RESOLUTION NO. 2022-02-XXX (R)

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF McKINNEY, TEXAS, AUTHORIZING THE ADOPTION OF THE CITY OF MCKINNEY BROADBAND ASSESSMENT REPORT AND RECOMMENDATIONS AND AUTHORIZING THE PUBLISHING OF A REQUEST FOR INFORMATION/QUALIFICATIONS

WHEREAS, the City Council of the City of McKinney, Texas, in 2019 began evaluating the necessity of next generation cellular technology, broadband technology, and the corresponding public and private uses of such infrastructure, and

WHEREAS, the City adopted updates and changes to the Small Wireless Facilities Design Manual and corresponding sections of the City of McKinney, Texas Code of Ordinances on July 21, 2020, and

WHEREAS, the City Council adopted Strategic Goals for the 2021-2022 Fiscal Year on June 15th, 2021 that included City Council Goal 1 "Direction for Strategic & Economic Growth | 1A Establish regional and infrastructure incentives to increase economic growth", and

WHEREAS, the City entered into an agreement with HR Green, Inc., one of the nation's longest operating engineering firms, to assist in assessing the broadband needs and status of the City of McKinney, and to provide recommendations for improvement, and

WHEREAS, the City and HR Green, Inc. have developed four primary recommendations for improvements to the City's broadband network in the City of McKinney; 1) Increase Community Infrastructure Base, 2) Expand City Fiber Facilities, 3) Evaluate a Pilot Project with McKinney Economic Development Corporation, and 4) Evaluate Methods to Increase Adoption.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF McKINNEY, TEXAS, THAT:

Section 1.   The City Council of the City of McKinney, Texas hereby adopts the City of McKinney Broadband Assessment Report and Recommendations (Exhibit A).

Section 2.   The City Council of the City of McKinney, Texas hereby authorizes the publishing of a request for information/qualifications to implement the recommendations identified in the City of McKinney Broadband Assessment Report and Recommendations.

Section 3.   This Resolution shall take effect immediately from and after the date of passage and is so resolved.

DULY PASSED AND APPROVED BY THE CITY COUNCIL OF THE CITY OF McKINNEY, TEXAS ON THE 15th DAY OF FEBRUARY, 2022.

CITY OF McKINNEY, TEXAS

_____
GEORGE C. FULLER, Mayor

ATTEST:

_____
EMPRESS DRANE, City Secretary

APPROVED AS TO FORM:

_____
MARK S. HOUSER, City Attorney

EXHIBIT A

McKinney, TX – Broadband Assessment Report and Recommendations
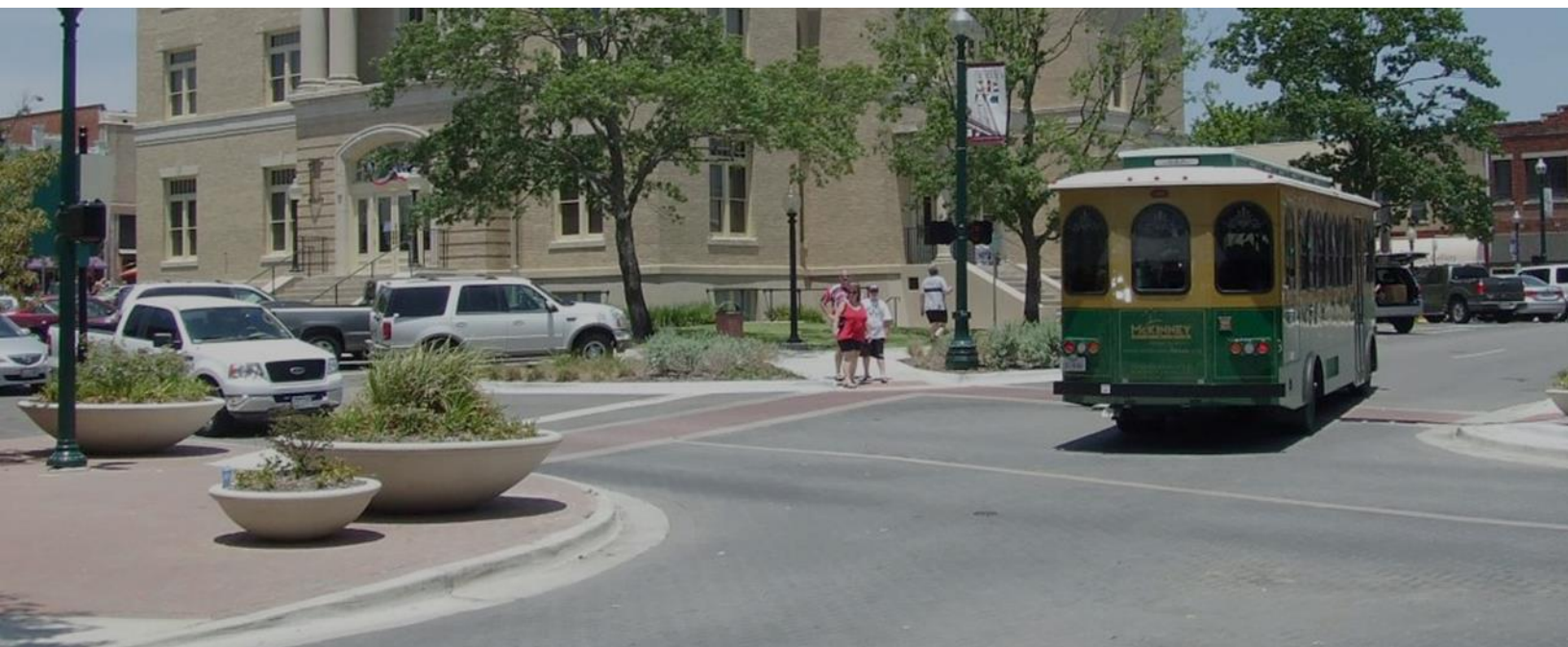
February 15, 2022

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Broadband Assessment Executive Summary

It was not that long ago that broadband was, for the most part, mainly a nice thing to have for most people. It was not necessarily an integral part of most people's lives or homes.   But, more and more aspects of communication, education, work, health, entertainment, etc. now rely on good connectivity. Broadband has now become a quality of life issue for most individuals and families, a key component of many aspects of most businesses of all sizes, a central ingredient in economic development and a primary way for governments to deliver services. The Covid-19 pandemic left no doubt how critical broadband has become for many of the most central parts of our lives and society.

In many ways, McKinney is a regional, State and national leader. Because of the central role that broadband plays in so many facets of our lives and work, having excellent broadband is now a key factor in a community's ability to lead and maintain a leadership position. From all aspects of a community (citizens, businesses, anchor institutions, economic development and City services), broadband has now become an important factor in what communities can offer, who they can attract and steps they can take. In short, good broadband can help a community be a leader – mediocre broadband makes leading difficult in many areas of what it means to be a community.

Our findings point to three categories of broadband connectivity in McKinney:

1. Citizens, businesses and other stakeholders in McKinney
2. City facilities
3. City Economic Development

Citizens, businesses and other stakeholders in McKinney

Through the research detailed in this Broadband Assessment, we have found that McKinney has **good** broadband access for non-governmental stakeholders (citizens, businesses, economic development targets, etc.). Connectivity with speeds that are above the minimum defined by the Federal Communications Commission (FCC) of 25 Megabits per second (Mbps) downloading from the internet and 3 Mbps upload, is available in the vast majority of McKinney. Moreover, speeds of 100/10 are also available in most of McKinney. 100/10 is considered good across the Country.

Those speeds and the current underlying broadband infrastructure (which will also be referred to and further defined as the technology base) that enables those speeds are likely not good enough to sustain McKinney's leadership in citizen needs, business needs, and economic development, over the next several years. McKinney is doing enough well and has enough exceptional things about it that those currently appear to overcome good, but average broadband.

That is not likely sustainable.   Across the United States, the need for greater speeds and increased capacity have grown exponentially year over year, which will continue. Axios, utilizing data from OpenVault, produced the following chart (Figure 1) that shows the continued growth in Gig capacity consumption per household. As programs are written that require greater capacity; as people use more devices; and, as more applications utilize the internet (cloud, videos, conferencing, etc.), the need for internet capacity will continue to grow exponentially (continuing the established growth pattern in the chart).

With these increased needs in capacity and speed, communities that have a tech base that provides speeds that only rise to a good level now, will likely struggle to maintain. Moreover, that scenario makes it more difficult to lead in available services, innovation and community identity.
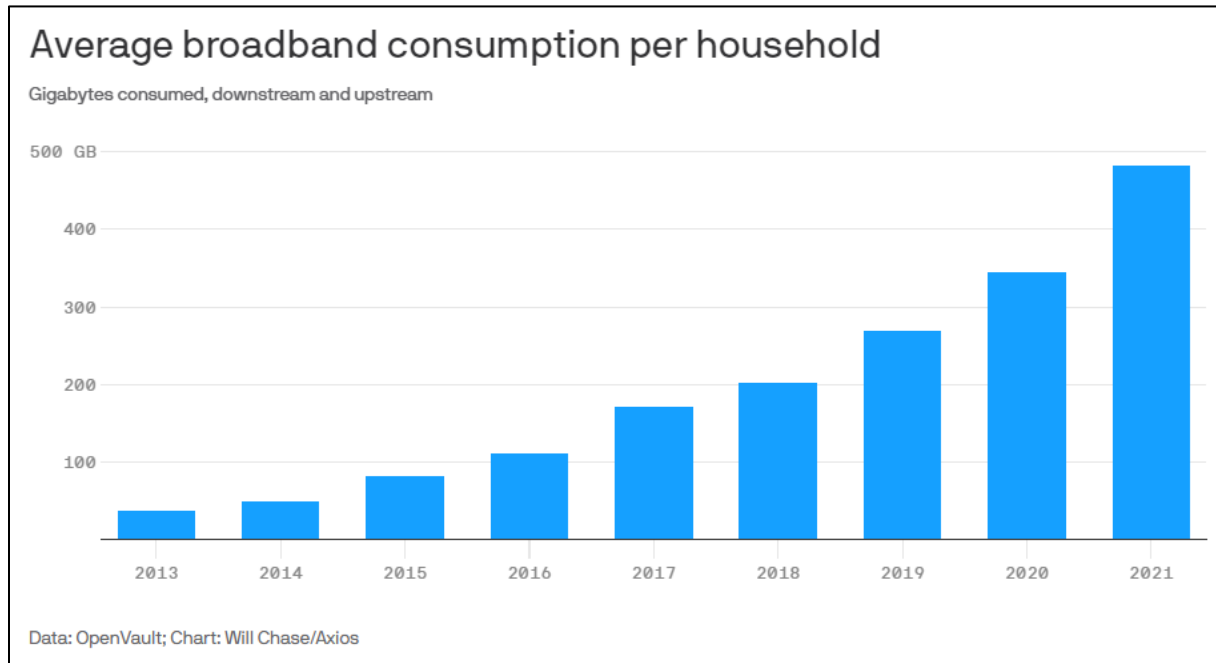
Average broadband consumption per household

Gigabytes consumed, downstream and upstream

500 GB	
400	
300	
200	
100	

2013   2014   2015   2016   2017   2018   2019   2020   2021

Data: OpenVault; Chart: Will Chase/Axios

Figure 1 - Average Gigabytes Consumed Per Household Per Year

In McKinney, as part of a broadband survey that was taken (see the Community Engagement section), respondents corroborated the importance that they feel broadband has.
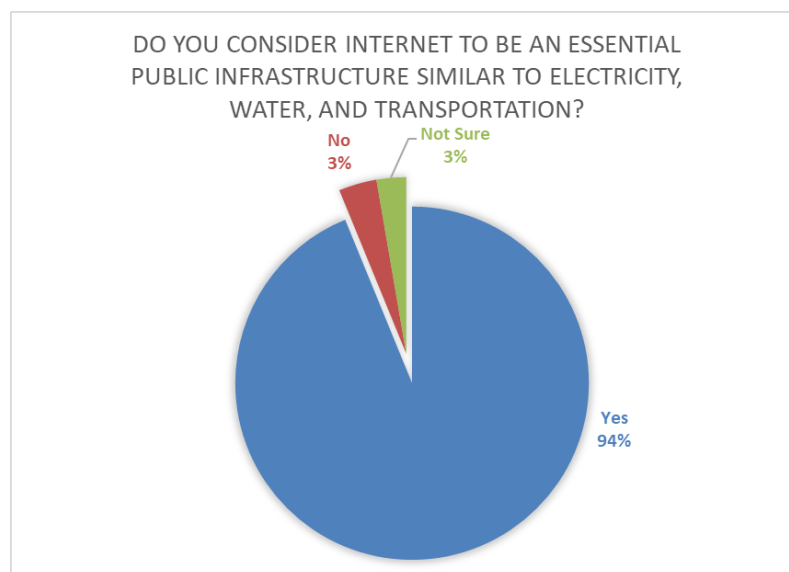
DO YOU CONSIDER INTERNET TO BE AN ESSENTIAL PUBLIC INFRASTRUCTURE SIMILAR TO ELECTRICITY, WATER, AND TRANSPORTATION?

No 3%   Not Sure 3%

Yes 94%

Figure 2 – McKinney Residents' Importance of Broadband

The tech base for the non-governmental facets of the community is not supplied or operated by the City. Private telecommunications providers have made the investment for the infrastructure that supplies broadband to the community's cities, businesses and non-governmental stakeholders. From industry information and meetings (further detailed later in this Plan), it does not appear that the tech base is fiber based (which is likely what is leading to good broadband as opposed to world-class).

City facilities

Over several years, the City of McKinney has developed a fiber ring to connect City facilities. Deploying this fiber showed considerable foresight and not only provides excellent connectivity now, but the fiber should also future-proof the City's internal broadband needs.

McKinney's governmental fiber network provides world-class capacity and speed for internal City operations. Also, because the City owns the network, the City maintains control over the function and the costs of internal connectivity.

We have found that City departments are happy with the City fiber connection of their offices. In the Public Engagement section of this Broadband Assessment, the details of their responses and the recommendations they have for further connectivity are documented.

The internal fiber network is an important asset for the functioning of the City government. And, with the proliferation of fiber, it will also provide scalability for future growth and needs.

City Economic Development

The McKinney Economic Development Corporation (EDC) has other specific broadband considerations. Along with their internal connectivity needs, they also have broadband goals that can support (and possibly elevate) their economic development and business attraction efforts. Having the most current technology, capacity and speeds can help them maximize properties and attract businesses.

As part of this Broadband Assessment process, the EDC was highly involved in the process and engaged with partners to discuss potential next steps.

It is important to underscore that an excellent tech base and broadband network is a strong selling point the EDC can use in their efforts. For businesses to know they will have world-class and future proof connectivity is an important factor in location decisions. Also, if business leadership know the community has a world-class tech base for their employees, they are more likely to consider those areas.

Methodology

The City engaged HR Green to complete a Vision and planning process to understand the broadband circumstances in McKinney and to form the basis for recommendations and next steps. The list of tasks were:

VISION
Task 0 – Kickoff Meeting
Task 1 - Verify Existing City Assets
Task 2 - Industry Market Assessment
Task 3 - Community Engagement
Task 4 - Gap Analysis
Task 5 – Visioning Meeting/Work Session
PLAN
Task 1 - Options to Improve Broadband
Task 2 – Fiber and Broadband Master Plan
Task 3 – P3 Options
Task 4 - Consensus Meetings
Task 5 – Partner RFQ Development, Evaluation & Selection

Figure 3 – McKinney Broadband Assessment Tasks

The Vision Phase of the project was comprised of research and documentation of findings to define the strengths and weaknesses of current broadband in McKinney. This included understanding the current fiber and other assets in the City, finding what providers have reported as their coverage and infrastructure types and directly asking citizens, businesses, City staff and other stakeholders what their actual broadband experiences are. The findings of those topics are further detailed in the other sections of this this Plan document.

With those detailed findings, the next phase (Planning) comprised defining actionable options to improve the broadband concerns that were uncovered. Those actionable next steps are summarized in the recommendations below and in the subsequent sections of this Plan.

Summary

McKinney has two, different consumers of broadband. The first is non-governmental. For citizens, businesses and most other stakeholders, broadband is good, but not world-class or future-proofed. For City offices (governmental), the internal fiber network is an important asset that is, and will continue to be, a significant strength.

The community infrastructure base (broadband for the citizens, businesses and other non-governmental stakeholders) is something that the City will likely need to address. The City does not own or control this infrastructure, but there are ways for the City to help improve the tech base. Future-proofing this infrastructure could provide world-class broadband services and an asset that can attract citizens and businesses, and provide more tools for the Economic Development Corporation. As part of the Broadband Assessment process, an RFI/RFQ could help coordinate efforts with a potential provider partner.

The connectivity for government facilities is fiber, thus it is the best infrastructure and future proofed. There are upgrades that could be made to this ring and those will be further detailed in this Broadband Assessment.

Recommendations

1. **Community infrastructure base:** Work with the provider community to develop a tech base that moves towards a Fiber-to-the-Premise (FTTP) model. Having access to fiber for every home and business will create world-class, future-proofed connectivity for the entire City. This will attract citizens and businesses, provide another tool for the EDC to use and provide a platform for innovation. This is most often done through a targeted Request for Information or Request for Qualifications. The focus of this type of collaborative tool is usually most effective if the City defines what the City can offer to help spur private investment (providing conduit, use of fiber, expedited permitting, co-marketing, etc.).

   Another option is for the City to deploy fiber for non-governmental use and either operate this network or to work with a private partner to operate it. This is more expensive and creates risks and complexity for the community, but it is an option.

   Details that support this recommendation can be found in Market Assessment Figures 11 – 13 and survey responses in figures 27 – 29.

2. **City facilities:** Expand the current, city owned fiber ring to City facilities that could benefit from connectivity, but have not had fiber deployed to them. Options for these expansions can be found in the "Options to Improve Broadband" section of this Plan. Details for this recommendation can be found in the "Fiber Extensions for City Network" section of this plan.

3. **City economic development:** In addition to having excellent connectivity that could come from Recommendation 1, the McKinney Economic Development Corporation (MEDC) could initiate pilot projects to enhance certain properties and attract certain businesses or business types. This could attract innovative businesses, provide a testing opportunity for different technologies and enhance specific properties. The EDC has been involved in this Broadband Assessment process and are anticipated to participate in a subsequent RFI/RFQ process. Detail regarding MEDC's broadband priorities and involvement in next broadband steps, see the Economic Development and Broadband section of this Plan.

4. **Adoption:** There are people and groups in McKinney who might have access to broadband, but because of financial reasons, language barriers, age related challenges, etc. are not able to adopt (or purchase) broadband services. There are existing Federal government programs to help with these issues, but the City could also take steps that are McKinney-centric. Creating a Digital Equity Plan that targets socio-economically disadvantaged populations could enable those groups to participate more actively in the digital economy.

   Detail regarding broadband adoption can be found on pages 11 and 12 and in the Library section of the public engagement stakeholder meetings.

The following pages provide the detail of findings of the study that support these recommendations.

Because there are many terms and abbreviations specific to the broadband industry, a Glossary of Terms is included in Attachment B.

Market Assessment

A Market Assessment analyzes the broadband coverage data that is available from telecommunications industry sources (the Federal Communications Commission (FCC) and known and trusted industry data analysis organizations). This is one step in the process of understanding the broadband coverage in McKinney. This data is further verified and clarified in other steps of the Broadband Assessment process.

The information further explained in this Market Assessment show some relevant findings to be further explored in the Broadband Assessment steps. These high level findings show that there appears to be access to good broadband for the majority of the City:

- Providers report that the citizens and businesses in McKinney have access to at least the minimum speeds defined by the FCC (25 Megabits per second download speed (Mbps) and 3 Mbps upload)
- Providers also report that the vast majority of citizens and businesses in McKinney have access to 100/10 Mbps or faster
- There appears to be at least two providers in most areas of McKinney, so there is some competition in the majority of the City

The other steps in the Broadband Assessment will either confirm these findings or challenge them.

These findings point out an aspect of broadband that could be a concern in McKinney. The providers show that **the infrastructure used to serve the City is only approximately thirty (30) percent fiber.** This is something that needs to be explored in more detail, but this could indicate an infrastructure issue that could hamper technological steps that the City might want to take.

The implications of this will be discussed in greater detail in the Introduction, but if the infrastructure limits the speeds, latency and capacity available, applications will be constrained by those limits. There are technologies that will likely increase the capability of cable, it remains to be seen how that compares with fiber.

In general, the industry data shows good broadband availability in general within the City. In the broadband assessment process, that has been checked. Ensuring an understanding of infrastructure will be important in subsequent broadband steps (which could include 5G as that technology is deployed), as lack of fiber appears to be a topic to address. Lastly, a Market Assessment only looks at the supply side. As broadband coverage in McKinney is better understood, it can also be important to understand if there are demand side issues (are there barriers to citizens adopting the services available.

Market Assessment Introduction

In general, broadband connectivity has changed from something nice to have to becoming incredibly important. Education, working from home, economic development, keeping youth in the area, telemedicine, etc. all need good connectivity. Even with that level of importance, understanding what broadband connectivity is available in any area (including McKinney) has challenges.

Examples of these challenges can range from providers not typically wanting to offer too detailed of information for competitive and security reasons, the rapid pace of infrastructure changes, continuous changing of pricing plans, inaccurate data, etc. Because of these reasons, it is important to utilize different tools to gather and analyze broadband accessibility information.

One of the beginning points of understanding broadband in a community is to research the industry reported data (what the providers report as their coverage). That research and analysis is done in this Market Assessment. As part of licensing, broadband providers are required to provide certain data for the customers they serve. That data is available from the FCC and other secondary sources that provide additional insight. Data in this report has been drawn from the following dedicated websites.

- BroadbandNow (https://broadbandnow.com/)
- DecisionData (https://decisiondata.org/)
- AllConnect (https://www.allconnect.com/)
- FCC (https://broadbandmap.fcc.gov/#/)
- Connected Texas (https://connectednation.org/texas/mapping-analysis/)

The data that comes from these sources is based on the information submitted to the FCC by providers and is helpful, but it is known to be flawed. The shortcomings of this data are:

- There is a reporting and displaying cycle that can, in some instances, make the data one to two years old before it is available.
- There are not significant repercussions for inaccurate reporting and inaccurate entering of the data.
- There can be secondary incentives for some providers to overstate their coverage (grants may not be available to potential competitors if coverage appears to be adequate)
- Data is recorded at the census block level – in a given census block, the highest coverage is generalized to the entire census block.

Even though the data is known to have these potential flaws, it is important for two reasons:

- To provide a baseline of data to work from
- This data is used for many federal and state grants. If it is incorrect, it is important to correct it.

Because of these problems in the data, a high-level market assessment cannot be fully relied upon, but it does provide a beginning point to understand coverage and it can also point out areas that need to be scrutinized in greater detail. McKinney is also conducting a survey of residents, business and other stakeholders. The "actual" data from the surveys will provide the data to compare to the Market Assessment information to either confirm or challenge it.

This Market Assessment will explore several areas of data regarding connectivity in McKinney.

Competition

Residences and businesses can obtain internet access services from a variety of providers or Internet Service Providers (ISP). The number of ISP's who provide services in the same area defines the amount of competition available to the residents and businesses in that area.

The experience of the consumer can vary greatly based on the ISP (their offerings, pricing, customer services, infrastructure utilized, etc.). Competition can be a strong driver for providers to improve all of those facets of their service. The more competitors, the more necessary to provide the best services over the best infrastructure.

Available Speeds

The most common measure used to understand broadband availability is speed. The FCC defines the minimum speeds that can be considered broadband as 25/3 (25 Mbps download from the internet to the user's device) and 3 Mbps upload from the user's device onto the internet. The discussion of whether 25/3 remains fast enough to accomplish what modern technology requires has become more earnest (particularly with the connectivity needs that the pandemic exposed), but 25/3 is the current FCC minimum standard.

Maps from the FCC and Connected TX show broadband speeds as they are reported. As stated previously, the data is reported on a census block basis. Therefore, each census block shows the highest speed within that census block.

Infrastructure

Providers have invested in different types of infrastructure to deliver internet. The different types of infrastructure are:

- Fiber
- Cable
- DSL (over copper)
- Fixed wireless
- Satellite.

Speed, capacity and reliability of the services offered can vary greatly based on the infrastructure. Fiber can provide the most reliable, fastest, highest capacity and lowest latency internet. Fiber reliability can be impacted by the equipment connected to the fiber, whether it is underground or on poles, and whether there is a redundant route. Cable and DSL can provide good service, but can also be limited more than fiber by the distance from equipment and the capacity of the line.

Fixed wireless can have its place in a network, but will be limited by environmental considerations and the number of customers and their traffic being run through the receiving equipment.

Satellite can also have its place in networks, but has the most limitations in this infrastructure list. There is a lot of conversation about satellite after Elon Musk's company started to deploy Starlink. The concept of considerably more low earth orbit satellites is intriguing in the impact that could be realized for customers.

The classic distinction to categorize end users has typically been either urban or rural. HR Green has further developed this framework to more accurately describe these circumstances from an infrastructure standpoint. In this high-level perspective, there is another category that is necessary to really understand infrastructure needs: Remote. So, end users live in urban settings, rural or they are remote.

Satellite has its best application in the remote setting, in which it is just too expensive to get fiber, cable or good functioning DSL to them and point to point might be too far away or inhibited because of terrain.

In urban or rural settings, fiber, cable, DSL or even point to point. Elon Musk even commented that Starlink was not an answer for all broadband, but for the locations that did not have better options.

To understand the implications of infrastructure, the McKinsey Institute developed a concept of layers. We most often focus on the middle layer (applications) because that is where the interesting uses are developed.

Figure 4 - McKinsey Institute Three Layers of "Smartness"

But, as this graphic shows, the application layer is, really, a function of the "tech base" or the infrastructure. **Applications can only work on infrastructure that can support it.** If the infrastructure is lacking in speed, capacity, latency or location, applications will be limited. Thus, having an infrastructure level that is future proof is important for any community that is wants to be progressive in smart applications, citizen needs and business uses.

Adoption

It is also important to recognize the top layer in the McKinsey graphic – adoption. The concept of who is utilizing the applications (uses) and who is not can be significant in a couple of ways. For citizens, not adopting available connectivity can be a function of not needing what is offered, price issues or lack of availability. If services are not available, public functions could be to help figure out ways to make it available. Where lack of adoption is because of economic or other social reasons, a public function might be to work on ways to address those issues.

Methodology

This Market Assessment looks at connectivity by zip code.
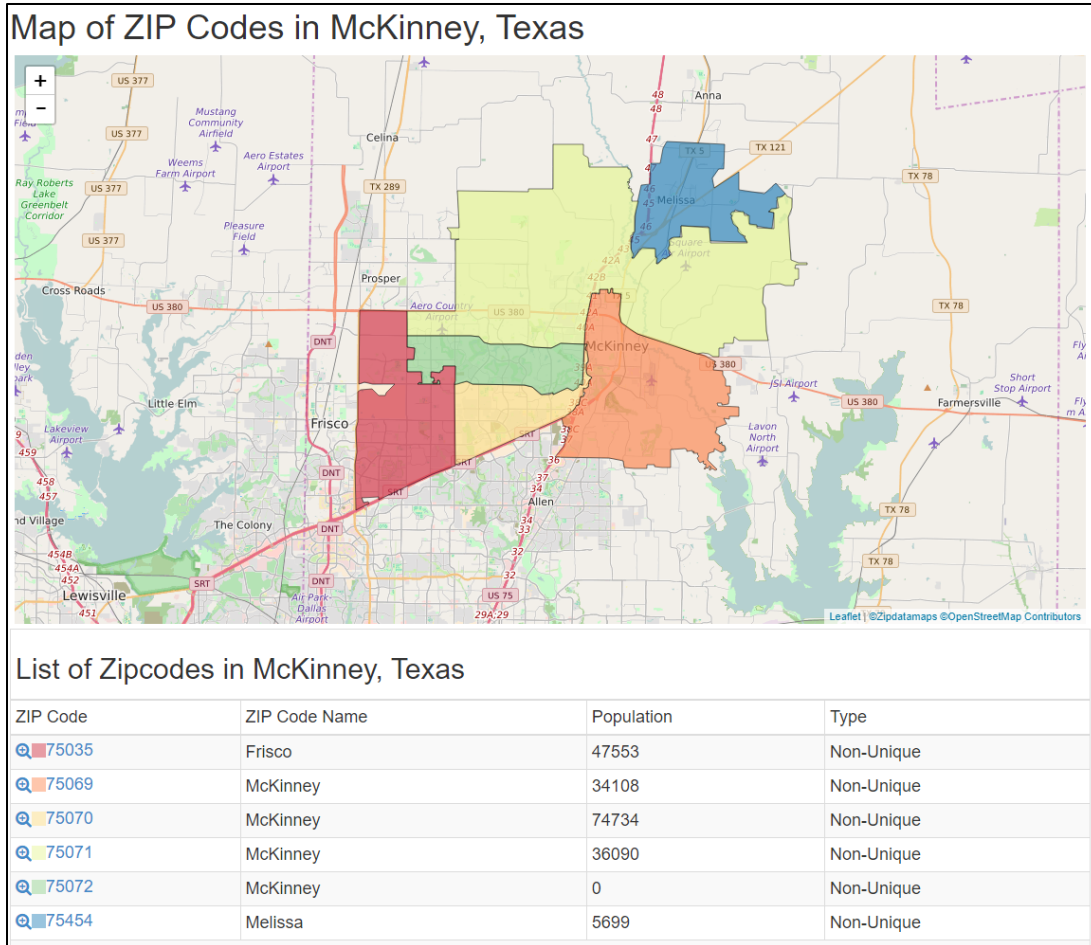
Figure 5- Zip Code Coverage Areas in McKinney

Since data is provided by zip code, all of the following findings are provided for the area of zip codes:

- 75069
- 75070
- 75071
- 75072
- 75013
- 75454

While data is provided by zip code, it is also collected by city. Thus, the findings show that the data can be grouped in two categories – zip codes 75069, 75070, and 75071 and zip codes 75013 and 75454. The zip code 75072 is a new zip code that has been split from other surrounding zip codes. It does not have available data, but it is expected that the data for that zip code is the same as those for zip codes 75069, 75070, and 75071.

Market Assessment Findings

In summary, BroadbandNow states:

"Cable and DSL are the dominant network options within the McKinney metro area. They are fighting over customers at most addresses and generally competing on service quality. Cable speed is overall better and more robust. That said, big-picture metrics we've recorded with either network system are comparable. Local speed test results show that local infrastructure is above-average, clocking in 25.89 percent above the state average so far as download speed.

Outside of the Internet options detailed above, EarthLink provides a third option for Internet in 96 percent of the McKinney area. Wireless companies like TierOne Networks are also worth looking at. However, the main wired providers usually offer a stronger value when it comes to performance and price.

- There are 27 internet providers in McKinney with 14 of those offering residential service
- **McKinney is the 93rd most connected city in Texas ahead of Melissa, but behind Allen, Frisco, Prosper, and Princeton.**
- There are 544 internet providers in all of Texas.
- 90.0% of Texans have access to 100mbps or faster broadband.
- Fiber optic internet is available to 54% of Collin County residents.
- Approximately 97% of McKinney residents are serviced by multiple wired providers.
- 100% of residents in Collin County have access to fixed wireless internet service.
- Texas is the 32nd most connected state in the U.S.
- The fastest zip code in McKinney for April 2021 is 75071.
- Aggregated 612 Internet plans in McKinney, in total."

The second bullet point is telling. The number of communities that have better connectivity than McKinney shows that McKinney's broadband is "good". But, having 93 communities with better broadband (including those that are specified) is indicative of the challenge of not having broadband that supports ongoing leadership.

BroadbandNow also shows the same set of providers on both the Residential and Business maps. Figure 2 below shows the map of competition (number of providers in a given area). From this BroadbandNow map, it appears that a majority of McKinney has a good level of competition. Competition helps keep pricing better for consumers and often leads to better products and customer service. Not having more granular data, it is hard to tell how consistent the competition is within the competitive areas. This is important to know if the providers really cover the entire area shown or if they have selected certain streets, addresses, density, etc.

The level of competition in these maps is higher than is often found.   There are also providers, T-Mobile for example, who have started offering home broadband through wireless 5G networks. Those types of services do not appear in this type of infrastructure assessment.
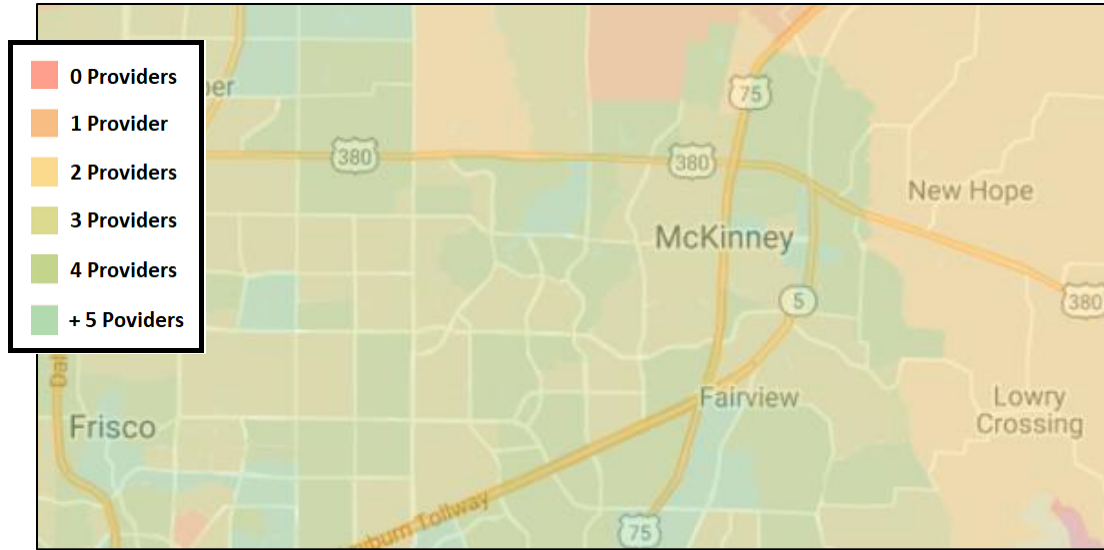
Figure 6 – Provider Competition in McKinney

Connected Texas is an organization that does mapping and does partial validation of internet speeds. The minimum the FCC classifies as broadband is 25 megabits per second Mbps upload and 25 Mbps down. In Figure 7 below, Connected Texas shows that, basically, all of McKinney has access to these minimum speeds.
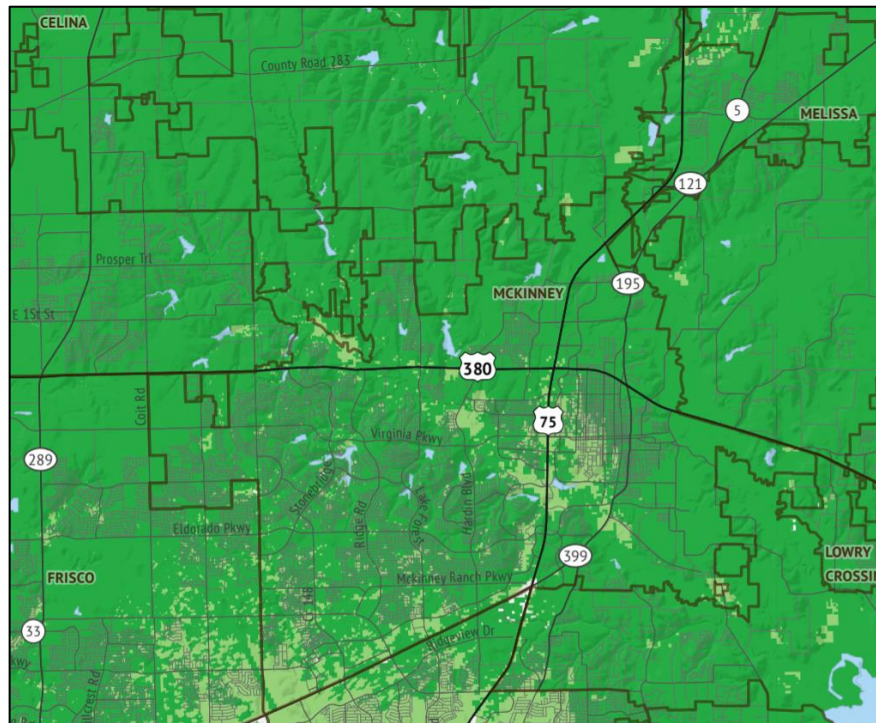
Figure 7 – Connected Nation – 25/3 Mbps

In Figures 7 and 8, the dark green represents areas that Connected TX has performed some level of verification and the lighter green shows where only FCC data is displayed. Connected TX's maps do not provide a more detailed view.

Figure 8 (below) shows Connected TX's findings for 100/10 Mbps. This map also shows good access for the vast majority of McKinney, although it does not go into greater detail than what is shown.
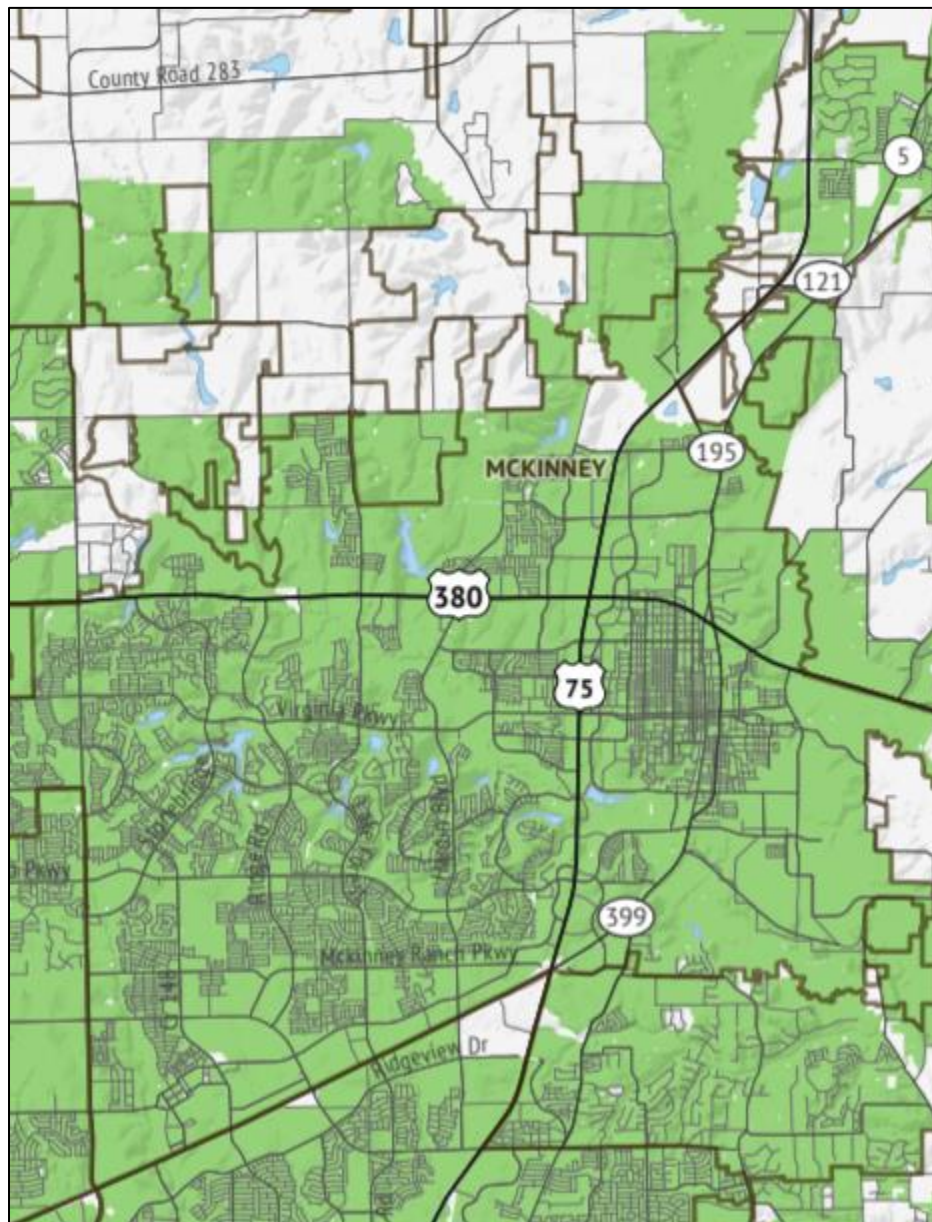
Figure 8 – Connected Nation 100/10 Mbps

Industry data seems to indicate that McKinney has access to decent speeds and multiple providers.

In addition to mapped data, other ways to analyze broadband in McKinney is through what providers advertise they offer and the infrastructure they have invested in.

When looking at a more granular level, maps show where providers define where they provide service and where they do not (at a census block level). The below FCC map shows detail of where there are fewer providers.
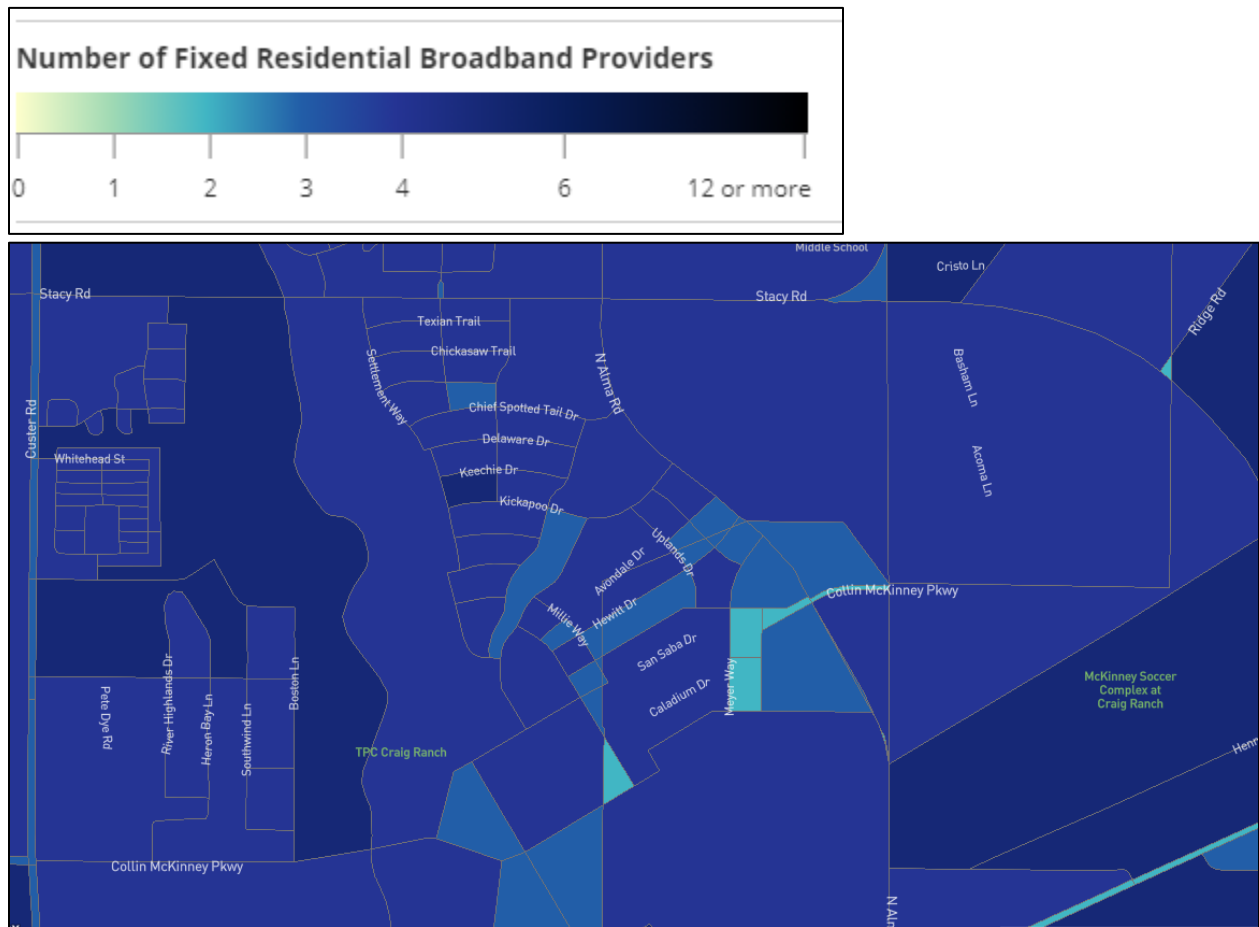
Figure 9 – FCC Map of Number of Providers

In regard to speeds, all ISPs advertise a maximum achievable or "up to" data speed which is what a consumer can expect to experience only under the best of all circumstances. The following tables show the highest speed plans and the lowest priced plans, but they are generally not related. The actual speeds enjoyed by customers on average are typically lower than the advertised "up to" speeds and can be highly variable across a given 24-hour period. This is because all internet service providers, regardless of transport medium, employ in their designs some degree of concentration and sharing of network resources. In an analysis of informational and provider websites, no service provider publishes a guaranteed minimum throughput speed. For example, DSL is a competitive product whose realized speeds can vary significantly due to a number of factors, from as low as 1Mbps/.25Mbps to 12M/3M,

but engineering guidelines typically dictate that the distance to the customer from the central office or DSLAM (Digital Subscriber Line Access Module) will not exceed 5,000 ft. of data-conditioned cable to qualify for DSL at all. DSL is available to the majority of the residential and business markets.

At the opposite end of the availability spectrum is satellite service. Because of their extra-terrestrial access scheme, satellite service providers theoretically can, and in practice often do, boast of availability approaching 100%. Here is a representative statement from HughesNet's website describing the availability of their internet services. "Because HughesNet® provides Internet service to customers through the use of satellite technology, virtually every residential home and business in the continental U.S. can get HughesNet service. Service can be installed in any building with a clear view of the southern sky, making it a great option for people who live in rural areas". In non-remote areas, satellite providers offer a very unsatisfying, and low-speed option as a provider of broadband services. Further lessening the attractiveness of satellite providers are frequent and aggressive overall data caps, which limit the overall consumption (similar to cellular plans that cap data use on their networks).

Zip Codes: 75069, 75070, 75071, and 75072

Residential Service Providers

Provider	Technology Type	Coverage Area	Speeds (up to)	Pricing (lowest priced plans)
Spectrum (Charter)	Cable	100%	1 Gbps	$49.99
AT&T Internet	IPBB	98.4%	100 Mbps	$45
AT&T Fiber	Fiber	30.5%	940 Mbps	$35
SuddenLink	Cable	17.8%	1 Gbps	$35
EarthLink	DSL	98.4%	100 Mbps	$49.95
Rise Broadband	Fixed Wireless	96.5%	100 Mbps	$34.95
EarthLink	Fiber	30.5%	1 Gbps	$49.95
ViaSat (Exede)	Satellite	100%	100 Mbps	$49.99
HughesNet	Satellite	100%	25 Mbps	$59.99
Grande Communications	Cable	10.6%	1 Gbps	$24.99
TierOne	Fixed Wireless	99.9%	5 Mbps	$42.5
Argon Technologies	Fixed Wireless	9.5%	10 Mbps	$44.95

Figure 10 – Residential Service Providers (BroadbandNow)

Figure 11 on the next page shows service providers for businesses in these zip codes.

Business Service Providers

Provider	Technology Type	Coverage Area	Speeds (up to)	Pricing
Spectrum Business (Charter)	Cable	100%	1 Gbps	$64.99
Rise Broadband	Fixed Wireless	100%	100 Mbps	$80.94
TierOne	Fixed Wireless	100%	5 Mbps	$69.99
Argon Technologies	Fixed Wireless	33.5%	15 Mbps	$79.95
AT&T	Fiber	32.1%	940 Mbps	$50
SuddenLink	Cable	29.1%	1 Gbps	$104.9
Comcast Business	Cable	5%	987 Mbps	$69.95
CenturyLink Business	Fiber	3.6%	940 Mbps	$49

Figure 11 – Business Service Providers (BroadbandNow)

There are other types of services that do not appear in an assessment of this type of infrastructure. The most predominant is service offered over cellular networks. Cellular home internet is becoming more prevalent as cellular networks are more densely deployed and the technology evolves (particularly 5G related). Another important factor in the greater offering and use of these services is changing plans on data usage.

The next section on the following page provides details for Zip Codes: 75013 and 75454.

Zip Codes: 75013 and 75454

Residential Service Providers

Provider	Technology Type	Coverage Area	Speeds (up to)	Pricing (lowest priced plans)
Spectrum (Charter)	Cable	100%	1 Gbps	$49.99
AT&T Internet	IPBB	93.7%	100 Mbps	$45
AT&T Fiber	Fiber	42.7%	940 Mbps	$35
Frontier	DSL	13.2	Unlisted	37.99
Frontier	Fiber	13.1	Unlisted	49.99
SuddenLink	Cable	2.3	1 Gbps	$35
Rise Broadband	Fixed Wireless	99.6%	100 Mbps	$34.95
EarthLink	DSL	93.7%	100 Mbps	$49.95
EarthLink	Fiber	42.7%	1 Gbps	$49.95
ViaSat (Exede)	Satellite	100%	100 Mbps	$49.99
HughesNet	Satellite	100%	25 Mbps	$59.99
Grande Communications	Cable	27.2%	1 Gbps	$24.99
Grande Communications	DSL	3.3%	6 Mbps	Unlisted
TierOne	Fixed Wireless	99.2%	5 Mbps	$42.5
Argon Technologies	Fixed Wireless	11.2%	10 Mbps	$44.95

Figure 12 - Residential Service Providers (BroadbandNow)

Business Service Providers

Provider	Technology Type	Coverage Area	Speeds (up to)	Pricing
Spectrum Business (Charter)	Cable	100%	1 Gbps	$64.99
Rise Broadband	Fixed Wireless	100%	100 Mbps	$80.94
TierOne	Fixed Wireless	100%	5 Mbps	$69.99
Argon Technologies	Fixed Wireless	95.6%	15 Mbps	$79.95
AT&T	Fiber	58.4%	940 Mbps	$50
Frontier	DSL	50	Unlisted	49.99
Frontier	Fiber	46.5	Unlisted	49.99
CenturyLink Business	Fiber	23.5%	940 Mbps	$49
SuddenLink	Cable	11.2%	1 Gbps	$104.9

Figure 13 - Business Service Providers (BroadbandNow)

Internet Service Providers & Plans

The following section and tables show the service offerings by provider, including their download speeds and cost per month of their advertised plans. There are often promotional plans, other charges and other services, but these tables show what is advertised.

Spectrum (Charter Communications)

Charter Communications Inc., with its corporate headquarters located in Stamford, Connecticut, is an American telecommunications and mass media company that offers its services to residents and businesses under the branding of Spectrum. Providing services to over 26 million customers in 41 states, it is the second-largest cable operator in the United States by subscribers, just behind Comcast, and third largest pay TV operator behind Comcast and AT&T. It is the fifth largest telephone provider based upon residential subscriber line count.

Plan	Download Speed	Cost/Month
Spectrum Internet®	200 Mbps	$50
Spectrum Internet® Ultra	400 Mbit/s	$70
Spectrum Internet® Gig	1000 Mbit/s	$110

Figure 14 – Charter/Spectrum Plans

AT&T

AT&T Inc. is an American multinational conglomerate holding company headquartered in Downtown Dallas, Texas. It is the world's largest telecommunications company, the largest provider of mobile telephone services, and the largest provider of fixed telephone services in the United States through AT&T Communications. Since June 14, 2018, it is also the parent company of mass media conglomerate WarnerMedia, making it the world's largest media and entertainment company.

Provider	Type of Service	Business / Residential	Download Speeds (Mbps)	Upload Speeds (Mbps)	Cost/Month
AT&T	DSL	Residential	3 (250 GB Cap)	1	$40
AT&T	DSL	Residential	6 (250 GB Cap)	1	$40
AT&T	DSL	Residential	50 (1000 GB Cap)	20	$40
AT&T	DSL	Both	100 (1000 GB Cap)	20	$60

Figure 15 – AT&T Plans

SuddenLink

Founded in 1992, the cable internet provider went through several name changes, including Classic Communications, Cerbridge Connections, and then Suddenlink. In the mid-2000s, it acquired most of its customers from Cox and Charter communications. Prior to its acquisition by Altice USA in 2016, it was the seventh largest cable operator in the country. Following the acquisition, it was combined with Cablevision. Suddenlink operates services in 11 states, including Arizona, Arkansas, California, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Oklahoma, Texas, and West Virginia.

Download Speed	Cost/Month
Internet 100 Mbps	$89.99
Internet 200 Mbps	$99.99 Current promotion is $30 per month for a year with 1 month free
Internet 400 Mbps	$119.99
1 Gig Internet	$139.99

Figure 16 – SuddenLink Plans

EarthLink

Earthlink provides a variety of Internet services for more than one million customers throughout the United States, among which include more than 150,000 business clients. Since the company was first established back in 1994, Earthlink's services include DSL, satellite, cable and wireless solutions. Half of the United States can order packages through Earthlink. However, not all options are available throughout all these states; some may only have the option to order satellite or dial-up Internet. Earthlink also provides standalone DSL, allowing customers to opt out of telephone services.

Provider	Type of Service	Business / Residential	Download Speeds (Mbps)	Upload Speeds (Mbps)	Cost/Month
EarthLink	DSL	Residential	3	UA	$40
EarthLink	DSL	Residential	6	UA	$45
EarthLink	DSL	Residential	7	UA	$50
EarthLink	DSL	Residential	15	UA	$55
EarthLink	Fiber	Residential	75	UA	$70
EarthLink	Fiber	Residential	100	UA	$80
EarthLink	Fiber	Residential	200	UA	$90
EarthLink	Fiber	Residential	1000	UA	$100

Figure 17 – EarthLink Plans

Rise Broadband

Rise Broadband (Rise). Rise, headquartered in Englewood, Colorado, is the nation's largest fixed wireless broadband service provider, delivering high-speed Internet and digital voice services to nearly 200,000 residential and commercial customers across 16 states. Rise's parent company, JAB Wireless, Inc., was incorporated in 2005 and previously operated as Skybeam, Digis, T6, Prairie iNet and Rhino Communications. All names were re-branded under the Rise name in 2015. Rise provides pricing discounts based on contract term length including installation discounts.

Download Speed	Cost/Month
25 Mbps	$80
50 Mbps	$90
100 Mbps	$100

Figure 18 – Rise Broadband Plans

Grande Communications

Grande Communications was established in 1999 as a recipient of the largest round of venture capital funding in Texas. It provides internet, telephone, and cable service in nine markets of Texas and provides enterprise service at several university campuses. An upcoming merger of Grande Communications is expected with RCN Corporation and Wave Broadband.

As of 2018, the following are their internet service plans:

Tier	Download Speed	Upload Speed	DOCSIS
Power 50	50 Mbps	5 Mbps	DOCSIS 3.0
Power 300	300 Mbps	20 Mbps	DOCSIS 3.0
Power 600	600 Mbps	35 Mbps	DOCSIS 3.1
Power 1000	1000 Mbps	50 Mbit/s or 1000 Mbps	DOCSIS 3.1/Fiber

Figure 19 – Grande Communications Plans

Frontier (DSL and Fiber)

Frontier Communications Corporation is a telecommunications company in the United States, which was known as Citizens Utilities Company until May 2000 and Citizens Communications Company until July 31, 2008. The company previously served primarily rural areas and smaller communities, but now also serves several large metropolitan markets.

The table below shows the cost of Frontier Communications' residential and business plans:

Provider	Type of Service	Business / Residential	Download Speeds (Mbps)	Upload Speeds (Mbps)	Cost/Month
Frontier	DSL	Both	24	3	$30
Frontier	DSL	Both	45	6	$35
Frontier	DSL	Both	100	12	$50
Frontier FiOS 50/50	Fiber	Both	50	50	$30
Frontier Vantage Fiber 50/50	Fiber	Both	50	50	$40
Frontier FiOS 75/75	Fiber	Both	75	75	$40
Frontier FiOS 100/100	Fiber	Both	100	100	$40
Frontier Vantage Fiber 100/100	Fiber	Both	100	100	$50

Figure 20 – Frontier Plans

In addition to local and long-distance telephone service, Frontier offers broadband Internet, digital television service, and computer technical support to residential and business customers in 29 states in the United States. Frontier is the eighth largest provider of broadband internet in the United States with 3,735,000 subscribers. It is also the 11th largest pay television provider in the United States with 838,000 subscribers.

It is important to note that in 2020, Frontier prepared to file for bankruptcy. According to sources, a "Frontier bankruptcy would rank as one of the biggest telecom reorganizations since WorldCom Inc. in 2020, Frontier is holding discussions with prospective lenders to negotiate the terms of a so-called debtor-in-possession loan, which would provide the liquidity to support the company's restructuring." In May 2021, Frontier exited the Chapter 11 bankruptcy.

HughesNet
Hughes Network Systems, LLC (formerly Hughes Communications) was founded in 1971. It is a wholly owned subsidiary of EchoStar (DirecTV). Hughes Network Systems is headquartered in Germantown, Maryland and provides a high-speed satellite internet service, HughesNet. The key aspect that differentiates it and other satellite operators from terrestrial purveyors is not speed but data caps - how much data is allowed per month in a given plan. As you increase in service tiers, you pay more for more data.

Plan	Download Speed – Up To (Mbps)	Upload Speed – Up To (Mbps)	Cost/Month
Internet	25 (10GB cap)	3	$59.99
Internet	25 (20GB cap)	3	$69.99
Internet	25 (30GB cap)	3	$99.99
Internet	25 (50GB cap)	3	$149.99

Figure 21 – HughesNet Plans

ViaSat (formerly Exede)

ViaSat Inc. (formerly Exede) was founded in May 1986. It is based in Carlsbad, California, with additional operations across the United States and worldwide. In 2017, Exede was rebranded Viasat Internet.
ViaSat is a provider of high-speed satellite broadband services and secure networking systems covering military and commercial markets.
The table below shows the cost of ViaSat's plans. Their plans have data caps in place.

Plan	Download Speed – Up To (Mbps)	Cost/Month
Bronze	12	$49.99
Silver	25	$69.99
Gold	50	$99.99

Figure 22 – Viasat Plans

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Community Engagement

The beginning point to understand broadband in McKinney was the Market Assessment. It is a good tool that is based on information that providers report to the Federal Communications Commission (FCC). It provides an important starting point, but it is known to have flaws in reporting delays and some inaccurate information.

To challenge or verify the Market Assessment findings, the next step is to engage the community in ways to get real-time, ground-truthed information. That is done in a formal Community Engagement process. The specific Community Engagement tools are:

- Survey of residences and businesses
- Meetings with City Department teams
- Meetings with providers

We found is the information that providers have reported in their 477 data appears to be fairly accurate. The broadband that is available in the City is **good**. 100/10 is available in most of McKinney. That is good as compared to much of the United States, but is not world class (which is currently more aligned with scalable to 1 Gbps). This indicates a lack of a unified fiber network across McKinney.

City department leaders also confirmed the benefits of the internal governmental fiber network. They also shared their possible needs in the future, which, because of the fiber tech base, can be added if those innovations make financial sense.

The Community Engagement process begins with a detailed Community Engagement Plan that outlines:

- Goals
- Messaging
- Avenues to engage recipients (social media, organizations, events, printed materials, etc.)
- Questions for the Survey
- Questions for the public sector
- Press release
- Etc.

The goal of the Community Engagement Plan is to define all of the steps that will be taken to engage those who are asked to respond, who will take them and what the content of the engagement will be. This is a dynamic tool to be used to foster the collaboration needed to get good results from the survey and meetings.

The complete Community Engagement Plan is in Attachment B.

Survey

The City of McKinney has strong relationships with the citizens and businesses. Through those relationships and the channels of communications for those relationships, the survey received very good response. To be statistically relevant, based on McKinney's population, the number of responses needed would be between 380 and 400 responses. McKinney received 1,304.

The breakout of the responses can be seen in the graphic below. With more startup and home-based businesses being established in the last several years, we give people the option of how to classify their business, then we combine the numbers. This was an excellent response to the survey.
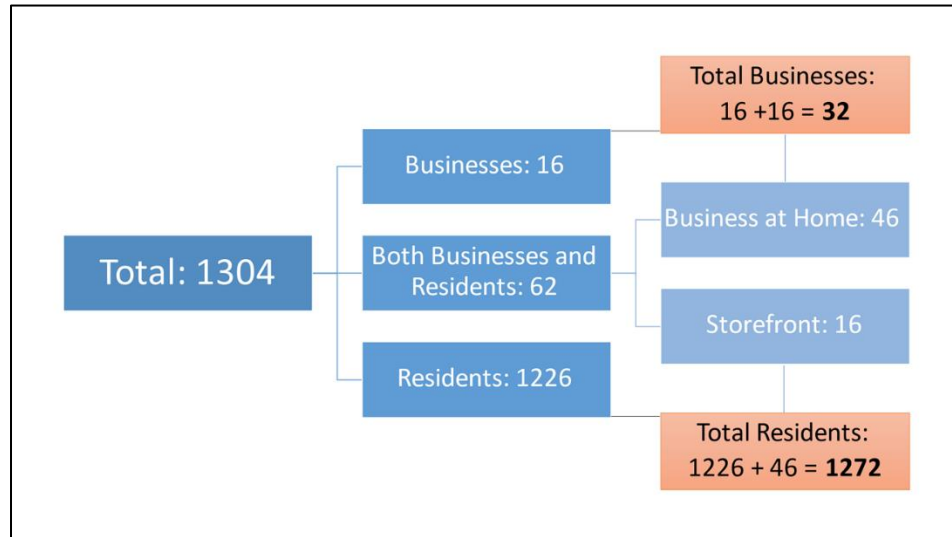

Figure 23 – Breakout of Survey Responses

The demographics of the survey respondents fairly closely mirrored the overall demographics of the City. Therefore, we did not see any significant numerical demographic preferences. In some surveys, there can be some demographic element that has a greater response than the normal population. In those cases, we have to determine if the results are swayed in any particular direction because of those unexpected response patterns. In McKinney, we did not see any response
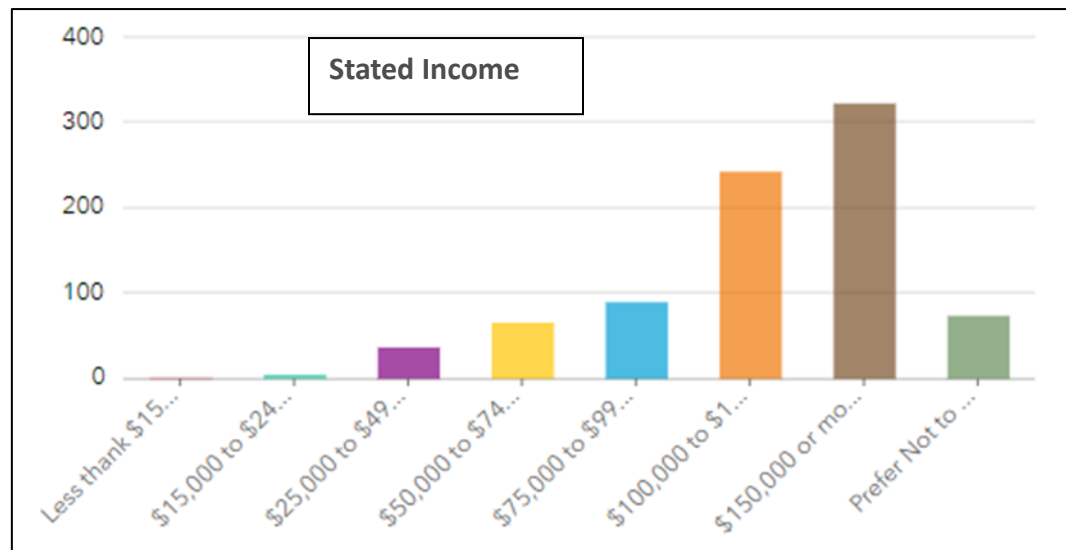

Figure 24 – Stated Income

categories that were dramatically different than the population as a whole. One exception to that is there were more males who took the survey than females, with that difference being greater than the normal population statistics. In looking at the other findings, we did not see where this difference appears to bias the results.
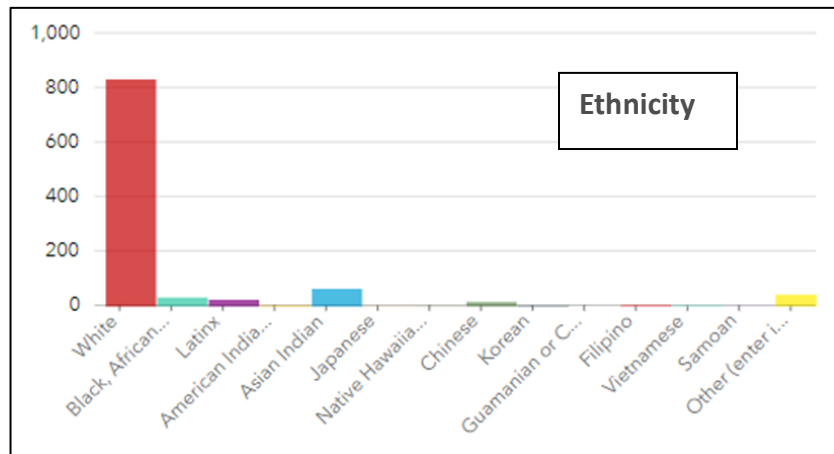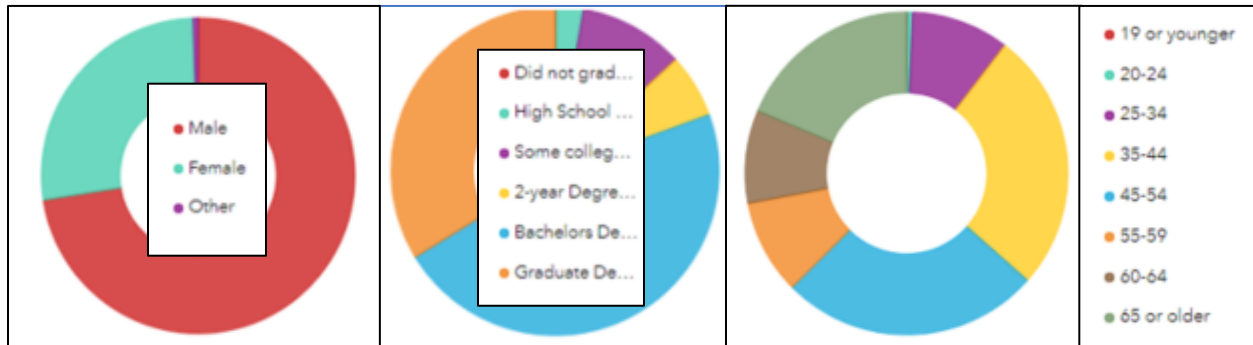
Figure 25 – Ethnicity Response in the Survey

Figure 26 – Gender, Education and Age Responses in the Survey

Speeds were recorded as part of the survey. There were a mix of speeds, but most of the recorded speeds showed good connectivity. The red dots indicate speeds between 1 Mbps and 10 Mbps download. Orange represent 10 Mbps to 25 Mbps (with 25 Mbps being the lowest speed that qualifies as broadband in the FCC guidelines). The darker the green, the faster the recorded download speed, with the dark green representing 250 Mbps to 1 Gbps.

Where there are red or orange dots in close proximity to clusters of dots in shades of green, there are different possibilities of why the speeds at the red and orange dots are not as good as those around them. One possibility is that there are better plans available, but the consumer has chosen a plan with lesser speeds because of cost or their not feeling that they need faster speeds or greater capacity. Another possibility is that they have chosen a provider with a less robust infrastructure because of price or because the consumer was not aware of other options. Worse speeds can also be because of the equipment the customer owns (an old computer, a faulty WiFi router, etc.).

Taking those variables into account, there are some clear summary messages in the survey results map:

- There are good speeds across McKinney (which verifies the 477 data), but they do not appear to be consistent or covering the whole City

- There are some clusters of red and orange dots. Those might be areas where there is not as good broadband available
- The coverages appear fairly good across the City in general (again, verifying the 477 data)
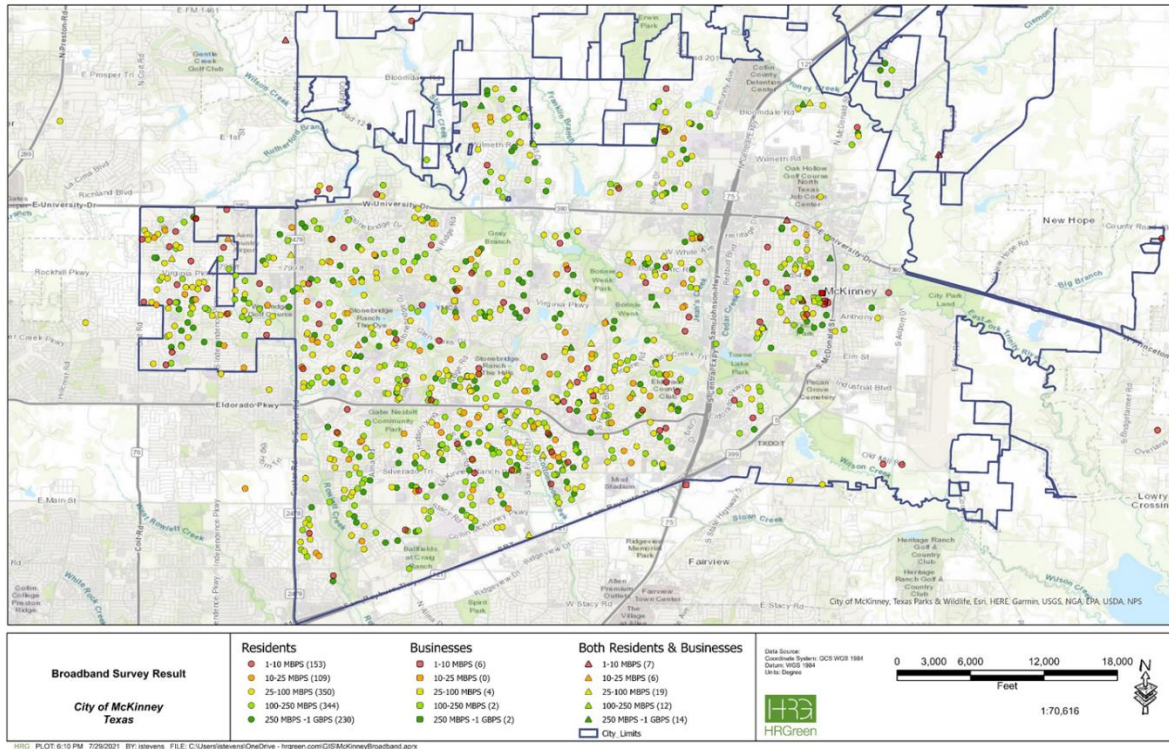
Figure 27 – Survey Map of Speeds

Survey respondents were also asked about how satisfied they are with the services offered from their providers. Figure 25 documents their responses. In general, it appears that consumers are, basically, satisfied with their customer service experience and data allowances. Regarding price and their speed/data rates, it does not appear that customers are particularly satisfied. Reliability seems to be, in general, mostly satisfying.
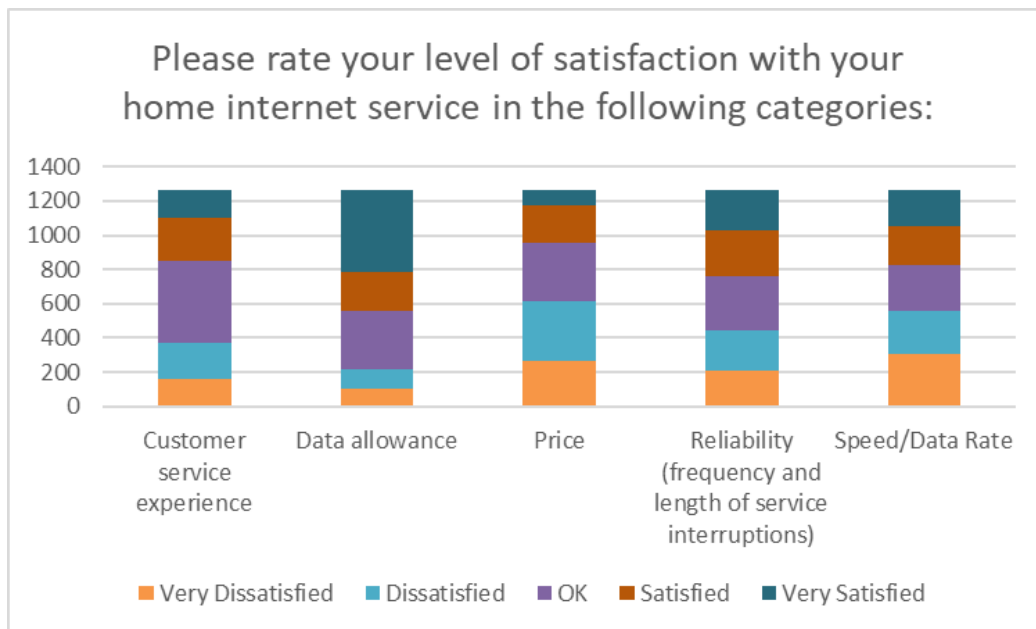
Figure 28 – Customer Satisfaction by Category

Similarly, respondents were asked about the importance of certain aspects of broadband. In the left section of the graph below, citizens clearly felt all of the broadband impacts were very important. The graph on the right shows how well they feel the providers are meeting those important needs. What is striking is the customer responses are underwhelming.   The vast majority of the responses were marginal (Mostly, OK and Bare Minimum). Those three responses totaled 89% of the responses. Those responses indicate the feeling that McKinney's broadband is good (at best), but certainly not exceptional.
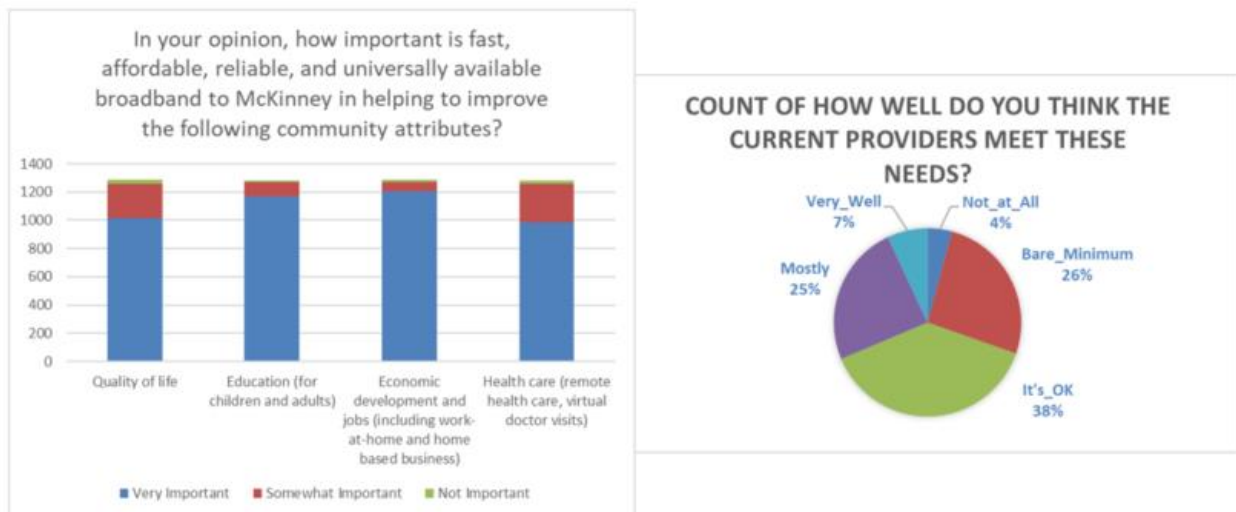
Figure 29 – Customers' Response to Important Broadband Characteristics

Figure 29 reflects the findings of this report that current broadband services are adequate, but not future-proofed. Thirty percent feel that current providers are not meeting needs and thirty-eight percent feel services are OK (totaling sixty-eight percent). While thirty-two percent feel needs are met in the community. Citizens in McKinney were asked their opinion about a new provider or municipal involvement in improving broadband.
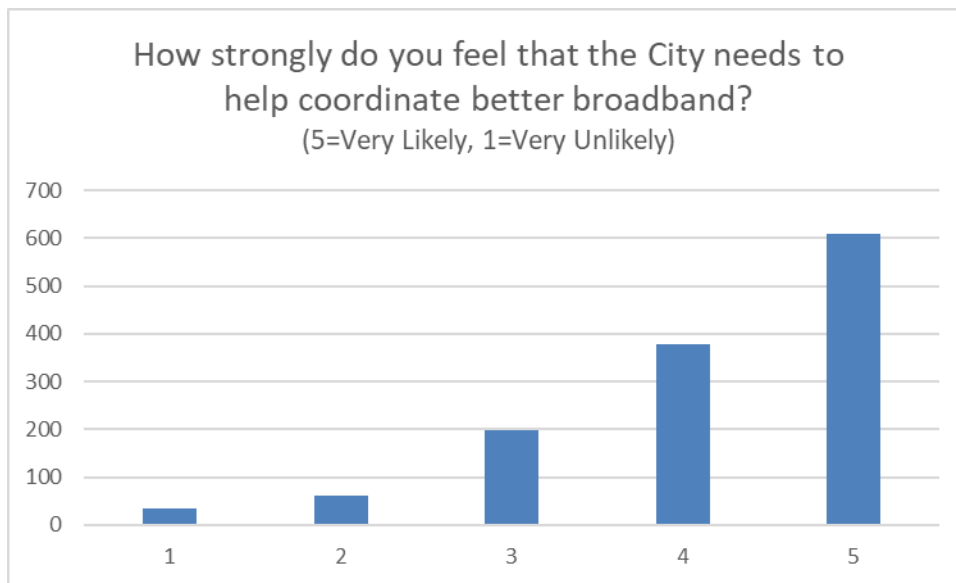
Figure 30 – Citizens' Request for City Involvement
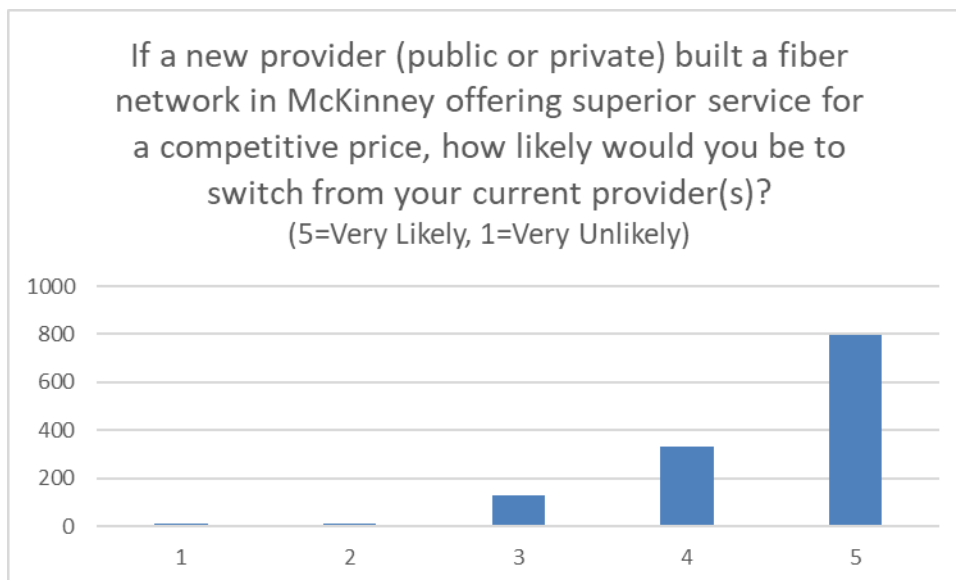
Figure 31 – Citizens' Response to New Providers
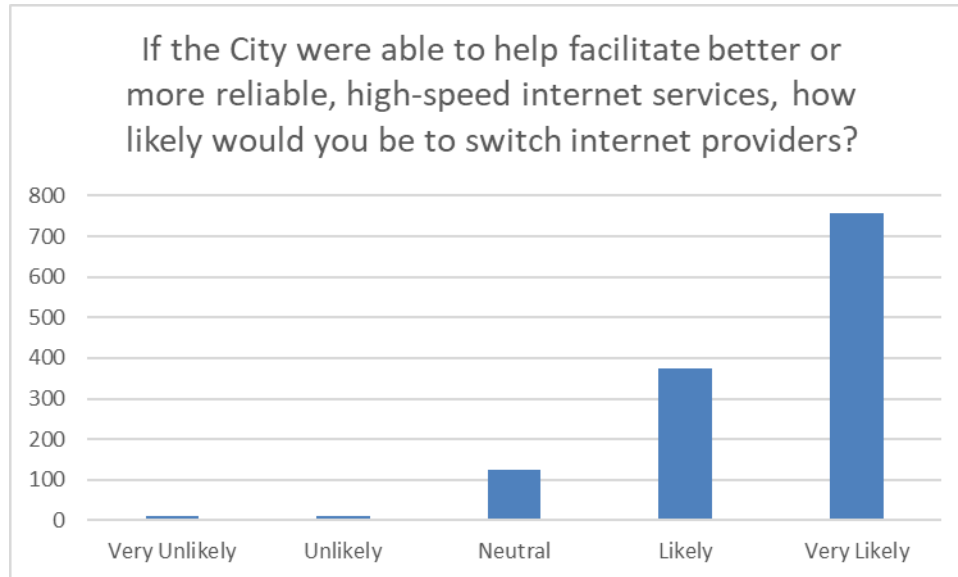
Figure 32 – If the City Helped with Better Broadband

Survey Summary

The City staff deserves credit in their communication with citizens and the channels they have developed to communicate with citizens. The survey had much better results than we often see and we thank the City staff for enabling those results.

The community survey largely supported the findings of the Market Assessment. The survey showed that there are **good** speeds in the City and a general feeling that broadband is acceptable. But, a deeper look at the responses shows that citizens and businesses do not feel that their connectivity is exceptional and are supportive of the City trying to help improve broadband. If McKinney had world-class broadband, built on a future proof tech base (mostly fiber), the results of the survey would have likely been much more enthusiastic about current services and less supportive of the City helping make improvements.

Stakeholder Meetings

Part of the Broadband Assessment process is gaining an understanding of how the current connectivity meets current needs and whether it is prepared for anticipated future demand. One task to evaluate current connectivity is a survey of residents and businesses. A survey was made available and results of that are in a separate report. The other important measure of current and future connectivity is the public sector and key stakeholders. To understand their current and future connectivity needs and resources, meetings were coordinated to discuss these issues. HR Green conducted interviews with the following departments:

- Information Technology
- Parks and Recreation
- Public Works

- Police
- Fire
- Libraries

At the highest level of analysis, McKinney has an active internal broadband program coordinated by the IT Department. There is a fiber backbone for City governmental use and several initiatives to continue improving that network.

In general, connectivity for City facilities is good, reliable and serves the needs of the departments.

Because of changing technology and needs, connectivity is more of a process than it is a final destination. A core fiber network has been deployed over several years through the efforts of the City IT Department. It meets the critical City departments connectivity needs. The City IT Department continues to work with the other City departments to extend the City fiber network to meet the additional needs that are identified. This will be discussed later in this report, but one focus of the recommendations of this report is to continue to define, refine, prioritize and fund the further extensions of the core City fiber network. This core fiber network is a strength for McKinney and should continue to be upgraded and extended.

Departments do have some current and future needs that will be further outlined in this summary. It is important to note that these are, by and large, already part of the initiatives to improve the City network. They are highlighted in this report so that they are included in the Broadband Assessment, not because they are unknown to, or are not currently being discussed, by City leadership.

The main themes that have developed from the public sector/stakeholder meetings are:

- There are planned new facilities that will need to be connected in the core fiber network
- There are some facilities or City assets that are either not yet connected or are on expensive or less reliable technology (cellular, dsl, etc.)
- There are geographical areas of the City that do not have good connectivity options
- There are anticipated growth areas of the City that will need to be evaluated for what the different City departments will need to adequately serve those areas
- There are plans that City departments have that will need greater connectivity
- Right of Way management is a current issue and that will continue to be an important topic
- As construction happens, fiber or conduit can be added at a cheaper cost as compared to a standalone fiber construction project.

Stakeholder Meeting Methodology

The participants were sent the questions in Figure 1 in advance for the departments to have time to think through the questions and their answers. The main focuses of the questions was to learn the departments' current connectivity, whether the current connectivity meets their current needs; and whether the departments envision future services that could require greater capacity.

City of McKinney, TX Broadband Discovery
Public Sector Needs Questionnaire – 8/31/21

The public sector has needs that need to be addressed in a Broadband Master Plan. Public sector entities can include:

IT	Parks and Recreation
Public Works	Planning and Development Services
Administration	Economic Development
Emergency Services	
Emergency Management	
Police	
Fire	

1. Current
   How is connectivity done currently today?

   Are there assets that aren't connected that would be good to have connected?

   Is there adequate redundancy (is your connectivity/internet reliable)?

   Is the connectivity what you want or are there improvements to make?

   How much is done on McKinney owned assets?

   How much is handled by private providers?
   Is customer service from private providers adequate?
   Are costs acceptable?   What are you currently paying?

2. Future
   What do you know of that is planned in the next 5 – 10 years that will require broadband in each of the departments?

   Is the current connectivity adequate to handle these next steps?

   Could connectivity keep you from taking these steps?

Figure 33 – Public Sector Questionnaire

Public Sector Meeting Findings

Information Technology

Attendee: IT Department Director

Current Infrastructure

One of the most important broadband assets for The City of McKinney is the City's development of an internal City owned 10 Gig fiber network. This is an important asset for the City government, providing stable, robust, network for City internal connectivity. Most City buildings are connected to the fiber network as well as two or three of the water towers. The City currently has two connections to the outside internet with different providers, which provides a backup plan when necessary.

The City also owns and operates a 1 Gig wireless ring on water towers that is a radio ring microwave. This ring includes duplex spur sites. This is licensed and primarily used for public safety.

There are some public extensions of the City's internal private network.

Options to Add to and Improve the Internal Fiber Network

A review of the current City internal fiber network has shown that it has been developed well and serves the City government in very positive ways. Complex networks like this continually have possibilities for improvement. In the meeting with the IT director, several specific opportunities to add to or improve the network were identified.

Redundancy is good, but there are options to make the redundancy even stronger. The IT Department is currently assessing where improvements could be made to improve redundancy. This is an important assessment to provide the most stable connectivity as possible. In the Fiber Extensions section of this Plan, there are recommended segments to add to the network. If those can help improve redundancy, they should be given a high priority. If the IT Department identifies segments that could improve redundancy that are not on the list in the Fiber Extensions section, those segments should be added to the list (and given a high priority).

There are some buildings that are not connected to the current network:
- Some fire stations: Fiber is currently built to three (3) of eleven (11) stations. The stations without fiber have 10 Mbps point to point that costs $650 to $800/mo.
- The New fire administration building that is being built will be connected to the fiber ring
- The new City Hall will require a significant level of connectivity – including having a data center in the building

And, there are some other improvements or additions to the network that could prove beneficial for the City:
- The City is looking to add a third connection to the internet in 2022 to provide

- Parks system: The Parks Department buildings/offices are on the City ring. There is, currently, an opportunity for a $1 million ARPA grant for further connectivity in the parks system
- Fiber to other assets that are not connected is also being reviewed and are included in the Fiber Extensions section
- Fiber on towers is being considered to provide connectivity for cameras and device control
- Adding cameras that can have backhaul for live or recording is being explored
- Some parts of the City network have 48 count fiber. That is serving the City well, but there could be opportunities to increase fiber counts in the future. Any new builds should contain higher fiber counts, which have specific recommendations in

A typical question in most communities regarding what will access fiber is whether SCADA will have its own system or be part of the fiber network. In McKinney, SCADA is not being considered to move to fiber in the short term. SCADA has a communications system that could be moved to cellular, but those are independent decisions from fiber connectivity. Having SCADA on its own network is the most common decision.

For maintenance, there is a contract with CapCo Communications. This contractor takes the fiber line to termination. CapCo seems to have a larger role in broadband in McKinney than contractors in many communities. That is neither good nor bad, but something to continue to evaluate and, having more contractors who are familiar with and able to work on McKinney's fiber could be beneficial.

Parks and Recreation

Attendees: Department Director and Staff

The City of McKinney has an excellent parks system with 3,000 acres in park land and six facility main buildings that are all connected to the City fiber. The City fiber provides the connectivity for those buildings that are needed for their communications needs.

There are some connectivity issues that are in on-going discussions with the City IT Department.
- Cellular connectivity: Parks and Recreation Department employees current use their personal cell phones in the field (for lack of other ways to connect). Given the locations of some of the parks, there can be only one cell phone connection over private networks. This can cause some challenges, particularly during events when cell phone coverage can be difficult

  Cell phones are an important part of the Parks and Recreation work. The irrigation system and lights can be set through cell phones.

- Large events: Connectivity during large events can cause challenges. Employee cell phones can have difficulty accessing the cell network when there are thousands of attendees also using the cell networks. In large events, it can be hard for vendors to access the internet on their cell phones to accept credit card payments

- Rec Center: Fiber was considered for connecting the Rec Center, but it would cost $80,000, so that was decided not to do at the time

The Parks and Recreation Department does some connectivity priorities. These are in ongoing conversations with the IT Department, but are listed here to keep as priorities in the Broadband Assessment:

- Having connectivity capacity for Parks and Recreation own internal use – particularly at large events
- At large events, a network for vendors so they can process credit cards
- Playground connectivity for options, including possibilities for children with disabilities
- Possibly kiosks for information, reservations, event information, etc.
- Possibly cameras in parking lots
- Possibly license plate readers in parking lots
- Trails – conduit and small cells
- People counters
- Live streaming of events

Public Works and Engineering

Attendees: Public Works Director and Director of Engineering

As with other City departments, Public Works has offices and other assets throughout the City. The Public Works offices are connected to the City core network, which provides the connectivity that they need for their office work. Some of the other Public Works assets and facilities are connected and some are not. Public works has ongoing discussions with the City IT Department about what other assets could be connected and when those connections could take place.

Public Works has important roles in connectivity. Because Public Works does utility and road projects, they have an opportunity to install conduit as part of these other projects. The current practice is to install two (2) three inch (3") conduits on any new project. On the other side of the road, the current practice is to install a two inch (2") conduit for street lighting and irrigation. Given the increase in broadband needs, we recommend considering adding a third conduit when possible.

Public Works also has some measure of control over the City's Right-of-Way (RoW). RoW is a limited asset and broadband can take a lot of available space. Adding conduit can help manage future RoW use. As part of RoW management, the City's preference is for buried utilities, but there is aerial broadband infrastructure and pole attachment agreements are considerations. As part of Phase I of the City's broadband steps, a RoW Management system was developed. We recommend utilizing that system to manage RoW. Having empty conduit available could be included as part of mitigation of lack of available RoW in some segments of the City. Evaluating the impacts of which utilities have franchise agreements and which do not could be significant in this process. Also, as RoW is reviewed, it is recommended the City continue to consider how use of RoW can pay for itself (within Texas statutes).

CapCo does all fiber construction and moves and owns some infrastructure. Making sure the City knows what capacity is owned by the City in different segments of co-ownership could be helpful to know if there are capacity issues

Public Works identified some general and some specific future broadband goals:

- General:
  - Connectivity – fiber to all facilities
  - Redundancy – either with fiber or different technology – for example, if fiber is cut on 380, there is no loop, so all connectivity south could be interrupted
  - Growth – northern areas will need infrastructure and connectivity of that infrastructure
  - Some existing City fiber is 48 count
    - Traffic and IT alternate controlling either 12 or 36
    - Are those controlling distinctions necessary?
    - Is 48 count enough?
- Specific:
  - There is a new Public Works facility planned in the area of Community Avenue
  - There is a desire to connect the park system with fiber
  - Will want to connect the pumping station and water tower – currently on a cellular connection
  - There will be a new water tower on Stacey Road that could be connected and possibly used for a location for other technology infrastructure
  - At some point, it would be good to connect the lift stations
  - The City's growth to the North could add another 100,000 people on North/South arterials – the connectivity of signals, traffic management, and road construction (installing conduit during those projects) will be considerations

Police

Attendee: Deputy Chief of Police

The Police Department has offices that are connected on the City fiber network (public safety building, storefront building on the square, in the fire building). Their connection is good and meets their connectivity needs.

In the office, the police mainly use laptops that are wireless and connect to WiFi. In the field, the main connectivity is through radios. This radio connectivity is mostly good and the radio system has never gone down, but there are some dead spots within McKinney City limits – mainly in the far southwest of the City. Cell phones and text are the backup communication systems to the radios in the field. In large City events, the police radios work. Because cell phones are the backup, if the radio system did have a problem and the police had to go to cell phones, the cell phones would likely not work in large events.

The Police Department utilizes Milestone to access all City information and in surveillance rooms. It does not work as well in some rooms, which is something to be looked into.

To print citations, the Police Department has handheld devices that are not connected to the cars – based on Bluetooth. Those work, but alternative might be explored over time.

The City does have street-light cameras, but the data is not recorded. Connectivity could help develop a

system in which that data could be recorded, but there are several considerations that would need to be decided to make that type of system fully operational.

The City does not currently have a License Plate Recognition system. That could be a future consideration. If so, how the components would be connected would need to be defined and implemented.

FirstNet – the police have looked at this and are interested, but have not adopted. There is a concern with proprietary devices between AT&T and Verizon and the challenges that would cause if they adopted FirstNet. Those proprietary issues are being evaluated. Whether they can be overcome is yet to be determined.

The Police Department does have some specific possible future decisions that would have connectivity needs:

- Command Post Vehicle: the Police Department is considering a Command Post Vehicle that will require good connectivity
- There could be another building in the park in the future

Fire

Attendee: Assistant Fire Chief

The City of McKinney Fire Department has fiber connection to three of their eleven stations. Stations are currently limited to 10 Mbps download and 10 Mbps download. As was stated in the IT Department meeting, this is something that is being addressed and is in ongoing discussions.

For connectivity in the field, the Fire Department uses phone like radios. Also, Cradle Point with a Verizon card is also utilized. There are some issues with this system:

- The current radios do not have GPS – so rely on cell phones and iPads, but the signal can be weak in the ETJ
- There is a need for a tower in the Southwest quadrant of the City - currently there is some bleed-over with the City of Frisco and the Fire Department uses AVL over Cradle Point through Verizon – signal is sometimes a problem. In apartments, there can be a signal problem – this is particularly important if they need more resources

Some other components of the connectivity of the Fire Department are being analyzed:

- RMS does not work with the microwave system
- In large events, it would be good to be able to section out priority connectivity service for emergency response – that is currently not available
- For inspections, the Fire Marshall has to manually input the information, then sync at the station, then use cellular to send it to the recipient

For many of the same reasons as the Police Department, the Fire Department is also not utilizing FirstNet. The Fire Department has the same concern over the difference between AT&T and Verizon proprietary equipment.

Library System

Attendee: Library Assistant Director
McKinney currently has 2 library locations. There is a potential for a third location in several years. Each of the buildings has two networks:
- Internal functions and operations are on the City fiber network
- Connectivity for patrons is through a private internet service provider. This connectivity is provided in WiFi and in computer stations

The library provides technology resources for people who do not have their own access to those resources. Examples of that are:
- People who do not have internet other than their cell phone
- People who come in to print
- Homeless and working poor use the library internet
- Students and business people come to the library for a better connectivity
- There is a smaller group of people who are heavy users of connectivity

The Library provides connectivity for a segment of the McKinney population who do not appear to have other adequate sources for broadband or who have some barrier to being able to utilize broadband in their homes. There is a significant need. Seventy-five to eighty percent of stations are in use in a fairly constant flow.

Mobility of use is a growing interest (within the library and outside the library) that the Library is exploring. There is a lot of use of people coming in with their own devices and connecting to WiFi. The library is considering starting a laptop checkout to only be used in the library (given the interest in this form of connectivity).

Some possible future needs and broadband opportunities that the Library has identified are:
- Internal equipment and hardware will likely need to be upgraded in the next few years.
- The possible new third location could be tech heavy with security and new technologies like book lockers – all of which will need connectivity.
- The library has had coding programs that were fairly popular and might continue in the future.
- There is also a possibility of a business library in the new City Hall. There will be likely be some need for some connectivity in that location.

Fiber Extensions for the City Network

The City has a robust fiber network to connect internal offices and many of the City's assets. The Information Technology Department is to be commended for their forward-thinking work to put this network together and to continue to develop it. This is an asset that distinguishes McKinney and future-proofs the City's ability to deliver services.

The Information Technology Department is aware of extensions that could be made to further utilize this fiber network. In the meetings with the other city departments, leaders had suggestions for connectivity, which had been discussed with IT. The communication between departments and IT appear to be good and the discussions of connectivity needs have been part of the dialogue and are ongoing.

In this section, HR Green performed a high-level design and high-level costing of the possible extensions. City IT knows many or all of these possible extensions. They are included in this Plan as a reference and as an order of magnitude for City leaders to consider for budgeting or grant purposes.

The existing capacity and availability of fiber was not examined in detail. It could be useful to ensure there is ample capacity for future use and these extensions.

The below maps show existing fiber and potential fiber extensions. Costs are also included after the maps. These are not intended to provide a list of extensions to be built in one project. If that were possible, that would be a great improvement to the City network, but it is more likely that these segments would be built over time.

To facilitate the process of identifying and prioritizing potential fiber builds, after the maps are spreadsheets of high-level costs. These are intended to help with prioritization, planning and budgeting. Material and fiber construction labor costs are fluctuating, so it could be beneficial to update cost projections as projects are progressing. Also, lead times for materials and availability of construction companies are extending, so those should be taken into account in planning and budgeting (some materials could be a year before they can be received).

The costs in Figures 41 and 42 are high-level. HR Green provides high-level design that is more detailed than most high-level design in the industry. The routes are designed to include details such as footages, handholes, material costs, overhead costs, construction costs, splicing, etc. What distinguishes high-level cost from detail design (or low-level costs) in HR Green design is high-level design is not field verified.

The typical sequence would be to produce a high-level design, then those drawings are used by field collection personnel to walk each segment and make sure there are not impediments to a fiber build and that the optimal path is used. Those marked-up notes are used to produce the detail or low-level design.

This map is a high-level view, showing the entire city with the existing fiber and planned extensions. Subsequent maps will show enlarged sections.
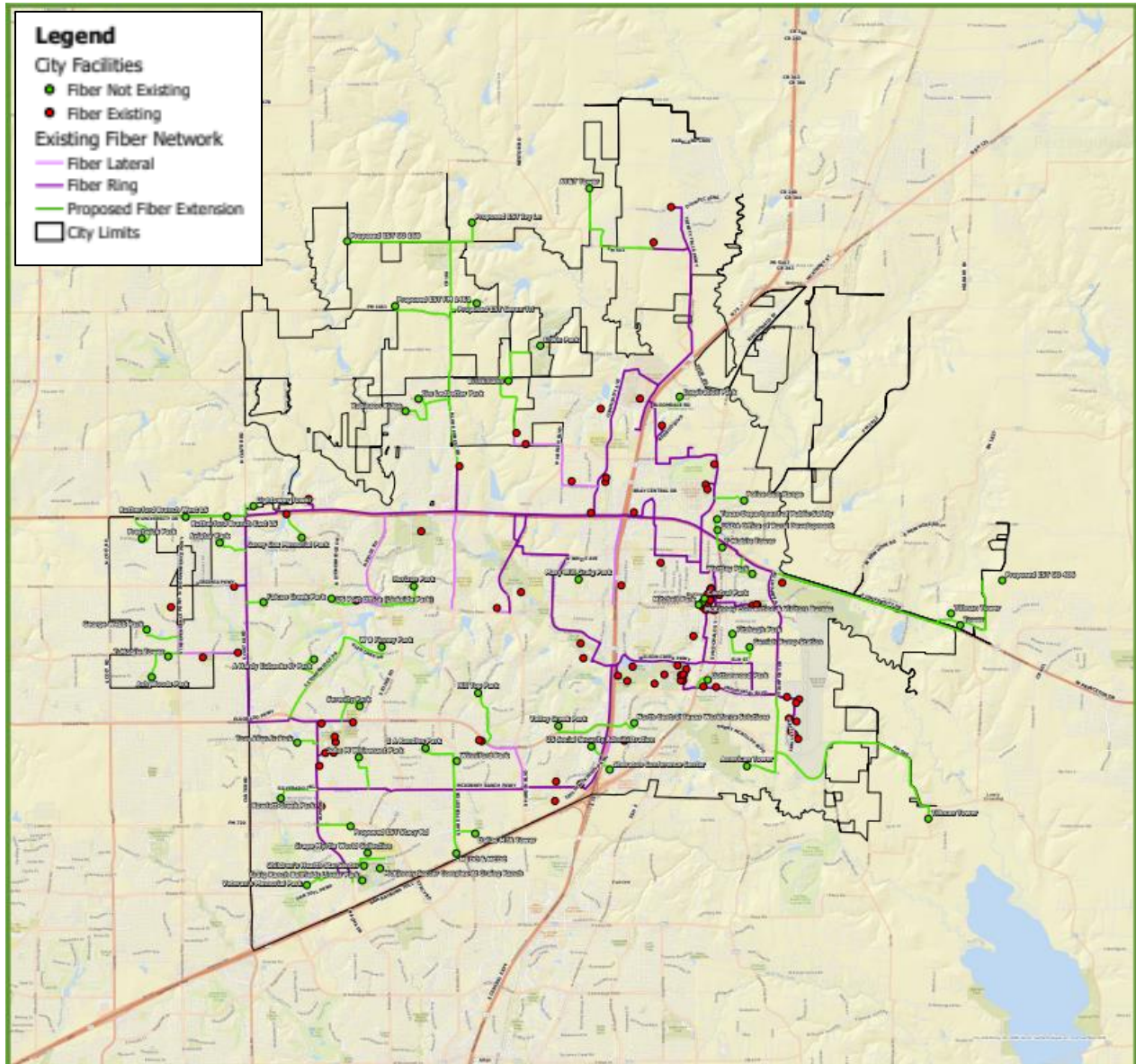
Figure 34 – McKinney Existing Fiber Ring with Possible Extensions

Figure 35 (below) enlarges the potential extensions in the downtown area. The proposed fiber routes are delineated in segments. Each segment is numbers on the map and given a description in the segment legend (describing what is connected by that segment). Each segment is also measured with the lineal feet listed.

	Segment	Length (ft)
23	Central Park	265.90
24	McKinney Convention & Visitors Bureau	290.83
25	Mitchell Park	445.80

Legend

City Facilities
- Fiber Not Existing
- Fiber Existing

Existing Fiber Network
- Fiber Lateral
- Fiber Ring
- Proposed Fiber Extension
- City Limits

Figure 35 – Downtown McKinney Fiber Ring and Proposed Extensions

The next section in Figure 36 on the next page is north McKinney.

	Segment	Length (ft)
1	AT&T Tower	9566.99
2	Brinkmann	5411.37
3	Erwin Park	4239.88
4	Jim Ledbetter Park	7700.01
5	Robinson Ridge	2890.16
6	Proposed EST Geren Trl	9258.42
7	Proposed EST FM 1461	4519.88
8	Proposed EST Ivy Ln	8484.31
9	Proposed EST CO 168	8013.89
10	Inspiration Park	2493.86
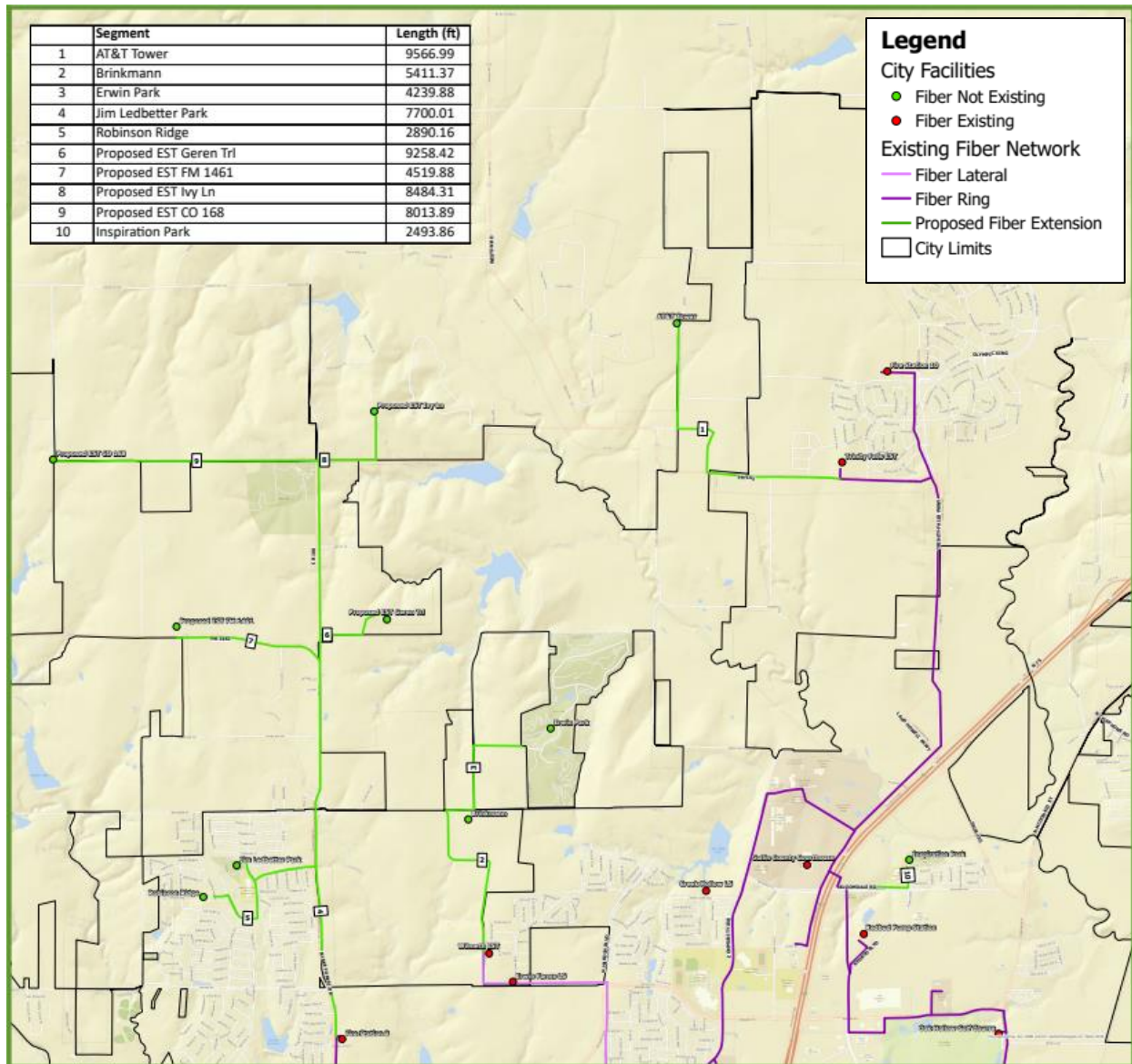
Figure 36 –North McKinney Fiber Ring and Proposed Extensions

Figure 37 on the next page shows the fiber ring and proposed extensions for east McKinney.

	Segment	Length (ft)
11	Future Tower University Dr	15275.40
12	Tillman Tower	1237.18
13	Proposed EST CO 406	6712.70
14	USDA Office of Rural Development	624.58
15	Texas Department of Public Safety	899.99
17	American Tower	8356.95
18	Cottonwood Park	1271.40
19	Gerrish Pump Station	1303.80
20	Fitzhugh Park	2611.80
21	T-Mobile Tower	732.48
22	Wattley Park	1703.72
60	Tillman Tower	18837.93

Figure 37 – East McKinney Fiber Ring and Proposed Extensions

The last map is south McKinney in figure 38 on the next page.

Segment	Length (ft)
26	North Central Texas Workforce Solutions	2313.83
27	Sheraton Conference Center	738.55
28	US Social Security Administration	939.69
29	Valley Creek Park	4087.96
30	Mary Will Craig Park	1664.16
31	Hill Top Park	4314.20
32	MEDC & MCDC	4860.69
33	Dallas MTA Tower	1573.38
34	Winniford Park	2235.04
35	E A Randles Park	2763.02
36	Craig Ranch Ballfields Linear Park	755.33
37	Children's Health StarCenter	1126.80
38	Crape Myrtle World Collection	940.68
39	McKinney Soccer Complex At Craig Ranch	1270.68
40	Veteran's Memorial Park	2864.99
41	Proposed EST Stacy Rd	2570.16
42	Rowlett Creek Park	3239.51
43	Tom Allen Jr Park	1500.97
44	John M Whisenant Park	3063.93
45	Serenity Park	2740.13
46	A Hardy Eubanks Jr Park	5939.14
47	W B Finney Park	7288.73
48	Horizon Park	3876.02
49	US Post Office (Linkside Park)	2003.03
50	Falcon Creek Park	1036.43
51	Carey Cox Memorial Park	2373.06
52	Lightower Tower	843.69
53	Rutherford Branch East LS	1412.34
54	Aviator Park	2436.86
55	Rutherford Branch West LS	3230.75
56	Prestwick Park	6860.66
57	George Webb Park	2547.12
58	T-Mobile Tower	848.60
59	Ash Woods Park	2476.31

Figure 38 – South McKinney Fiber Ring and Proposed Extensions

These maps include all of the current possible fiber extensions identified by the City Departments (listed in Figure 40 below). These will likely change over time, but they provide a good basis to work from and to review and update. The next section includes the high level costs for these potential ring extensions.

HR Green high-level designs include detailed routes, costs and quantities. Figure 39 on the next page shows the materials lists and quantities summarized for all of the segments. The assumption is that all of these fiber extensions are built underground (as opposed t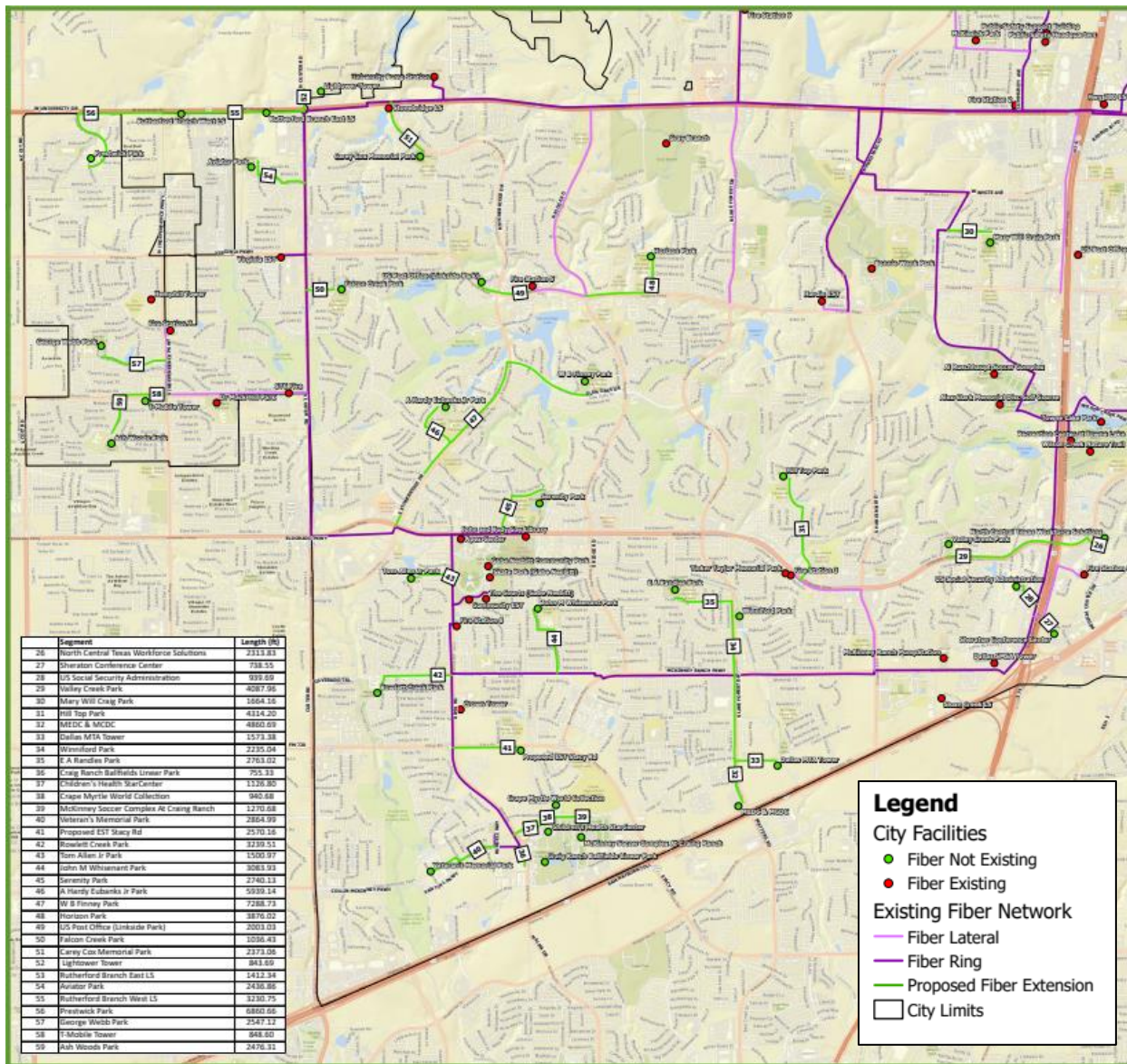o on utility poles). This is more expensive construction, so there could be cost savings if aerial construction was used. And, accessibility to poles would have to be determined, which was not done for this Plan.

Vendor	Vendor Part Number	Description	Qty
Fiber Backbone - New Conduit			
HUBBELL POWER SYSTEM -TELE	ASCF114	CLAMP SUSPENSION .591-.787 MPEI (96ct-144ct)	0
HUBBELL POWER SYSTEM -TELE		CLAMP SUSPENSION FOR 288CT - 432CT ADSS CABLE	0
CHANNELL COMMERCIAL	BULKU132415	HAND HOLE 13X24X15 BULK/SHIELD X LID W/ RACKING ANTI SEIZE PENTA HEAD BC	23
CHANNELL COMMERCIAL	BULKU243624	HAND HOLE 24X36X24B BULK/SHIELD X LID W/ RACKING ANTI SEIZE PENTA HEAD B	231
OFS		FIBER LOOSE TUBE 24 COUNT, SINGLE-MODE - 24,000' WOOD REELS WITH FLEX WI	40,000
OFS		FIBER LOOSE TUBE 96 COUNT, SINGLE-MODE - 24,000' WOOD REELS WITH FLEX WI	215,000
OFS		FIBER LOOSE TUBE 144 COUNT, SINGLE-MODE - 24,000' WOOD REELS WITH FLEX W	215,000
OFS		FIBER LOOSE TUBE 288 COUNT, SINGLE-MODE - 24,000' WOOD REELS WITH FLEX W	215,000
		Slack Loop Kit - Vertical Double Arm Storage Kit	0
COMMSCOPE	FOSC450D66NT0N0V	CLOSURE "D"	142
COMMSCOPE	FOSC-ACC-D-TRAY-36	TRAY (D) 36	568
COMMSCOPE	C82508000	FOSC ACCD POLE MOUNT KIT	0
HUBBELL POWER SYSTEM -TELE		CLAMP DEADEND PREFORMED STYLE	0
HUBBELL POWER SYSTEM -TELE		CLAMP DEADEND PREFORMED STYLE	0
HUBBELL POWER SYSTEM -TELE		FIBER DAMPERS	0
		DOWN GUY AND ANCHOR KITS	0
		MISC Pole Mounting hardware	0
		Innerduct & locate wire	215,000
		3 - 2" HDPE Conduit w/locate Wire	215,000
		FIBER MARKER WITH TEST	231
		Fiber Distribution Panels - Corning or Commscope 144ct units	60

Figure 39 – Material List and Quantities for All Segments Combined

HR Green also developed the following specifications to guide the costing:

Service Location Backbone Construction Cost Estimate Guideline
Locations identified in McKinney
- 60 Service Locations
- 142 Splice Locations
- 231 Hand Holes
1. GIS will provide the following to Network Engineer for each segment:
- Estimated UG footage
- Total Splice points – Underground
- Total Hand Hole locations
- Total Service locations
- Design path map(s)
2. Network Engineer will determine following cost per segment:
- Estimated Material Cost breakout for 96ct, 144ct, 288ct cable options
- Estimated Material Cost breakout for 24ct cable for the laterals to anchor institutions
- Estimated Direct Labor Cost
  - Underground
    - New construction
- Estimated Overhead (Internal) Labor Cost (25%-30% of direct labor cost)
- Estimated Contingency Cost (5%-10% of total cost)
Middle Mile Design Assumptions (segment to segment)

- Follow roads
- Use Loose Tube for 96ct, 144ct, 288ct cable in most situations
- Slack loop every ~1500' (100' slack)
- Splice case every ~4500' or Y locations
- Add FDPs
- Install 3 - 2" conduit package

GIS – Fiber Map – Backbone (Segment to Segment) - Backbone Network
- Path map
  - Include buried color (include legend with footages)
  - Include service building location as referenced in lists provided

Estimated Design Engineering and PMO Labor Cost
- Construction Project Management
- Permitting
- Traffic Control Plans
- Construction Plan Sheets
- GIS Mapping
- Quality Control

The list of facilities that were designed to consisted of the following:

Name	Name	Name
AT&T Tower	T-Mobile Tower	Proposed EST Stacy Rd
Brinkmann	Wattley Park	Rowlett Creek Park
Erwin Park	Central Park	Tom Allen Jr Park
Jim Ledbetter Park	McKinney Convention & Visitors Bureau	John M Whisenant Park
Robinson Ridge	Mitchell Park	Serenity Park
Proposed EST Geren Trl	North Central Texas Workforce Solutions	A Hardy Eubanks Jr Park
Proposed EST FM 1461	Sheraton Conference Center	W B Finney Park
Proposed EST Ivy Ln	US Social Security Administration	Horizon Park
Proposed EST CO 168	Valley Creek Park	US Post Office (Linkside Park)
Inspiration Park	Mary Will Craig Park	Falcon Creek Park
Future Tower University Dr	Hill Top Park	Carey Cox Memorial Park
Tillman Tower	MEDC & MCDC	Lightower Tower
Proposed EST CO 406	Dallas MTA Tower	Rutherford Branch East LS
USDA Office of Rural Development	Winniford Park	Aviator Park
Texas Department of Public Safety	E A Randles Park	Rutherford Branch West LS
Police Gun Range	Craig Ranch Ballfields Linear Park	Prestwick Park
American Tower	Children's Health StarCenter	George Webb Park
Cottonwood Park	Crape Myrtle World Collection	T-Mobile Tower
Gerrish Pump Station	McKinney Soccer Complex At Craing Ranch	Ash Woods Park
Fitzhugh Park	Veteran's Memorial Park	Tillman Tower

Figure 40 – List of End Points for Fiber High-Level Design

Based on these end points and the specs to do high-level design to them, the following costs were calculated. The feet, counts and costs for material and installation are listed in Figure 41 below. Figure 42 shows the segment, feet and costs to enable a spreadsheet that is more readable.

Segment Number	Segment Description	New Underground Conduit Feet	Blended Path Feet	Hand Holes	Splice Points	Estimated 96ct or 24ct Material Costs	Estimated 144ct or 24ct Material Costs	Estimated 288ct or 24ct Material Costs	Estimated Backbone Installation Cost (no splicing)	Estimated Design Engineering and PMO Labor Cost	Estimated 96ct Total Backbone Segment and 24ct Laterals w/Splicing Cost	Estimated 144ct Total Backbone Segment and 24ct Laterals w/Splicing Cost	Estimated 288ct Total Backbone Segment and 24ct Laterals w/Splicing Cost	Totals
1	AT&T Tower	9,567	9,567	8	4	$47,401	$51,497	$69,840	$236,408	$59,102	$392,910	$404,808	$447,161	$1,709,126
2	Brinkmann	5,411	5,411	5	3	$26,811	$29,128	$39,503	$134,723	$33,681	$226,749	$234,841	$262,886	$988,323
3	Erwin Park	4,240	4,240	4	2	$21,007	$22,823	$30,951	$105,757	$26,439	$176,840	$182,533	$202,563	$768,913
4	Jim Ledbetter Park	7,700	7,700	7	3	$38,151	$41,448	$56,211	$190,750	$47,688	$316,260	$325,430	$358,301	$1,374,238
5	Robinson Ridge	2,890	2,890	3	2	$14,320	$15,557	$21,098	$72,814	$18,203	$124,187	$129,244	$146,427	$541,851
6	Proposed EST Geren Trl	9,258	9,258	8	4	$45,872	$49,836	$67,587	$229,002	$57,251	$381,045	$392,798	$434,500	$1,657,891
7	Proposed EST FM 1461	4,520	4,520	5	3	$22,394	$24,330	$32,995	$113,327	$28,332	$192,471	$200,143	$226,308	$840,300
8	Proposed EST Ivy Ln	8,484	8,484	7	3	$42,037	$45,669	$61,936	$209,573	$52,393	$346,416	$355,956	$390,481	$1,504,462
9	Proposed EST CO 168	8,014	8,014	7	3	$39,706	$43,137	$58,502	$198,283	$49,571	$328,328	$337,647	$371,180	$1,426,354
10	Inspiration Park	2,494	2,494	3	2	$12,356	$13,424	$18,205	$63,303	$15,826	$108,949	$113,819	$130,167	$476,049
11	Future Tower University Dr	15,275	15,275	12	5	$75,684	$82,225	$111,512	$375,910	$93,977	$619,532	$635,967	$695,900	$2,690,709
12	Tillman Tower	1,237	1,237	2	2	$6,130	$6,660	$9,032	$32,592	$8,148	$59,873	$64,152	$77,849	$264,436
13	Proposed EST CO 406	6,713	6,713	6	3	$33,259	$36,133	$49,003	$166,505	$41,626	$277,541	$286,247	$317,036	$1,207,350
14	USDA Office of Rural Development	625	625	2	2	$3,095	$3,362	$4,559	$17,890	$4,472	$36,319	$40,309	$52,714	$162,720
15	Texas Department of Public Safety	900	900	2	2	$4,459	$4,844	$6,570	$24,500	$6,125	$46,908	$51,028	$64,014	$208,449
16	Police Gun Range	2,078	2,078	3	2	$10,294	$11,184	$15,167	$53,314	$13,328	$92,946	$97,620	$113,090	$406,944
17	American Tower	8,357	8,357	7	3	$41,406	$44,984	$61,006	$206,517	$51,629	$341,519	$350,999	$385,255	$1,483,315
18	Cottonwood Park	1,271	1,271	2	2	$6,299	$6,844	$9,281	$33,414	$8,353	$61,189	$65,484	$79,253	$270,117
19	Gerrish Pump Station	1,304	1,304	2	2	$6,460	$7,018	$9,518	$34,191	$8,548	$62,435	$66,745	$80,582	$275,497
20	Fitzhugh Park	2,612	2,612	3	2	$12,941	$14,059	$19,066	$66,133	$16,533	$113,484	$118,410	$135,006	$495,632
21	T-Mobile Tower	732	732	2	2	$3,629	$3,943	$5,347	$20,480	$5,120	$40,468	$44,509	$57,141	$180,636
22	Wattley Park	1,704	1,704	3	2	$8,441	$9,171	$12,437	$44,339	$11,085	$78,568	$83,066	$97,748	$344,856
23	Central Park	266	266	2	2	$1,317	$1,431	$1,941	$9,282	$2,320	$22,528	$26,349	$37,998	$103,166
24	McKinney Convention & Visitors Bureau	291	291	2	2	$1,441	$1,566	$2,123	$9,880	$2,470	$23,486	$27,319	$39,020	$107,305
25	Mitchell Park	446	446	2	2	$2,209	$2,400	$3,254	$13,599	$3,400	$29,445	$33,351	$45,379	$133,036
26	North Central Texas Workforce Solutions	2,314	2,314	3	2	$11,464	$12,455	$16,891	$58,982	$14,746	$102,027	$106,813	$122,781	$446,158
27	Sheraton Conference Center	739	739	2	2	$3,659	$3,975	$5,391	$20,625	$5,156	$40,701	$44,745	$57,390	$181,644
28	US Social Security Administration	940	940	2	2	$4,656	$5,058	$6,860	$25,453	$6,363	$48,435	$52,573	$65,643	$215,040
29	Valley Creek Park	4,088	4,088	4	2	$20,254	$22,005	$29,842	$102,111	$25,528	$170,998	$176,620	$196,329	$743,688
30	Mary Will Craig Park	1,664	1,664	3	2	$8,245	$8,958	$12,149	$43,390	$10,847	$77,047	$81,527	$96,124	$338,287
31	Hill Top Park	4,314	4,314	4	2	$21,375	$23,223	$31,494	$107,541	$26,885	$179,697	$185,425	$205,612	$781,252
32	MEDC & MCDC	4,861	4,861	5	3	$24,083	$26,164	$35,483	$121,507	$30,377	$205,575	$213,408	$240,291	$896,888
33	Dallas MTA Tower	1,573	1,573	3	2	$7,796	$8,469	$11,486	$41,211	$10,303	$73,556	$77,993	$92,400	$323,214
34	Winniford Park	2,235	2,235	3	2	$11,074	$12,031	$16,316	$57,091	$14,273	$98,997	$103,746	$119,547	$433,074
35	E A Randles Park	2,763	2,763	3	2	$13,690	$14,873	$20,170	$69,762	$17,441	$119,298	$124,295	$141,211	$520,740
36	Craig Ranch Ballfields Linear Park	755	755	2	2	$3,742	$4,066	$5,514	$21,028	$5,257	$41,346	$45,398	$58,079	$184,430
37	Children's Health StarCenter	1,127	1,127	2	2	$5,583	$6,065	$8,226	$29,943	$7,486	$55,629	$59,856	$73,320	$246,108
38	Crape Myrtle World Collection	941	941	2	2	$4,661	$5,063	$6,867	$25,476	$6,369	$48,473	$52,612	$65,684	$215,204
39	McKinney Soccer Complex At Craing Ranch	1,271	1,271	2	2	$6,296	$6,840	$9,276	$33,396	$8,349	$61,161	$65,456	$79,224	$269,998
40	Veteran's Memorial Park	2,865	2,865	3	2	$14,195	$15,422	$20,915	$72,210	$18,052	$123,219	$128,264	$145,394	$537,671
41	Proposed EST Stacy Rd	2,570	2,570	3	2	$12,734	$13,835	$18,762	$65,134	$16,283	$111,883	$116,789	$133,298	$488,718
42	Rowlett Creek Park	3,240	3,240	4	2	$16,051	$17,438	$23,649	$81,748	$20,437	$138,375	$143,597	$161,517	$602,812
43	Tom Allen Jr Park	1,501	1,501	3	2	$7,437	$8,079	$10,957	$39,473	$9,868	$70,772	$75,175	$89,429	$311,191
44	John M Whisenant Park	3,084	3,084	4	2	$15,280	$16,600	$22,513	$78,014	$19,504	$132,394	$137,542	$155,134	$576,981
45	Serenity Park	2,740	2,740	3	2	$13,576	$14,750	$20,003	$69,213	$17,303	$118,418	$123,404	$140,271	$516,939
46	A Hardy Eubanks Jr Park	5,939	5,939	5	3	$29,426	$31,969	$43,356	$147,389	$36,847	$247,041	$255,383	$284,540	$1,075,953
47	W B Finney Park	7,289	7,289	6	3	$36,113	$39,234	$53,208	$180,330	$45,082	$299,689	$308,666	$340,670	$1,302,993
48	Horizon Park	3,876	3,876	4	2	$19,204	$20,864	$28,295	$97,024	$24,256	$162,849	$168,371	$187,633	$708,497
49	US Post Office (Linkside Park)	2,003	2,003	3	2	$9,924	$10,782	$14,622	$51,523	$12,881	$90,076	$94,716	$110,028	$394,552
50	Falcon Creek Park	1,036	1,036	2	2	$5,135	$5,579	$7,566	$27,774	$6,944	$52,155	$56,339	$69,612	$231,104
51	Carey Cox Memorial Park	2,373	2,373	3	2	$11,758	$12,774	$17,324	$60,404	$15,101	$104,304	$109,118	$125,211	$455,992
52	Lightower Tower	844	844	2	2	$4,180	$4,541	$6,159	$23,148	$5,787	$44,743	$48,837	$61,704	$199,100
53	Rutherford Branch East LS	1,412	1,412	2	2	$6,998	$7,602	$10,310	$36,796	$9,199	$66,608	$70,969	$85,036	$293,518
54	Aviator Park	2,437	2,437	3	2	$12,074	$13,117	$17,789	$61,935	$15,484	$106,757	$111,601	$127,828	$466,586
55	Rutherford Branch West LS	3,231	3,231	4	2	$16,007	$17,391	$23,585	$81,538	$20,385	$138,039	$143,256	$161,158	$601,358
56	Prestwick Park	6,861	6,861	6	3	$33,992	$36,930	$50,083	$170,056	$42,514	$283,230	$292,006	$323,107	$1,231,918
57	George Webb Park	2,547	2,547	3	2	$12,620	$13,711	$18,594	$64,581	$16,145	$110,997	$115,892	$132,352	$484,892
58	T-Mobile Tower	849	849	2	2	$4,205	$4,568	$6,195	$23,266	$5,817	$44,932	$49,028	$61,906	$199,917
59	Ash Woods Park	2,476	2,476	3	2	$12,269	$13,330	$18,077	$62,881	$15,720	$108,274	$113,136	$129,447	$473,135
60	Tillman Tower	18,838	18,838	14	6	$93,335	$101,401	$137,518	$462,810	$115,703	$762,133	$782,093	$855,086	$3,310,080
	McKinney Totals	213,983	213,983	231	142	$1,060,210	$1,151,832	$1,562,094	$5,377,251	$1,344,313	$9,140,223	$9,503,423	$10,741,959	$39,881,306

Figure 41 – Spreadsheet of Costing Details per Segment

In Figure 42, the detail columns are removed to make a more readable list of costs per segment.

Segment Number	Segment Description	New Underground Conduit Feet	Totals
1	AT&T Tower	9,567	$1,709,126
2	Brinkmann	5,411	$988,323
3	Erwin Park	4,240	$768,913
4	Jim Ledbetter Park	7,700	$1,374,238
5	Robinson Ridge	2,890	$541,851
6	Proposed EST Geren Trl	9,258	$1,657,891
7	Proposed EST FM 1461	4,520	$840,300
8	Proposed EST Ivy Ln	8,484	$1,504,462
9	Proposed EST CO 168	8,014	$1,426,354
10	Inspiration Park	2,494	$476,049
11	Future Tower University Dr	15,275	$2,690,709
12	Tillman Tower	1,237	$264,436
13	Proposed EST CO 406	6,713	$1,207,350
14	USDA Office of Rural Development	625	$162,720
15	Texas Department of Public Safety	900	$208,449
16	Police Gun Range	2,078	$406,944
17	American Tower	8,357	$1,483,315
18	Cottonwood Park	1,271	$270,117
19	Gerrish Pump Station	1,304	$275,497
20	Fitzhugh Park	2,612	$495,632
21	T-Mobile Tower	732	$180,636
22	Wattley Park	1,704	$344,856
23	Central Park	266	$103,166
24	McKinney Convention & Visitors Bureau	291	$107,305
25	Mitchell Park	446	$133,036
26	North Central Texas Workforce Solutions	2,314	$446,158
27	Sheraton Conference Center	739	$181,644
28	US Social Security Administration	940	$215,040
29	Valley Creek Park	4,088	$743,688
30	Mary Will Craig Park	1,664	$338,287
31	Hill Top Park	4,314	$781,252
32	MEDC & MCDC	4,861	$896,888
33	Dallas MTA Tower	1,573	$323,214
34	Winniford Park	2,235	$433,074
35	E A Randles Park	2,763	$520,740
36	Craig Ranch Ballfields Linear Park	755	$184,430
37	Children's Health StarCenter	1,127	$246,108
38	Crape Myrtle World Collection	941	$215,204
39	McKinney Soccer Complex At Craing Ranch	1,271	$269,998
40	Veteran's Memorial Park	2,865	$537,671
41	Proposed EST Stacy Rd	2,570	$488,718
42	Rowlett Creek Park	3,240	$602,812
43	Tom Allen Jr Park	1,501	$311,191
44	John M Whisenant Park	3,084	$576,981
45	Serenity Park	2,740	$516,939
46	A Hardy Eubanks Jr Park	5,939	$1,075,953
47	W B Finney Park	7,289	$1,302,993
48	Horizon Park	3,876	$708,497
49	US Post Office (Linkside Park)	2,003	$394,552
50	Falcon Creek Park	1,036	$231,104
51	Carey Cox Memorial Park	2,373	$455,992
52	Lightower Tower	844	$199,100
53	Rutherford Branch East LS	1,412	$293,518
54	Aviator Park	2,437	$466,586
55	Rutherford Branch West LS	3,231	$601,358
56	Prestwick Park	6,861	$1,231,918
57	George Webb Park	2,547	$484,892
58	T-Mobile Tower	849	$199,917
59	Ash Woods Park	2,476	$473,135
60	Tillman Tower	18,838	$3,310,080
	McKinney Totals	213,983	$39,881,306

Figure 42 – Total Cost per Segment

The detail in the original documents have been supplied to City staff to reference and use.

The next step would typically be to decide what year each segment is anticipated to be built and, then, prioritize the segments per year. HR Green also highly recommends that this list be compared to the City Capital Improvement Project plan to align these segments with other construction projects. The costs to install conduit and fiber are greatly reduced if they can be installed as part of another project.

Economic Development and Broadband

The McKinney Economic Development Corporation (MEDC) considers access to high capacity technology infrastructure crucial to modern economic development efforts that are supported by a dynamic workforce and new and innovative businesses. McKinney strives to be a destination for technology focused companies; through our technology start-up support program, the Innovation Fund, we have recruited 23 new technology start-ups to the City. These companies require infrastructure in order to scale, grow, and deliver excellent and innovative products to market and without ubiquitous broadband coverage, these companies cannot excel in the marketplace. Dense broadband infrastructure enables Smart City applications such as smart parking, connected vehicles, and air/noise monitoring throughout the City, all of that data has to be sent back via fiber cables to a hub for processing, and that doesn't happen without broadband services. It is required in the new digital economy and is more important than ever before in recruiting new corporate citizens to the City of McKinney.

MEDC's main broadband related priority areas are the 121 corridor, the 380 corridor, and the highway 5 corridor.

MEDC is developing an initial pilot project for fiber and other ancillary technology infrastructure (smart street lighting, wireless, etc) to be performed in conjunction with City of McKinney CIP project for the expansion and construction of Collin McKinney Parkway. Project will include collaboration with City officials on conduit placement and construction, fiber services, street lighting products, wireless services and other technology infrastructure services along SH 121.

MEDC's pilot project is intended to be in conjunction with the RFI/RFQ the City develops for improving the community broadband infrastructure base.

Attachment A – Community Engagement Plan

City of McKinney, TX

Broadband Assessment - Community Engagement Plan

Overview

One key component of the Broadband Assessment is community engagement. This is important to understand the current connectivity in the City of McKinney, 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 Assessment (especially if any grants are possible).

This community engagement plan will include the following groups:
- Citizens
- Businesses
- Anchor institutions - Mainly quasi-government: Libraries, Post Office, education, health and can include key businesses either in McKinney or thinking about locating to McKinney
- Public entities

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) – or if they do not have service
- Satisfaction with their current service
- Concerns with their current service or options (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.

Messaging

The key messages to communicate include:

- The reason why the City of McKinney is developing a Broadband Assessment and why this survey is an important part of that Plan – including potential benefits to businesses, organizations and citizens:
  (Sample messaging): The City of McKinney is developing a Broadband Assessment. As part of this Plan, the City is conducting this survey to specifically understand where there are broadband connectivity issues (inadequate options, lack of reliability or price issues) for businesses and residents in McKinney, so that the City can explore options to improve broadband service (it can be important to clarify what the City is considering – just to set

expectations of City involvement)
- Encourage businesses, organizations and residents to take the online survey.
- Encourage businesses, organizations and residents to attend focus group or public meetings.

Strategies

- Survey:
  - A significant key to the success of this project will be the surveys. The key to getting enough responses to receive statistically valid response rates is **promotion**. Thus, the form of the survey (virtual only, printed, etc.) and how those will be made available become very important.
  - Survey will be online only. But, it will be promoted in several formats. We have not included the Scope for printing or mailing surveys (if they could be distributed in City utility bills or made available at City facilities)
  - Draft list of survey questions – See Attachment A & B
  - Online is, typically Plan A. Plan B (backup plan if we are not getting enough responses can include):
    - Printed survey (possibly mailed back to HR Green, the City or dropped off at City Hall, etc.) – this is possible as Plan B, but not currently in Plan A
    - It is also possible to do some door or door or phone canvassing, but those can become very costly
  - Survey will be open 30 – 45 days

- Distribution:
  - Working with City personnel is very important. Those contacts are:
    - Communications:
    - City social media:
    - City Staff:
  - What roles will the City play in promotion (and distribution) of the survey?
  - Websites – see website list below
  - Social media – see Facebook pages below
  - Email lists – if the City, City Utilities, Chambers of Commerce, etc. have email lists, emails can be sent that include the survey link. Do those email lists exist?
  - Media –PSA's can be sent to newspapers and radio (see sample in Attachment D)
  - If Plan B is needed - printed surveys can be included in utility billings, available at the City Hall, handed out at public meetings and at information tables (if there are any of these that make sense) – this is possible but not planned
  - If there are events in the City while the survey is open, the survey can be promoted there

- Audience:
  - City residents
  - City Businesses
  - Both – those operating businesses from their homes
  - Anchor Institutions – these will be done in group or individual meetings with questions

very similar to the surveys. We meet with them separately to discuss their specific needs, timelines and if they own any broadband infrastructure – see Attachment C for sample questions
- Schools
- Libraries
- Health Care

o Public entities– these will be done in group or individual meetings with questions very similar to the surveys. We meet with them separately to discuss their specific needs, timelines and if they own any broadband infrastructure – see Attachment C for sample questions
- Fire
- Police
- Emergency Management
- City departments (Administration, Public Works/Engineering, Planning, IT, Finance, Utilities, Economic Development, Parks, Emergency Management, Police)
- City departments (where applicable)

o Other key stakeholders – examples of these could be Chambers of Commerce, Business leaders, major developers (particularly if there are new planned commercial or residential developments that might needs broadband service

o We will need to finalize this list

- Outcomes:
  o Current market conditions and deficiencies
  o Who their providers is (or, if no provider – why)
  o What they currently pay
  o Whether their current service is adequate
  o What they like and dislike today
  o Do they have any needs for the future
  o What they do with Internet services
  o Predicted take rate and optimum monthly cost they would be willing to pay – to develop feasibility of options and to use to talk with potential provider partners
  o Whether they want the City taking an active role in improving broadband
    o Demographic questions (their location, age, ethnicity, etc.)

Websites
- City Website
- McKinney ISD
- McKinney Area Chamber of Commerce
Can we use these?

Social Media

STAY CONNECTED

- ✉ E-Newsletter Signup
- ▶ YouTube
- f Facebook
- 📷 Instagram
- 🐦 Twitter
- 🏠 NextDoor

- Facebook
    - DowntownMcKinney
    - Marketplace
    - McKinneyPolice
    - McKinneyCares
- Chamber of Commerce Facebook page – 2.7K members

Can we use these? Promotion will consist of posts that we will provide

Public Meeting

- In these Covid-19 times, meetings can still be difficult. They can be good to answer questions and to generate interest in the survey. They are best done in person, but they can be done virtually. We find attendance is lower in the virtual setting, but they can still be beneficial. As with the surveys, the key is promotion.
- Are there any community events that will happen within the timeline of the survey?
- Will we have any public meetings and/or have a presence at any events?

Community Engagement Plan - Residential Broadband Survey

The purpose of this survey is to learn about broadband connectivity in the City of McKinney. Your participation is very important to understand your satisfaction with your current broadband options and the service you are being provided, and to gauge your interest in other broadband options being developed.

The survey takes only a few minutes to complete and your feedback is very important.

Please limit your responses to one survey per household and please take the survey from a device connected to your home broadband service (instead of a device connected to cellular service).

If you are a business decision-maker or owner, please participate in our business survey as well.

Your individual answers are anonymous and confidential, so please answer as honestly as possible. Thank you for your input!

Do you live in the City of McKinney:
Please enter your location (map).

INTERNET
Does your home subscribe to internet service?
> No:
>> Why not? (availability, price, do not need)

> Yes:
>> Which company do you use (list)?
>> Speed test link
>> Overall satisfaction with provider (very dissatisfied to very satisfied)
>> Rate satisfaction with home internet service
>>> Customer service
>>> Data allowance
>>> Price
>>> Reliability
>>> Speed/Data Rate
>> What ways does your household use internet (list)?
>> How many connected devices?
>> How is your internet provided – if known (fiber, cable, DSL, Point to Point, Satellite)
>> How likely would you be to recommend your provider to a friend?
>> Do you have any comments, questions or concerns about your current internet service?

TELEVISION

Does your home subscribe to television service?

> Yes: Which provider (list)?
>
>   What is your overall satisfaction with your television provider (scale)

LANDLINE PHONE

Do you subscribe to landline telephone service?

> Yes: Which provider (list)?
>
>   What is your overall satisfaction with your telephone provider (scale)

Approximately what is the total monthly cost (rounded to the nearest dollar) of ALL services (internet, television and landline telephone) that you receive at home (do not include the cost of your cellular plan)?

MCKINNEY'S BROADBAND FUTURE

In your opinion, how important is fast, affordable, reliable and universally available broadband to McKinney in helping to improve the following City attributes?

> Quality of life (scale: Not Important, Somewhat Important, Very Important)
>
> Education (for children and adults): (scale)
>
> Economic Development and jobs (including work at home and home based business): (scale)
>
> Health Care (remote health care): (scale)

How well do you think the current providers meet these needs: (1-10 scale)

When considering a company for broadband services (internet, television and telephone), how important are the following characteristics of that company?

> Is locally owned: (scale)
>
> Provides excellent customer service: (scale)
>
> Is involved in the community: (scale)
>
> Uses the best available technology: (scale)
>
> Price: (scale)

If a new provider (public or private) built a fiber network in McKinney, offering superior service for a competitive price, how likely would you be to switch from our current provider(s)? 1 – 10 scale

Additional comments, questions or concerns?

Tell us about yourself:

> Gender
>
> Age (drop down box of ranges)
>
> What is the range of your current household income? (drop down box of ranges)
>
> What is the highest level of education you have completed? (drop down box of ranges)

We appreciate you taking the time to participate in this survey!

Community Engagement Plan - Business Broadband Survey

The purpose of this survey is to learn about broadband connectivity **at your workplace**. Your participation is very important to understand your satisfaction with your current broadband options and the service you are being provided, and to gauge your interest in other broadband options being developed.

The survey takes only a few minutes to complete and your feedback is very important.

Please limit your responses to one survey per business and please take the survey from a device connected to your business broadband service (instead of a device connected to cellular service).

If you live in the City of McKinney, please participate in our residential survey as well.

Your individual answers are anonymous and confidential, so please answer as honestly as possible. Thank you for your input!

Is your business in McKinney City limits?
Please enter your location (map).

Where is your business? Storefront or In My Home

What is the primary industry sector of your business?
>Agriculture
>Banking/Financial Services
>Bar/Restaurant
>Church or Religious Organization
>Construction
>Education
>Government/Public Service/Non-Profit
>Health Care
>Hospitality
>Import/Export
>Manufacturing
>Professional Services (Including Accounting, Legal and Insurance)
>Rental Housing
>Retail Sales
>Other – write in

Is your business served by fiber optics – if known?

Does your business subscribe to internet service?

No:

  Why not? (availability, price, do not need)

Yes:

  Which company do you use (list)?
  Speed test
  Do you offer internet/wifi to the public?
  How many devices are connected to the internet at your business? Include PC's, tablets, smart phones and any other device that uses internet connection.
  How do you use internet at your business?
        Company website
        Credit Card processing
        Data management (backup or data storage)
        Education and professional development (including webinars)
        Electronic health records
        Email
        File or data sharing
        Hosting your own server
        Online banking
        Online purchasing or inventory
        Online sales
        Operations in the cloud (accounting, sales, project management, etc.)
        Social media
        Streaming music
        Streaming video
        Video conferencing
        Video security
        Web surfing
        Other
  Have you had employees work from home during Covid-19?
  If you have had employees work from home during Covid-19, do you foresee that they might continue to work from home? (yes, no, maybe, not sure)
  Overall satisfaction with provider (very dissatisfied to very satisfied)
  Rate satisfaction with business internet service
        Customer service
        Data allowance
        Price
        Reliability
        Speed/Data Rate
  How likely would you be to recommend your provider to a peer?
  How important is internet service to your business **today**? (scale)

How important do you think **improved** internet service will be to your business **in the next few years**?

Over the past few years, have internet speeds and services kept up with your business needs?

Do you have any comments, questions or concerns about your current internet service?

Do you subscribe to landline telephone service?

Yes:

Which provider (list)?

What types of telephone service does your business use – if known?

Traditional phone lines

DID

PRI

Hosted VoIP

Hosted PBX

SIP Trunking

Other

How many telephone lines does your business have? Include voice, fax, security systems, etc.

What is your overall satisfaction with your telephone provider (scale)

Approximately what is the total monthly cost (rounded to the nearest dollar) of ALL services (internet, television and landline telephone) that you receive at your business (do not include the cost of your cellular plan)?

CITY OF MCKINNEY BROADBAND FUTURE

In your opinion, how important is fast, affordable, reliable and universally available broadband to the City of McKinney in helping to improve the following City attributes?

Quality of life (scale: Not Important, Somewhat Important, Very Important)

Education (for children and adults): (scale)

Economic Development and jobs (including work at home and home based business): (scale)

Health Care (remote health care): (scale)

How well do you think the current providers meet these needs: (1-10 scale)

When considering a company for broadband services (internet, television and telephone), how important are the following characteristics of that company?

Is locally owned: (scale)

Provides excellent customer service: (scale)

Is involved in the community: (scale)

Uses the best available technology: (scale)

Price: (scale)

If a new provider (public or private) built a fiber network in McKinney, offering superior service for a competitive price, how likely would you be to switch from our current provider(s)?

    1 – 10 scale

Additional comments, questions or concerns?

We appreciate you taking the time to participate in this survey!

Community Engagement Plan – Anchor Institution/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

Community Engagement Plan – Sample Press Release

FOR IMMEDIATE RELEASE   **DATE:**

CITY OF MCKINNEY SOLICITING INPUT REGARDING BROADBAND SERVICES FOR RESIDENTS AND BUSINESSES

The City of McKinney has initiated a discovery study to gain a clearer understanding of broadband needs in McKinney and to develop a citywide Broadband Assessment. An online survey is now available to gather specific information from residents and businesses. The survey will be available through XXXXXXX and may be accessed at: xxxxxxxxxxxxxxxxxxxxxxx.

The city leadership of McKinney understand that broadband is a critical service for businesses, organizations and citizens. This survey and Broadband Assessment will allow the 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 McKinney. We also view broadband as a competitive issue in keeping the City of McKinney as one of the top destinations to work and live," said XXXXXXXXXXXXXX. "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 what next steps to take."

"We will be gathering input through XXXXXXXXXXXXXXXXXX," said XXXXXXXXXXXXXXXXXXXXXXXXXXXX. "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 survey and analysis will be completed this summer. The City has contracted with HRGreen, a national engineering firm with offices in Texas, to complete this initial discovery phase.

###

Contact: XXXXXXXXXXXXXXX, TitleXXXXXXXXXXXXXXXXXXXXX at
XXXXXXXXXXXXXXXXXXXX or (XXX) XXX-XXXX

Attachment B - Glossary of Terms

Access – infrastructure that delivers broadband – if there is infrastructure available to a potential customer (through any technology), that potential customer has access

Access Point – a device that allows wireless devices to communicate with a wired network using Wi-Fi or related standards. Sometimes referred to as AP, Wireless Access Point, or WAP. Access Points contain both a radio and a wired network connection, and relay communications between the two.

Adoption – customer decision to purchase broadband services that are available

Backhaul: is the fiber that carries aggregated user data from the network's central office to internet connection points located at carrier hotels.

Backbone/network backbone – in telecommunications, a generic term referring to the part of a network that interconnects all sites on the network, and, therefore, handles the majority of the network traffic. Smaller networks are attached to the backbone through aggregation sites by means of additional circuits and network devices, such as routers.

Bandwidth/high bandwidth – transmission capacity of an electronic pathway such as a communications circuit. Network bandwidth is described in terms of how much data can move across the network within a given amount of time and is typically expressed in bits per second (bps). Examples of measurements include kbps, Mbps or Gbps. The "high" in "high bandwidth" is always relative to current norms for different circumstances. High Bandwidth is a term that typically means a bandwidth at the top end or above what is commercially available at a given location.

Broadband – a marketing term that refers to high bandwidth Internet access. Traditionally, it meant "any band- width greater than dial up." Broadband data transmission is digital, meaning that text, images, and sound are all transmitted as "bits" of data. In the context of this project, Broadband refers to providing Internet connectivity at much higher bandwidth than has been available and affordable to most libraries. The FCC, in 2015, defines broadband to the home to be anything above 25 Mbps, in the sense that anything less than 25 Mbps to the home would not qualify as "broadband."

Capacity/high capacity – is the complex measurement of the maximum amount of data that may be transferred between network locations over a network, also known as throughput. "High" is again relative to current norms and measured in bits per second (bps).

CBRS – Citizens Broadband Radio Service – a wireless network capable of 4G and 5G connectivity that can be segmented to carry different applications (internet, Public Works related applications, public safety communications, etc.)

Co-location – refers to the way information technology hardware and resources are located or installed in a shared or common location. In this context, networking hardware resources owned by an

organization are located outside the organization's physical premises and "co-located" with other organizations' hardware, often through a commercial service provider.

Commercial networks/carriers (provides) – any entity engaged in the business of providing telecommunications services that are regulated by the Federal Communications Commission or other governmental body. These are generally for-profit companies.

Dark Fiber: installed fiber not currently being used.

Digital Subscriber Line (DSL) – a family of technologies that are used to provide Internet access by transmitting digital data over telephone lines. It may be either symmetric (same bandwidth both direction), or asymmetric (different bandwidth each direction). The service may be implemented simultaneously over the same lines used to provide voice service.

Federal Communications Commission (FCC) – the federal agency responsible for regulating interstate communications by radio, television, wire, satellite, and cable. The FCC also participates in international communications standards coordination and policy development.

Fiber/fiber-optic cable – fiber optic technology converts electrical signals carrying data to light and transmits the light through transparent glass fibers. A variety of fiber optic cable types are available, depending on the application. Supported distances vary based on cable type, transmitter source (laser or LED), data rate, etc.

Internet Service Provider (ISP) – a communications carrier that provides access to the Internet. ISPs are not necessarily directly connected via an Internet exchange; they may in turn acquire connectivity from another ISP.

Last mile connection – a term used by the telecommunications industry to refer to the final leg of a network to the customer, generally from the provider's last POP to the customer.

Local Area Network (LAN) – a computer network that interconnects computers within a limited area such as a building or small group of adjacent buildings.

Long Term Evolution (LTE) – in telecommunication, a standard for wireless communication of high-speed data for mobile phones and data terminals.

Megabits per second – see "Bandwidth" and "Throughput"

Middle mile – the segment of a telecommunications network linking a network operator's core network/back- bone to the local provider's network, typically situated in the incumbent telephone company's central office that provides access to the local loop.

Node: connection point that can receive, create, store, or send data along a network

Overbuild: to create a network that goes into competition with incumbent provider.

Point-to-Point – a microwave broadband application that requires line-of-sight from a transmission point to an end point. This technology is less expensive to install and can provide good service (depending on equipment and usage)

Population Density – population density will be classified as either urban, rural or remote. For the definition of eligibility for their grants and loans, Rural Utility Services defines rural in two ways: any area not within a city or town with population exceeding 20,000 or an urbanized area adjacent to a city greater than 50,000 and any area not within boundaries of any city, village, or borough with population exceeding 5,000. For this analysis, "rural" will mean either unincorporated or in a community less than 5,000. Remote will mean population density less than one person per twenty acres.

Right of Way – the land set aside for public passage or use (street, sidewalk, trail, utilities, etc.) which is owned or controlled by a governmental entity.

Throughput – rate of data transmission per unit time; see "Capacity/High Capacity". The most common throughput measurements include:
- **Kilobits per second (Kbps)** – a transmission rate; 1,000 bits per second. 1,000 kbps = 1 Mbps. Kilo is the unit prefix for 103.
- **Megabits per second (Mbps)** – a data transmission rate; 1,000,000 bits per second. 1,000 Mbps = 1 Gpbs. Mega is the unit prefix for 106.
- **Gigabits per second (Gbps)** – a data transmission rate; 1,000,000,000 bits per second. 1 Gbps = 1,000 Mbps or 1,000,000 kbps. Giga is the unit prefix for 109.

Wired or wireless infrastructure – wired infrastructure is infrastructure that has a physical wire or line run to the premise (fiber, cable or DSL). Wireless include the technologies that do not have a physical line (point-to-point, radio frequency, etc.)

Wi-Fi (Wireless Fidelity) – a local area wireless technology that allows an electronic device to participate in computer network using specific wireless frequencies and protocols. Current standards use the 2.4 GHz and 5 GHz unlicensed industrial, scientific, and medical radio bands. Sometimes referred to as Wireless LAN or WLAN.