Satisfied; 5 = Mostly Satisfied; 6 = Completely Satisfied

Answered: 134

	1	2	3	4	5	6	TOTAL	WEIGHTED AVERAGE
Service and reliability	3.73% 5	9.70% 13	7.46% 10	20.15% 27	34.33% 46	24.63% 33	134	4.46
Speed as advertised	7.46% 10	11.94% 16	15.67% 21	22.39% 30	24.63% 33	17.91% 24	134	3.39
Price or value for services received	7.46% 10	14.18% 19	22.39% 30	27.61% 37	17.91% 24	10.45% 14	134	3.66
Customer and technical support	8.96% 12	12.69% 17	17.16% 23	23.13% 31	25.37% 34	12.69% 17	134	3.81
Relevant service offerings	4.48% 6	11.94% 16	16.42% 22	26.87% 36	26.12% 35	14.18% 19	134	4.01

Q19: How important is each of the following to you for your home internet service (1 = Unimportant; 6 = Very Important)

Answered: 134



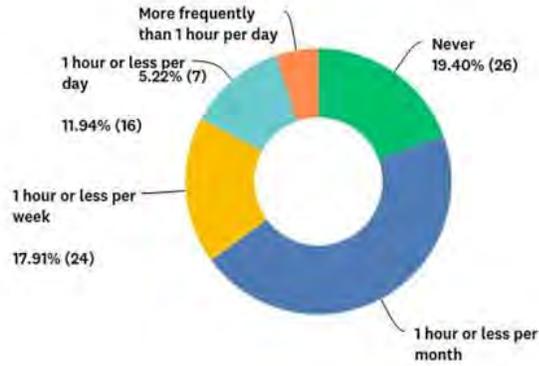
Q19: How important is each of the following to you for your home internet service (1 = Unimportant; 6 = Very Important)

Answered: 134

	1	2	3	4	5	6	TOTAL	WEIGHTED AVERAGE
Service and reliability	0.00% 0	0.00% 0	0.00% 0	0.75% 1	4.48% 6	94.78% 127	134	5.94
Speed as advertised	0.00% 0	0.00% 0	0.75% 1	2.99% 4	17.16% 23	79.10% 106	134	5.75
Price or value for services received	0.00% 0	0.00% 0	3.73% 5	10.45% 14	20.15% 27	65.67% 88	134	5.48
Customer and technical support	0.75% 1	1.49% 2	8.21% 11	17.16% 23	23.88% 32	48.51% 65	134	5.07
Relevant service offerings	3.73% 5	3.73% 5	8.96% 12	19.40% 26	17.16% 23	47.01% 63	134	4.84

Q20: How often do you experience outages of an hour or longer due to connection problems or slow/inoperable speeds?

Answered: 134



Q20: How often do you experience outages of an hour or longer due to connection problems or slow/inoperable speeds?

Answered: 134

ANSWER CHOICES	RESPONSES	
Never	19.40%	26
1 hour or less per month	45.52%	61
1 hour or less per week	17.91%	24
1 hour or less per day	11.94%	16
More frequently than 1 hour per day	5.22%	7
TOTAL		134

Q21: Overall, how satisfied are you with the speeds and options available from local internet providers, including your own? (1 = Very Unsatisfied; 6 = Very Satisfied)

Answered: 134



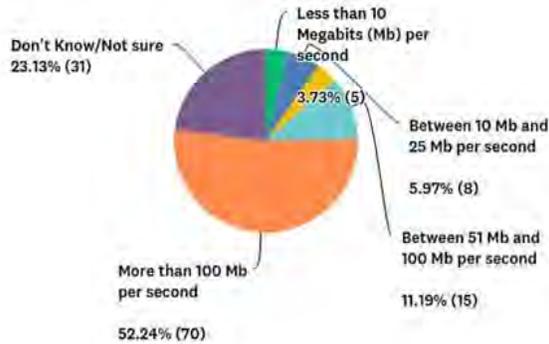
Q21: Overall, how satisfied are you with the speeds and options available from local internet providers, including your own? (1 = Very Unsatisfied; 6 = Very Satisfied)

Answered: 134

	1	2	3	4	5	6	TOTAL	WEIGHTED AVERAGE
(no label)	8.96%	14.93%	10.45%	20.90%	27.61%	17.16%	134	3.93
	12	20	14	28	37	23		

Q23: Upload and download speeds are important to many people. In some cases, providers will advertise "up to" speeds as part of your subscription package. What speeds were you told you would receive when you signed up for your service?

Answered: 134



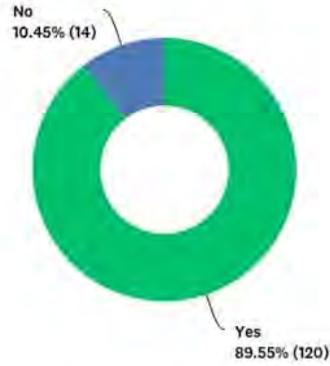
Q23: Upload and download speeds are important to many people. In some cases, providers will advertise "up to" speeds as part of your subscription package. What speeds were you told you would receive when you signed up for your service?

Answered: 134

ANSWER CHOICES	RESPONSES
Less than 10 Megabits (Mb) per second	3.73% 5
Between 10 Mb and 25 Mb per second	5.97% 8
Between 26 Mb and 50 Mb per second	3.73% 5
Between 51 Mb and 100 Mb per second	11.19% 15
More than 100 Mb per second	52.24% 70
Don't Know/Not sure	23.13% 31
TOTAL	134

Q25: If it was available, would you be interested in a broadband service that allowed you to receive internet service with greater reliability and speed for a cost which was comparable (+/- 10%) to your current internet service bill?

Answered: 134



Q25: If it was available, would you be interested in a broadband service that allowed you to receive internet service with greater reliability and speed for a cost which was comparable (+/- 10%) to your current internet service bill?

Answered: 134

ANSWER CHOICES	RESPONSES	
Yes	89.55%	120
No	10.45%	14
TOTAL		134

Q26: If the City were able to help facilitate better or more reliable, high-speed internet services, how likely would you be to switch internet providers? (1 = Very Unlikely; 6 = Very Likely)

Answered: 134



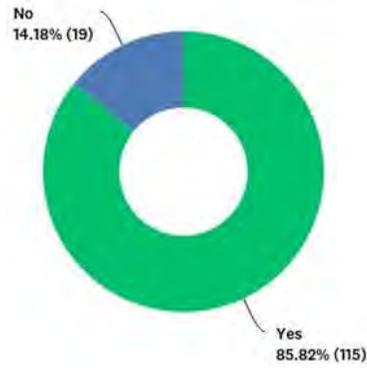
Q26: If the City were able to help facilitate better or more reliable, high-speed internet services, how likely would you be to switch internet providers? (1 = Very Unlikely; 6 = Very Likely)

Answered: 134

	1	2	3	4	5	6	TOTAL	WEIGHTED AVERAGE
How Likely or Unlikely	3.73%	5.22%	8.96%	17.16%	22.39%	42.54%	134	4.11

Q27: Does anyone in your home currently telecommute (work from home)?

Answered: 134



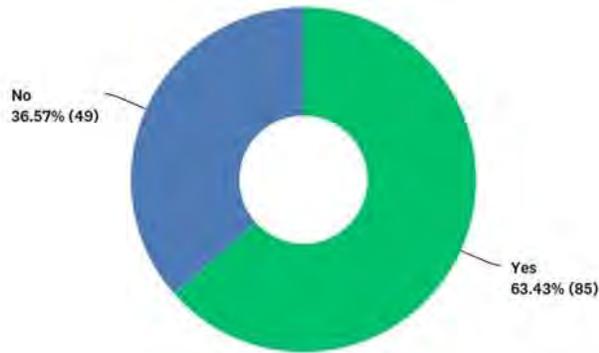
Q27: Does anyone in your home currently telecommute (work from home)?

Answered: 134

ANSWER CHOICES	RESPONSES	
Yes	85.82%	115
No	14.18%	19
TOTAL		134

Q29: Do you currently have students in your home who need to access the internet to complete homework, research, or other assignments?

Answered: 134



Q29: Do you currently have students in your home who need to access the internet to complete homework, research, or other assignments?

Answered: 134

ANSWER CHOICES	RESPONSES	
Yes	63.43%	85
No	36.57%	49
TOTAL		134

Q31: If we have additional questions, may we contact you?

Answered: 134



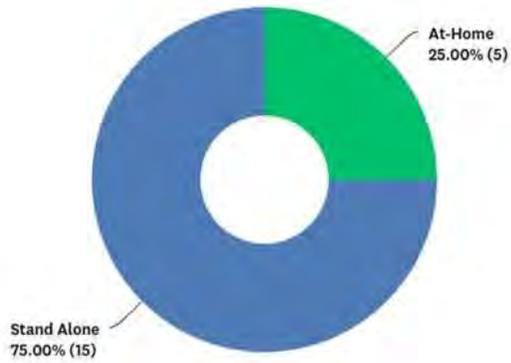
Q31: If we have additional questions, may we contact you?

Answered: 134

ANSWER CHOICES	RESPONSES	
No, I prefer to remain anonymous	55.97%	75
Yes, you may contact me, type contact information below	0.00%	0
Yes, you may contact me. (Please provide contact information below.)	44.03%	59
TOTAL		134

Q33: Is this an At-Home business or Stand Alone?

Answered: 20



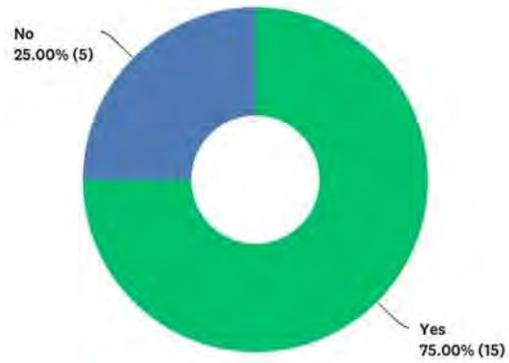
Q33: Is this an At-Home business or Stand Alone?

Answered: 20

ANSWER CHOICES	RESPONSES	
At-Home	25.00%	5
Stand Alone	75.00%	15
TOTAL		20

Q36: May we share your business name and your name with City officials?

Answered: 20



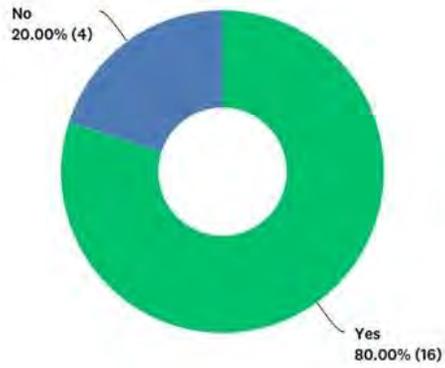
Q36: May we share your business name and your name with City officials?

Answered: 20

ANSWER CHOICES	RESPONSES	
Yes	75.00%	15
No	25.00%	5
TOTAL		20

Q37: Is your business headquartered in Fulshear?

Answered: 20



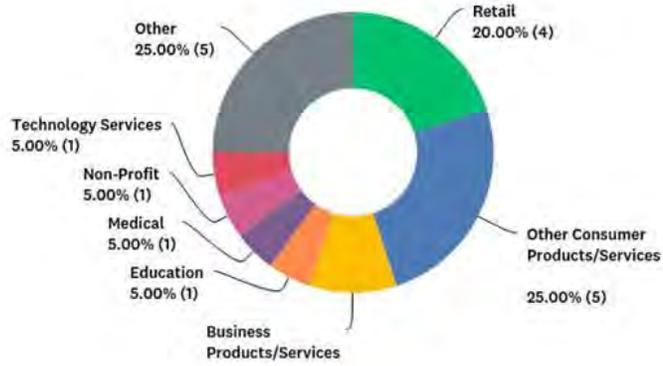
Q37: Is your business headquartered in Fulshear?

Answered: 20

ANSWER CHOICES	RESPONSES	
Yes	80.00%	16
No	20.00%	4
TOTAL		20

Q38: What is the primary type of service provided by your business?

Answered: 20



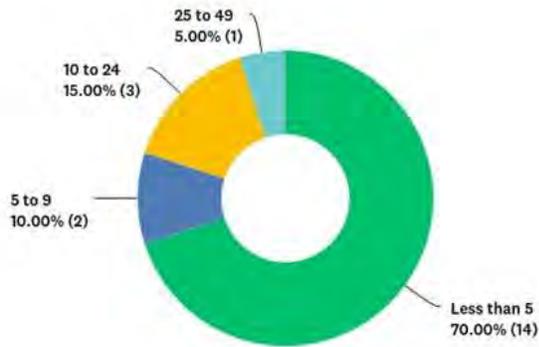
Q38: What is the primary type of service provided by your business?

Answered: 20

ANSWER CHOICES	RESPONSES	
Retail	20.00%	4
Other Consumer Products/Services	25.00%	5
Business Products/Services	10.00%	2
Government	0.00%	0
Education	5.00%	1
Medical	5.00%	1
Non-Profit	5.00%	1
Restaurant	0.00%	0
Technology Services	5.00%	1
Other	25.00%	5
TOTAL		20

Q39: How many people does your company employ locally?

Answered: 20



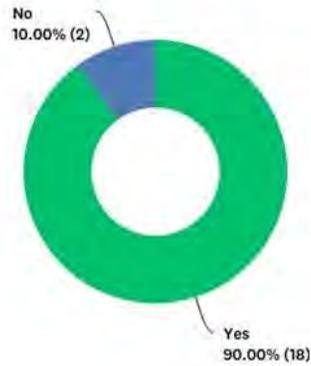
Q39: How many people does your company employ locally?

Answered: 20

ANSWER CHOICES	RESPONSES	
Less than 5	70.00%	14
5 to 9	10.00%	2
10 to 24	15.00%	3
25 to 49	5.00%	1
50 to 99	0.00%	0
100 to 249	0.00%	0
250 to 499	0.00%	0
More than 500	0.00%	0
TOTAL		20

Q40: Now, please tell us about the internet services that you utilize. Does your business currently subscribe to internet service? (If "yes," skip to question #11)

Answered: 20



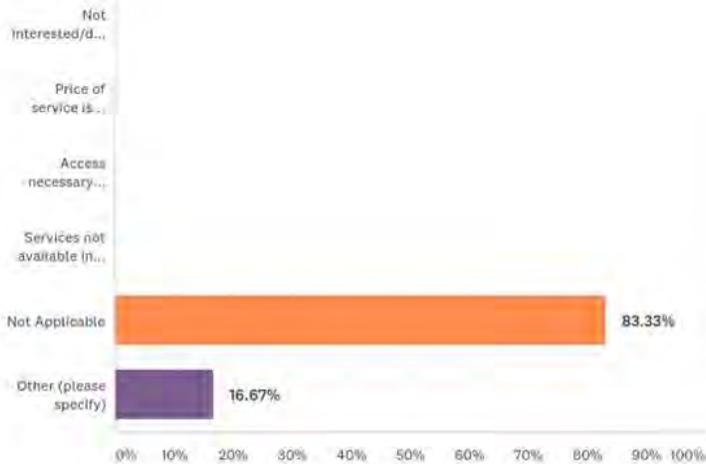
Q40: Now, please tell us about the internet services that you utilize. Does your business currently subscribe to internet service? (If "yes," skip to question #11)

Answered: 20

ANSWER CHOICES	RESPONSES	
Yes	90.00%	18
No	10.00%	2
TOTAL		20

Q41: If you answered "No" to the previous question, what are the primary reasons you do not have internet services for your business? (check all that apply)

Answered: 12



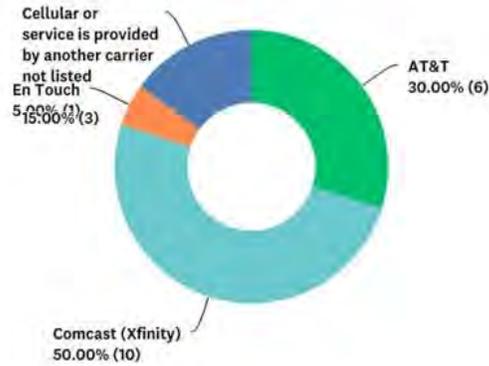
Q41: If you answered "No" to the previous question, what are the primary reasons you do not have internet services for your business? (check all that apply)

Answered: 12

ANSWER CHOICES	RESPONSES
Not interested/don't need them	0.00% 0
Price of service is outside my budget	0.00% 0
Access necessary services via free WiFi at locations outside my business	0.00% 0
Services not available in my area	0.00% 0
Not Applicable	83.33% 10
Other (please specify)	16.67% 2
Total Respondents: 12	

Q42: What company do you utilize to provide your internet service?

Answered: 20



Q42: What company do you utilize to provide your internet service?

Answered: 20

ANSWER CHOICES	RESPONSES
AT&T	30.00% 6
Rise Broadband	0.00% 0
EarthLink	0.00% 0
Comcast (Xfinity)	50.00% 10
En Touch	5.00% 1
Consolidated Communications	0.00% 0
SkyNet	0.00% 0
HughesNet	0.00% 0
ViaSat (Exceed)	0.00% 0
Cellular Carrier is Primary Internet	0.00% 0
Cellular Carrier is Primary Internet	0.00% 0
Cellular or service is provided by another carrier not listed	15.00% 3
TOTAL	20

Q43: How much do you currently pay per month for the internet portion of your communications bill?

Answered: 20



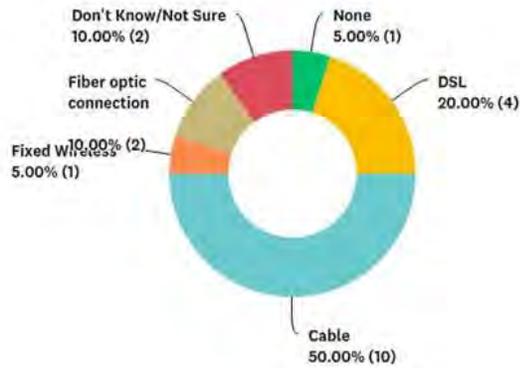
Q43: How much do you currently pay per month for the internet portion of your communications bill?

Answered: 20

ANSWER CHOICES	RESPONSES	
Less than \$50.00	10.00%	2
\$50.00 to \$99.99	15.00%	3
\$100.00 to \$149.99	35.00%	7
\$150.00 to \$199.99	10.00%	2
\$200.00 to \$249.99	10.00%	2
\$250.00 to \$499.99	15.00%	3
\$500.00 to \$999.99	5.00%	1
More than \$1,000.00	0.00%	0
TOTAL		20

Q44: What type of internet service do you currently receive?

Answered: 20



Q44: What type of internet service do you currently receive?

Answered: 20

ANSWER CHOICES	RESPONSES
None	5.00% 1
Dial Up	0.00% 0
DSL	20.00% 4
Cable	50.00% 10
Fixed Wireless	5.00% 1
Satellite Internet	0.00% 0
Cell Phone or Cellular Connection only	0.00% 0
Fiber optic connection	10.00% 2
Don't Know/Not Sure	10.00% 2
TOTAL	20

Q45: How important are each of the following to you for your business internet service? (1 = Unimportant; 2 = Mostly Unimportant; 3 = Somewhat Unimportant; 4 = Somewhat Important; 5 = Mostly Important; 6 = Very Important)

Answered: 20



Q45: How important are each of the following to you for your business internet service? (1 = Unimportant; 2 = Mostly Unimportant; 3 = Somewhat Unimportant; 4 = Somewhat Important; 5 = Mostly Important; 6 = Very Important)

Answered: 20

	1	2	3	4	5	6	TOTAL	WEIGHTED AVERAGE
Service reliability	0.00% 0	0.00% 0	0.00% 0	5.00% 1	5.00% 1	90.00% 18	20	5.85
Speed as advertised	0.00% 0	0.00% 0	0.00% 0	0.00% 0	20.00% 4	80.00% 16	20	5.80
Price or value for services received	0.00% 0	0.00% 0	10.00% 2	15.00% 3	40.00% 8	35.00% 7	20	5.00
Customer and technical support	0.00% 0	0.00% 0	10.00% 2	10.00% 2	35.00% 7	45.00% 9	20	5.15
Relevant service offerings	5.00% 1	5.00% 1	5.00% 1	20.00% 4	35.00% 7	30.00% 6	20	4.65
Availability of redundant services	5.00% 1	15.00% 3	5.00% 1	10.00% 2	30.00% 6	35.00% 7	20	4.50

Q46: Please rate your level of satisfaction with your business internet service (1 = Completely Unsatisfied; 2 = Mostly Unsatisfied; 3 = Somewhat Unsatisfied; 4 = Somewhat Satisfied; 5 = Mostly Satisfied; 6 = Completely Satisfied)

Answered: 20



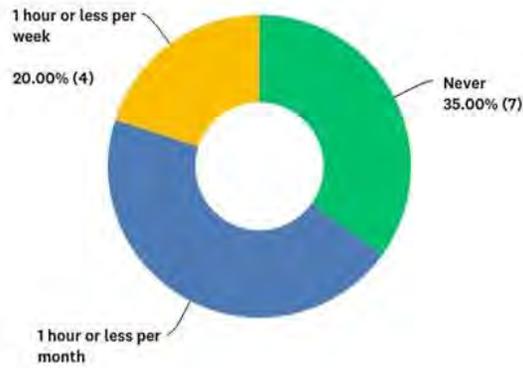
Q46: Please rate your level of satisfaction with your business internet service (1 = Completely Unsatisfied; 2 = Mostly Unsatisfied; 3 = Somewhat Unsatisfied; 4 = Somewhat Satisfied; 5 = Mostly Satisfied; 6 = Completely Satisfied)

Answered: 20

	1	2	3	4	5	6	TOTAL	WEIGHTED AVERAGE
Service reliability	5.00% 1	5.00% 1	5.00% 1	25.00% 5	40.00% 8	20.00% 4	20	4.50
Speed as advertised	5.00% 1	5.00% 1	10.00% 2	25.00% 5	35.00% 7	20.00% 4	20	4.40
Price or value for services received	5.00% 1	10.00% 2	35.00% 7	10.00% 2	30.00% 6	10.00% 2	20	3.80
Customer and technical support	5.00% 1	10.00% 2	20.00% 4	15.00% 3	45.00% 9	5.00% 1	20	4.00
Relevant service offerings	10.00% 2	15.00% 3	25.00% 5	25.00% 5	20.00% 4	5.00% 1	20	3.45

Q47: How frequently is your current internet service unavailable for at least an hour due to interruptions in your connection or slow/inoperable speeds?

Answered: 20



Q47: How frequently is your current internet service unavailable for at least an hour due to interruptions in your connection or slow/inoperable speeds?

Answered: 20

ANSWER CHOICES	RESPONSES	
Never	35.00%	7
1 hour or less per month	45.00%	9
1 hour or less per week	20.00%	4
1 hour or less per day	0.00%	0
More frequently than 1 hour per day	0.00%	0
TOTAL		20

Q48: Overall, how satisfied are you with the speeds and options available from local internet providers, including your own? (1 = Very Unsatisfied; 6 = Very Satisfied)

Answered: 20



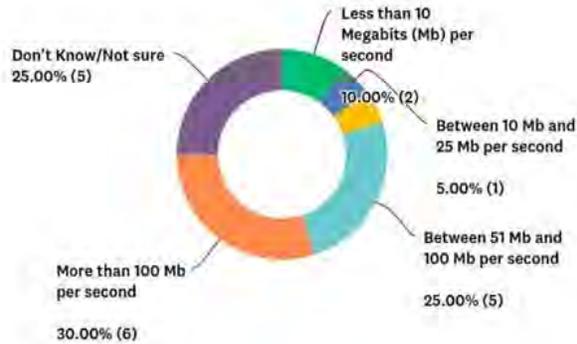
Q48: Overall, how satisfied are you with the speeds and options available from local internet providers, including your own? (1 = Very Unsatisfied; 6 = Very Satisfied)

Answered: 20

	1	2	3	4	5	6	TOTAL	WEIGHTED AVERAGE
(no label)	15.00%	10.00%	15.00%	25.00%	30.00%	5.00%	20	3.60
	3	2	3	5	6	1		

Q50: Upload and download speeds are important to many people. In some cases, providers will advertise "up to" speeds as part of your subscription package. What speeds were you told you would receive when you signed up for your service?

Answered: 20



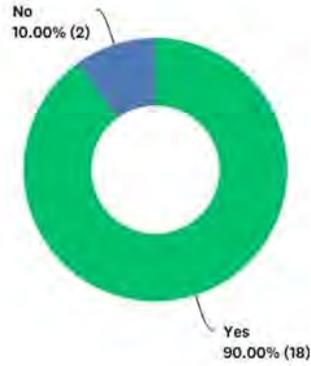
Q50: Upload and download speeds are important to many people. In some cases, providers will advertise "up to" speeds as part of your subscription package. What speeds were you told you would receive when you signed up for your service?

Answered: 20

ANSWER CHOICES	RESPONSES
Less than 10 Megabits (Mb) per second	10.00% 2
Between 10 Mb and 25 Mb per second	5.00% 1
Between 26 Mb and 50 Mb per second	5.00% 1
Between 51 Mb and 100 Mb per second	25.00% 5
More than 100 Mb per second	30.00% 6
Don't Know/Not sure	25.00% 5
TOTAL	20

Q52: If it was available, would you be interested in a broadband service that allowed you to receive internet service with greater reliability and speed for a cost which was comparable (+/- 10%) to your current internet service bill?

Answered: 20



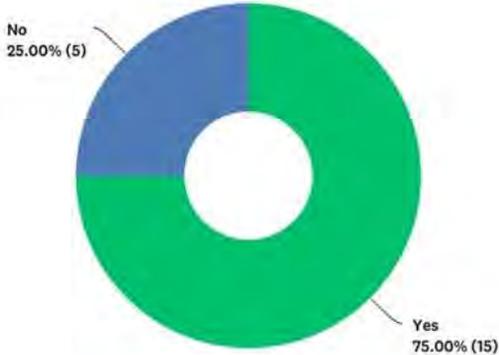
Q52: If it was available, would you be interested in a broadband service that allowed you to receive internet service with greater reliability and speed for a cost which was comparable (+/- 10%) to your current internet service bill?

Answered: 20

ANSWER CHOICES	RESPONSES	
Yes	90.00%	18
No	10.00%	2
TOTAL		20

Q53: Do you feel that the current service would allow you to continue to grow your business in Fulshear?

Answered: 20



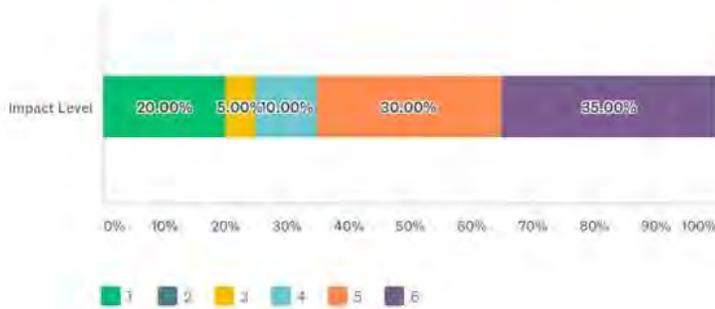
Q53: Do you feel that the current service would allow you to continue to grow your business in Fulshear?

Answered: 20

ANSWER CHOICES	RESPONSES	
Yes	75.00%	15
No	25.00%	5
TOTAL		20

Q54: What impact does the availability of high-speed, broadband internet service have for business in Fulshear on your plans for growing or expanding your business? (1 = No Impact; 6 = Significant Impact)

Answered: 20



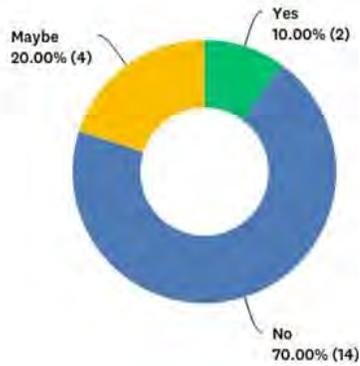
Q54: What impact does the availability of high-speed, broadband internet service have for business in Fulshear on your plans for growing or expanding your business? (1 = No Impact; 6 = Significant Impact)

Answered: 20

	1	2	3	4	5	6	TOTAL	WEIGHTED AVERAGE
Impact Level	20.00%	0.00%	5.00%	10.00%	30.00%	35.00%	20	4.35

Q55: Have you considered moving or relocating your business as a result of limited access to high-speed, broadband internet services?

Answered: 20



Q55: Have you considered moving or relocating your business as a result of limited access to high-speed, broadband internet services?

Answered: 20

ANSWER CHOICES	RESPONSES	
Yes	10.00%	2
No	70.00%	14
Maybe	20.00%	4
TOTAL		20

Q57: If the City of Fulshear were to facilitate the development of reliable, high-speed internet services, how likely would you be to switch internet providers? (1 = Very Unlikely; 6 = Very Likely)

Answered: 20



Q57: If the City of Fulshear were to facilitate the development of reliable, high-speed internet services, how likely would you be to switch internet providers? (1 = Very Unlikely; 6 = Very Likely)

Answered: 20

	1	2	3	4	5	6	TOTAL	WEIGHTED AVERAGE
How Likely or Unlikely	10.00%	0.00%	5.00%	25.00%	30.00%	30.00%	100	4.55

Q58: How strongly do you feel that the City needs to help coordinate better broadband (1 = Not At All; 6 = Strongly feel there is an issue and would like the City to coordinate)

Answered: 20



Q58: How strongly do you feel that the City needs to help coordinate better broadband (1 = Not At All; 6 = Strongly feel there is an issue and would like the City to coordinate)

Answered: 20

	1	2	3	4	5	6	TOTAL	WEIGHTED AVERAGE
How Strongly	10.00%	0.00%	10.00%	15.00%	20.00%	45.00%	9	4.70

Q60: If we have additional questions, may we contact you?

Answered: 20



Q60: If we have additional questions, may we contact you?

Answered: 20

ANSWER CHOICES	RESPONSES
No, I prefer to remain anonymous	55.00% 11
Yes, you may contact me, type contact information below	0.00% 0
Yes, you may contact me. (Please type contact information below.)	45.00% 9
TOTAL	20

Comments from Survey Responses
When it works, it's just fine. The problem is when lines are cut in the middle of a work day and the service is down for more than an hour sometimes into "days".
We are new to area so not sure how long term we will feel about Comcast. I am disappointed it was only option.
It's been reliable for the most part, just extremely slow.
Limited ISP vendors in my area – Only Comcast
Have to have two different services. If one goes down the other is a backup. The additional service increases our cost by more that \$1500.
This is a business imperative. When we are not downtown or in a business corridor we need to be able to work from home with comparable services. It allows freedom, growth and value to our community.
Don't MADE me use a certain provider because you think it is what is best for me.
Too slow, not nearly enough bandwidth
Have to have two services in case one goes down. It is very disappointing that fiber has been run along 359 from the main intersection, north, but is not available to us.
Any chance for P3 solutions to encourage greater broadband investments in fiber as well as cellular services across the Fulshear area?

ATTACHMENT C
Policy Recommendations

Yellow highlighted areas point out topics or questions for the City to consider.



Fulshear Texas
Fort Bend County's Premier Address



*SMALL WIRELESS FACILITY
DESIGN GUIDELINES*

MARCH 5, 2020

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Section I. Executive Summary

A. Background

The City of Fulshear, as with communities across the country and around the world, is facing the next wave of communications technology. While the economic benefits are immense, it has the potential to impact the safety, aesthetic values, and enjoyment of our community in a manner and to a degree that is far more extensive than cellular phones and other types of recent technology.

Small wireless communications, also known as 5G technology, utilizes higher frequencies with the capability to accommodate significantly higher data needs than current 4G/LTE technologies. The physical limits of the higher frequencies require that the transmitters be installed at the spacing of streetlights or fire hydrants rather than 2+/- miles or greater distances that 4G/LTE technologies accommodate. The result of this physical need is that the public rights-of-way are the optimal location to install the required equipment.

In September of 2018, the Federal Communications Commission (FCC) adopted the Declaratory Ruling and Third Report and Order, known as FCC 18-133. The Order outlines the extent to which local agencies may or may not regulate the installation of small wireless facilities within the public rights-of-way and the use of existing public infrastructure.

One year prior to the adoption of the FCC Order, in September of 2017, Chapter 284 of the Texas Local Government Code became effective. In general, Chapter 284 allows wireless network companies to place network nodes (small wireless facilities) in the public right-of-way (ROW), and provides rules, regulations, and fee structures to reimburse cities for use of the ROW. The Chapter states that cities would retain authority to manage the public ROW to ensure the health, safety, and welfare of the public, and would receive compensation for the installation of network nodes on poles.

Similar to the advent of the telephone which required extensive wires, switch boxes, poles and other structures to provide these services, small wireless communications technology will require a structure to mount a transmitter approximately every 300 to 500 feet with fiber and power connections to each one.

Absent the adoption of guidelines to assure that installations are context sensitive, service providers would be free to install equipment with no concern for the visual impact that they create. This document seeks to accommodate the implementation of the new technology while assuring that the new infrastructure is installed using context sensitive solutions.

In addition, the equipment needs to be located where it will not interfere with visibility for drivers, interference with sidewalks, or other common amenities found in public rights-of-way.

Other issues such as safety, noise and accommodating multiple providers at each location are also addressed within these guidelines.

B. FCC Order

The Order establishes fees, “shot clocks,” and provides limits on local governments’ control of small wireless infrastructure.

The FCC Order establishes fees as follows:

- \$500 for non-recurring fees, including a single up-front application that includes up to five Small Wireless Facilities, with an additional \$100 for each small wireless facility beyond five
- \$1,000 for non-recurring fees for a new pole (not a collocation) intended to support one or more small wireless facilities.
- \$270 per small wireless facility per year for all recurring fees, including any possible ROW access fee or fee for attachment to municipally-owned structures in the ROW

The following shot clocks are the FCC's permit review times for new small wireless facilities:

- A 60-day review period for collocation of small wireless facilities
- A 90-day review period for construction of new small wireless facilities

Existing shot clocks for non-small wireless facilities deployments remain in place:

- 90 days for collocation on an existing structure
- 150 days for deployment on a new structure

According to the FCC Order, the “shot clock” rules are as follows:

- Both the new and existing shot clocks apply to “any approval that a siting authority must issue under applicable law prior to deployment.” This includes zoning approvals and building permits, and may also include license or franchise agreements to access the rights-of-way, leases for use of municipal poles or property in the rights-of-way, electric permits and road closure permits, among others.
- For small wireless facilities deployments, shot clocks are reset if the siting authority notifies the applicant within 10 days after submission that the application is incomplete. For subsequent determinations of incompleteness, the shot clock would toll—not reset—if the siting authority provides written notice within 10 days that the supplemental submission did not provide the requested information.
- For non-small wireless facilities, shot clocks begin to run when an application is first submitted, and can be paused—not reset—if the siting authority notifies the applicant within 30 days that the application is incomplete. For subsequent determinations of incompleteness, the process is the same as described above for small wireless facilities.
- Failure to act within the new small wireless facility shot clock constitutes a presumptive violation of the Communications Act and applicants may seek expedited injunctive relief in court within 30 days of a local government missing a shot clock deadline. **There is no “deemed granted” remedy.**

The FCC Order, limits aesthetic reviews and requirements (including undergrounding, spacing, and historic/environmental requirements) to what is:

- reasonable
- no more burdensome than those applied to other types of infrastructure deployments
- objective and published in advance

The effective date of the 2018 Order with respect to the new limitations on rights-of-way fees and deadlines for acting on permit applications was January 14, 2019.

C. Chapter 284

In a similar manner to the FCC Order, Chapter 284 establishes fees, “shot clocks,” and provides limits on local governments’ control of small wireless infrastructure.

Chapter 284 establishes fees as follows:

- *Annual Public Right-Of-Way Rate:* A public right-of-way rate for use of the public right-of-way may not exceed an annual amount equal to \$250 multiplied by the number of network nodes installed in the public right-of-way in the municipality’s corporate boundaries.
- *Application Fees:* \$500 per application covering up to five network nodes, \$250 for each additional network node per application, and \$1,000 per application for each pole.

- *Service Pole Attachment Fee:* The rate to collocate a network node on a service pole in the public right-of-way shall be \$20 per pole per year.
- *Use of Public Right-Of-Way and Applicable Rate:* A network provider must pay the municipality a monthly public right-of-way rate for transport facilities in an amount equal to \$28 multiplied by the number of the network provider's network nodes located in the public right-of-way.

The following “shot clocks” are Chapter 284’s permit review times for network nodes and node support poles:

- Within 30 days of receiving an application for a network node or node support pole, or 10 days for a transport facility, the City shall determine and notify the Applicant whether the application is complete; or if incomplete, the City must specifically identify the missing information in such notification.
- The City shall make its final decision to approve or deny a complete application no later than (i) 21 days after receipt of a complete application for a transport facility, (ii) 60 days after receipt of a complete application for a network node; and (iii) 150 days after receipt of a completed application for a new node support pole.
- The City shall advise the Applicant in writing of its final decision, and, if denied, the basis for that denial, including specific provisions of City Code or applicable law on which the denial was based, and send the documentation to the Applicant on or before the day the City denies the application. The Applicant may cure the deficiencies identified by the City and resubmit the application within 30 days of the denial without paying an additional application fee. The City shall approve or deny the revised application within 90 days of receipt of the amended application. The subsequent review by the City shall be limited to the deficiencies cited in the original denial.
- If the City fails to act on an application within the review period specified, the application shall be deemed approved.
- An applicant seeking to collocate network nodes may, at the Applicant’s discretion, file a consolidated application and receive permits for up to 30 network nodes. Provided however, the City’s denial of any node within a single application shall not affect other nodes submitted in the same application. The City shall grant permits for any and all nodes in a single application that it does not deny, subject to the requirements of this Section.

Chapter 284 also reiterates existing Texas municipal local police-power-based regulations. It states:

- Subject to this chapter [Chapter 284] and applicable federal and state law, a municipality may continue to exercise zoning, land use, planning, and permitting authority in the municipality’s boundaries, including with respect to utility poles.
- A municipality may exercise that authority to impose police-power-based regulations for the management of the public right-of-way that apply to all persons subject to the municipality.
- A municipality may impose police-power-based regulations in the management of the activities of network providers in the public right-of-way only to the extent that the regulations are reasonably necessary to protect the health, safety, and welfare of the public.

D. Goal Statement

Pursuant to its police power authority, the City enacts these Design Guidelines in order to meet its fiduciary duty to the citizens of the City, and to give assistance and guidance to wireless telecommunications providers to assist such companies in the timely, efficient, safe and aesthetically pleasing installation of technologically competitive equipment.

SECTION 1. PURPOSE AND APPLICABILITY

This Small Wireless Design Manual provides objective, technically feasible criteria applied in a non-discriminatory manner that reasonably match the aesthetics and character of the immediate area regarding all of the following, which the City shall consider in reviewing an application.

- (a) The location of any ground-mounted small wireless facilities including their relationship to other existing or planned small wireless sites
- (b) The location of a small wireless facility on a wireless support structure
- (c) The appearance and concealment of small wireless facilities, including those relating to materials used for arranging, screening, and landscaping
- (d) The design and appearance of a wireless support structure including any height requirements adopted in accordance with this manual and the City's Small Wireless Facility Siting Policy.

The City of Fulshear ("City") recognizes that the State of Texas has delegated to the City the fiduciary duty, as a trustee, to manage the public right-of-way for the health, safety, and welfare of the public to Texas municipalities.

The FCC Order and Chapter 284 of the Texas Local Government Code allows certain wireless Network Providers to install in the public rights-of-way their wireless facilities. These wireless facilities are described as "Micro Network Nodes", "Network Nodes", and "Node Support Poles". These facilities are defined in Section 2 of this Manual.

This Design Manual shall apply to any sittings, installations, collocations in, on, over or under the public rights-of-way of Network nodes, Node support poles, Micro network nodes, Distributed Antenna Systems, microwave communications or other Wireless Facilities, by whatever nomenclature, whether they are installed pursuant to Chapter 284, the Order, or installed pursuant to an agreement as agreed to and consented to by the City in its discretion, or installed as may otherwise be allowed by state or federal law.

It is the goal of the City to allow the installation of a small wireless infrastructure, including Micro Network Nodes, Network Nodes, Node Support Poles and related ground equipment, with a minimum foot print. This shall be accomplished by small wireless siting and the use of multi-cell poles that can accommodate multiple applicants.

The provisions of this Manual shall not limit or prohibit the City's discretion to promulgate and make publicly available other information, materials or requirements in addition to, and separate from this Design Manual that do not conflict with state or federal law.

A Network Provider shall comply with the City's Ordinances except where in conflict with this Design Manual.

SECTION 2. DEFINITIONS

Abandon and its derivatives means the facilities installed in the right-of-way (including by way of example but not limited to: poles, wires, conduit, manholes, handholes, cuts, network nodes and node support poles, or portion thereof) that have been left by Provider in an unused or non-functioning condition for more than 120 consecutive calendar days unless, after notice to Provider, Provider has established to the reasonable satisfaction of the City that the applicable facilities, or portion thereof, is still in active use.

Administrative Review means ministerial review of an Application by the City relating to the review and issuance of a Permit, to determine whether the issuance of a Permit is in conformity with the applicable provisions of these Guideline and all City Codes.

Antenna means communications equipment that transmits or receives electromagnetic radio frequency signals used in the provision of wireless services.

Applicable codes means:

- (A) uniform building, fire, electrical, plumbing, or mechanical codes adopted by a recognized national code organization; and
- (B) local amendments to those codes

Applicable Law means Chapter 284 of the Texas Local Government Code and federal law to the extent it preempts local control.

Applicant means any person who submits an application and is a network provider.

Application means a request submitted by an applicant (i) for a permit to collocate network nodes; or (ii) to install a transport facility; or (iii) approve the installation, replacement or modification of a pole.

Authority Used as a noun, means a state, county, or city governing body, board, agency, office or commission authorized by law to make legislative, quasi-judicial, or administrative decision relative to an application.

Base station means a structure or equipment at a fixed location that enables FCC-licensed or authorized wireless communications between user equipment and a communications network. The term does not encompass a tower or any equipment associated with a tower.

Batched Applications is the submission of multiple siting applications at one time. Batched applications shall not exceed 30 individual Small Wireless Facilities.

City means the City of Fulshear, Texas or its lawful successor. As used throughout, the term City also includes the designated agent of the City.

City Code means those ordinance provisions relevant to use of the public right-of-way where compliant with applicable law.

City Council means the Fulshear City Council.

City Manager shall mean City Manager or designee

Chapter 284 means Texas Local Government Code; Title 9. Public Buildings and Grounds; Subtitle A. Municipal Public Buildings and Grounds; [Chapter 284. Deployment of Network Nodes in Public Right-of-Way](#), which is incorporated herein by this reference.

Collocate and *collocation* mean the installation, mounting, maintenance, modification, operation, or replacement of network nodes in a public right-of-way on or adjacent to a pole.

Concealment or Camouflaged means any Wireless Facility or Pole that is covered, blended, painted, disguised, camouflaged or otherwise concealed such that the Wireless Facility blends into the surrounding environment and is visually unobtrusive. A Concealed or Camouflaged Wireless Facility or Pole also includes any Wireless Facility or Pole conforming to the surrounding area in which the Wireless Facility or Pole is located and may include, but is not limited to hidden beneath a façade, blended with surrounding area design, painted to match the supporting area, or disguised with artificial tree branches.

Contractor means a person, partnership, corporation, or other legal entity who undertakes to construct, install, alter, move, remove, trim, demolish, repair, replace, excavate, or add to any improvements or public improvements covered by this Manual, that requires work to be undertaken and workers, and/or equipment to be in the ROW in the process of performing the above-named operations. Contractor, as the term is defined herein, should include any and all types of general contractor and subcontractor and successors or assigns of said contractor.

Decorative pole means a streetlight pole specially designed and placed for aesthetic purposes and on which no appurtenances or attachments, other than specially designed informational or directional signage or temporary holiday or special event attachments, have been placed or are permitted to be placed according to nondiscriminatory municipal codes.

Design District means an area that is zoned, or otherwise designated by municipal code, and for which the city maintains and enforces unique design and aesthetic standards on a uniform and nondiscriminatory basis.

Disaster emergency or disaster or emergency means an imminent, impending, or actual natural or humanly induced situation wherein the health, safety, or welfare of the residents of the city is threatened, and includes, but is not limited to any declaration of emergency by city state or federal governmental authorities.

Distribute Antenna System (DAS) A type of small wireless facility consisting of a network of spatially separated antenna nodes connected to a common source via a transport medium that provides wireless service within a geographic area. Generally, serves multiple carriers. Shall be included as a type of "Network Node."

Duct or conduit means a single enclosed raceway for cables, fiber optics, or other wires. "Duct" or "conduit" shall not include the maintenance duct associated with a conduit that is reserved for use in replacing damaged cable or for rerouting purposes.

Easement means and shall include any public easement or other compatible use created by dedication, or by other means, to the city for public utility purposes or any other purpose whatsoever. "Easement" shall include a private easement used for the provision of utilities.

Effectively Screen aesthetically pleasing construction meant to conceal small wireless facility equipment. Shall be required where needed to improve the aesthetics of the local environment.

Eligible facilities request means any request for modification of an existing tower or base station that does not substantially change the physical dimensions of such tower or base station, involving: (i) Collocation of new transmission equipment; (ii) Removal of transmission equipment; or (iii) Replacement of transmission equipment.

Equipment Concealed Whenever technically feasible, antennas, cabling, and equipment shall be fully concealed within a Pole, or otherwise camouflaged to appear to be an integrated part of a Pole.

Excavation or Excavate means any opening and/or tunneling in or under the surface of any public place or public rights-of-way in the City. The exception is an opening into a lawful structure below the surface of a public place or public right-of-way (e.g., a manhole), the top of which is flush with the adjoining surface and so constructed as to allow frequent openings without injury or damage to the public place or public rights-of-way.

Facilities or facility means and includes, but shall not be limited to, pipes, conduits, wires, cables, towers, switches, amplifiers, transformers, fiber optic lines, antennae, poles, ducts, conductors, lines, mains, vaults, appliances, attachments, equipment, structures, manholes, fixtures, appurtenances, and such other objects, devices, or other items of tangible personal property, which are designed, constructed, installed, placed, used or operated in, upon, over, across, above, or below public rights-of-way. Notwithstanding the foregoing, structures designed and constructed for the support and passage of vehicular and pedestrian traffic, such as streets, alleys, highways, driveways, and sidewalks, whether at, below, or above grade, shall not be deemed to be facilities; provided, further, a private, individually owned, connection or attendant downstream service line or device, through which a utility service is

received by the end user owning same, for which required permits have been issued under applicable building, plumbing, electrical, or other codes of the city, shall not be deemed as facilities hereunder.

Federal Communications Commission or FCC means the Federal Administrative Agency, or lawful successor, authorized to oversee cable television and other multi-channel regulation on a national level.

Height means maximum height of the small wireless facility, including antenna, above established grade measured at the base of the structure

Highway right-of-way means right-of-way adjacent to a state or federal highway.

Historic district means an area that is zoned or otherwise designated as a historic district under municipal, state, or federal law.

Indemnification means that any provider who owns or operates network nodes, node support poles, or transport facilities in the ROW shall indemnify, protect, defend, and hold the City and its elected officials, officers, employees, agents, and volunteers harmless against any and all claims, lawsuits, judgments, costs, liens, losses, expenses, fees to include reasonable attorney fees and costs of defense, proceedings, actions, demands, causes of action, liability and suits of any kind and nature, including personal or bodily injury or death, property damage or other harm for which recovery of damages is sought, to the extent that it is caused by the negligence of the Operator who owns or operates Small Wireless Facilities and wireless service in the ROW, any agent, officer, director, representative, employee, affiliate, or subcontractor of the Operator, or their respective officers, agents, employees, directors, or representatives while installing, repairing, or maintaining facilities in the Rights-of-Way.

Inspector means the person designated by the City within the Public Works Department or the City development department to fulfill the responsibilities that have been empowered with such position.

Landscape means any combination of living plant material, such as trees, shrubs, vines, ground covers, flowers, vegetables, turf or grass; natural features, such as land and water forms; and structural features, including but not limited to landscaped pedestrian plazas, fountains, reflecting pools, screening, walls, fences and benches.

Landscape Screening The installation at grade of plantings, shrubbery, bushes or other foliage intended to screen the base of a small wireless facility from public view.

Lattice Tower an antenna support tower that is self-supporting with multiple legs and cross-bracing of structural steel.

Law means common law or a federal, state, or local law, statute, code, rule, regulation, order, or ordinance.

Local means within the geographical boundaries of the City.

Location means the City approved and lawfully permitted location for the Network Node.

Macro tower means a guyed or self-supported pole or monopole greater than 50 feet, as per the FCC Order, above ground level and that supports or is capable of supporting antennas.

Mayor means the Mayor for the City.

Micro network node means a network node that is not larger in dimension than 24 inches in length, 15 inches in width, and 12 inches in height, and that has an exterior antenna, if any, not longer than 11 inches.

Monopole a structure composed of a single spire, pole or tower designed and used to support network node antennas or related equipment. Provisions addressed to node support poles herein shall also apply to monopoles.

Municipal park means an area that is zoned or otherwise designated by municipal code as a public park for the purpose of recreational activity.

Municipally owned utility pole means a utility pole owned or operated by a municipally owned utility, as defined by [Section 11.003, Utilities Code](#), and located in a public right-of-way.

MUTCD means Manual of Uniform Traffic Control Devices.

Network node means equipment at a fixed location that enables wireless communications between user equipment and a communications network. The term:

(A) includes:

- i. equipment associated with wireless communications;
- ii. a radio transceiver, an antenna, a battery-only backup power supply, and comparable equipment, regardless of technological configuration; and
- iii. coaxial or fiber-optic cable that is immediately adjacent to and directly associated with a particular collocation; and

(B) does not include:

- i. an electric generator;
- ii. a pole; or
- iii. a macro tower.

Network provider means:

(A) a wireless service provider; or

(B) a person that does not provide wireless services and that is not an electric utility but builds or installs on behalf of a wireless service provider:

- i. network nodes; or
- ii. node support poles or any other structure that supports or is capable of supporting a network node.

Node support pole means a pole or *monopole* installed by a network provider for the primary purpose of supporting a network node.

Order means the FCC's [Declaratory Ruling and Third Report and Order](#), WT Docket No. 17-79, WC Docket No. 17-84, FCC-18-133, released September 27, 2018, which is incorporated herein by this reference.

Permit means a written authorization for the use of the public right-of-way or collocation on a service pole required from a municipality before a network provider may perform an action or initiate, continue, or complete a project over which the municipality has police power authority.

Person means an individual, corporation, limited liability company, partnership, association, trust, or other entity or organization, including the City.

Pole means a service pole, municipally owned utility pole, node support pole, or utility pole.

Policy means the City's Small Wireless Facility Siting policy, which is incorporated herein by this reference.

Private easement means an easement or other real property right that is only for the benefit of the grantor and grantee and their successors and assigns.

Provider has the same meaning as "Network Provider."

Public right-of-way means the area on, below, or above a public roadway, highway, street, public sidewalk, alley, waterway, or utility easement in which the municipality has an interest. The term does not include:

(A) a private easement; or

(B) the airwaves above a public right-of-way with regard to wireless telecommunications.

Public right-of-way management ordinance means an ordinance that establishes the rules and regulations

regarding the public right-of-way.

Routine Maintenance means:

- (A) work in the public right-of-way that does not require excavation or closing of sidewalks or vehicular lanes in a public right-of-way;
- (B) replacing or upgrading a network node or pole with a node or pole that is substantially similar in size or smaller and that does not require excavation or closing of sidewalks or vehicular lanes in a public right-of-way; or
- (C) the installation, placement, maintenance, operation, or replacement of micro network nodes that are strung on cables between existing poles or node support poles, in the public right-of-way.

Service pole means a pole, other than a municipally owned utility pole, owned or operated by a municipality and located in a public right-of-way, including:

- (A) a pole that supports traffic control functions;
- (B) a structure for signage;
- (C) a pole that supports lighting, other than a decorative pole; and
- (D) a pole or similar structure owned or operated by a municipality and supporting only network nodes.

Signage is prohibited on all network nodes and node support poles, including stickers, logos, and other non-essential graphics and information unless required by the FCC, except for a small placard identifying the service provider and contact information, which shall be placed at 6-feet above grade, facing away from the public rights-of-way.

Small cell or small wireless facility means a facility meeting all of the following criteria:

- (A) facilities mounted on structures 30 feet, as per the City, or less in height including their antennas, or on structures no more than 10 percent taller than other adjacent structures, or that do not extend existing structures where they are located to a height of more than 30 feet or by more than 10 percent, whichever is greater;
- (B) each antenna is no more than 6 cubic feet in volume;
- (C) all other wireless equipment associated with the structure, including wireless equipment associated with the antenna and any pre-existing associate equipment on the structure is no more than 28 cubic feet in volume; and
- (D) facilities do not result in human exposure to radio frequency radiation in excess of applicable safety standards specified in [47 CFR Rule 1.1307\(b\)](#).

Unless specifically provided for herein, provisions addressed to network nodes herein shall also apply to small cells and small wireless facilities.

Stealth shall mean a method that hides or conceals an antenna, supporting electrical or mechanical equipment or any other support structure, including network nodes.

Street means only the paved portion of the right-of-way used for vehicular travel, being the area between the inside of the curb to the inside of the opposite curb, or the area between the two parallel edges of the paved roadway for vehicular travel where there is no curb. A "Street" is generally part of, but smaller in width than the width of the entire right-of-way, while a right-of-way may include sidewalks and utility easements, a "Street" does not. A "street" does not include the curb or the sidewalk, if either are present at the time of a permit application or if added later.

SWPPP shall mean Storm Water Pollution Prevention Plan.

TAS means Texas Accessibility Standards.

Tower means any structure built for the sole or primary purpose of supporting any FCC-licensed or authorized antennas and their associated facilities, including structures that are constructed for wireless communications services including, but not limited to, private, broadcast, and public safety services, as well as unlicensed wireless services and fixed wireless services such as microwave backhaul, and the associated site.

Traffic Signal means any device, whether manually, electrically, or mechanically operated by which traffic is alternately directed to stop and to proceed.

Transport facility means each transmission path physically within a public right-of-way, extending with a physical line from a network node directly to the network, for the purpose of providing backhaul for network nodes.

Underground Requirement Area shall mean means an area where poles, overhead wires, and associated overhead or above ground structures have been removed and buried or have been approved for burial underground pursuant to municipal ordinances, zoning regulations, state law, private deed restrictions, and other public or private restrictions, that prohibit installing aboveground structures in a public right-of-way.

User means a person or organization which conducts a business over facilities occupying the whole or a part of a public street or right-of-way, depending on the context.

Utility pole means a pole that provides:

- (A) electric distribution with a voltage rating of not more than 34.5 kilovolts; or
- (B) services of a telecommunications provider, as defined by [Section 51.002, Utilities Code](#).

Wireless service means any service, using licensed or unlicensed wireless spectrum, including the use of Wi-Fi, whether at a fixed location or mobile, provided to the public using a network node.

Wireless service provider means a person that provides wireless service to the public.

Wireless facilities mean “Micro Network Nodes,” “Network Nodes,” and “Node Support Poles”.

SECTION 3. PROHIBITED AND PREFERRED LOCATIONS

A. Prohibited or Restricted Areas

Municipal Parks and Residential Areas. A Network Provider may not install a Node Support Pole in a public right-of-way without the City's discretionary, nondiscriminatory, and written consent if the public right-of-way is in a Municipal park or is adjacent to a street or thoroughfare that is:

- (1) not more than 50 feet wide of paved street surface, being the area measured as the shortest distance between the inside of the curb to the inside of the opposite curb, or the area measured as the shortest distance between the two parallel edges of the paved roadway for vehicular travel where there is no curb; and
- (2) adjacent to single-family residential lots or other multifamily residences or undeveloped land that is designated for residential use by zoning or deed restrictions.

A Network Provider installing a Network Node or Node Support Pole in a public right-of-way described above shall comply with private deed restrictions and other private restrictions in the area that apply to those facilities.

Each permit application shall disclose if it is within a Municipal Park and Residential Areas as described above.

Historic District and Design Districts. A Network Provider must obtain advance written approval from the City before collocating Network Nodes or installing Node Support Poles in a Design District with Decorative Poles or in an area of the City zoned or otherwise designated as a Design District or Historic District.

As a condition for approval of Network Nodes or Node Support Poles in Design Districts with Decorative Poles or in a Historic District, the City shall require reasonable design or Concealment measures for the Network Nodes or Node Support Poles. Therefore, any request for installations in a Design District with Decorative Poles or in a Historic District, must be accompanied with proposed Concealment measures in the permit applications.

The City requires that a Network Provider use Camouflage measures to improve the aesthetics of the Network Nodes, Node Support Poles, or related ground equipment, or any portion of the nodes, poles, or equipment, to minimize the impact to the aesthetics in Design Districts or in an Historic District.

Network Provider shall comply with and observe all applicable City, State, and federal historic preservation laws and requirements.

Each permit application shall disclose if it is within a Design District with Decorative Poles or in an area of the City zoned or otherwise designated as a Design District or Historic District.

Historic Landmarks. A Network Provider is prohibited from installing a Network Node or Node Support Pole within 300 feet of a historic site or structure or Historic Landmark recognized by the City, state or federal government, as of the date of the submission of the permit. Each permit application must disclose if it is with 300 feet of such a structure.

Compliance with Undergrounding Requirements. A Network Provider shall comply with nondiscriminatory undergrounding requirements, including municipal ordinances, zoning regulations, state law, private deed restrictions, and other public or private restrictions, that prohibit installing aboveground structures in a public right-of-way without first obtaining zoning or land use approval.

Areas may be designated from time to time by the City as Underground Requirement Areas in accordance with filed plats, and or conversions of overhead to underground areas, as may be allowed by law.

Each permit application shall disclose if it is within an area that has undergrounding requirements.

B. Least preferable locations

Residential Areas and Parks. A Network Provider is prohibited from installing a Network Node on an existing pole in a public right-of-way without written consent from the City Council if the public right-of-way is located in or adjacent to a street or thoroughfare that is adjacent to a municipal park or single-family residential lots or other multifamily residences or undeveloped land that is designated for residential use by zoning or deed restrictions.

A Network Provider installing a Network Node or a Node Support Pole in a public right-of-way shall comply with private deed restrictions and other private restrictions in the area that apply to those facilities.

Historic Districts and Design Districts. A Network Provider is prohibited from installing a Network Node or a Node Support Pole in the public right-of-way in any area designated by the City as a Design Districts or in an area of the City zoned or otherwise designated as a Historic District unless such a Network Node or a new Node Support Pole is camouflaged.

C. Most preferable locations

1. *Industrial areas* if not adjacent to a Municipal Park, Residential area, Historic District or Design District.
2. *Highway Rights-of-Way areas* if not adjacent to a Municipal Park, Residential area, Historic District or Design District.
3. *Retail and Commercial areas* if not adjacent to a Municipal Park, Residential area, Historic District or Design District.

D. Designated Areas

The City Council may designate an area as a Historic District or a Design District at any time.

Currently designated *Historic Districts* are:

The failure to designate an area in this Chapter shall not mean that such an area is not within a defined district, if so designated by the City Council. Future areas may be designated as one of these Districts at any time. Such a designation does not require a zoning case.

While it is not required to designate Underground Compliance Areas to prohibit above ground Wireless facilities, the City may also, from time to time, also designate Underground Compliance Areas.

E. Exceptions

The City by its discretionary consent and agreement may grant exception to the above prohibited locations and sizes, but only in a non-exclusive, and non-discriminatory manner.

F. Order of Preference

In general, network nodes and related ground equipment shall be installed on support facilities as follows (Most Preferred to Least Preferred):

1. *Existing telephone or electrical lines between existing utility poles.* Micro Network Nodes shall only be lashed on existing telephone or electrical lines between existing utility poles (electric poles or telephones poles), with notice to the pole owner as required by the Federal Pole Attachment Act, and not placed on Utility Poles, Node Support Poles or Service Poles.
2. *Existing Utility Poles* (electric poles or telephones poles), shall be the preferred support facility for Network Nodes and related ground equipment.

3. *Municipal Service Poles:*
 - a. *Non-decorative street lights* with a height of more than 20 feet.
 - b. *Traffic signal structures* when such installation will not interfere with the integrity of the facility and will not interfere with the safety of the public.
 - c. *Street signage* shall be a low priority use for attachment of a Network Node.
 - d. *Other municipal Service pole* use is discouraged.
4. *New node support poles* or monopoles shall be the least preferred type of allowed facility for attachment of Network Nodes.

SECTION 4. GUIDELINES ON PLACEMENT

A. Generally

A Network Provider shall construct and maintain Network Nodes and Node Support Poles in a manner that does not:

1. obstruct, impede, or hinder the usual travel or public safety on a public right-of-way;
2. obstruct the legal use of a public right-of-way by other utility providers;
3. violate nondiscriminatory applicable codes;
4. violate or conflict with any Laws, including but not limited to City Code and the Federal Americans with Disabilities Act (ADA) ([42 U.S.C. Section 12101 et seq.](#)).

B. General Requirements and Information

1. *Size Limits.* Network Providers shall provide detailed drawings, with calculations to show strict conformity to the size limitations, as specified in this Subsection, as well as in Section 2 of this Manual, regarding the size of a Micro Network Node, size of Network Nodes, and, maximum pole height, with each application and with each request for a permit for each location.

(a) A "Micro network node" means a network node that is not larger in dimension than 24 inches in length, 15 inches in width, and 12 inches in height, and that has an exterior antenna, if any, not longer than 11 inches.

(b) A network node must conform to the following conditions:

(1) each antenna that does not have exposed elements and is attached to an existing structure or pole:

- I. must be located inside an enclosure of not more than six cubic feet in volume;
- II. may not exceed a height of three feet above the existing structure or pole; and
- III. may not protrude from the outer circumference of the existing structure or pole by more than two feet;

(2) if an antenna has exposed elements and is attached to an existing structure or pole, the antenna and all of the antenna's exposed elements:

- I. must fit within an imaginary enclosure of not more than six cubic feet;
- II. may not exceed a height of three feet above the existing structure or pole; and
- III. may not protrude from the outer circumference of the existing structure or pole by more than two feet;

(3) an antenna and equipment attached to a building:

- I. must be installed on the rear or the side elevations close to other existing utility boxes/poles and if an antenna is installed on a side elevation it must not be visible from public right-of-way;

any interference. Network Nodes shall not be allowed on City's public safety radio infrastructure.

4. *Improperly Located Network Node facilities, Node Support Poles and related ground equipment.*
 - a. Improperly Located Network Node facilities, Node Support Poles and related ground equipment shall not impede pedestrian or vehicular traffic in the Right-of-Way. If any Network Node facilities, Node Support Poles or ground equipment is installed in a location that is not in accordance with the plans approved by the City and impedes pedestrian or vehicular traffic or does not comply or otherwise renders the Right-of-Way non-compliant with applicable Laws, including the American Disabilities Act, then Network Provider shall promptly remove the Network Node facilities, Node Support Poles or ground equipment.
 - b. Notice to Remove unauthorized facilities and relocate and penalty: After 30 days' notice to remove of Network Node facilities, Node Support Poles or ground equipment that is located in the incorrect permitted location, if not relocated the Network Provider shall be subject to a penalty, as per City Code, per day until the Network Node facilities, Node Support Poles or ground equipment is relocated to the correct area within the permitted Location, regardless of whether or not the Network Provider's contractor, subcontractor, or vendor installed the Network Node facilities, Node Support Poles or ground equipment in strict conformity with the City Code, and other applicable ordinances concerning improperly located facilities in the rights-of-way.

5. *Noise.* Network Providers are required to incorporate ambient noise suppression measures and/or required to place the equipment in locations less likely to impact adjacent residences or businesses to ensure compliance with all applicable noise regulations. The maximum allowable noise emitted by the Small Wireless Facility shall not exceed 30 dB measured at a distance of 3 feet from any portion of the facility.

C. Underground Requirement Areas

1. A Network Provider shall, in relation to installation for which the City approved a permit application, comply with nondiscriminatory undergrounding requirements, including municipal ordinances, zoning regulations, state law, private deed restrictions, and other public or private restrictions, that prohibit installing aboveground structures in a public right-of-way without first obtaining zoning or land use approval.
2. If a location is designated by the City to transits to be an Underground Requirement Area, then a Network Provider's permit for the location of the Micro Network Node, Network Node, Node Support Pole, and related ground equipment at such location will be revoked 90 days after the designation, with removal of said the Micro Network Node, Network Node, Node Support Pole, and related ground equipment at such location within 90 days of such designation, or as otherwise reasonably allowed by the City for the transition of other overhead facilities.

D. Network Node facilities placement

1. *Right-of-Way:* Network Node facilities, Node Support Poles and related ground equipment shall be placed, as much as possible, within two feet of the outer edge of the Right-of-Way line to minimize any obstruction, impediment, or hindrance to the usual travel or public safety on a public right-of-way. A minimum three feet from back of curb. No above ground facilities shall be located closer than three feet from the back of curb or edge of alley or within sight visibility area.
2. *Height above ground.* Network Node attachments to a pole shall be installed at least twelve (12) feet above the ground, and if a Network Node attachment is projecting toward the street, for the safety and protection of the public and vehicular traffic, the attachment shall be installed no less than sixteen (16) feet above the ground.

3. *Protrusions.* No protrusion from the outer circumference of the existing structure or pole shall be more than two (2) feet.

4. **Number of Network Nodes per Site.** The City encourages the collocation of more than one Network Node on any one Pole (see *Appendix A* for a multi-node monopole design).

E. New Node Support Poles or Monopoles

1. *New Node Support Poles Spacing.* New node support poles or monopoles shall be spaced apart from existing utility poles or Node Support poles at the same as the spacing between utility poles in the immediate proximity, but no less than at a minimum 500 feet from a utility pole or another Node Support Pole to minimize the hazard of poles adjacent to road ways and to minimize effect on property values and aesthetics on the area. New node supports poles shall be designed as Monopoles, consistent with the pole designs concepts detailed in **Appendix A**.
2. *Height of Node Support Poles or modified Utility Pole.* A Node support pole or modified Utility Pole may not exceed the lesser of:
 - a. 10 feet in height above the tallest existing utility pole located within 500 linear feet of the new pole in the same public right-of-way; or
 - b. 30 feet above ground level, as per the City.
3. *Size and Height of New Wireless Facilities.* New Wireless Facilities in the right-of-way should be no greater than the maximum size and height of any other Utility Poles in the immediate proximity.
4. *Style and Color.* All new Node Support Poles shall match existing poles found in the immediate proximity in style and color.

F. Ground Equipment

1. *Ground Equipment near street corners and intersections:* Ground equipment should be minimal and the least intrusive. To minimize any obstruction, impediment, or hindrance to the usual travel or public safety on a public right-of-way the maximum line of sight required to add to safe travel of vehicular and pedestrian traffic and in order to maximize that line of sight at street corners and intersections and to minimize hazards at those locations, ground equipment may not be installed within 30 feet of a street corner or a street intersection. Ground equipment should be neutral color, and of material compatible with the surrounding structures as determined by the City staff. Ground equipment must be within two feet from the outer edge of ROW and minimum three feet from back of curb.
2. *Ground Equipment near Municipal Parks.* For the safety of Municipal park patrons, particularly small children, and to allow full line of sights near Municipal park property, the Network Provider shall not install Ground Equipment in a Right-of-Way that is within a Park or within 250 feet of the boundary line of a Park, unless approved by the City in writing.
3. *Minimize Ground equipment density:* To enhance the safety requirements of line of sight of pedestrians, particularly small children, the City's designee may deny a request for a proposed Location if the Network Provider installs Network Node ground equipment where existing ground equipment within 300 feet already occupies a footprint of 25 sq. ft. or more.

G. Municipal Service Poles

1. *In accordance with Agreement.* Installations on all Service Poles shall be in accordance with a written agreement with the owner of the Service Pole (City, etc.).

2. *Required industry standard pole load analysis:* Installations on all Service Poles shall have an industry standard pole load analysis completed and certified by a registered engineer in the State of Texas, and submitted to the municipality with each permit application indicating that the Service Pole to which the Network Node is to be attached will safely support the load.
3. *Height of attachments:* All attachments on all Service Poles shall be at least 12 feet above grade, and if a Network Node attachment is projecting toward the street, for the safety and protection of the public and vehicular traffic, the attachment shall be installed no less than sixteen (16) feet above the ground.
4. *Installations on Traffic Signals:* Installations on all Traffic signal structures must not interfere with the integrity of the facility in any way that may compromise the safety of the public and must be in accordance with a written agreement with the owner of the traffic signal structure (City, etc.). Installation of Network Node facilities on any traffic signal structures shall:
 - a. Be encased in a separate conduit than the traffic light electronics;
 - b. Have a separate electric power connection than the traffic signal structure; and
 - c. Have a separate access point than the traffic signal structure; and
 - d. Not be attached to signal arms.
5. *Installations on Street signage:* Installations on all street signage structures must not interfere with the integrity of the facility in any way that may compromise the safety of the public. Installation of Network Node facilities on any street signage structures that has electrics shall:
 - a. Be encased in a separate conduit than any City signage electronics;
 - b. Have a separate electric power connection than the signage structure; and
 - c. Have a separate access point than the signage structure.

SECTION 5. GENERAL AESTHETIC REQUIREMENTS

A. Concealment

1. Concealment of Network Nodes and Node support poles shall be required by the City in Design Districts with Decorative Poles and in Historic Districts.
2. The City requires that all new node support poles be camouflaged, except those located in an area zoned or predominantly industrial area. Companies shall submit their proposal for camouflage with the permit application in accordance with the City's Policy.
3. The Network Node facilities shall be concealed or enclosed as much as possible in an equipment box, cabinet, or other unit that may include ventilation openings. External cables and wires hanging off a pole shall be sheathed or enclosed in a conduit, so that wires are protected and not visible or visually minimized to the extent possible.

B. New Node Support Pole Spacing

New node support poles shall be at a minimum 300 feet from a utility pole or another Node Support Pole to minimize the hazard of poles adjacent to road ways and to minimize effect on property values and aesthetics on the area.

C. Minimize Ground Equipment Concentration

In order to minimize negative visual impact to the surrounding area, and to enhance the safety requirements of line of sight of pedestrians, particularly small children, the City's designee may deny a request for a proposed Location if the Network Provider installs Network Node ground equipment where existing ground equipment within 300 feet already occupies a footprint of 25 sq. ft. or more to minimize effect on property values and aesthetics on the area.

D. Allowed Colors

Colors in Historic Districts and Design Districts must be approved by the City from a palette of approved colors. Unless otherwise provided, all colors shall be earth tones or shall match the background of any structure the facilities are located upon and all efforts shall be made for the colors to be inconspicuous. Colors in areas other than in Historic Districts and Design Districts shall conform to colors of other installations of telecommunication providers in the immediately adjacent areas.

SECTION 6. ELECTRICAL SUPPLY

- A. Network Provider shall be responsible for obtaining any required electrical power service to the Micro Network Node, Network Node facilities, Node Support Poles and ground equipment. The City shall not be liable to the Network Provider for any stoppages or shortages of electrical power furnished to the Micro Network Node, Network Node facilities, Node Support Poles or ground equipment, including without limitation, stoppages or shortages caused by any act, omission, or requirement of the public utility serving the structure or the act or omission of any other tenant or Network Provider of the structure, or for any other cause beyond the control of the City.
- B. Network Provider shall not allow or install generators or back-up generators in the Right-of-Way.

SECTION 7. INSURANCE, INDEMNITY, BONDING AND SECURITY DEPOSITS

- A. Insurance, bonding and security deposits shall be in strict accordance with the City's applicable ordinances.
- B. Indemnity shall be in accordance with the City's applicable ordinances and Section 2 of this Manual.

SECTION 8. REMOVAL, REPLACEMENT, MAINTENANCE, AND REPAIR

A. Removal or Relocation by Network Provider

1. If the Network Provider removes or relocates a Micro Network Node, Network Node facilities, Node Support Pole or related ground equipment at its own discretion, it shall notify the City in writing not less than 10 business days prior to removal or relocation. Network Provider shall obtain all Permits required for relocation or removal of its Micro Network Node, Network Node facilities, Node Support Poles and related ground equipment prior to relocation or removal.
2. The City shall not issue any refunds for any amounts paid by Network Provider for Micro Network Node, Network Node facilities, Node Support Poles or related ground equipment that have been removed.

B. Removal or Relocation Required for City Project

1. Except as provided in existing state and federal law, a Network Provider shall relocate or adjust Micro Network Node, Network Node, Node Support Pole and related ground equipment in a public right-of-way in a timely manner and without cost to the City.
2. Network Provider understands and acknowledges that the City may require Network Provider to remove or relocate its Micro Network Node, Network Node, Node Support Pole and related ground equipment, or any portion thereof from the Right-of-Way for City construction projects as allowed by state and feral law, including the common-law.
3. Network Provider shall, at the City's direction, remove or relocate the same at Network Provider's sole cost and expense, except as otherwise provided in existing state and federal law, whenever the City reasonably determines that the relocation or removal is needed for any of the following purposes: Required for the construction, completion, repair, widening, relocation, or maintenance of, or use in connection with, any City construction or maintenance project of a street public rights-of-way to enhance the traveling publics use for travel and transportation.
4. If Network Provider fails to remove or relocate the Micro Network Node, Network Node, Node Support Pole or related ground equipment, or portion thereof as requested by the City within 90 days of the Network Provider 's receipt of the request, then the City shall be entitled to remove the Micro Network Node, Network Node, Node Support Pole or related ground equipment, or portion thereof at the Network Provider's sole cost and expense, without further notice to Network Provider.
5. Network Provider shall, within 30 days following issuance of invoice for the same, reimburse the City for its reasonable expenses incurred in the removal (including, without limitation, overhead and storage expenses) of the Micro Network Node, Network Node, Node Support Pole or related ground equipment, or portion thereof.

C. Removal Required by City for Safety and Imminent Danger Reasons

1. Network Provider shall, at its sole cost and expense, promptly disconnect, remove, or relocate the applicable Micro Network Node, Network Node, Node Support Pole and related ground equipment within the time frame and in the manner required by the City if the City reasonably determines that the disconnection, removal, or relocation of any part of a Micro Network Node, Network Node, Node Support Pole and related ground equipment:
 - (a) is necessary to protect the public health, safety, welfare, or City property;
 - (b) the Micro Network Node, Network Node, Node Support Pole and related ground equipment, or portion thereof, is adversely affecting proper operation of streetlights or City property; or

- (c) Network Provider fails to obtain all applicable licenses, permits, and certifications required by Law for its Micro Network Node, Network Node, Node Support Pole and related ground equipment, or use of any Location under applicable law.

If the City reasonably determines that there is imminent danger to the public, then the City may immediately disconnect, remove, or relocate the applicable Micro Network Node, Network Node, Node Support Pole and related ground equipment at the Network Provider's sole cost and expense.

2. The City shall provide 90 days written notice to the Network Provider before removing a Micro Network Node, Network Node, Node Support Pole and related ground equipment under this Section, unless there is imminent danger to the public health, safety, and welfare.
3. Network Provider shall reimburse City for the City's actual cost of removal of Micro Network Node, Network Node, Node Support Pole and related ground equipment within 30 days of receiving the invoice from the City.

SECTION 9. INSTALLATION AND INSPECTIONS

A. Installation

Network Provider shall, at its own cost and expense, install the Micro Network Node, Network Node facilities, Node Support Poles and related ground equipment in a good and workmanlike manner and in accordance with the requirements promulgated by the City, as such may be amended from time to time. Network Provider's work shall be subject to the regulation, control and direction of the City.

All work done in connection with the installation, operation, maintenance, repair, modification, and/or replacement of the Micro Network Node, Network Node facilities, Node Support Poles and related ground equipment shall be in compliance with all applicable laws, ordinances, codes, rules and regulations of the City, applicable county, the state, and the United States ("Laws").

B. Inspections

The City may perform visual inspections of any Micro Network Node, Network Node, Node Support Pole or related ground equipment located in the Right-of-Way as the City deems appropriate without notice. If the inspection requires physical contact with the Micro Network Node, Network Node, Node Support Poles or related ground equipment, the City shall provide written notice to the Network Provider within five business days of the planned inspection. Network Provider may have a representative present during such inspection.

SECTION 10. REQUIREMENTS UPON ABANDONMENT

Network Provider shall remove Micro Network Node, Network Node, Node Support Pole and related ground equipment when such facilities are Abandoned regardless of whether or not it receives notice from the City. Unless the City sends notice that removal must be completed immediately to ensure public health, safety, and welfare, the removal must be completed within the earlier of 90 days of the Micro Network Node, Network Node, Node Support Pole and related ground equipment being Abandoned or within 90 days of receipt of written notice from the City. When Network Provider removes, or Abandons permanent structures in the Right-of-Way, the Network Provider shall notify the City in writing of such removal or Abandonment and shall file with the City the location and description of each Micro Network Node, Network Node, Node Support Pole and related ground equipment removed or Abandoned. The City may require the Network Provider to complete additional remedial measures necessary for public safety and the integrity of the Right-of-Way.

SECTION 11. GENERAL PROVISIONS

1. **As Built Maps and Records.** Network Provider shall maintain accurate maps and other appropriate records of its Network Node facilities, Node Support Poles and related ground equipment as they are actually constructed in the Rights-of-Way, including, upon request, the use of Auto CAD/GIS digital format. Network Provider will provide additional maps to the City upon request.
2. **Courtesy and Proper Performance.** Network Provider shall make citizen satisfaction a priority in using the Right-of-Way. Network Provider shall train its employees to be customer service-oriented and to positively and politely interact with citizens when dealing with issues pertaining to its Micro Network Node, Network Node, Node Support Pole and related ground equipment in the Right-of-Way. Network Provider's employees shall be clean, courteous, efficient, and neat in appearance and committed to offering the highest quality of interaction with the public. If, in the opinion of the City, Network Provider is not interacting in a positive and polite manner with citizens, he or she shall request Network Provider to take all remedial steps to conform to these standards.
3. **ALLOCATION OF FUNDS FOR REMOVAL AND STORAGE.** The City has appropriated \$0 to pay for the cost of any removal or storage of Micro Network Node, Network Node, Node Support Pole and related ground equipment, as authorized under this Article, and no other funds are allocated.
4. **OWNERSHIP.** No part of a Micro Network Node, Network Node, Node Support Pole and related ground equipment erected or placed on the Right-of-Way by Network Provider will become, or be considered by the City as being affixed to or a part of, the Right-of-Way. All portions of the Micro Network Node, Network Node, Node Support Pole and related ground equipment constructed, modified, erected, or placed by Network Provider on the Right-of-Way will be and remain the property of Network Provider and may be removed by Network Provider at any time, provided the Network Provider shall notify the City prior to any work in the Right-of-Way.
5. **Tree Maintenance.** Network Provider, its contractors, and agents shall obtain written permission from the City before trimming trees hanging over its Micro Network Node, Network Node, or Node Support Pole, to prevent branches of such trees from contacting attached Micro Network Node, Network Node, or Node Support Pole. When directed by the City, Network Provider shall trim under the supervision and direction of the Parks Director or designee. The City shall not be liable for any damages, injuries, or claims arising from Network Provider's actions under this section.
6. **Lighting.** The City has illumination and lighting guidelines. All new or replacement light fixtures and luminaries must meet those guidelines.
7. **Signage.** Network Provider shall post its name, location identifying information, and emergency telephone number in an area on the cabinet of the Network Node facility that is visible to the public. Signage required under this section shall not exceed 4" x 6", unless otherwise required by law (e.g. RF ground notification signs) or the City.

Except as required by Laws or by the Utility Pole owner, Network Provider shall not post any other signage or advertising on the Micro Network Node, Network Node, Node Support Pole, Service pole or Utility Pole.

8. **Graffiti Abatement.** As soon as practical, but not later than fourteen (14) calendar days from the date Network Provider receives notice thereof, Network Provider shall remove all graffiti on any of its Micro Network Node, Network Node, Node Support Pole, and related ground equipment located in the Right of Way. The foregoing shall not relieve the Network Provider from complying with any City graffiti or visual blight ordinance or regulation.

9. **Restoration.** Network Provider shall repair any damage to the Right-of-Way, or any facilities located within the Right-of-Way, and the property of any third party resulting from Network Provider's removal or relocation activities (or any other of Network Provider's activities hereunder) within 10 calendar days following the date of such removal or relocation, at Network Provider's sole cost and expense, including restoration of the Right-of-Way and such property to substantially the same condition as it was immediately before the date Network Provider was granted a Permit for the applicable Location or did the work at such Location (even if Network Provider did not first obtain a Permit), including restoration or replacement of any damaged trees, shrubs or other vegetation. Such repair, restoration and replacement shall be subject to the sole, reasonable approval of the City.

10. **Network provider's responsibility.** Network Provider shall be responsible and liable for the acts and omissions of Network Provider's employees, temporary employees, officers, directors, consultants, agents, Affiliates, subsidiaries, sub-Network Provider's and subcontractors in connection with the installations of any Micro Network Node, Network Node, Node Support Pole and related ground equipment, as if such acts or omissions were Network Provider's acts or omissions.

SECTION 12. ADMINISTRATIVE HEARING – REQUEST FOR EXEMPTION

Should the Network Provider desire to deviate from any of the standards set forth in the Design Manual, the Network Provider may request an Administrative Hearing before a Board of Appeals. The Zoning Board of Adjustment shall act as the Board of Appeals for a Request for Exemption.

The process for an application, hearing and vote shall follow the process set out for a variance.

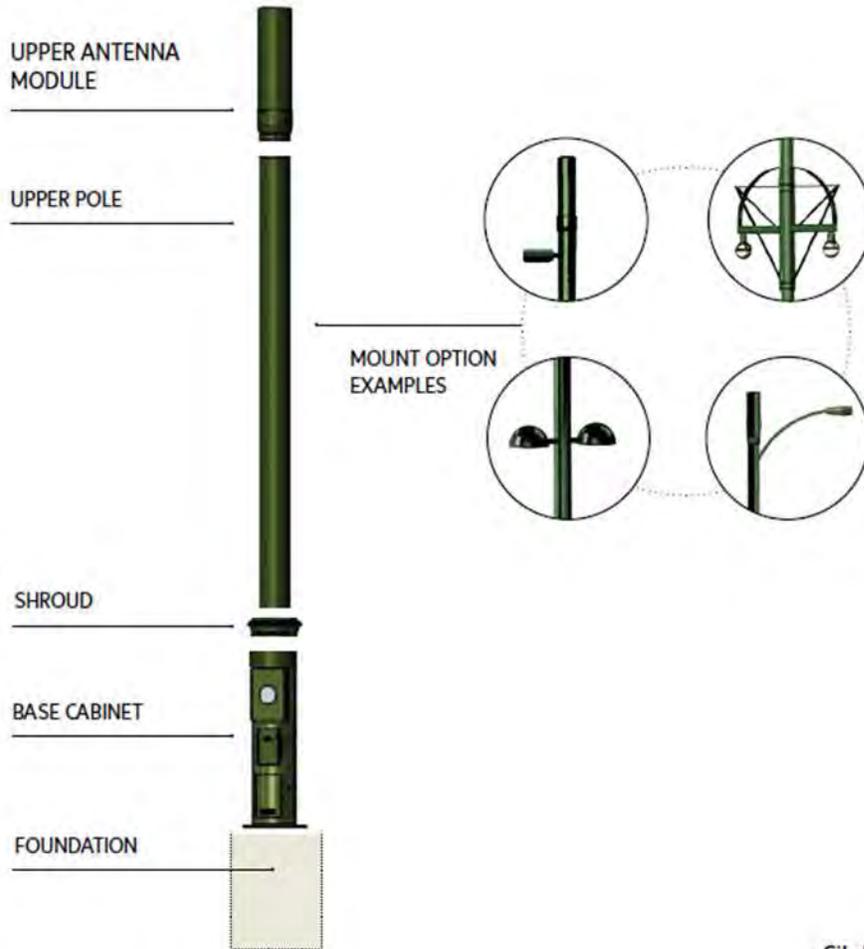
SECTION 13. DESIGN MANUAL - UPDATES

Placement or Modification of Micro Network Node, Network Node, Node Support Pole and related ground equipment shall comply with the City's Design Manual at the time the Permit for installation or Modification is approved and as amended from time to time.

APPENDIX A. DESIGN CONCEPTS

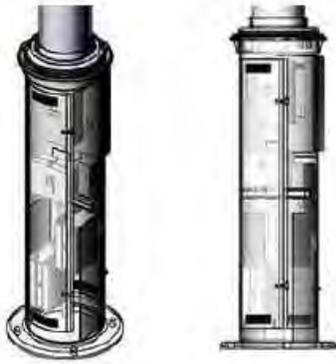
The following diagrams and information were provided by, and used with the permission of, Comptek Technologies/CityPole®. The inclusion of this information in no way indicates that the City endorses CityPole or its products. Self-contained poles from other manufacturers will be considered as long as the structure meets the other guidelines outlined in City Code and this document.

A.1 Small Wireless Facility Pole



CityPole.com

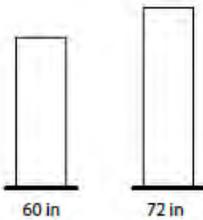
A.2 Base Cabinet



Integrated wireless equipment in base cabinet.

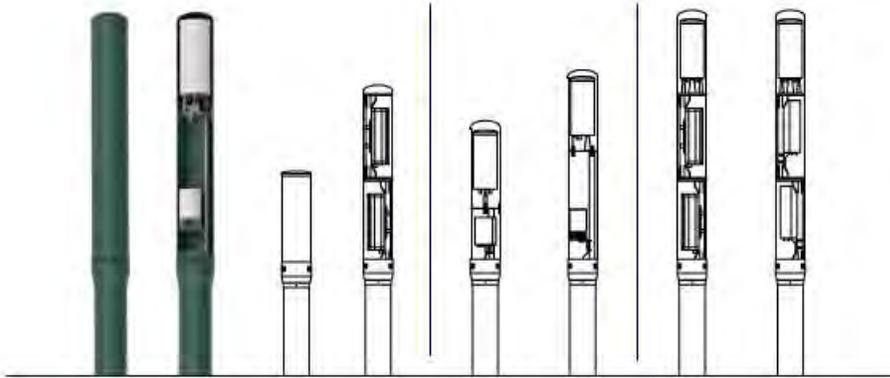


The base cabinet can be configured with a wide range of electrical disconnects to meet local building codes and preferences.



The base cabinet height can be chosen to house future equipment and complement local cityscapes.

A.3 Upper Antenna Module



The upper antenna module can be easily reconfigured for a number of technology generations. These includes multiple configurations of cellular technology, various backhaul and low power options such as WiFi, Bluetooth, or Zigbee, and as many as three different technology generations.

A.4 Foundation Selection



CityPole® pre-cast foundation speeds work in the Right of Way.



Caisson and custom designs are available.

Cast in place foundations are acceptable, as long as the foundation meets accepted guidelines for structural integrity required by the attached equipment.

A.5 Lighting Accessories



A.6 Color Options

CITYPOLE® STANDARD RAL COLOR OPTIONS



CUSTOM COLORS AND NATURAL FINISHES
ARE AVAILABLE UPON REQUEST



A.7 Product Selection Matrix

		Standard CityPole® System Offering	Custom Options
Overall Pole Height		25', 30', 35', and 40' Above Ground Level (AGL)	Available ↓
Color Choices		9 Color Choices are Standard (Custom colors are available.)	
Base Cabinet	Technology Types	1, 2, or 3 Different Technologies can be Accommodated	
	Dimension	Ground Diameter: 18", 20", 24" Height: 60", Optional 72"	
	Flexible Mount System	FlexMount™ system to reconfigure internals for future equipment sizes.	
	Electrical Options	No Disconnect, Disconnect Only, or Meter and Disconnect.	
	Universal Meter Bay	Accommodates power meter and meter screen requirements as determined by local utility provider; fits meter boxes of all sizes.	
Upper Pole Antenna Module	Rad Center Location	Variable and Based on Pole Height and Other Options	
	Technology Types	1, 2, or 3 Different Technologies can be Accommodated	
	Auxiliary Bay Options	Low Power RF, Backhaul, and Wifi Options can be Accommodated. Multiple and reconfigurable 12 3/4 inch modules with RlexRail™ universal equipment track system optional.	
	Antenna Mount and Shroud Options	Separate and Secure Bays with RF Transparent Materials to accommodate 4G/5G Equipment. Omni and Panel Types available.	
Accessory Selection	Lighting	Pole can be ordered without lighting or with 1, 2, 3, or 4 lights.	
	Light Mounts	Standard Plate or Offset Arms depending on light selection	
	Lighting	Shoobox, Cobrahead, Cylindrical, Dome and Acorn	
	Other Technology	Gun Shot Sensors, Video, Weather, Traffic Mgmt	
	Lower Shroud Details	Multiple Options are Available	
	Base Plate Details	Multiple Options are Available	
	Foundation Options	Pre-cast, or Cast-in-Place	
Environmental Control	Thermal Management	All Equipment and Antenna Bays Monitored for Temperature. Passive and Forced Air Standard; Heat Pipe and Thermoelectrical Optional	
	Security	External and Internal Locking Features. CityPole® FlexSmart™ Control and Connectivity Optional.	
	Monitoring and Control	Industrial Controller with 24 Digital and 12 Analog Inputs with FlexSmart™	

CITY OF FULSHEAR

Chapter 32 - STREETS, SIDEWALKS AND OTHER PUBLIC PLACES

ARTICLE III. - NETWORK NODES AND NODE SUPPORT POLES

POLICY TITLE: Small Wireless Facility Siting

POLICY NO.: XX.X.X

Sec. 32-151. - Purpose and Scope

- (1) The purpose of this Article is to establish policies and procedures for the placement of node support poles, transport facilities, and network nodes, as they are defined by this Article and Chapter 284 of the Texas Local Government Code, within the rights-of-way in the City of Fulshear, which will provide public benefits and will be consistent with the preservation of the integrity, safe usage, and visual qualities of the City public right-of-way and the City as a whole. The policy establishes standards for the siting and design of node support poles, transport facilities, and network nodes. As such, the provisions of this policy are intended to regulate and guide the installation of network nodes on existing infrastructure and to regulate and guide the installation of new node support poles and

transport facilities when needed. It is the desire of the City to encourage the development of an aesthetically pleasing local environment. It is also the intent of the City to encourage the expansion of wireless technology, as it provides a valuable service to City residents and businesses. It is not the City's goal to unreasonably discriminate among providers of functionally equivalent services nor to have the effect of prohibiting, either directly or indirectly, the provisions of small wireless services. It is the City's goal to encourage wireless providers to construct new facilities disguised through techniques of camouflage, concealment, and stealth design, as defined in this Policy.

- (2) In enacting this Article, the City is establishing uniform standards to address issues presented by network nodes, including without limitation, ensuring that network nodes, transport facilities, or node support poles do not adversely affect:
 - (a) use of streets, sidewalks, alleys, parkways and other public ways and places;
 - (b) vehicular and pedestrian traffic;
 - (c) the operation of facilities lawfully located in public right-of-way or public property;
 - (d) the ability of the City to protect the environment, including the prevention of damage to trees;
 - (e) the character of residential and historic areas, and city parks, in which network nodes may be installed; and
 - (f) the rapid deployment of network nodes to provide the benefits of wireless services.
- (3) A recent FCC Order states that all local jurisdictions must comply with various rules and recommendations on the exercise of local aesthetic, zoning, public works, and fee schedules when dealing with network node (Small Wireless Facility) installations. The FCC Order also concludes that local governments function as regulators of their rights-of-way. The FCC's Declaratory Ruling and Third Report & Order concluded that when local governments regulate, they do so as a regulatory function. This section supports this view of local governments acting as regulators. Thus, Fulshear, Texas is in clear need of policies that support their role as a regulator of their rights-of-way.
- (4) The City recognizes its responsibilities under the federal Telecommunications Act of 1996 and Texas law (Chapter 284 of the Texas Local Government Code) and believes that it is acting consistent with the federal Telecommunications Act and Chapter 284 of the Texas Local Government Code in ensuring that development activity does not endanger public health, safety, or welfare. The City intends this Policy to ensure that the installation, augmentation and relocation of network node installations in the public rights-of-way are conducted in such a manner as to lawfully balance the legal rights of applicants under the federal Telecommunications Act and Chapter 284 of the Texas Local Government Code with the rights, safety, privacy, property and security of residents of the City.
- (5) This Article is not intended to, nor shall it be interpreted or applied to: (1) prohibit or effectively prohibit any wireless telecommunications service provider's ability to provide wireless services; (2) prohibit or effectively prohibit any entity's ability to provide any interstate or intrastate telecommunications service; (3) unreasonably discriminate among providers of functionally equivalent services; (4) deny any request for authorization to

place, construct or modify wireless telecommunications service facilities on the basis of environmental effects of radio frequency emissions so long as such wireless facilities comply with the FCC's regulations concerning such emissions; (5) prohibit any collocation or modification that the City may not deny under federal or state law; or (6) otherwise authorize the City to preempt any applicable federal or state law.

- (6) This Article supersedes all Articles, parts of Articles or rules adopted prior hereto that are in conflict herewith, to the extent of such conflict.

Sec. 32-152. - Definitions

- (1) "Antenna" means communications equipment that transmits or receives electromagnetic radio frequency signals used in the provision of wireless services.
- (2) "Applicable codes" means:
 - (a) uniform building, fire, electrical, plumbing, or mechanical codes adopted by a recognized national code organization; and
 - (b) local amendments to those codes to the extent not inconsistent with this Article.
- (3) "Applicable Law" means Chapter 284 of the Texas Local Government Code and federal law to the extent it preempts local control.
- (4) "Applicant" means any person who submits an application and is a network provider.
- (5) "Application" means a request submitted by an applicant (i) for a permit to collocate network nodes; or (ii) to install a transport facility; or (iii) approve the installation, replacement or modification of a pole.
- (6) "Base station" means a structure or equipment at a fixed location that enables FCC-licensed or authorized wireless communications between user equipment and a communications network. The term does not encompass a tower or any equipment associated with a tower.
- (7) "Certificated telecommunications provider" (CTP) means a person who has been issued a certificate of convenience and necessity, certificate of operating authority, or service provider certificate of operating authority by the Public Utility Commission to offer local exchange telephone service. A CTP does not include a network provider, as defined herein.
- (8) "Chapter 284" means Texas Local Government Code; Title 9. Public Buildings and Grounds; Subtitle A. Municipal Public Buildings and Grounds; [Chapter 284. Deployment of Network Nodes in Public Right-of-Way](#).
- (9) "City" means the City of Fulshear, Texas. As used throughout, the term City also includes the designated agent of the City.
- (10) "City Code" means those ordinance provisions relevant to use of the public right-of-way where compliant with applicable law.

- (11) "Collocate" and "collocation" means the installation, mounting, maintenance, modification, operation, or replacement of network nodes in a public right-of-way on or adjacent to a pole.
- (12) "Concealment" means any wireless facility or pole that is covered, blended, painted, disguised, or otherwise concealed such that the wireless facility blends into the surrounding environment and is visually unobtrusive. A concealed wireless facility or pole also includes any wireless facility or pole conforming to the surrounding area in which the wireless facility or pole is located and may include, but is not limited to hidden beneath a façade, blended with surrounding area design, painted to match the supporting area, or disguised with artificial tree branches.
- (13) "Day" means calendar day.
- (14) "Decorative pole" means a streetlight pole specially designed and placed for aesthetic purposes and on which no appurtenances or attachments, other than specially designed informational or directional signage or temporary holiday or special event attachments, have been placed or are permitted to be placed according to nondiscriminatory municipal codes.
- (15) "Design district" means an area that is zoned, or otherwise designated by municipal code, and for which the city maintains and enforces unique design and aesthetic standards on a uniform and nondiscriminatory basis.
- (16) "Duct or conduit" means a single enclosed raceway for cables, fiber optics, or other wires. "Duct" or "conduit" shall not include the maintenance duct associated with a conduit that is reserved for use in replacing damaged cable or for rerouting purposes.
- (17) "Eligible facilities request" means any request for modification of an existing tower or base station that does not substantially change the physical dimensions of such tower or base station, involving: (i) Collocation of new transmission equipment; (ii) Removal of transmission equipment; or (iii) Replacement of transmission equipment.
- (18) "Facilities or facility" means and includes, but shall not be limited to, pipes, conduits, wires, cables, towers, switches, amplifiers, transformers, fiber optic lines, antennae, poles, ducts, conductors, lines, mains, vaults, appliances, attachments, equipment, structures, manholes, fixtures, appurtenances, and such other objects, devices, or other items of tangible personal property, which are designed, constructed, installed, placed, used or operated in, upon, over, across, above, or below public rights-of-way. Notwithstanding the foregoing, structures designed and constructed for the support and passage of vehicular and pedestrian traffic, such as streets, alleys, highways, driveways, and sidewalks, whether at, below, or above grade, shall not be deemed to be facilities; provided, further, a private, individually owned, connection or attendant downstream service line or device, through which a utility service is received by the end user owning same, for which required permits have been issued under applicable building, plumbing, electrical, or other codes of the City, shall not be deemed as facilities hereunder.
- (19) "Historic district" means an area that is zoned or otherwise designated as a historic district under municipal, state, or federal law.

- (20) "Law" means common law or a federal, state, or local law, statute, code, rule, regulation, order, or ordinance.
- (21) "Macro tower" means a guyed or self-supported pole or monopole greater than the height parameters prescribed by Section 32-155 of this Article and that supports or is capable of supporting antennas.
- (22) "Micro network node" means a network node that is not larger in dimension than 24 inches in length, 15 inches in width, and 12 inches in height, and that has an exterior antenna, if any, not longer than 11 inches.
- (23) "Municipally owned utility pole" means a utility pole owned or operated by a municipally owned utility, as defined by [Section 11.003, Utilities Code](#), and located in a public right-of-way.
- (24) "Municipal park" means an area that is zoned or otherwise designated by municipal code as a public park for the purpose of recreational activity.
- (25) "Network node" means equipment at a fixed location that enables wireless communications between user equipment and a communications network. The term:
- (a) includes:
 - i. equipment associated with wireless communications;
 - ii. a radio transceiver, an antenna, a battery-only backup power supply, and comparable equipment, regardless of technological configuration; and
 - iii. coaxial or fiber-optic cable that is immediately adjacent to and directly associated with a particular collocation; and
 - (b) does not include:
 - i. an electric generator;
 - ii. a pole; or
 - iii. a macro tower.
- (26) "Network provider" means:
- (a) a wireless service provider; or
 - (b) a person that does not provide wireless services and that is not an electric utility but builds or installs on behalf of a wireless service provider:
 - i. network nodes; or
 - ii. node support poles or any other structures that supports or is capable of supporting a network node.
- (27) "Node support pole" means a pole installed by a network provider for the primary purpose of supporting a network node.

- (28) "Order" means the FCC's [Declaratory Ruling and Third Report and Order](#), WT Docket No. 17-79, WC Docket No. 17-84, FCC-18-133, released September 27, 2018.
- (29) "Permit" means a written authorization for the use of the public right-of-way or collocation on a service pole required from a municipality before a network provider may perform an action or initiate, continue, or complete a project over which the municipality has police power authority.
- (30) "Person" means an individual, corporation, limited liability company, partnership, association, trust, or other entity or organization, including the City.
- (31) "Pole" means a service pole, municipally owned utility pole, node support pole, or utility pole.
- (32) "Private easement" means an easement or other real property right that is only for the benefit of the grantor and grantee and their successors and assigns.
- (33) "Public right-of-way" means the area on, below, or above a public roadway, highway, street, public sidewalk, alley, waterway, or utility easement in which the municipality has an interest. The term does not include:
- (a) a private easement; or
 - (b) the airwaves above a public right-of-way with regard to wireless telecommunications.
- (34) "Public right-of-way management ordinance" means Code of Ordinances, City of Fulshear, Chapter 32 - Streets, Sidewalks and Other Public Places, Article II. – Streets, Division 2. - Use of Rights-of-Way.
- (35) "Public right-of-way rate" means an annual rental charge paid by a network provider to a municipality related to the construction, maintenance, or operation of network nodes within a public right-of-way in the municipality.
- (36) "Routine Maintenance" means:
- (D) work in the public right-of-way that does not require excavation or closing of sidewalks or vehicular lanes in a public right-of-way;
 - (E) replacing or upgrading a network node or pole with a node or pole that is substantially similar in size or smaller and that does not require excavation or closing of sidewalks or vehicular lanes in a public right-of-way; or
 - (F) the installation, placement, maintenance, operation, or replacement of micro network nodes that are strung on cables between existing poles or node support poles, in the public right-of-way.
- (37) "Service pole" means a pole, other than a municipally owned utility pole, owned or operated by a municipality and located in a public right-of-way, including:
- (a) a pole that supports traffic control functions;
 - (b) a structure for signage;

- (c) a pole that supports lighting, other than a decorative pole; and
 - (d) a pole or similar structure owned or operated by a municipality and supporting only network nodes.
- (38) “Small cell or small wireless facility” means a facility meeting all of the following criteria:
- (E) facilities mounted on structures 30 feet or less in height including their antennas, or on structures no more than 10 percent taller than other adjacent structures, or that do not extend existing structures where they are located to a height of more than 30 feet or by more than 10 percent, whichever is greater;
 - (F) each antenna is no more than 6 cubic feet in volume;
 - (G) all other wireless equipment associated with the structure, including wireless equipment associated with the antenna and any pre-existing associate equipment on the structure is no more than 28 cubic feet in volume; and
 - (H) facilities do not result in human exposure to radio frequency radiation in excess of applicable safety standards specified in [47 CFR Rule 1.1307\(b\)](#).

Unless specifically provided for herein, provisions addressed to network nodes herein shall also apply to small cells and small wireless facilities.

- (39) “Stealth” shall mean a method that hides or conceals an antenna, supporting electrical or mechanical equipment or any other support structure, including network nodes.
- (40) “Substantially similar” shall mean:
- (a) the new or upgraded facility, including the antenna or other equipment element, will not be more than ten (10) percent larger than the existing facility or 10 feet, whichever is greater; or the extension of facilities less than six feet from a tower; or the new or upgraded pole will not be more than ten (10) percent higher than the existing pole, provided that the increase may not result in the pole exceeding the applicable height limitations prescribed by this Article and Local Government Code Chapter 284, as may be further amended; or increasing the size of ground equipment cabinets by ten percent in height or volume; and
 - (b) the replacement or upgrade does not include replacement of an existing pole; and
 - (c) the replacement or upgrade does not defeat existing concealment elements of a pole; and
 - (d) the determination of whether a replacement or upgrade is substantially similar is made by measuring from the dimensions of the facilities as approved by the City.
- (41) “Technical Grounds” means, in light of prevailing industry and engineering standards, reasons of insufficiency of capacity, safety, reliability and/or generally applicable engineering purposes consistent with applicable law and City Code.
- (42) “Tower” means any structure built for the sole or primary purpose of supporting any FCC-licensed or authorized antennas and their associated facilities, including structures that are constructed for wireless communications services including, but not limited to, private,

broadcast, and public safety services, as well as unlicensed wireless services and fixed wireless services such as microwave backhaul, and the associated site.

- (43) "Transport facility" means each transmission path physically within a public right-of-way, extending with a physical line from a network node directly to the network, for the purpose of providing backhaul for network nodes.
- (44) "Utility pole" means a pole that provides:
 - (a) electric distribution with a voltage rating of not more than 34.5 kilovolts; or
 - (b) services of a telecommunications provider, as defined by [Section 51.002, Utilities Code](#).
- (45) "Wireless service" means any service, using licensed or unlicensed wireless spectrum, including the use of Wi-Fi, whether at a fixed location or mobile, provided to the public using a network node.
- (46) "Wireless service provider" means a person that provides wireless service to the public.

Sec. 32-153. - Permitted Use; Application and Fees

- (1) Permitted Use: Collocation of network nodes, and the placement of transport facilities and node support poles, meeting the parameters set forth in Section 32-155 below and in applicable law, shall be a permitted use. No zoning or land use review shall apply, subject to the requirements in Section 32-155.
- (2) Permit Required. No person shall place a network node, transport facility, or node support pole in the public right-of-way, without first filing a permit application and obtaining a permit therefore, except as otherwise provided in this Article.
- (3) Permit Application. All permit applications filed pursuant to this Article shall be on a form, paper or electronic, provided by the City. The Applicant may designate portions of its application materials that it reasonably believes contain proprietary or confidential information as "proprietary" or "confidential" by clearly marking each page of such materials accordingly.
- (4) Application Requirements. The permit application shall be made by the network provider or its duly authorized representative and shall contain the following:
 - (a) The Applicant's name, address, telephone number, e-mail address, and signatures.
 - (b) The names, addresses, telephone numbers, and e-mail addresses of all consultants, if any, acting on behalf of the Applicant with respect to the filing of the application.
 - (c) The applicant shall disclose if the applicant proposes that the facilities will be located in: a design district; historic district; within three-hundred (300) feet of public art; near a historic site, or a structure or landmark recognized as historic by the city, state or federal government; within a municipal park; within a residential district; or in an area that has undergrounding requirements.

- (d) The applicant shall provide detailed drawings in electronic form, with calculations and dimensions to show strict conformity to the size, distance and spacing limitations in this Article.
 - (e) The applicant requesting a permit shall provide the City with documentation in the format specified by the City.
 - (f) The applicant shall provide analysis indicating that the proposed facilities will not cause any interference with City public safety radio system, traffic signal light system, or other City safety communications components.
 - (g) The applicant must provide the specific address for all facilities that will be located on a pole. Addresses are determined by the City. The applicant shall provide a dated aerial photograph of the overall site depicting the site's relation to major streets and highways and poles. For any application requesting a new pole, photos are required showing the before and after conditions.
 - (h) The applicant must ascertain, in consultation with the City, whether any other authorizations from the City will be required in order for the proposed installation to be made and completed. For all applications for the installation or construction of wireless facilities, including network nodes and node support poles, if any such additional authorizations are required, the applicant is responsible for providing all the information necessary for the City to review and act on the additional authorizations. Such additional authorizations that must be included with the application shall include, but not be limited to, executed agreement(s) with the City for attachment to service poles.
 - (i) A site specific non-ionizing electromagnetic radiation (NIER) report for the network node equipment type and model being installed at the site that is endorsed by a radiofrequency engineer licensed in the State of Texas, including a certification that the network node complies with all radiation and electromagnetic standards. The report shall specify approach distances to the general public and occupational workers at the ground and antenna centerline levels. The report shall include instructions regarding powering off the equipment or contact information for a person who can power off the equipment. No significant changes to the power, location, RF emission patterns and/or emitting frequencies may be made without prior notification and approval. However, non-substantive changes, for example, in-kind replacements of transmitters of the same frequency, radiation patterns and power are permitted. The City retains the right to independently verify the RF patterns as installed.
 - (j) Completeness. The application is not complete unless it contains all information required by this Section, requested on the application form, and required by any supplemental list of required documentation provided by the City with the application form.
- (5) Exceptions.
- (a) No application, permit or fee is required of network providers for:

- i. routine maintenance that does not require excavation or closing of sidewalks or vehicular lanes in a public right-of-way;
 - ii. replacing or upgrading facilities that are Substantially Similar in size or smaller; and that do not require excavation or closing of sidewalks or vehicular lanes in a public right-of-way; or
 - iii. the installation, placement, maintenance, operation, or replacement of micro network nodes or similar structures that are strung on cables between existing poles or node support poles, in compliance with the National Electric Safety Code. If, however, traffic will be affected by the installation, placement, maintenance or replacement of a micro network node or similar structure, a traffic control plan is required.
- (b) Although no application, permit or fee is required, the City requires advance notice of the work described above and approval of the pole's owner for that specific address. Work under this section must still meet all other requirements in this Article.
- (6) Information Updates. Any amendment to information contained in a permit application shall be submitted in writing to the City within 30 days after the change necessitating the amendment.
- (7) Application Fees. All applications for permits pursuant to this Article shall be accompanied by a non-recurring fee of \$500 for up to five network nodes addressed in the same application, \$100 for each additional node in the same application; and a non-recurring fee of \$1000 for each new node support pole.

Fees per application for network nodes, transport facilities, and poles are the maximum allowed by Texas Local Government Code Chapter 284 or the Order, whichever is lower, as further amended.

The City of Fulshear reserves the right to require an applicant to pay the fees and costs of any consultant retained by the City to assist in the review of plans, applications, reports, inspections, and/or testing.

- (8) Design Manual. In addition to the application requirements above, the application must conform with the design guideline requirements as specified in the City's design manual, which are incorporated herein by this reference.

Sec. 32-154. - Action on Permit Applications

- (1) Review of Applications. The City shall review applications for network nodes, node support poles and transport facilities in light of their conformity with applicable law and City Code and shall issue such permits on nondiscriminatory terms and conditions subject to the following requirements:
- (a) Within 10 days of receiving an application for a network node, node support pole, or a transport facility, the City shall determine and notify the Applicant whether the application is complete; or if incomplete, the City must specifically identify the

missing information in such notification. There shall be no fee charged for completion and resubmittal of an application.

- (b) The City shall make its final decision to approve or deny a complete application no later than (i) 21 days after receipt of a complete application for a transport facility, (ii) 60 days after receipt of a complete application for a network node; and (iii) 90 days after receipt of a completed application for a new node support pole.
- (c) The City shall advise the Applicant in writing of its final decision, and, if denied, the basis for that denial, including specific provisions of City Code or applicable law on which the denial was based, and send the documentation to the Applicant on or before the day the City denies the application. The Applicant may cure the deficiencies identified by the City and resubmit the application within 30 days of the denial without paying an additional application fee. The City shall approve or deny the revised application within 90 days of receipt of the amended application. The subsequent review by the City shall be limited to the deficiencies cited in the original denial.
- (d) An applicant seeking to collocate network nodes may, at the Applicant's discretion, file a consolidated application and receive permits for up to 30 network nodes. Provided however, the City's denial of any node within a single application shall not affect other nodes submitted in the same application. The City shall grant permits for any and all nodes in a single application that it does not deny, subject to the requirements of this Section.

- (2) Review of Eligible Facilities Requests. Notwithstanding any other provision of this Article, the City shall approve and may not deny applications for eligible facilities requests within sixty (60) days according to the procedures established under [47 CFR 1.40001\(c\)](#).

Sec. 32-155. - Network Nodes in the Public right-of-way; Maximum Height; Other Requirements

- (1) Maximum Size of Permitted Use. Permitted use network nodes, including without limitation, network nodes, transport facilities, or node support poles in the public right-of-way shall be subject to the following size limitations:
 - (a) Each antenna that does not have exposed elements and is attached to an existing structure or pole:
 - i. must be located inside an enclosure of not more than six cubic feet in volume;
 - ii. may not exceed a height of three feet above the existing structure or pole; and
 - iii. may not protrude from the outer circumference of the existing structure or pole by more than two feet;
 - (b) If an antenna has exposed elements and is attached to an existing structure or pole, the antenna and all of the antenna 's exposed elements:
 - i. must fit within an imaginary enclosure of not more than six cubic feet;

- ii. may not exceed a height of three feet above the existing structure or pole; and
 - iii. may not protrude from the outer circumference of the existing structure or pole by more than two feet;
 - iv. must be mounted flush with the pole near the top
- (c) The cumulative size of other wireless equipment associated with the network node attached to an existing structure or pole may not:
 - I. be more than 28 cubic feet in volume; or
 - II. protrude from the outer circumference of the existing structure or pole by more than two feet;
 - III. attachments on all poles shall be at least 12 feet above grade, and if a Network Node attachment is projecting toward the street, the attachment shall be installed no less than sixteen (16) feet above the ground.
- (d) Ground-based enclosures, separate from the pole, may not be higher than three feet six inches from grade, wider than three feet six inches, or deeper than three feet six inches;
- (e) Pole-mounted enclosures may not be taller than five feet; and
- (f) The following types of associated ancillary equipment are not included in the calculation of equipment volume:
 - I. electric meters;
 - II. concealment elements;
 - III. telecommunications demarcation boxes;
 - IV. grounding equipment;
 - V. power transfer switches;
 - VI. cut-off switches; and
 - VII. vertical cable runs for the connection of power and other services.
- (g) Equipment attached to node support poles may not protrude from the outer edge of the node support pole by more than two feet.
- (h) Equipment attached to a utility pole must be installed in accordance with the National Electrical Safety Code, subject to applicable codes, and the utility pole owner's construction standards.
- (i) A network provider shall ensure that each new, modified, or replacement utility pole or node support pole installed in a public right-of-way in relation to which the network provider received approval of a permit application does not exceed the lesser of:

- I. are mounted on structures 30 feet or less in height including their antennas, or
 - II. are mounted on structures no more than 10 percent taller than other adjacent structures, or
 - III. do not extend existing structures on which they are located to a height of more than 30 feet or by more than 10 percent, whichever is greater; and
 - IV. shall be at a minimum 500 feet from a utility pole or another Node Support Pole
- (j) Network node facilities must not result in human exposure to radio frequency radiation in excess of applicable safety standards specified in [47 CFR Rule 1.1307\(b\)](#), or as specifically amended by the FCC. After transmitter and antenna system optimization, but prior to unattended operations of the facility, the wireless provider or its representative must conduct on-site post-installation RF emissions testing to demonstrate actual compliance with the [FCC OET Bulletin 65](#) RF emissions safety rules for general population/uncontrolled RF exposure in all sectors. For this testing, the transmitter shall be operating at maximum operating power, and the testing shall occur outwards to a distance where the RF emissions no longer exceed the uncontrolled/general population limit. The wireless provider shall submit documentation of this testing to the City within ninety (90) days after installation of the facility. RF emissions testing shall be conducted annually and the wireless provider shall submit documentation of this testing to the City within ninety (90) days after the testing is completed.
- (k) EXCEPTIONS. A network provider may construct, modify, or maintain in a public right-of-way a network node or node support pole that exceeds the height or distance limitations prescribed by this Article only if the City approves the construction, modification, or maintenance subject to all applicable zoning or land use regulations and applicable codes.
- (2) Undergrounding Provisions. A network provider shall comply with nondiscriminatory undergrounding requirements, including City ordinances, zoning regulations, state law, private deed restrictions, and other public or private restrictions, that prohibit installing aboveground structures in a public right-of-way without first obtaining zoning or land use approval. This requirement or restriction shall not be interpreted to prohibit a network provider from replacing an existing structure.
- (3) Concealment. Facilities shall be concealed or enclosed as much as reasonably possible in an equipment box, cabinet, or other unit that may include ventilation openings. External cables and wires hanging off a pole shall be sheathed or enclosed in a conduit, so that wires are protected and not visible or visually minimized. Guy wires, anchors, pedestals, boxes, and other above grade facilities shall not fully or partially encroach within a sidewalk area.
- (4) Historic Areas and Design Districts. Stealth or concealment of facilities and poles shall be required by the City in design districts with decorative poles, in historic districts, and within

three-hundred (300) feet of a historic site or structure or historic landmark recognized by the city, state or federal government. Subject to the permit application approval time frames in Section 32-154, a network provider must obtain advance approval from the City before collocating new network nodes or installing new node support poles in any areas zoned or designated as a historic district or as a design district if the district has decorative poles. Such installations shall be subject to the design and aesthetic standards of such areas.

- (5) Installation in Municipal Parks and Residential Areas. A network provider may not install a new node support pole in a public right-of-way without the City's discretionary, nondiscriminatory, written consent of the **Public Works Director**, if the public right-of-way is located in a municipal park or is adjacent to a street or thoroughfare that is 1) not more than 50 feet wide; and 2) adjacent to single-family residential lots or other multifamily residences or undeveloped land that is designated for residential use by zoning or deed restrictions. A network provider shall comply with private deed restrictions and other private restrictions when installing network nodes in parks and residential areas.
- (6) Zoning. A network provider seeking to construct, replace or modify a pole or node in the public right-of-way that exceeds the height or size limits contained in this section, shall be subject to applicable zoning requirements.

Sec. 32-156. - Effect of Permit

- (1) Authority Granted. A permit from the City authorizes an applicant to undertake only certain activities in accordance with this Article, and does not create a property right or grant authority to the Applicant to impinge upon the rights of others who may already have an interest in the public right-of-way.
- (2) Time of Installation. A network provider shall begin the installation for which a permit is granted not later than six months after final approval and shall diligently pursue the installation to completion. Provided, however, the City may place a longer time limit on completion or grant reasonable extensions of time as requested by the network provider.
- (3) Right to Occupy. Once a network provider has collocated a network node or placed a node support pole pursuant to a permit, the provider shall be permitted to continue to maintain such collocation or such pole unless required to remove or relocate under the terms of this Article.
- (4) Interference with network nodes. City will not grant a permit to any Person to install any network node or other wireless facility if the City knows or has reason to know that such Person's use of such network node or other wireless facility may in any way adversely affect or interfere with the use and operation of an existing and operational network node for which the City has previously issued a permit.

Sec. 32-157. - Removal, Relocation or Modification of Network Nodes in the ROW

- (1) Notice. Within 90 days following written notice from the City, a network provider shall, at its own expense, protect, support, temporarily or permanently disconnect, remove, relocate, change or alter the position of any network node or node support pole within the public right-of-way whenever the City has determined that such removal, relocation,

change or alteration, is reasonably necessary for the construction, repair, maintenance, or installation of any City improvement in or upon, or the operations of the City in or upon, the public right-of-way.

- (2) Emergency Removal or Relocation of Facilities. The City retains the right and privilege to disconnect or move any network node located within the public right-of-way of the City, as the City may determine to be necessary, appropriate or useful in response to any public health or safety emergency. If circumstances permit, the City shall notify the network provider and allow the network provider an opportunity to move its own facilities prior to the City disconnecting or removing a facility and shall notify the network provider after disconnecting or removing a network node or node support pole.
- (3) Abandonment of Facilities. Upon abandonment of a network node or node support pole within the public right-of-way, the network provider shall notify the City within 90 days. Following receipt of such notice, the City may direct the network provider to remove all or any portion of a network node or node support pole if the City, or any of its departments, determines, subject to City Code, that such removal is necessary to protect public health, safety and welfare.

Sec. 32-158. - Public Right-of-Way Rate

- (1) Annual Rate. Once a network provider has installed and made operational a network node in the public right-of-way, network provider shall pay to the City compensation for use of the public right-of-way in the amount of **\$250 annually per node** in the City public right-of-way.
- (2) At the City's discretion, the City may charge a network provider a lower rate or fee if the lower rate or fee is:
 - (a) nondiscriminatory;
 - (b) related to the use of the public right-of-way; and
 - (c) not a prohibited gift of public property.
- (3) Cease Payment. A network provider is authorized to remove its facilities at any time from the public right-of-way and cease paying the City compensation for use of the public right-of-way following removal and notification to the City of such removal.

Sec. 32-159. - Attachment to Service Poles in the Public Right-of-Way

A network provider shall be permitted to attach network nodes to city-owned service poles, consistent with applicable law and City Code and subject to the requirements specified herein.

- (1) Permits. A network provider shall obtain a permit, pursuant to the terms of this Article, prior to collocating network nodes on service poles.
- (2) Make Ready. Network Provider shall be responsible for costs for make ready work on City service poles to which provider seeks to place a network node.
- (3) Technical Limitations. In the event the City determines, based upon technical grounds, that inadequate space exists on a service pole to accommodate the proposed network

node, such pole may be replaced by network provider, at the network provider's expense, with a service pole with adequate space to accommodate the proposed network node.

- (4) Facilities Rearrangements. If another provider would have to rearrange or adjust any of its facilities to accommodate a new network node, the City shall use reasonable efforts to work with the affected providers to coordinate such activity. All make ready work shall comply with NESC, and other applicable codes. The Applicant shall not be responsible for any third-party costs, including those of other network providers, to adjust existing attachments that are non-compliant with the NESC and other applicable codes at the time of the application.
- (5) Service Pole Attachment Fee. The rate to collocate a network node on a service pole in the public right-of-way shall be \$20 per pole per year. Subject to the provisions of Section 32-160, such compensation together with the application fee and the public right-of-way rate specified in Section 32-158 shall be the sole compensation that the network provider shall be required to pay to the City.
- (6) Cease Payment. A network provider is authorized to remove its facilities at any time from a service pole in the public right-of-way and cease paying the attachment fee to the City upon notification to the City that the facilities have been removed.

Sec. 32-160. - Transport Facilities

Installation of transport facilities, including applicable compensation to the City for such facilities, shall be governed by this Section.

- (1) A network provider that wants to connect a network node to the network using the public right-of-way may:
 - (a) install its own transport facilities subject to Subsection (2); or
 - (b) obtain transport service from a person that is paying municipal fees to occupy the public right-of-way that are the equivalent of not less than \$28 per node per month.
- (2) A network provider may not install its own transport facilities unless the provider:
 - (a) has a permit to use the public right-of-way; and
 - (b) pays to the municipality a monthly public right-of-way rate for transport facilities in an amount equal to \$28 multiplied by the number of the network provider's network nodes located in the public right-of-way for which the installed transport facilities provide backhaul unless or until the time the network provider's payment of municipal fees to the municipality exceeds its monthly aggregate per-node compensation to the municipality.
- (3) A public right-of-way rate required by Subsection (2) is in addition to any public right-of-way rate required by Section 32-158.

Sec. 32-161. - Design Manual

A network provider shall comply with the City's design manual, if any, in place on the date a permit application is filed in relation to work for which the City has approved a permit application. The City's design manual may not conflict with applicable law and must be competitively neutral.

Sec. 32-162. - Effective Date

This Policy (Ordinance?) shall take effect ___ (XX) days after its passage, approval and publication.

**ENGINEERING SERVICES
RESTRICTED RIGHT OF WAY POLICY**

1.0 Purpose

1.1 The City Council adopted via modification to City Code Article XX, Chapter XX on May XX, 2020, certain language intended to allow for the beneficial use of public right of way by communication providers. The provisions of the ordinance and the contents of this policy were developed with input from representatives of the most common users of public right of way for communication.

1.2 It is the belief of the City of Fulshear that proactive management of City Right of Way will guarantee that the use of the right of way will serve community needs, protect the health and welfare of its residents and businesses, and provide long-term access to those who in the future may wish to deploy communications and other assets.

1.3 City Manager or his/her designee were directed to create a policy and management system under which restricted Right of Way shall be identified, categorized and managed such that access for future use under Article V is maintained.

2.0 Scope

2.1 The City shall require that this policy be implemented for management of all public rights of way on city-owned streets rated as Arterial classification or higher.

2.2 The policy can be modified partially or in its entirety at any time by action of the City Manager or his/her designee.

3.0 Policy

3.1 The City has previously defined processes by which communication providers may make application to deploy communication transmission systems including, copper, coaxial cables, fiber or other wired technologies (hereafter designed "Cable"). Except as noted in this Policy, all existing City processes identified via separate ordinance or policy shall be followed.

3.2 Identification of Transmission System Assets

Communication Providers shall be required to provide information to the City in a format suitable for conversion into the City's GIS system for any new deployment of Cable in public rights of way covered by this Policy. Complete as-built information shall be submitted to the City via a GIS shapefile following material

completion of work permitted by the city no later than 90 days following completion of the construction of such work. As-built information will include the location of deployed Cables at an accuracy of not less than 3 centimeters, but do not require depth of placement data.

The City shall track all current and proposed deployments in its GIS system, and will make available to the public and Communication Providers a map of current deployed Cable.

Provider Cables displayed on City GIS maps and publicly available shall be presented in such a way as to conceal the identity of individual provider Cables

3.3 Preferred Right of Way Use

In order to maximize the efficacy of available Right of Way, the City has established a preferred hierarchy for deployment of Cables by Providers. Cables shall be located in areas of available Right of Way as follows (Most Preferred to Least Preferred):

- a) Edge of Pavement to Edge of Right of Way: This preferred alternative should be studied and used in all instances.
- b) Parkway and Grass Medians: Should Right of Way identified in section 3.3(a) or in Section 3.5 of this policy not be available the City may, at its sole discretion, allow Providers to deploy Cable in Parkway or Grass Medians.
- c) Sidewalk and other Paved Right of Way: The City desires to retain access to the Right of Way under sidewalks and other paved infrastructure to maintain a deployment corridor of last resort. Sidewalks and other Paved Right of Way may be used for Cable deployment only with the express permission of the City.

3.4 Classification of Public Right of Way

Public Right of Way covered under this policy shall be classified into one of three categories. Roadways shall be defined as restricted under this policy if one or more of the characteristics is met.

RED – Severely Restricted Right of Way
Six feet or less of right of way available on one or both sides of the roadway
75% of the available right of way has been consumed by current communication transmission systems.



City has public safety needs that could require larger than normal amounts of ROW based on anticipated or future need; or anticipates significant restrictions due to natural terrain or other utility use.

YELLOW – Moderately Restricted Right of Way
Ten feet or less of right of way available on one or both sides of the roadway
60% of the available right of way has been consumed by current communication transmission systems.
City has public safety needs that could require larger than normal amounts of ROW based on anticipated or future need.

GREEN – Non Restricted Right of Way
More than 10 feet of right of way is available on one or both sides of the roadway
Less than 60% of the available right of way has been consumed by current communication transmission systems.

When detailed location data is not available, the city will estimate consumed right of way using a formula that multiplies the number of current deployed Cables times 15 inches to estimate the total consumed right of way in each area.

3.5 Joint Use and Existing Municipal Infrastructure

The City has developed, a joint use infrastructure model by which multiple communication providers consolidate their Cables into a single, shared duct-bank (Appendix A).

Joint Use Infrastructure enables the City and Communication Providers the ability to share the cost of the deployment equally, enables the deployment of multiple Cables in order to consume significantly less Right of Way, and preserves right of way for future uses.

Providers will be required to sign a Master Agreement (Appendix B), which outlines the terms and conditions of use, financial considerations, maintenance and upkeep requirements and other conditions related to the Joint Use Utility.

A Memorandum of Understanding (Appendix C) will be issued to Providers for all planned Joint Use Infrastructure under consideration by the City. This MOU is intended to achieve the goals outlined in this section by providing open and inclusive access for Providers prior to the execution of final design and construction.

3.6 New Cable Construction



Providers who desire to deploy new Cable construction utilizing Public Right of Way shall comply with the requirements outlined below.

Red – Severely Restricted Right of Way

Due to the limited availability of Right of Way for future public safety use, Providers who wish to deploy Cable in a Red Restricted Right of Way shall be required to show that the deployment will not further encumber the Right of Way. The City requires that Providers must create additional capacity at least equal to the amount of right of way being used for the deployment, as follows:

- Deployment in New Roadway: The City may create Joint Use Infrastructure in areas of new construction that are designated Red Zones. Providers will be required to follow the process outlined in Section 3.5 of this Policy to occupy Joint Use Infrastructure.
- Deployment in Existing Roadway (With Existing Ducts and Joint Use Infrastructure Available): Providers must utilize existing ducts and Joint Use Infrastructure where available. The City will sell or lease capacity at the then-current rates identified in this Policy in Appendix D.
- Deployment in Existing Roadway (Without Existing Ducts and Joint Use Infrastructure Available) - Providers shall work with City staff to create a Relocation Plan for existing and planned Cables to new Joint Use Infrastructure. Upon request, the City shall identify current Providers in the Right of Way and will organize the Relocation Plan following the steps outlined in Section 3.5.
- Relocation of Existing Cables – The City may, from time to time, widen, realign or otherwise modify existing roadway covered by this Policy. The City shall cause all current Providers with Cable in the Right of Way to relocate into Joint Use Infrastructure as outlined in Section 3.5 of this Policy.

Yellow – Moderately Restricted Right of Way

Providers who wish to deploy Cable in a Yellow Restricted Right of Way shall be required to create additional capacity at least equal to the amount of Right of Way being utilized. Provider may meet this requirement in a number of ways, as follows:

- Deployment in New Roadway: The City may create Joint Use Infrastructure in areas of new construction that are designated Yellow Zones. Providers will be required to follow the process

outlined in Section 3.5 of this Policy to occupy Joint Use Infrastructure.

- Deployment in Existing Roadway (With Existing Ducts and Joint Use Infrastructure Available): Providers may utilize existing ducts and Joint Use Infrastructure where available. The City will sell or lease capacity at the then-current rates identified in this Policy in Appendix D.
- Deployment in Existing Roadway (Without Existing Ducts and Joint Use Infrastructure Available) - Provider shall demonstrate that it has made all reasonable effort to minimize the impact to Right of Way or to create additional capacity within the given Right of Way. At a minimum, Provider will allow the City or other Providers to leverage open trenches to deploy shadow conduit by providing at least 120 days of notice of proposed construction. The City may deploy shadow conduit by reimbursing the Provider for the proven, incremental cost of materials and labor to place the city's conduit. Providers who desire to place shadow conduit shall make reasonable cost-sharing arrangements at industry-standard rates. Further, the City may, in limited cases but at its sole discretion, request that the Joint Use Infrastructure process be started where such deployments may further the goals of the City.
- Relocation of Existing Cables – The City may, from time to time, widen, realign or otherwise modify existing roadway covered by this Policy. Should Cable relocation be required, the City will work with Providers to identify the lowest-cost alternatives suitable to relocate existing Cables or to create new Joint Use Infrastructure as outlined in Section 3.5 of this Policy.

Green – Unrestricted Right of Way

Providers who wish to deploy Cable in an Unrestricted Right of Way shall follow all current policies related to deployment of underground utilities identified via then-current policies of the City.

4.0 Distribution

Originally distributed to all Department Directors and Development Services

Authorized by the City Council effective May XX, 2020.

City Manager

Date

March 3, 2020

Congested ROW Categories

Level	Restriction	City Alternative	ROW Available	ROW Consumed	Provider Impact	Additional Impacts
GREEN	Non Arterials or No Restriction	Non-Issue	Open	Less than 60% is anticipated to be consumed	Per Existing Policies & City Processes	
YELLOW	Moderately Restricted	Limited Options	10 feet or less on one or both sides	60% of Available is consumed or is anticipated	Must show it has taken all reasonable efforts to minimize ROW or creates additional capacity	Permittee or City may request joint trench or conduit sharing
RED	Severely Restricted	Minimal Options	6 Feet or less on one or both sides	75% of Available is consumed or anticipated to be consumed	Must show intended use will not further restrict ROW (Joint Build)	Permittee may be requested or required to conduit share

