UTAH BROADBAND CENTER
CONNECTING UTAH

ALPINE CITY
LOCAL BROADBAND PLAN

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EXECUTIVE SUMMARY

Alpine City is in the northeastern part of Utah County. The City strives to provide its residents with the necessary amenities in the digital world. Access to reliable and affordable internet services is not currently available to all. Alpine City wishes to reduce the digital divide in many aspects of life, including education, health care, remote work opportunities, entertainment, and social connections.

VISION	Our vision is to give all residents in Alpine City the ability to utilize high-speed internet services in their daily lives.

KEY BARRIERS	Topography	Lack of ISPs	Deployment Costs
	The rocky terrain in service areas, poor line of sight and harder to trench landscapes	Need more competition from ISPs to lower the price of service	Greater distances between homes means higher installation costs

COVERED POPULATIONS	Aging Adults	Low-Income Households	Individual in a Racial or Ethnic Minority Group	Veterans	Individuals with Disabilities

GOALS	To identify pockets of homes with little to no service within the city	Better, cheaper, and faster internet for Alpine City residents.	Fiber to every home

KEY STRATEGIES	Research and understand community needs	Identify existing assets and ISP carriers	Analyze existing infrastructure to determine broadband expansion costs	Secure broadband expansion funding

1 OVERVIEW OF THE LOCAL BROADBAND PLAN

1.1 VISION

Our vision is to give all residents in Alpine City the ability to utilize high-speed internet services in their daily lives.

This vision includes providing broadband infrastructure that is accessible, modern, and scalable throughout Alpine City and promotes social and economic growth by providing equitable opportunities to participate in the current digital economy. A collaborative effort among Alpine City, internet service providers (ISPs), and other private and public stakeholders, along with clear goals and objectives, will be imperative to accomplish this vision for all Alpine City residents, including unserved (internet speeds lower than 25/3) and underserved (internet speeds lower than 100/20) areas within the city, to have reliable access to high-speed internet at a reasonable price and, ultimately, fiber to every home.

1.2 GOALS AND OBJECTIVES

Alpine City's Local Broadband Plan goals are:

- Ensure all residents have access to high-speed internet, irrespective of their location, by identifying infrastructure gaps throughout the city.
- Expand broadband service to Alpine City's unserved and underserved areas, where internet connectivity may be constrained or unavailable from lack of infrastructure.
- Work with ISPs to provide affordable broadband services for all residents, particularly lower-income families, and businesses, to prevent the development of a digital gap based on economic differences.
- Invest in broadband infrastructure that is scalable, can support developing technologies, and can accommodate rising bandwidth demands.
- Install city-owned broadband infrastructure.
- Update city codes related to broadband infrastructure.
- Continue to keep City IT services up to date with best practices by reviewing City website and City IT practices every 2-3 years.

Alpine City's Local Broadband Plan will have the following objectives to identify current broadband infrastructure and service needs and implement the stated goals:

- Provide an existing broadband assets inventory.

- Analyze data and map infrastructure needs.
- Identify unserved and underserved areas within the city.
- Provide an implementation strategy for infrastructure needs.

2 BACKGROUND

On November 15, 2021, the Infrastructure Investment and Jobs Act (IIJA) was signed into law. This Act included a $65 billion investment in high-speed broadband internet infrastructure and efforts to close the digital divide to ensure that all Americans have access to reliable and affordable high-speed internet.

Included in the IIJA was the Broadband Equity, Access, and Deployment (BEAD) Program. The BEAD Program provides $42.45 billion to expand high-speed internet access by funding planning, infrastructure deployment, and adoption programs throughout the United States.

Through this funding, the Utah Broadband Center (UBC) launched a grant program that will consist of two phases. The first phase is planning and the second is implementation. The State of Utah was awarded $5 million to support both the creation of a statewide Digital Connectivity Plan and provide funding for local communities to create local broadband plans.

The UBC awarded Alpine City funds to create a plan for broadband infrastructure deployment in the region. Alpine City's broadband plan will be used to inform the statewide Digital Connectivity Plan that will determine Utah's broadband priorities over the coming years.

2.1 SCOPE OF BROADBAND PLAN

Alpine City, located in Utah Valley between the Salt Lake City and Provo metropolitan areas, is situated between the Uinta National Forest on the east, Highland and Lehi on the west, Draper and the Uinta National Forest on the north, and Highland and Cedar Hills to the south. Numerous industries, including manufacturing, agriculture, and the service sectors, are located throughout Alpine City. Despite its thriving community, Alpine City deals with issues related to broadband infrastructure and access needs, which have significant repercussions for economic growth, education, health care, and the general quality of life for its residents.

Alpine City also has unique community needs that require customized broadband solutions. These needs include serving underserved populations, such as low-income households, elderly residents, and community minorities; and addressing the specific needs of key sectors, such as agriculture, education, health, and emergency services. Understanding various community needs is critical in developing a comprehensive and effective broadband infrastructure local plan.

Given these challenges and opportunities, there is a compelling need for a broadband infrastructure plan that addresses the unique needs of Alpine City. This Local Broadband Plan aims to leverage federal/state funding to expand broadband access, improve internet speeds, close infrastructure gaps, and accelerate broadband adoption. By improving broadband

infrastructure, the plan aims to promote digital inclusion for all residents in Alpine City and lay a foundation plan for future grants and funding.

A summary of the demographics of the area is outlined in **Table 1** below. These statistics reflect the most updated data from the U.S. Census 2020 for the State of Utah.[1] **Figure 1** shows the location boundaries for Alpine City.

Table 1. Alpine City's Demographic Profile

ALPINE CITY	
Total Population	10,251
Median Household Income	$138,438
Total Employer Establishments	466
Bachelor's Degree or Higher	56.9%
Employment Rate	57.8%
Poverty	6.9%
Median Age	31.8
Race and Ethnicity	
White	92.2%
Hispanic/Latino	3.8%
American Indian and Alaska Native	0.2%
All Others	3.8%
Land Area in Square Miles	1,288.6

[1] U.S. Census Bureau. (2021). Alpine, Utah.
Alpine Utah - Census Bureau Tables

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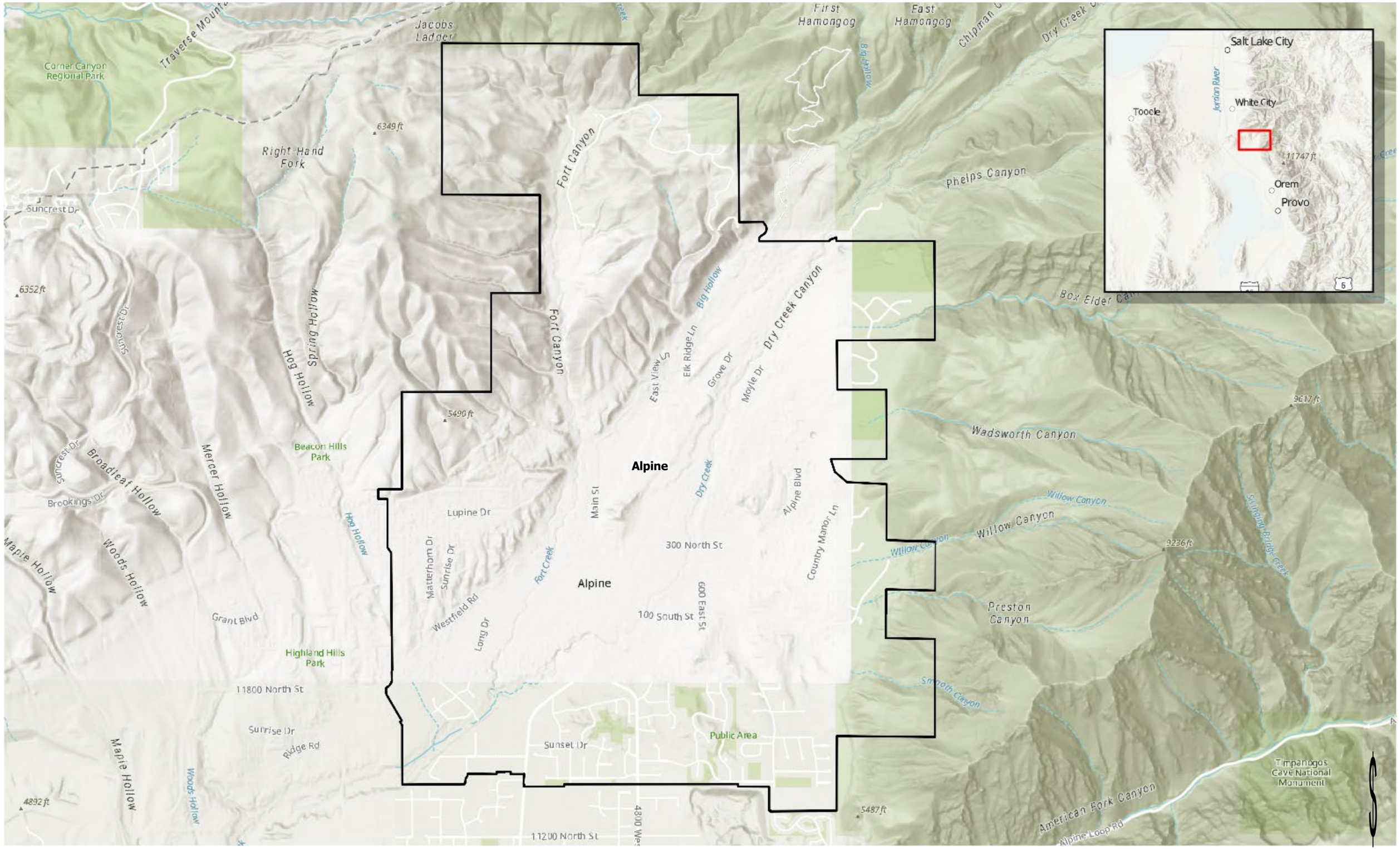

Figure 1: Boundaries of Alpine City

2.2 WHAT IS BROADBAND?

Broadband is a dedicated connection to high-speed internet. The threshold for what speed is defined as high-speed internet changes according to the standards presented by the Federal Communication Commission (FCC). Currently, broadband is defined as any speeds above 25 megabits per second (Mbps) download speed and 3 Mbps upload speed (25/3 Mbps).[2]

The BEAD Program defines households with less than 25/3 Mbps as unserved locations and those with less than 100/20 Mbps as underserved locations.[3] Community anchor institutions with less than 1/1 gigabits per second (Gbps) speeds are also considered underserved, as defined by Section 60102 of the IIJA, which also sets forth the BEAD program[4].

2.2.1 Broadband Network Distribution

The infrastructure that data travels along is called a network. Like other public utilities such as roads or water pipes, the network infrastructure is carefully planned and then built according to how many people need to be served in both the present and the future. Within the network, data is carried across fiber, wires, or radio signals in the air (wireless). These various means of carrying data have different capacities and speeds. The part of the network used to transport data between cities or across cities is known as middle mile infrastructure. The middle mile network connects to hubs built throughout a city. The part of the network that connects from a hub to the end-user is called final mile or last mile infrastructure. End-users can be businesses, residential homes, or individuals connecting to cell service. In **Figure 2**, the blue lines connecting the city to the hubs represent middle mile infrastructure, and the orange lines connecting the hubs to the residential houses represent final mile (or last mile) infrastructure.

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[2] FCC. (2015). Broadband Progress Report. https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2015-broadband-progress-report

[3] NTIA. Notice of Funding Opportunity - Broadband Equity, Access, and Deployment (BEAD) Program. Section I. Program Definitions, C. Definitions. Pages 16-17. https://broadbandusa.ntia.doc.gov/sites/default/files/2022-05/BEAD%20NOFO.pdf

[4] United States Congress. (2021). H.R. 3684- Infrastructure Investment and Jobs Act. 60401(e)(3)(C). https://www.congress.gov/bill/117th-congress/house-bill/3684/text

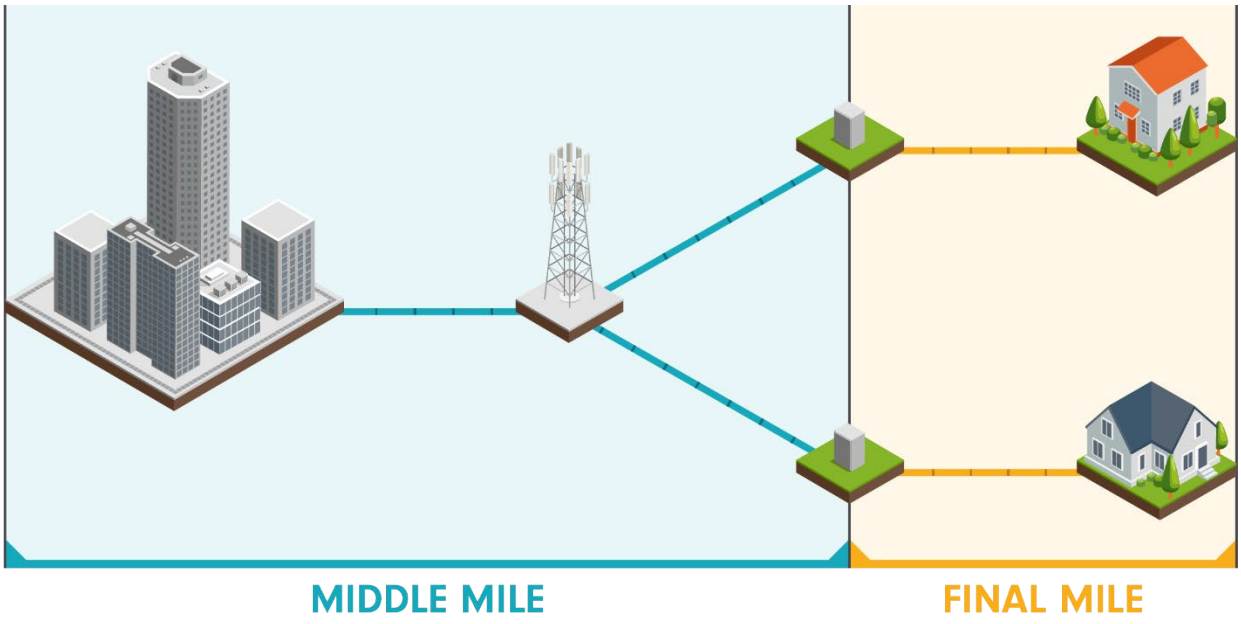

Figure 2. Typical Broadband Infrastructure

2.2.2 Types of Broadband

There are various technologies that high-speed broadband internet can be served through, such as fiber optic, digital subscriber line (DSL), cable modem (Coax), and wireless technologies. Each form of technology has pros and cons.

2.2.2.1 Fiber Optic

Fiber optic technology sends data-carrying digital signals as light through cables made of glass fibers. It provides the fastest, most reliable networks. Because fiber is a newer technology, many areas do not have fiber networks developed, and this type of network can require building new infrastructure. Fiber optic cables can be placed on existing power poles or they can be placed inside conduit buried in the ground. If the network is designed and installed correctly, symmetrical speeds can be up to 400 Gbps; however, 400 Gbps speeds are typically only designed for and installed in the backbone/distribution cables of the network. **Fiber optic is the gold standard for high-speed broadband internet as it provides the fastest speeds and can support emerging digital technologies into the future.**

2.2.2.2 DSL

DSL uses existing copper telephone cables to transmit data. Speeds vary widely based on local providers, the condition of cables, the distance between homes, and the equipment at the primary connection point. Because of this, DSL speeds can be less than 1 Mbps or up to 100 Mbps. With maximum DSL speeds at 100 Mbps, DSL does not meet the ever-growing needs of future technologies, so it is not a preferred option when building modern broadband infrastructure.

2.2.2.3 Cable Modem (Coax)

Cable modem delivers increased speeds over DSL and transmits broadband data over the same coaxial cables that are used for cable televisions. Like DSL, it is not a preferred option when building new broadband infrastructure, but it can be used where existing infrastructure is in place. Cable modems use a protocol called Data Over Cable Service Interface Specification (DOCSIS). There are six versions of DOCSIS (1.0, 1.1, 2.0, 3.0, 3.1, and 4.0). The speeds range between 40 Mbps download and 10 Mbps for upload for version 1.0 to 10 Gbps download and 6 Gbps upload for version 4.0.

2.2.2.4 Wireless

Wireless broadband includes several technologies, including satellite broadband, Wireless Local Area Networks (WLANs), Wi-Fi, and cellular 4G, 5G, and LTE. These technologies use radio spectrum to transmit broadband data. **BEAD funding can only be used to build wireless broadband technology when it is connected to a terrestrial middle mile network and cannot be used on satellite broadband technologies.**

Satellite Broadband – Satellite internet involves satellites that orbit the earth while transmitting long-range signals to individual subscriber locations anywhere on earth with a clear view of the sky. It is primarily a middle mile wireless solution, but many people use satellite internet directly to their homes as well. Satellite connection speeds vary based on location, and weather and tree foliage can affect the signal. Typical connection speeds are 12-100 Mbps. However, satellite internet has a higher latency (a delay of transmission also known as lag), making video calls extremely "glitchy" on this type of internet. An acceptable range of latency is between 50-100 ms. Satellite connection latency typically falls within 594-624 ms.[5] For the BEAD program, the NTIA currently does not recognize satellite broadband technologies as a reliable wireless technology.

WLANs – WLANs are the last mile networks used at homes or businesses to distribute internet to phones, computers, and other devices through radio signals. Wi-Fi and hotspots are both examples of a WLAN. Connection speeds are dependent on the service provided at the access point.

Cellular 4G, 5G, and LTE –M Cellular 4G, 5G, and LTE involve antennas mounted on cell towers transmitting radio signals, which are then received through the modems in cell phones, mobile routers, cellular antennas, or various signal boosters. Mobile carriers now offer residential fixed wireless broadband plans supported by their mobile towers. A middle mile fiber network connected to a tower will increase the network capabilities and provide a better final connection to the cellular user. The download speeds can often reach 600 Mbps if specialized equipment is used to boost the signal. This is usually the fastest high-speed broadband internet available for users who do not have access to fiber optic technology. This technology supports broadband speeds for mobile devices as well as fixed wireless broadband service to residences.

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[5] Cooke, K. (2023). Is Satellite Internet a Good Option? Pros and Cons of Satellite Internet Service. SatelliteInternet.com.
https://www.satelliteinternet.com/resources/satellite-internet-pros-and-cons

2.2.3 Benefits of Broadband

High-speed broadband internet has become an integral part of society. It is critical for work, education, telehealth, and the completion of everyday tasks.

High-speed broadband internet has transformed the way the world does business. There are few businesses that can operate today without the internet, and while some can get by with a low-speed connection, high-speed internet is becoming more and more necessary. A Pew Research Center survey[6] conducted in April 2021 found that 90% of adults surveyed considered internet "essential or important for them personally during the [COVID-19] pandemic."[7] High-speed broadband internet has allowed for remote work possibilities, which opens the possibility of highly skilled workers relocating to smaller communities and benefiting the economies of those communities. Readily available access to the internet has allowed businesses to widen their customer base to a global market. Alpine City's primary business partners are dentists, doctors, veterinarians, gas stations, and the local donut shop. High-speed broadband internet helps economic growth by making processes more efficient and allows expansion to customers in the global markets. In today's world, broadband can grow Alpine City's economic outlook.

With the world becoming more and more digital every day, those who do not have access or operating knowledge of the internet here in Alpine are getting left behind, specifically, when it comes to paying bills, accessing employment opportunities, or continuing to work in Alpine.

Because of the difficulty in getting quality and affordable internet services, Alpine City is seeing lack of broadband internet impact economic development opportunities for businesses to start up or locate here.

Developing digital skills at a young age has become increasingly important, as high-speed broadband internet is an integral tool in modern education and preparation for the future workforce. Access to online classes, homework submissions, and research opportunities can be lost if a reliable high-speed broadband internet connection is not secured. Many districts are also utilizing online learning on snow days and other times when it is not possible for students to gather at the school. Online classes can be made available for specialized subjects like foreign language or technological courses that do not have a local teacher available. Children without access to a broadband internet connection may be left out in these scenarios.

Other online resources are also becoming more important for communities. For example, telehealth is a tool that allows users to connect to doctors and medical providers online. Some of the benefits of telehealth include decreased health care costs, access to specialists not available locally, travel time reductions, and reducing the risk of exposing others to viral infections. High-speed broadband internet is necessary when completing a video call with a health professional.

High-speed broadband internet has become increasingly essential for daily tasks. High-speed internet is used when paying bills, accessing banks and retirement accounts, and applying and

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6 https://www.pewresearch.org/internet/2021/09/01/the-internet-and-the-pandemic/
7 https://www.pewresearch.org/internet/2021/09/01/the-internet-and-the-pandemic/

interviewing for jobs. High-speed broadband internet is also vital when enjoying modern-day entertainment, such as video streaming, watching live sports, or playing live video games. It is used when communicating with family and friends, especially when making a video call. Even using a smartphone with 4G or 5G service involves broadband technology.

3 CURRENT STATE OF BROADBAND AND DIGITAL ACCESS

3.1 METHODS TO DETERMINE THE CURRENT STATE OF BROADBAND

The planning team took several steps to determine the current state of high-speed broadband internet in Alpine City. This planning team included the following individuals and/or organizations:

- Alpine City – Carla Merrill (Mayor), Ryan Robinson (Assistant City Administrator, Planning and Zoning), Shane Sorensen (City Administrator), Heidi Jackman (Communications)
- Horrocks – Eleise Lowe (Project Manager), Jason Libert (Technical Analysis), and Shane Eller (Technical Analysis)

The activities performed included:

- **Public Outreach:** Alpine City conducted targeted public outreach to gather feedback from residents starting in March 2023 through May 2, 2023. The purpose of this outreach was to learn and understand regional broadband needs and to identify gaps in broadband availability, accessibility, and affordability for residents. Public outreach was conducted for both the Utah Internet Speed Test and the Alpine Broadband Survey in the following ways:
    a. Utah Internet Speed Test – Used the Connecting Utah webpage to obtain the internet speed test data.
    b. Alpine Broadband Survey – A location-specific landing page was created and linked on all collateral to capture public feedback and encourage involvement in the development of the Local Broadband Plan. The landing page received 45 visits from April 21, 2023, to May 2, 2023.

Various forms of collateral were created and distributed to stakeholders and the public within Alpine City. The outreach team utilized the collateral items to communicate with the public and spread awareness and involvement in the planning process. The following paragraphs list the outreach material created.

- **Public Surveys:** The outreach team created the Alpine Broadband Survey to gather more qualitative data from the public about their experience with internet connectivity. Questions in this survey covered topics such as residents' current internet connections, device accessibility, affordability options, connectivity for businesses, community internet needs, and voluntary disclosure of demographics.

  As of July 5, 2023, there were 54 surveys completed for Alpine City's broadband planning efforts. There were 2 completed specifically in Alpine City with statewide efforts from the UBC.

- **Internet Speed Tests:** Stakeholders' participation in the Utah Internet Speed Test, sponsored by the UBC, helped the team gather real-time internet upload and download speeds in the Alpine City area. The outreach team advertised the Utah Internet Speed Test through social media to notify the public of Alpine City's planning effort.

  As of July 5, 2023, there were 408 speed tests completed in Alpine City. See **Section 3.5.1** for more detailed Internet Speed Test results and information.

  Stakeholder Meetings: The UBC, as part of the statewide planning effort, conducted stakeholder workshops in each of the 29 counties in Utah. Workshop participants included community advocates, educators, public and elected officials, and industry leaders. During these meetings, participants engaged in in-depth discussion relating to broadband. Topics included education, economic impact, affordability, availability, barriers, and opportunities to expand access to high-speed internet. The stakeholder meeting for Utah County was held on January 23, 2023. Individuals from the Alpine City Council were in attendance.

- **Meeting With Internet Service Providers:** Meetings were scheduled and conducted with identified ISPs and Alpine City officials to create a partnership, discuss ISP expansion plans in Alpine City, and assess their readiness to apply for federal BEAD deployment grant funding for the area. Focus areas included service requirements and ISPs' capacity to deliver reliable broadband connectivity. The approach involved comprehensive measures such as analyzing data from the FCC and the Utah Broadband Maps as well as conducting surveys and meetings with local officials. ISPs' active involvement in the Affordable Connectivity Program (ACP) was confirmed, verifying their commitment to expanding broadband access in unserved and underserved regions. The unique geography and characteristics of the Alpine City were considered when evaluating infrastructure needs and associated costs to establish realistic project timelines and budgets. In addition to providing valuable insights into ISP capabilities and commitment to expanding broadband access, meeting with the respective ISPs provided crucial information for formulating effective plans to deliver internet connectivity to unserved and underserved communities.

- **Existing Assets Assessment:** Using data collected from state GIS mapping efforts, the FCC, the Utah Residential Broadband Map[8], surveys, meetings with stakeholders, and internet speed tests, the technical team created an asset inventory of all existing broadband assets within Alpine. The integration of GIS data into the assessment provided valuable insights into the existing broadband landscape, aiding in the development of targeted strategies for enhancing connectivity.

- **Disparity Analysis:** Analysis was conducted to identify and map areas within Alpine that are unserved and underserved. To further understand potential disparities in broadband access, socioeconomic and demographic variables were considered that could contribute to inequalities in broadband access between members of one group versus another. Examples of groups considered include Age 60+, Disabled Individuals, Veterans, Incarcerated Individuals, Non-White, and Rural Areas. This data was gathered from both public outreach efforts and the U.S. Census and analyzed. GIS mapping technology allows visualization of those areas that may require targeted intervention for digital inclusion efforts.

- **Research:** The team collected research from various sources and agencies regarding broadband infrastructure and deployment best practices, federal funding opportunity qualifications, all resources produced by the NTIA, and broadband outreach best practices.

  Additional research was conducted by utilizing the latest U.S. Census data to provide insights into an area's population and household data, geographic distribution, demographic information, socioeconomic information, internet adoption and usage, and commuting patterns. These factors contribute to the formation of a comprehensive plan that is based upon data.

- **Geographic Information System (GIS) Mapping:** To visualize and analyze broadband coverage, gaps, and infrastructure locations in Alpine City, GIS mapping technology was utilized. This mapping approach provided valuable insights into the current state of broadband connectivity, identifying areas of need, and assisting in the planning of future expansion.

3.2 EXISTING RESOURCES

Existing programs include all the programs and activities that Alpine City currently performs or has performed in the past. Alpine City collaborated with the project team to produce this Local Broadband Plan which will inform Utah's statewide digital connectivity plan. The statewide connectivity plan will be submitted to the NTIA and they will determine the amount of total funding Utah will receive from the federal government for broadband and digital access expansion. Once federal funds are awarded, the state will allocate those funds based on areas with the most need.

[8] UGRC. Utah Residential Broadband Map. https://broadband.ugrc.utah.gov/

Funding for the Alpine City broadband plan was provided by the UBC, powered by the Governor's Office of Economic Opportunity, through the Local Broadband Planning Grant. A total of $942,738 grant funds were awarded to 28 organizations[9] across the state to build comprehensive plans relating to local broadband and digital access needs. Alpine City was awarded $25,000 for broadband infrastructure planning (see **Table 2** and **Table 3**).

Table 2. Current Broadband-Related Resources

ACTIVITY NAME	DESCRIPTION	INTENDED OUTCOME(S)
Local Broadband Plan	This project aims to shape Utah's broadband priorities in the coming years through the statewide Digital Connectivity Plan.	Aid Alpine City to identify needs and gaps in Local Broadband Infrastructure, then strategize and implement the plan.
Utah County Digital Equity Act	Three Programs to bring affordable, high-speed internet to all communities: State Planning Program, State Capacity Program, and Competitive Program.	The State Planning Program is a grant for the state to develop digital equity plans, while the State Capacity Program supports the implementation of those plans and digital equity projects. The Competitive Program distributes 1.25 billion annually over five years through NTIA for digital equity projects open to various entities.

Table 3. Broadband Funding

SOURCE	PURPOSE	TOTAL	EXPENDED	AVAILABLE
Utah Broadband Center	Alpine broadband infrastructure planning	$25,000	$24,970	$30

3.3 PARTNERSHIPS

This section identifies existing and potential partners and community anchor institutions that Alpine City may engage for the development and implementation of the Local Broadband Plan. Such partners include organizations that are already engaged in issues related to broadband deployment and digital inclusion, such as local governments, college and university systems, school systems, faith-based organizations, foundations, chambers of commerce, and local ISPs. The following list and

Table 4 show the partnerships in Alpine City.

- Anchor institutions that CentraCom provides fiber service for. This list comprises all the anchor institutions located in Alpine City.
    - City Hall

[9] https://business.utah.gov/broadband/utah-broadband-center-announces-2023-planning-grant-recipients

- Fire Station
- Public Works
- Alpine Elementary School
- Timberline Middle School

Table 4. Statewide Partners

NAME	CONTACT INFORMATION	ROLE IN BROADBAND DEPLOYMENT AND ADOPTION
Rebecca Dilg	rdilg@utah.gov (801) 538-8681	Utah Broadband Center Director *Governor's Office of Economic Opportunity*
Claire Warnick	cwarnick@utah.gov (801) 450-6682	Utah Broadband Center Program Manager *Governor's Office of Economic Opportunity*
Teri Mumm	tmumm@utah.gov	Utah Broadband Center Digital Access Program Manager *Governor's Office of Economic Opportunity*
Lynne Yocom	yocom@utah.gov (801) 514-4565	Fiber Optics Manager *Utah Department of Transportation*
Liz Gabbitas	lgabbitas@utah.gov	Digital Access and Education Program Manager *Utah State Library*
Vikram Ravi	vravi@ntia.gov	Federal Program Officer for Utah *National Telecommunications and Information Administration*

3.4 ASSET INVENTORY

Broadband assets include hard assets (e.g., towers, buildings, and utility poles) and soft assets (e.g., programs, activities, strategies, skills, people) that can be leveraged to close the digital divide. Hard assets in Alpine City are described in section 3.4.1. Alpine City's soft assets are described in sections 3.4.2 and 3.4.3.

3.4.1 Broadband Availability

Broadband availability relates to whether the physical broadband infrastructure is available in a region to support specific speeds. To deliver broadband speeds of at least 100/20 Mbps broadband speeds to the end-user, a robust network must be in place.

General Service Areas

Figure 3 and **Figure 4** below depict the wireline and fixed wireless broadband currently available in Alpine City, Utah. ISPs are required to submit their corresponding service areas twice a year through FCC Form 477. ISPs are now required to submit service areas through the FCC webpage[10]. The accuracy of the service locations can be influenced by the optimism and interests

[10] Federal Communications Commission. December 2022. Information for Filers. https://www.fcc.gov/BroadbandData/filers

of the ISPs. These maps, part of the Utah Residential Broadband Map[11], provide specific upload and download speed information as well as fixed and mobile wireless data. **Figure 3** shows service areas considered "served" which have at least 100/20 Mbps speeds. **Figure 4** shows service areas considered "underserved" which have at least 100/20 Mbps speeds. Underserved and unserved areas will be further discussed in the needs and gaps analysis in Section 3.5.

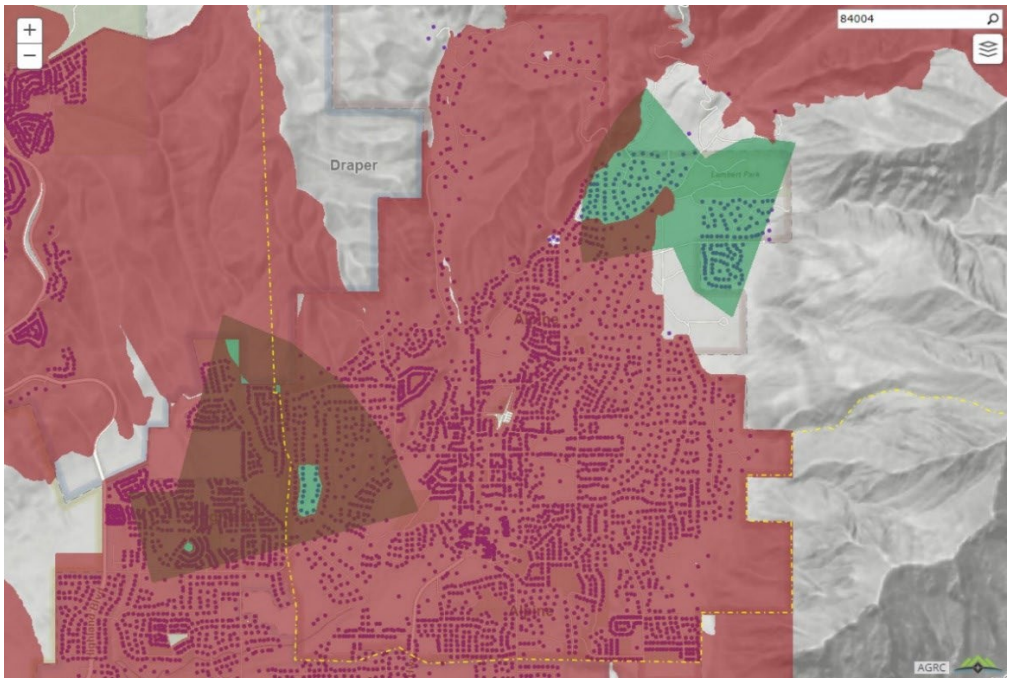

Figure 3. Broadband Coverage Area in Alpine City with 100/20 Mbps Minimum Speeds (Red Areas are Wired Service, Green Areas are Fixed Wireless Service)

[11] UGRC. Utah Residential Broadband Map. https://broadband.ugrc.utah.gov/

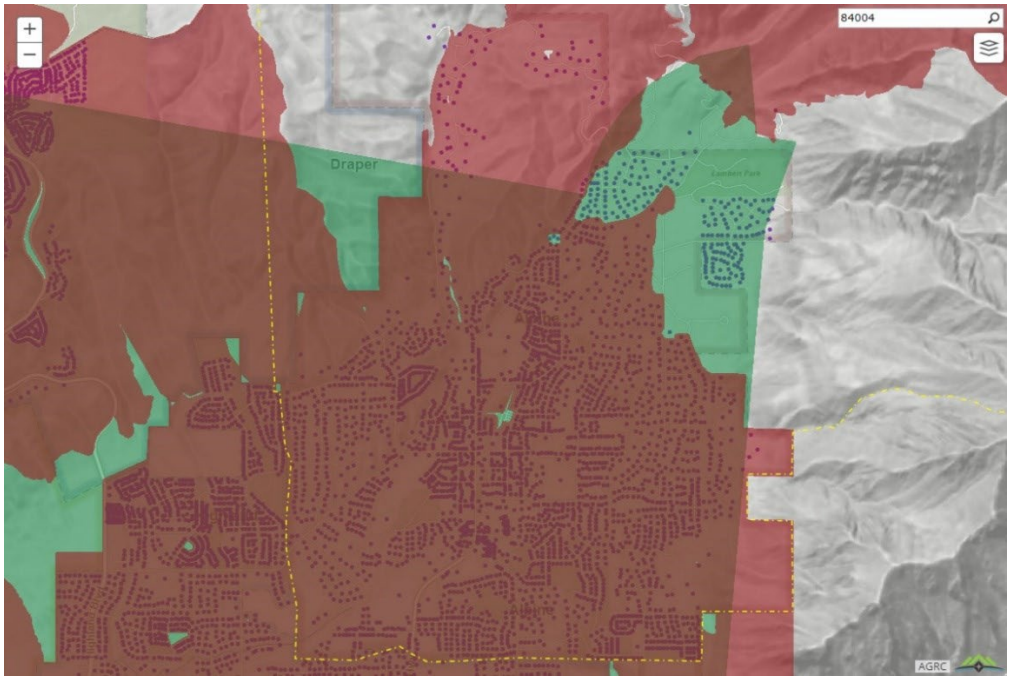

Figure 4. Broadband Coverage Area in Alpine City with 25/3 Mbps Minimum Speeds (Red Areas are Wired Service, Green Areas are Fixed Wireless Service)

Table 5 summarizes the availability of different internet technologies for the population of Alpine, including fiber, cable/DSL, licensed wireless, and unlicensed wireless for all available speeds. These numbers were obtained from GIS data as reported from FCC Form 477.[12]

Table 5. Technology Available to Region's Population

CITY	FIBER	CABLE/DSL	LICENSED WIRELESS	UNLICENSED WIRELESS
Alpine	15.9%	95.6%	0%	100%

Internet Service Providers (ISPs)

Private ISP companies provide internet service to residents and businesses and typically own the networks that distribute the broadband to their customers. Twice a year, ISPs report their service areas through FCC Form 477. In Utah, these coverage areas are mapped onto the Utah Residential Broadband Map[13], a state GIS map from the Governor's Office of Economic Opportunity. In Alpine City, a range of ISPs cater to the diverse needs of residents and businesses.

[12] Federal Communications Commission. Fixed Broadband Deployment Data from FCC Form 477. https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477

[13] UGRC. Utah Residential Broadband Map. https://broadband.ugrc.utah.gov/

Wired and fixed wireless ISPs currently serving Alpine City are:

- Comcast
- CentraCom
- CenturyLink (Lumen)
- RISE
- Utah Broadband

Figure 5, **Figure 6**, **Figure 7**, **Figure 8**, and **Figure 9** show the current coverage areas of each of the available wired and fixed wireless ISPs in Alpine City. Areas in red are wired service while areas in green are fixed wireless service. These coverage areas show any coverage available by the ISP, regardless of whether it is a high or low speed.

Other ISPs that are not reported on the Utah Broadband Map, but residents indicated subscribing to on the public survey include TMobile (2 respondents) and Verizon (1 respondent).

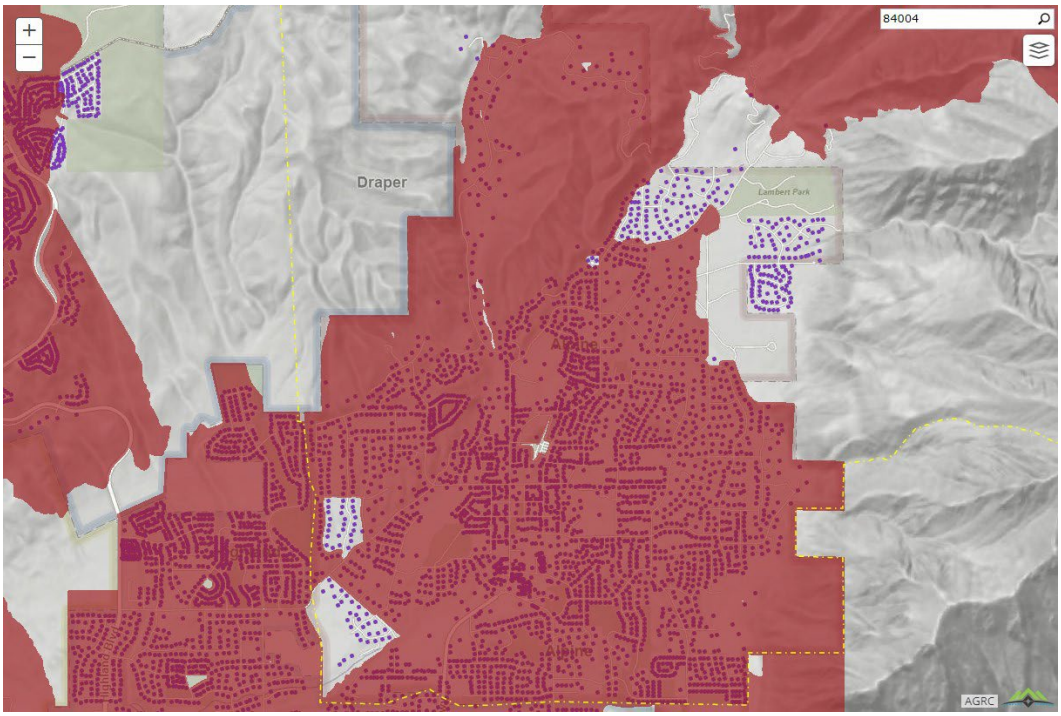

Figure 5. Comcast Coverage Area in Alpine City with Any Speed (Red Areas are Wired Service, Green Areas are Fixed Wireless Service)

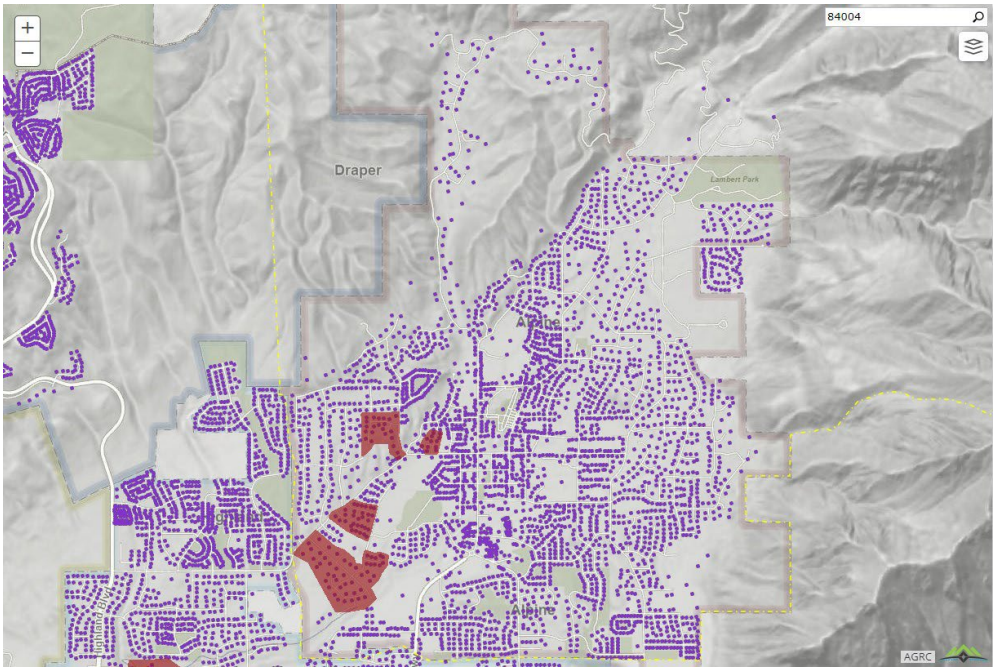

Figure 6. CentraCom Coverage Area in Alpine City with Any Speed (Red Areas are Wired Service, Green Areas are Fixed Wireless Service)

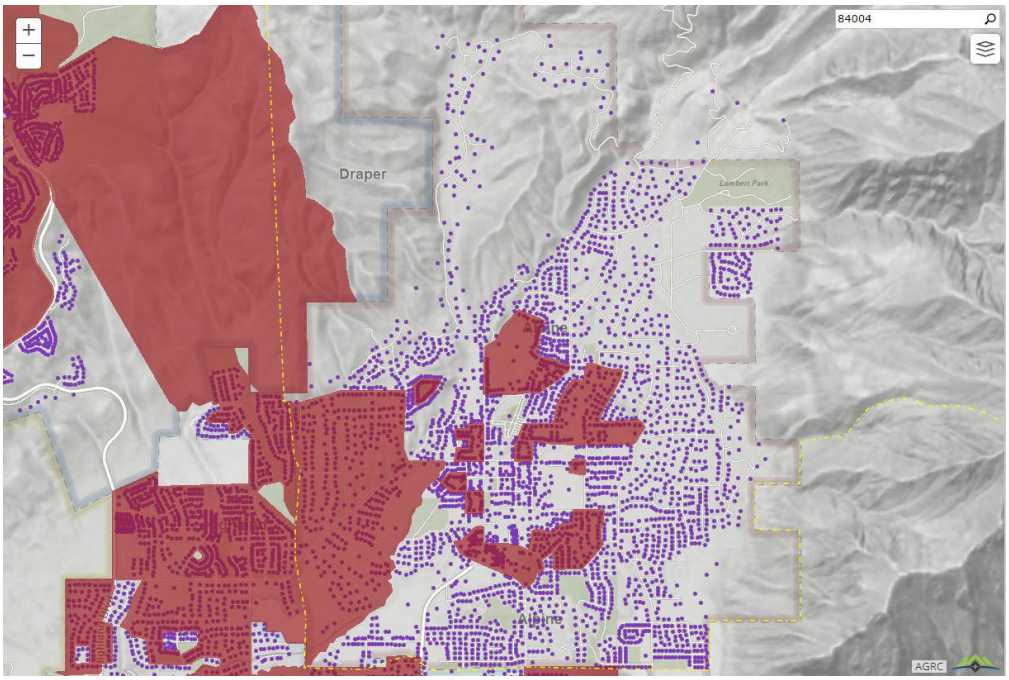

Figure 7. CenturyLink (Lumen) Coverage Area in Alpine City with Any Speed (Red Areas are Wired Service, Green Areas are Fixed Wireless Service)

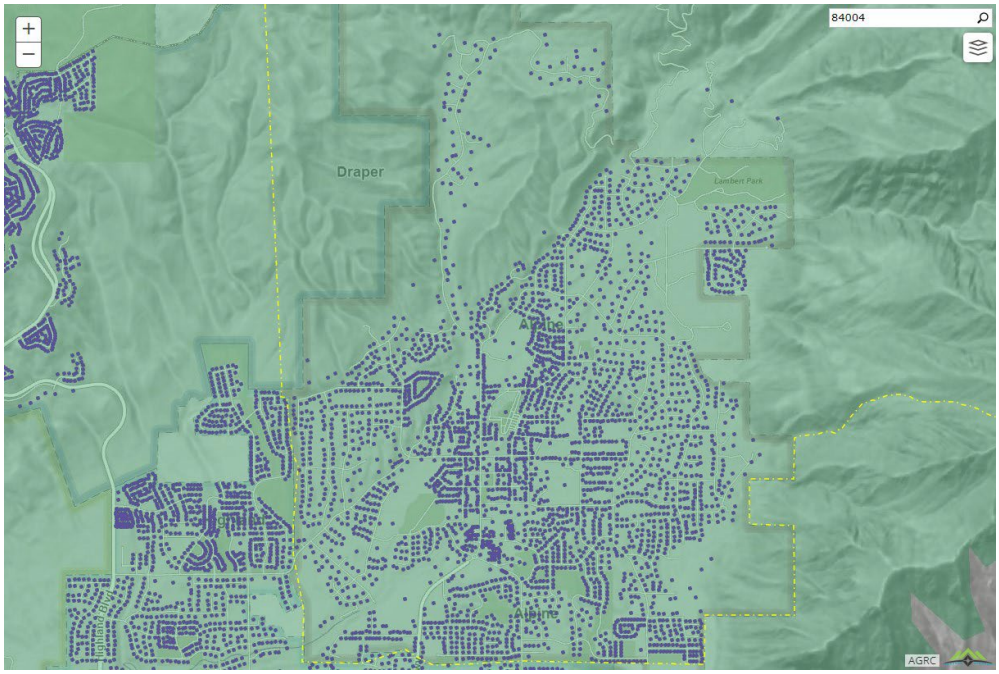

Figure 8. Rise Coverage Area in Alpine City with Any Speed (Red Areas are Wired Service, Green Areas are Fixed Wireless Service)

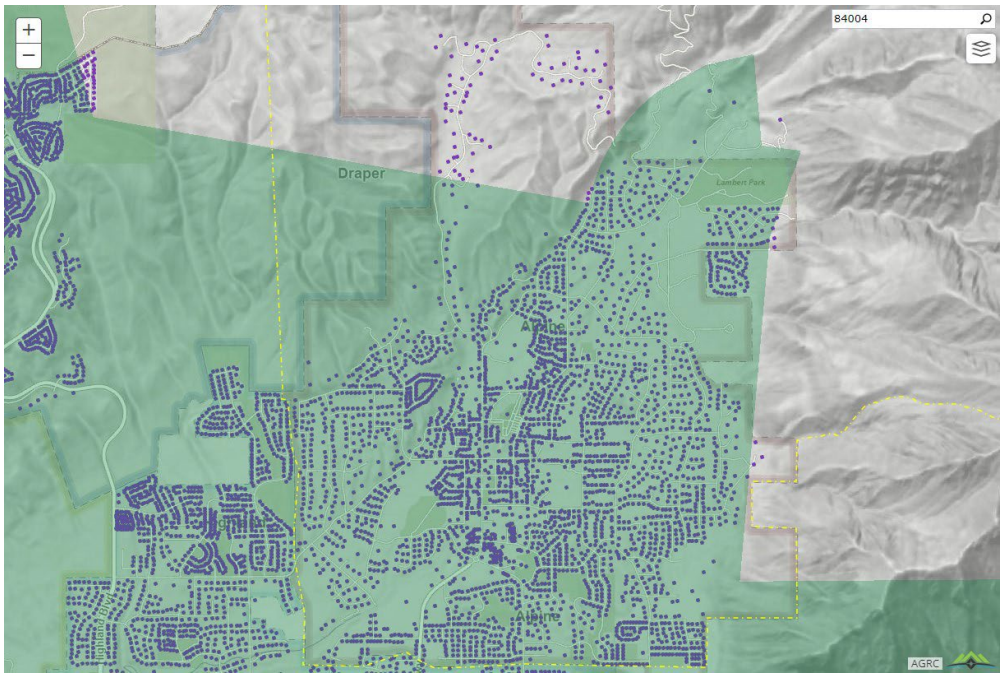

Figure 9. Utah Broadband Coverage Area in Alpine City with Any Speed (Red Areas are Wired Service, Green Areas are Fixed Wireless Service)

Wireless Towers

Point-to-point wireless towers, also known as microwave towers or wireless backhaul towers, are structures used in telecommunications to establish wireless communication links between two specific points. These towers facilitate the transmission of data, voice, or other forms of communication over long distances without the need for physical cables or fiber optic lines. The primary purpose of point-to-point wireless towers is to establish a direct and dedicated connection between two locations. These towers are typically equipped with directional antennas, which transmit and receive signals in a focused beam, allowing for high-speed and reliable data transmission. **Figure 10** shows the location of the wireless tower located in Alpine City.

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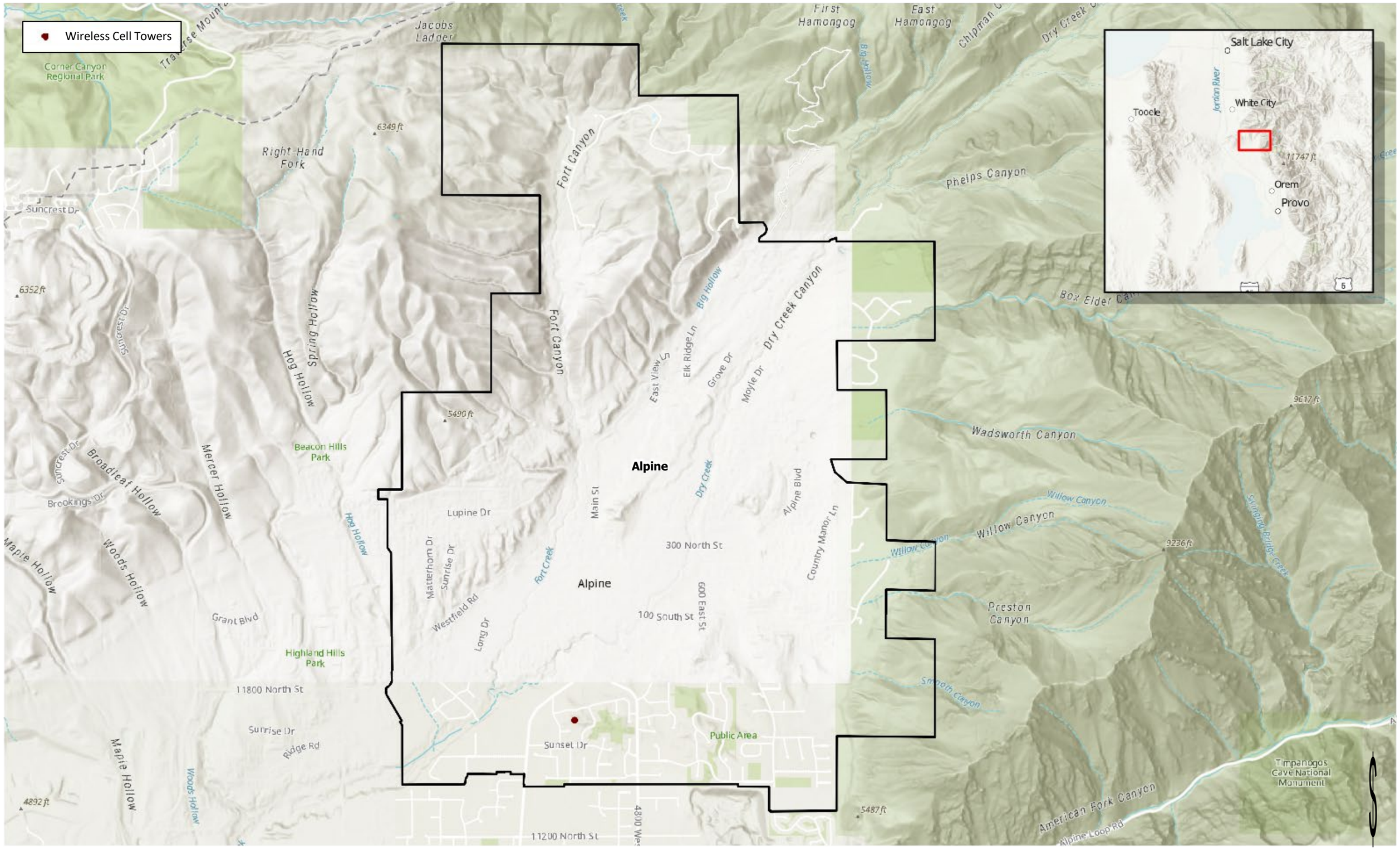

Horrocks.

Figure 10: Wireless Cell Towers in Alpine City

Stakeholder Feedback

Stakeholders from the outer edge of Alpine City residents have expressed concerns about the lack of high-speed broadband internet service in their area. Limited access to reliable and fast internet connections hampers their daily activities, including remote work, distance learning, and accessing online services. Efforts are underway to collaborate with service providers and government agencies to extend high-speed broadband infrastructure to these areas, aiming to bridge the digital divide and promote inclusivity. Improved internet connectivity will enhance educational and employment opportunities, communication, and overall socioeconomic growth in the outer edge of the Alpine community.

Municipal Fiber Network

Alpine City is connected to a fiber network owned by CentraCom to connect city buildings and support smart city initiatives. The following city buildings are on this network: Alpine's City Hall, Fire Station, and Public Works. **Figure 11** shows the locations of community resources in Alpine City.

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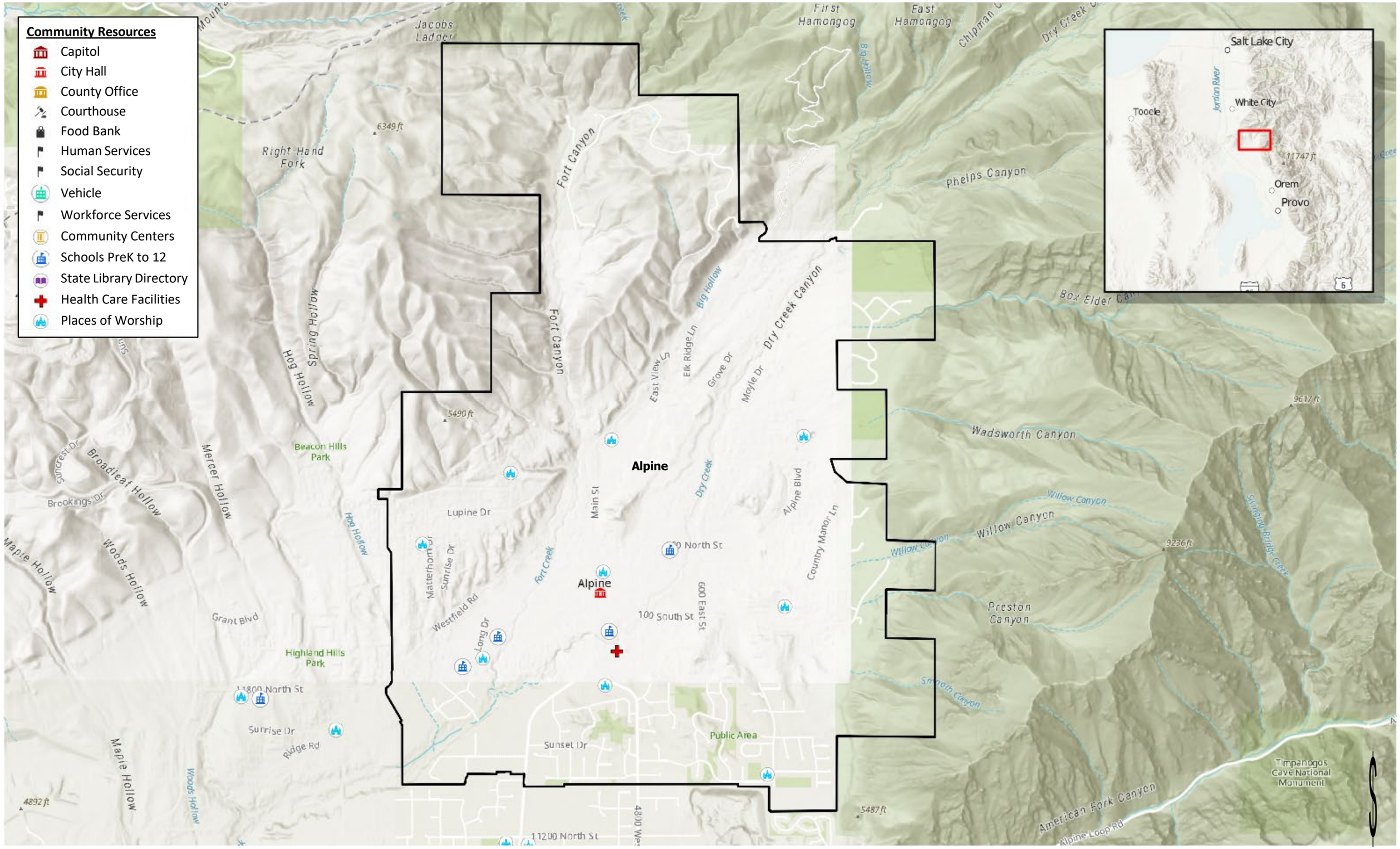

Horrocks.

Figure 11: Community Resources in Alpine City

3.4.2 Digital Access

Digital access refers to the ability of individuals to use and benefit from digital technologies, including high-speed internet. In addition to the availability of broadband infrastructure, digital access also depends on factors such as knowledge, skills, and personal hardware. As digital technologies continue to play an increasingly important role in our daily lives, the need for access to high-speed internet becomes more pressing. Digital access is an important aspect of this issue, as it refers to the fair and just distribution of digital resources and opportunities, particularly for covered populations (unserved, underserved, and underrepresented communities). In Alpine City, ensuring digital access for all residents is a critical part of building a thriving and inclusive community.

Public Wi-Fi Networks

Utah Communities Connect (UCC) developed an interactive map detailing public Wi-Fi locations in Utah as a response to the access needs brought on by the COVID-19 pandemic. This map documents Wi-Fi access points throughout Utah. In Alpine City, no Wi-Fi access points are documented.[14]

The Utah Bookmobile provides public library service (including public Wi-Fi) to communities in Utah that do not have a physical library. Currently, the bookmobile visits Alpine City every other week at the River Meadows Senior Living, Creekside Park, and the LDS Church on 165 N Main.[15]

Wi-Fi Hotspot Loan Programs

The State Library Division has a program that provides free wireless hotspot devices to the public. Residents can check out a hotspot device to be able to connect online remotely at zero cost. These devices are available at most state- or municipality-owned libraries across the state. Alpine City does not have a library within their boundaries, but the City reimburses residents if they get a library card at libraries in neighboring cities.

Mobile Wireless Access

Mobile wireless carriers provide strong coverage areas across Alpine City. According to the data provided by the major mobile wireless carriers, there are no areas where mobile wireless service is not available. For those locations that are covered by mobile wireless, most of the service that is offered supports the “served” threshold of 100/20 Mbps broadband speeds. See **Figure 12** for a mobile wireless coverage map of at least 100/20 Mbps speeds (data provided to the Utah Geospatial Resource Center)[16]. The blue shaded area shows mobile coverage. Alpine City has full mobile coverage.

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[14] Utah Communities Connect. Public Wi-Fi Access Points. https://utah.maps.arcgis.com/apps/webappviewer/index.html?id=e463ba10af034b6e90a8d01b5c13ec55 (accessed May 9, 2023)

[15] Utah Bookmobile. Find Us On the Road. https://bookmobiles.utah.gov/utah/schedule/

[16] UGRC. Utah Residential Broadband Map. https://broadband.ugrc.utah.gov/

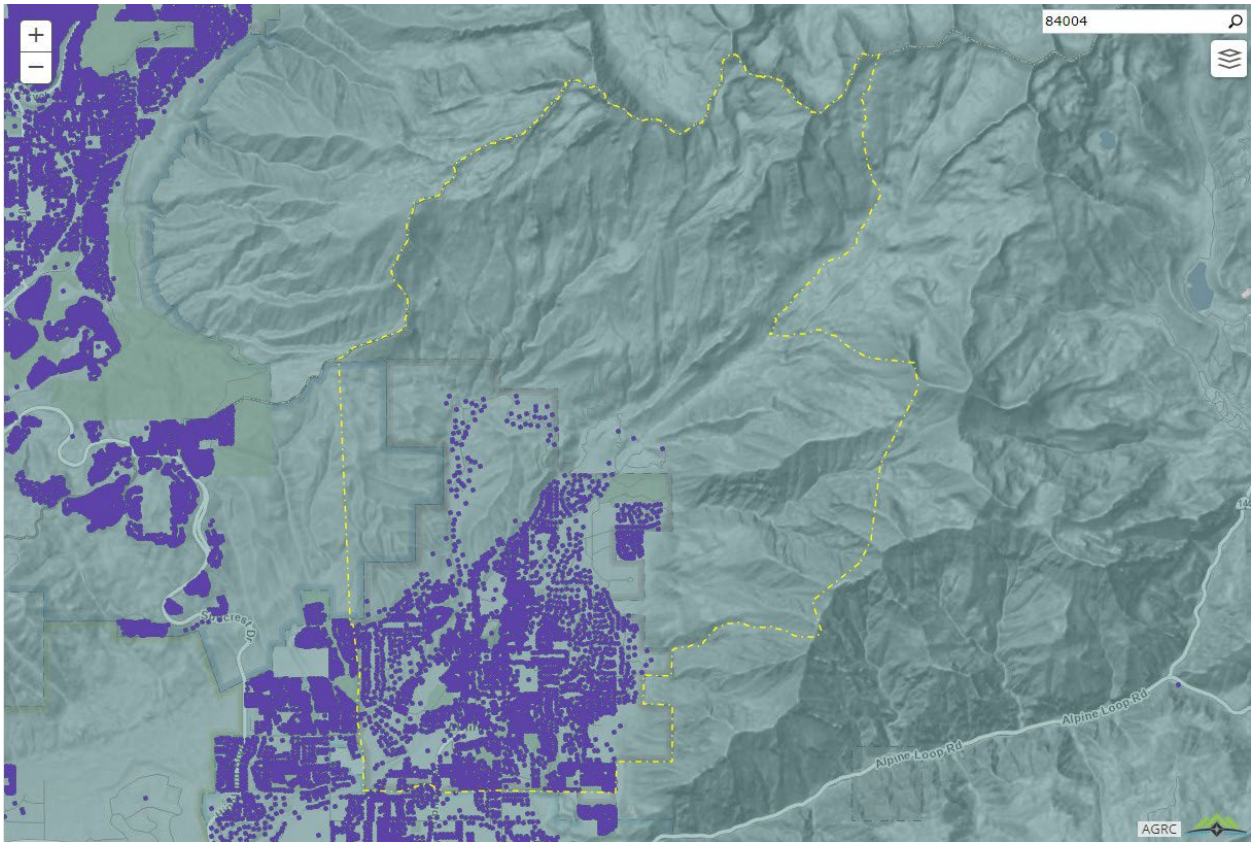

Figure 12. Mobile Wireless Coverage Area in Alpine City (100/20) Mbps Minimum Speeds)

3.4.3 Broadband Affordability

Broadband affordability is a critical component of digital access, as the cost of high-speed internet can be a significant barrier for many households. In Alpine City, the economic affordability of broadband varies depending on a variety of factors, including the availability of affordable broadband service plans and discounted or subsidized broadband programs. While some ISPs offer competitive pricing and bundles that can make high-speed internet more accessible, others may charge higher prices for their services. Understanding the overall affordability of broadband in Alpine City is essential for ensuring that all residents have access to the digital resources and opportunities they need to thrive.

Table 6 outlines the providers available in the area, as well as their respective costs, available speeds, and participation in the ACP. Participation in the ACP program is a requirement for ISPs to be awarded federal BEAD implementation funding.

Table 6. Providers and Prices

PROVIDER	PRICE	DESCRIPTION OF SERVICE TIER, ADVERTISED SPEEDS, AND AFFORDABILITY	PARTICIPATES IN THE AFFORDABLE CONNECTIVITY PROGRAM?
Comcast	$34-$289/month	10 Mbps – 1 Gbps	Yes
CentraCom	$35.95/month $55.95/month $69.95/month $119.95/month $129.95/month $139.95/month	50 Mbps/5 Mbps 75 Mbps/10 Mbps 100 Mbps/20 Mbps 250 Mbps/25 Mbps 500 Mbps/50 Mbps 1 Gbps/100 Mbps	Yes
CenturyLink	$25-$175/month	10 Mbps – 1 Gbps	Yes
RISE	$50-$85/month	10 Mbps 25 Mbps 100 Mbps	Yes
Utah Broadband	$50-$150/month	10 Mbps – 10 Gbps	Yes

There are various federal and state programs that aim to make broadband more affordable for low-income households, including the ACP, the Lifeline program, the E-Rate program, and the Utah Universal Service Fund.

Affordable Connectivity Program (ACP)

The most impactful affordability asset currently available to residents of Alpine City is the ACP. This federal benefit provides a service discount of up to $30 per month on a home internet plan, and households on Tribal lands are eligible for up to $75 per month to mitigate the higher cost of service in rural and remote areas. Unfortunately, the ACP is underutilized in Utah. Other assets include efforts to increase the awareness and use of ACP, such as grant-funded projects and the state-led Act Now campaign. Alpine City has 13 subscribers enrolled in the ACP.[17]

Lifeline

Lifeline is an FCC program that helps make communications services more affordable for low-income consumers. Lifeline provides a discount on qualifying monthly telephone service, broadband internet service, or bundled voice-broadband packages. The Lifeline program offers $9.25 per month to certain qualifying households and plans, and the State of Utah provides an

[17] FCC. April 2023. Affordable Connectivity Program Providers. https://www.fcc.gov/affordable-connectivity-program-providers

additional $3.25 per month. As of January 2023, The Universal Service Administrative Co. provides the following participation metrics for Utah (see **Table 7**).[18]

Table 7. Lifeline Subscriber Data for Utah County

LIFELINE SUBSCRIBERS	NUMBER
Subscriber Count in Utah County (January 2023)	1,894
Eligible Households for the State of Utah	219,359
Estimated 2023 Lifeline Participation Rate for the State of Utah	11%

E-Rate

The Schools and Libraries Universal Service Support Program, commonly known as the E-rate program, helps schools and libraries to obtain affordable broadband. The E-rate program is administered by the Universal Service Administrative Company (USAC) under the direction of the FCC. USAC is responsible for processing applications for support, confirming eligibility, and reimbursing service providers and eligible schools and libraries for the discounted services. USAC also ensures that the applicants and service providers comply with the E-rate rules and procedures established by the FCC. Four service categories are eligible for E-rate funding: telecommunications, internet access, internal connections, and basic maintenance of internal connections.[19]

The Utah Education Network (UEN) is the E-rate consortium lead in applying for and implementing E-rate funds received in Utah. UEN helps schools and libraries apply for discounts on broadband services through the E-rate program. This program utilizes Utah Universal Service Funds (UUSF), which are collected through fees on consumers' phone bills.

There are three schools in Alpine that use E-rate. Those schools are Alpine Elementary, Westfield Elementary, and Timberline Middle.

3.5 NEEDS AND GAPS ASSESSMENT

To ensure that all residents of Alpine City have access to high-quality broadband internet, a needs and gaps assessment is essential. This assessment will identify gaps between the current state of broadband deployment and the needs of residents, businesses, and institutions. Through needs identification, data collection, and analysis, policymakers and community leaders can develop and implement strategies that address these gaps, ensuring that all residents have access to the digital resources necessary for success in today's economy.

To gather more qualitative data from the public about their experience with internet connectivity, a survey was created and distributed to the public. Questions in this survey covered topics such

[18] Universal Service Administrative Co. Jan. 2023. Lifeline Program Data. https://www.usac.org/lifeline/resources/program-data/#

[19] Universal Service Administrative Co. Eligible Services List. https://www.usac.org/e-rate/applicant-process/before-you-begin/eligible-services-list

as residents' current internet connections, device accessibility, affordability options, connectivity for businesses, community internet needs, and voluntary disclosure of demographics. A toll-free hotline number was provided for residents taking the survey who did not have access to the internet. As of May 2, 2023, there were 48 completed for Alpine's broadband planning efforts. There were 2 completed specifically in Alpine City in conjunction with the statewide UBC Digital Connectivity Plan. Survey results and charts, related to broadband's current needs and gaps, are included in the sections following.

3.5.1 Broadband Availability

The ability to interact with friends and family, access educational and health care resources, and fully engage in the digital economy are all made possible by having access to high-speed broadband. However, not every part of Alpine City has access to dependable and reasonably priced broadband connectivity.

The primary metric by which broadband availability is evaluated is what speeds are available to residents and businesses throughout Alpine City. The BEAD program aims to provide service of 100/20 Mbps speeds to every American. Serviceable locations with speeds under 25/3 Mbps are considered unserved locations that are given top priority for broadband funding. Locations with speeds less than 100/20 Mbps are considered underserved locations and are the second priority for BEAD funding.

FCC Service Locations

The FCC has created a map[20] that shows the service availability at each broadband serviceable location. Residences and businesses that are classified as unserved or underserved will qualify for BEAD funding. The data within the other sections of 3.5.1 generally support the FCC service designations.

Table 8 shows the number of FCC locations that fall within each speed tier in Alpine City. **Figure 13** shows all FCC serviceable locations while **Figure 14** shows only the unserved and underserved locations.

Table 8. Broadband Speeds Available

	UNSERVED (BELOW 25/3 MBPS)		UNDERSERVED (BELOW 100/20 MBPS)		SERVED (ABOVE 100/20 MBPS)		
CITY	NUMBER OF LOCATIONS	%	NUMBER OF LOCATIONS	%	NUMBER OF LOCATIONS	%	TOTAL FCC LOCATIONS
Alpine	10	0.3%	187	6.3%	2,757	93.3%	2,954

[20] FCC. National Broadband Map. https://broadbandmap.fcc.gov/home

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FCC Locations

- Served (>100 M Down)
- Underserved (25-100 M Down)
- Unserved (<25 M Down)

Figure 13: FCC Service Locations in Alpine City

0 0.25 0.5 1 Mile

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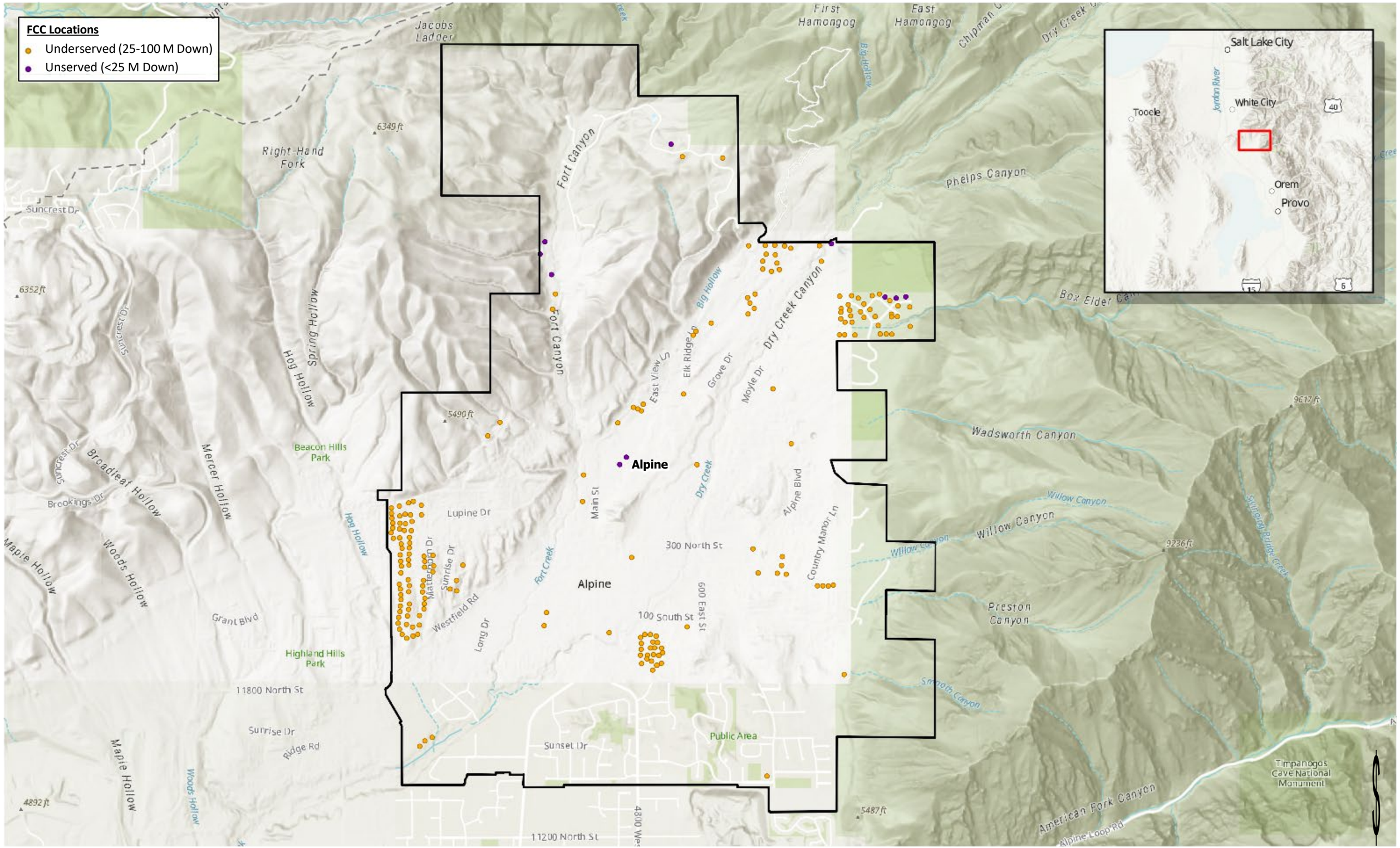

Figure 14: FCC Underserved/Unserved Service Locations in Alpine City

Survey Results

The Alpine Survey asked respondents to indicate if they had a household internet connection. Of 48 respondents, 100% responded "Yes, I have an internet connection at my residence."

Internet Speed Test

In order to correctly gauge the accuracy of FCC broadband data and ISP coverage areas, Alpine held an Internet Speed Test campaign throughout the region using the speed test provided by the Utah Broadband Center.[21] Residents could test the current speeds that their device was experiencing at the time of the test. Speed tests provide insight of additional unserved and underserved locations, showing gaps and discrepancies beyond the information provided by ISP data and FCC broadband data. These real-time internet download and upload speeds, while beneficial, did not come without limitations. For example, residents may be experiencing lower speeds because they are paying for a slower speed tier, which indicates an affordability issue. In addition, lower speeds may be due to personal hardware that has been installed incorrectly, which would be a digital access issue. The speed test cannot show if these other factors are happening, so it is best used to assess general trends.

Table 9 shows the results of the Internet Speed Test. Out of the total 408 taken, nearly 13% of the locations classify as unserved (download speeds of below 25 Mbps). **Figure 15** shows the locations and results of the speed tests. **Figure 16** shows the speed test locations, along with the FCC unserved and underserved locations.

Table 9. Internet Speed Test Results

DOWNLOAD SPEED	ALPINE CITY
No Service	4
Below 10 Mbps	25
Below 25 Mbps	24
Below 500 Mbps	341
Above 500 Mbps	14
Total Locations	408

[21] https://business.utah.gov/broadband/speed-test/

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Speed Test Results

- No Service
- <10 M down
- <25 M down
- <500 M Down
- >500 M down

Alpine

Figure 15: Speed Test Results for Alpine City

0 0.25 0.5 1 Mile

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FCC Locations
- Underserved Location (25-100 M Down)
- Unserved Location (<25 M Down)

Speed Test Results
- No Service
- <10 M down
- <25 M down

Figure 16: Unserved Speed Test Results and Underserved/Unserved FCC Locations in Alpine City

0 0.25 0.5 1 Mile

Survey Results

The Alpine Broadband Survey asked the respondents what company they use for internet service. There were 50 responses to this question, with 40 respondents indicating that Xfinity was their ISP. This data is detailed in **Figure 17** below.

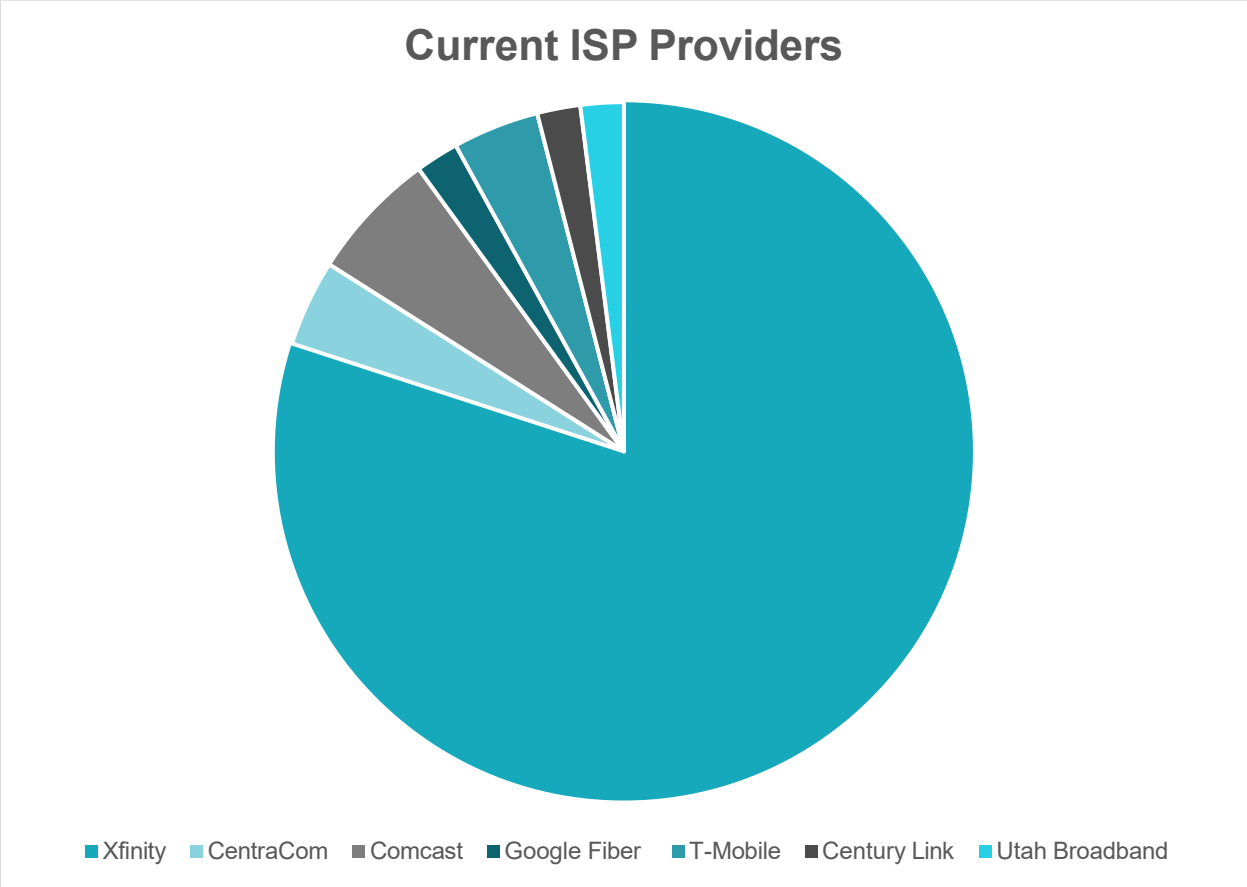


Figure 17. Current ISP Providers

3.5.2 Digital Access

There are many barriers to digital access in Alpine City which have made it difficult for residents to access high-speed broadband internet. These barriers primarily include affordability, community anchor institutions with lack of access to broadband connectivity and/or devices, and lack of access to broadband connectivity. To address these needs, it is important to prioritize initiatives that improve digital literacy and provide affordable access to high-speed internet, particularly in underserved areas of Alpine City.

Covered Populations

A covered population refers to a group of individuals who are eligible for a particular program or intervention based upon economic or socioeconomic factors. The goal of defining a covered

population is to target resources and focus them on those who are most in need. **Table 10** below shows covered populations in Alpine City.

Table 10. Covered Populations

	PERCENT OF POPULATION				
CITY	AGE 60 AND OVER	DISABILITY	VETERANS	LOW-INCOME POPULATION	NOT WHITE OR HISPANIC
Alpine	34.1%	14.5%	4.4%	6.9%	5.6%

Internet Subscription Rates

Alpine City recognizes the vital role broadband internet plays in the community. Census data provides valuable information into the adoption and accessibility of broadband services among the population. This data assists in identifying areas of opportunity and addressing existing gaps in broadband access. As of 2023, 100% of Alpine City households have a broadband internet subscription.

The Alpine broadband survey asked respondents what they use internet for at home. There were 44 responses to this question, and most respondents indicated they use their internet for entertainment, remote learning/working, shopping, video conferencing, gaming, and remote health care. **Figure 18** shows the breakdown of these uses.

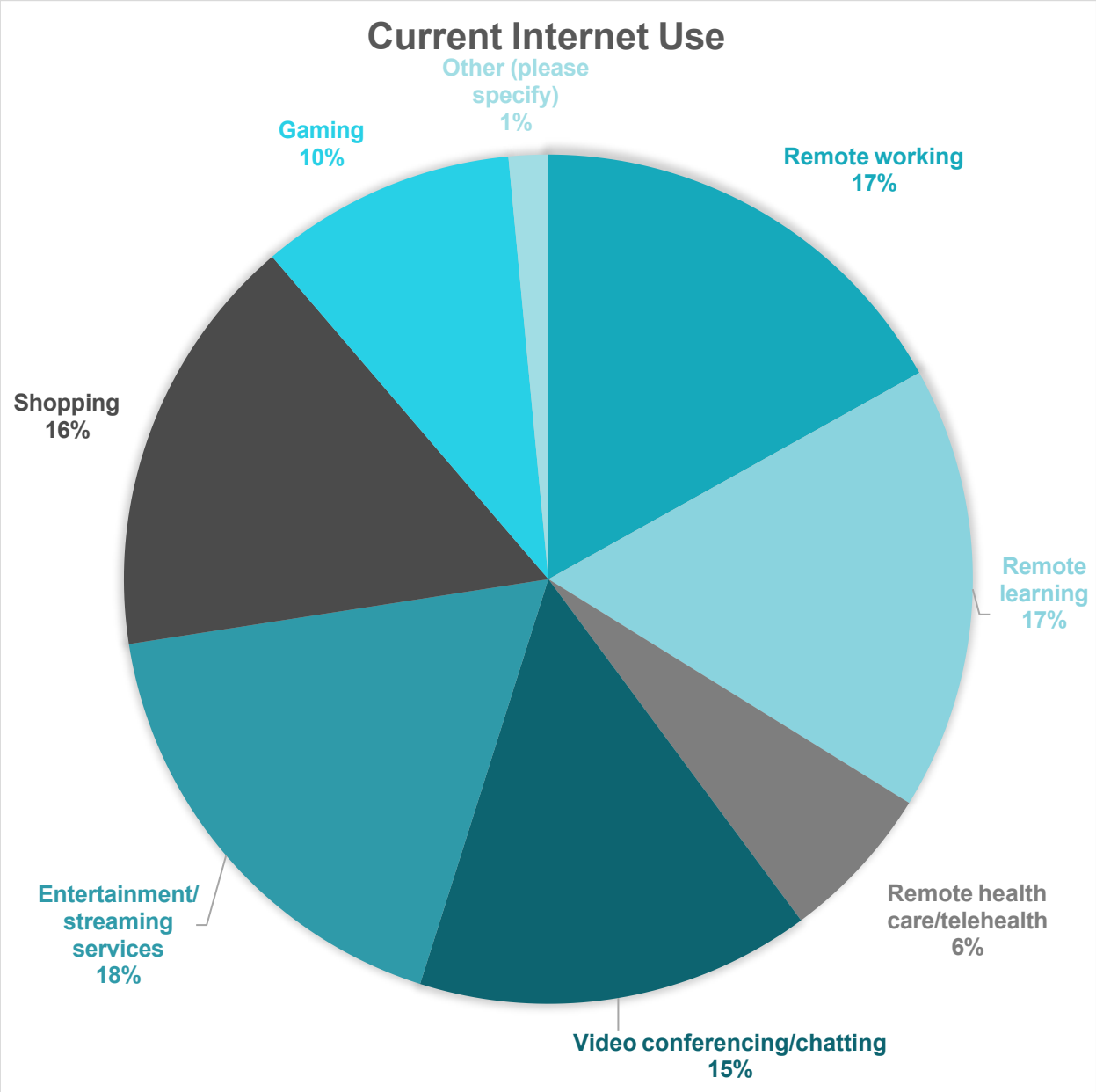


Figure 18. Household Internet Use

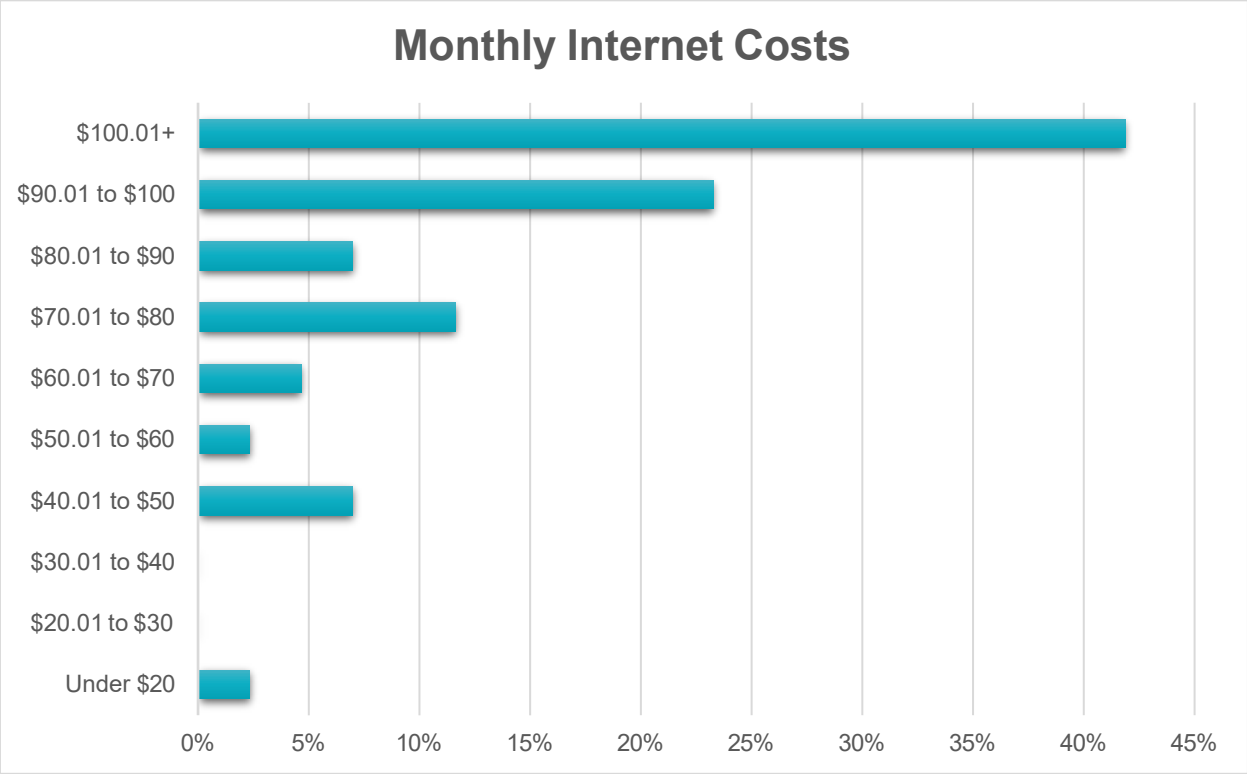
3.5.3 Broadband Affordability

Broadband affordability can be a hurdle for some Alpine City residents, hindering access. Residents don't have many options for services where they live. The service is often poor quality, but high cost.

Survey Data

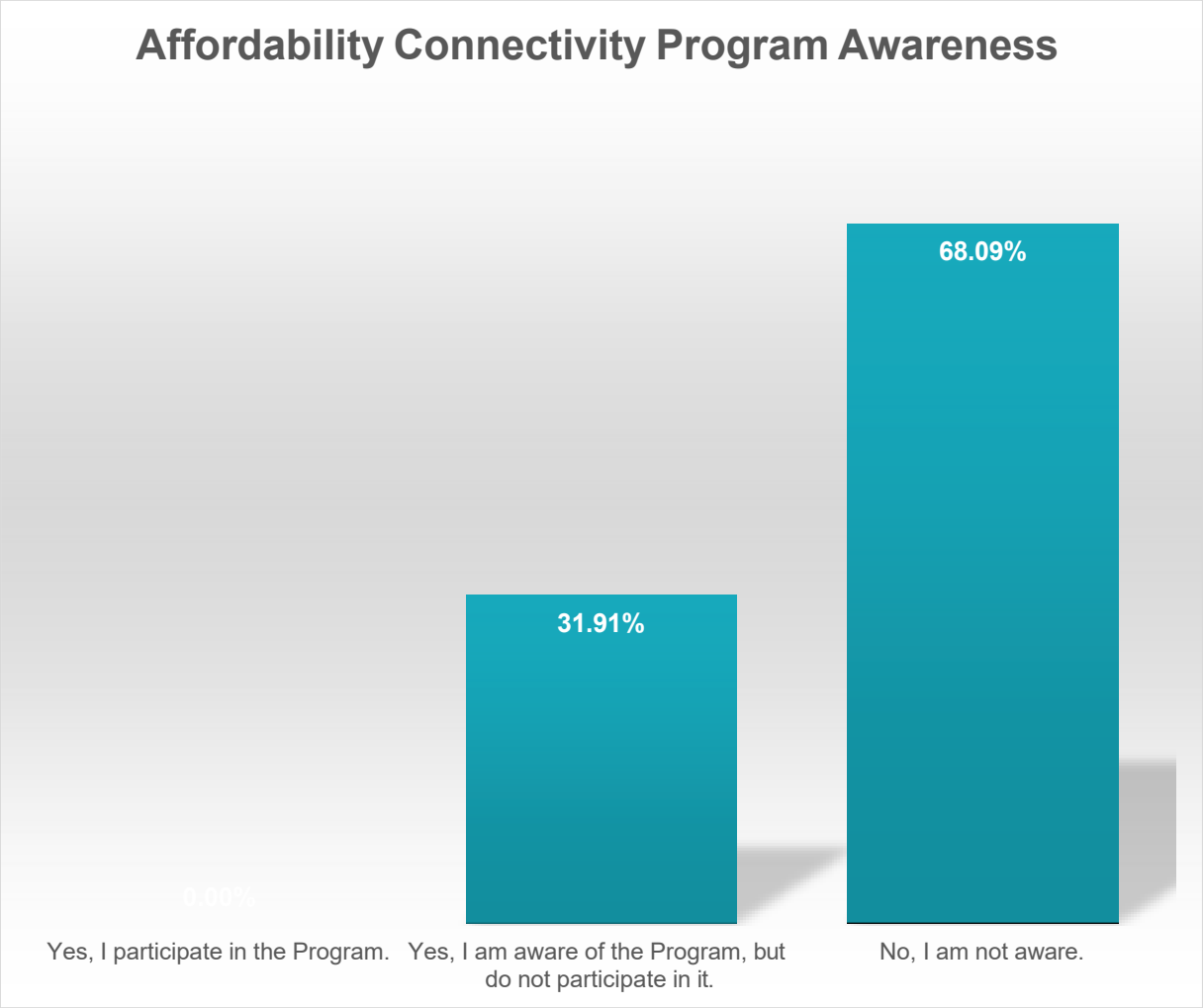
The Alpine Broadband Survey asked respondents what the monthly charge was for their household internet service. There were 43 responses to this question, with 42% indicating they pay more than $100 for monthly internet service. This data is detailed in **Table 11** below. Those reporting speeds under 25 Mbps are paying $75-$395/month (the $395/month plan is Google Fi) with an average cost of $106.25/month among 8 survey respondents. Those reporting speeds up to 100 Mbps are paying from $20-$500/month with an average cost of $103.57/month among 19 survey respondents. Those reporting speeds up to 1 Gbps are paying from $50-$260/month with an average cost of $153.41/month among 20 survey respondents.

Table 11. Monthly Charge for Internet Service



Survey respondents were also asked about their awareness of the Affordable Connectivity Program (ACP). Of the 47 responses to this question, 32 people shared they were not aware of the ACP. This data is detailed in **Table 12** below.

Table 12. Affordable Connectivity Program Awareness



4 OBSTACLES OR BARRIERS

The project team has identified various obstacles related to broadband deployment and adoption within Alpine City. These obstacles include physical barriers, permitting, and right-of-way.

Physical Barriers

The geographic features of Alpine City pose challenges for deploying internet infrastructure due to physical barriers. With its hilly terrain, constructing fixed wireless networks becomes problematic. Moreover, the larger frontage of houses in Alpine City adds to the individual costs incurred. Addressing these physical obstacles is essential to ensure widespread access and participation in the digital era.

Permitting and Right-of-Way

It is important to obtain various permits at the earliest stages of implementation. This includes coordinating with utilities; addressing canal and waterway crossings; securing railroad permits; obtaining federal, state, and local permits in the right-of-way; and obtaining easements when broadband equipment encroaches land outside of the public right-of-way.

Table 13 shows many of the permitting entities within Alpine City. **Figure 19** the land ownership throughout the region, which informs permitting. All land in Alpine City is privately owned. In Alpine City it can take up to 45 days to receive the relevant permits.

Table 13. Permitting

LEVEL	APPROXIMATE TIMEFRAME FOR PERMITTING	ENTITY
Local	30 Days	Alpine City Engineering
Utility	45 Days	Electrical Company
Utility	45 Days	Gas Company
Utility	45 Days	Other Telecom

Figure 19: Land Ownership in Alpine City

5 IMPLEMENTATION PLAN

5.1 PRIORITIES

Table 14. Priorities for Broadband Deployment and Digital Access

PRIORITY	DESCRIPTION
Establishing high-speed internet in all areas with speeds less than 100 Mbps.	Establish high speed internet to all residences. Especially those in the northern and eastern parts of town that are underserved.
Ensuring existing areas have adequate download and upload speeds.	Increase the service level to those areas that currently have inadequate coverage levels.
Fiber to every home.	Provide option of fiber optic internet connection to all residents.
Work with ISPs to service Alpine with high-speed internet above 100/25 Mbps.	Develop partnership with ISPs serving Alpine to increase coverage areas to areas of Alpine that are unserved and underserved.
Explore installing city-owned broadband infrastructure.	Exploring placing conduit into collector roads as they get updated according to the Transportation Master Plan.
Update city codes related to broadband infrastructure.	Update franchise agreements, new development code, and City specifications to create broadband standards.
Review City website and City IT practices every 2-3 years.	Ensure that all City IT services are up to date to support Alpine residents and emerging technology.

5.2 KEY EXECUTION STRATEGIES

Drawing on the vision and goals in Section 1.2, this section explains the specific strategies that Alpine City will undertake to realize those goals.

GOAL 1: Establish high-speed internet in all areas with speeds less than 100 Mbps

OBJECTIVE	STRATEGY	IMPLEMENTATION DETAILS
Make sure that BEAD funding is utilized for areas that qualify. Especially areas with higher cost to install.	• Work with UBC to ensure that ISPs are bidding on Alpine and will serve all areas of the city.	Key Players: City, State, and federal officials, ISPs Funding Sources: Grants as they become available. Timeline: When Alpine is awarded BEAD funding.
Determine whether Alpine City has been successful in achieving service goals.	• Assess results of fiber buildouts to determine if additional action needs to be made. • Create public survey for City website for ongoing input from residents to report broadband internet needs.	Key Players: City officials Funding Sources: Public/private funding Timeline: Every three (3) years from the adoption of this plan.
Identify funding sources for broadband infrastructure.	• Identify funding sources for installing fiber in high-cost areas. This may be City funded, private ISP funded, or public grants or loans available. • Partner with ISPs as needed to obtain funding.	Key Players: City officials Funding Sources: Public funds, Private ISP partners, Timeline: Ongoing

GOAL 2: Bring fiber internet to every home

OBJECTIVE	STRATEGY	IMPLEMENTATION DETAILS
Identify new ISP to install infrastructure throughout areas of the city with poles available where installation is low-cost. This will give an additional ISP footing into the city to explore take-rates and hopefully install to the rest of the city.	• Have conversations with Utah Broadband, Centracom, and Senawave by end of 2023.	Key Players: City officials, private partnerships Funding Sources: ISP partners, grants or loans. Timeline: End of 2023
Have additional conversation with Comcast to see if they will install fiber to the home.	• Comcast covers most of Alpine City with Co-axial cable to the home. The most cost-effective way to get fiber to every home would be for Comcast to upgrade their infrastructure to fiber.	Key Players: Comcast, City officials Funding Sources: Private or public funding options Timeline: End of 2023

GOAL 3: Installing city-owned broadband infrastructure and updating city codes related to broadband infrastructure.

OBJECTIVE	STRATEGY	IMPLEMENTATION DETAILS
Install City-owned broadband infrastructure would allow additional ISPs to establish service in Alpine,	• Laying fiber conduit and boxes during construction of collector roads starting summer of 2023 and going forward. • Allow additional ISPs to install fiber in City-owned conduit so more areas can be served with lower installation costs. • Make sure transportation master plans identify roads that need broadband infrastructure.	Key Players: City officials, Funding Sources: Public funding. Timeline: Ongoing
Create dig-once friendly policies and practices.	• Develop an email list to notify ISPs and other interested companies when roads are being serviced. • Update city codes and specs • Determine if City will allow ISPs to install using MicroTrenching	Key Players: City officials Funding Sources: Public funding Timeline: ongoing.
Continue to create plans for broadband expansion within Alpine.	• Add Broadband section to all Master Plans developed in the future.	Key Players: City officials Funding Sources: Public funding Timeline: Ongoing
Ensure that franchise agreements with ISPs reflect what Alpine wants from ISP.	• Update and review standard franchise agreements with current and future ISPs	Key Players: City officials, ISP Funding Sources: ISP Timeline: Ongoing
Provide public Wi-Fi hotspots to ensure that all residents have the opportunity to connect to the internet.	• Install public Wi-Fi hotspots	Key Players: City officials, public and private entities Funding Sources: Public or private funding Timeline: Ongoing

GOAL 4: Continuing to keep broadband services up to date with best practices by reviewing every 2-3 years.

OBJECTIVE	STRATEGY	IMPLEMENTATION DETAILS
Keep residents informed of Alpine City events, notices, and resources.	• City Website up to date with current information • Continue to communicate with residents on website and City social media channels regarding City events, services, updates, classes, ect • Provide education on how to use the City website.	Key Players: City officials Funding Sources: Public funding Timeline: Ongoing
Inform residents on classes and information specific to internet access.	• Put information about ACP program on City website. • Put information about any computer literacy classes taught at nearby senior centers on City website.	Key Players: City officials Funding Sources: Public funding Timeline: Ongoing
Provide increased accessibility and improved efficiency to City processes by digitalizing City documents.	• Digitalizing City documents and services where applicable	Key Players: City officials Funding Sources: Public funding Timeline: Complete by end of 2025
Ensure that all broadband goals and services are relevant and achievable, matching the City's current goals and needs.	• Review progress on this broadband plan every 2-3 years. Evaluate new and existing broadband goals.	Key Players: City officials and private entities Funding Sources: Public funding Timeline: Every 2-3 years.

5.3 ONGOING STAKEHOLDER ENGAGEMENT

Continued stakeholder engagement is vital to the success of Alpine's broadband deployment strategies. Alpine City will continue to build strong relationships with community partners and key stakeholders as this plan is implemented. The success of getting all residents connected to reliable high-speed internet will be dependent on the ability to continually coordinate efforts with local community partners.

Key initiatives to support continued engagement include:

- **Create a Broadband Working Group:** This working group should be diverse and represent a variety of roles. Important representation in this group includes municipal officials, educators, community influencers, business leaders, technical experts, and

organizations that represent the covered populations. A broadband working group will ensure that there is city-wide support for resulting broadband projects.

- **Meet with Internet Service Providers:** Building a relationship with an internet service provider (ISP) can be beneficial for both Alpine City and the ISP. By working together, Alpine City can help to ensure that their residents have access to high-quality, affordable broadband internet.

  The following strategies promote the establishment of a collaborative partnership with local ISPs:

  - IMPORTANT: Only meet with one ISP company at a time. Ask them to share their future build-out plans for Alpine City. They are more willing to share information when their competition is not in the room.
  - Streamline permitting and processes: Review and streamline the permitting and approval processes for ISPs to facilitate efficient infrastructure deployment.
  - Create incentives: Offer incentives such as tax breaks or expedited permit processing for ISPs that invest in broadband infrastructure.
  - Foster public-private partnerships: Explore opportunities for public-private partnerships with ISPs to leverage resources, expertise, and funding.
  - Collaborate on funding opportunities: Work together with ISPs to identify and pursue available funding sources, grants, or subsidies for broadband projects.
  - Share infrastructure resources: Explore possibilities for sharing existing infrastructure, such as utility poles or conduit, to reduce costs and deployment timelines.
  - Regular communication and updates: Establish regular communication channels to keep ISPs informed about city initiatives, policies, and upcoming projects related to broadband infrastructure.

- **Continue Stakeholder Communication:** Stakeholder communication that is frequent and transparent helps build and maintain community support. Alpine City should aim to educate, garner support, and celebrate accomplishments through stakeholder communication. Tactics for communicating with stakeholders should be varied and represent traditional and virtual engagement. Specific tactics to continue stakeholder communication include:

  - Regularly meet and coordinate regularly with local ISPs to gain insight into expansion priorities and monitor the progress of ongoing projects.

- **Identify and Update Community Priorities**: Each community within Alpine City has different needs, resources, technologies, financing, and partnership options. Reevaluation of priorities will be required to keep community members engaged,

achieve a local vision of connectivity, and increase broadband utilization. Updates to the Local Broadband Plan may become necessary through the process of planning, implementing, and evaluating success.

  - Continuously gather feedback and perspectives through an ongoing local broadband survey that remains accessible year-round. Adopt the survey as projects and initiatives are implemented to assess their effectiveness.

- **Understand Regional Context:** By establishing and strengthening working relationships with a variety of stakeholders, Alpine City may identify additional opportunities, barriers or initiatives. Continued coordination with key stakeholders will allow Alpine City to clearly communicate the benefits of connectivity, empower local entities to advocate for broadband initiatives, and build enthusiasm and support for projects. This may be accomplished through:

  - Conducting surveys to gather information and insights directly from the residents of Alpine City. Ask questions related to their needs, preferences, and challenges regarding connectivity, internet access, and digital resources.

  - Engaging with local stakeholders such as community leaders, business owners, educational institutions, healthcare providers, and non-profit organizations.

  - Analyzing available data on the region, including demographics, population growth trends, economic indicators, and internet penetration rates.

  - Collaborating with regional organizations, government agencies, and industry experts who have knowledge and experience working in the Alpine City area.

- **Advertise and continue to increase enrollment in the Affordable Connectivity Program.** The ACP is an FCC benefit program that helps ensure that all households can afford broadband. The benefit provides a discount of up to $30 per month toward internet service for eligible households and up to $75 per month for households on qualifying Tribal lands.

  - Utilize online platforms such as social media, search engine advertising, and display ads to reach a wide audience in Alpine City.

  - Collaborate with local organizations and schools to promote ACP.

  - Participate in local events, fairs, or festivals to engage directly with residents.

  - Organize a door-to-door campaign where trained volunteers or staff members visit Alpine City residents to provide personalized information.

  - Reach out to local newspapers, radio stations, and community newsletters to share press releases or arrange interviews to raise awareness about the ACP.

- Ensure that promotional materials, websites, and enrollment forms are available in multiple languages spoken in Alpine City.
- Implement a referral program where the current ACP participants receive incentives or rewards referring eligible individuals to enroll in the program.

5.4 ESTIMATED TIMELINE FOR UNIVERSAL SERVICE

Universal service is the goal of providing broadband service to every resident of Alpine. Achieving this goal depends upon receiving sufficient funding for broadband infrastructure projects, the timeline by which ISPs build at, and the timeline by which the BEAD program is administered by. Due to this timeline being determinant on external elements, Alpine intends to communicate closely with all ISPs building in the area and follow the state timeline as listed in the statewide Digital Connectivity Plan. The state aims to provide universal broadband service for all Utahns by December 31, 2028. The timeline more specific to items relevant to Alpine officials are listed in Section 5.2 of this plan.

Individual Broadband Project Minimum Timeline

It will be up to the ISPs to carry out the design and construction of broadband infrastructure projects within Alpine, however, a sample broadband project timeline is listed here for reference. An estimated timeline concerning activities necessary to implement broadband services include the following:

Table 15. Broadband Infrastructure Project Design and Build Phase Estimated Timeline for ISPs

STEP	DESCRIPTION	TIMELINE
High-Level Design (HLD)	Create a preliminary FTTP (Fiber to the Premise) design before fielding and jurisdictional research	30-60 Days
Low-Level Design (LLD)	Create a FTTP design that is constructable using fielding data and jurisdictional research	60-90 Days
Permitting	Get approval from the appropriate jurisdictions for construction	Up to 180 Days
Construction	Build a functioning FTTP network	90-180 Days
Project Audit	Review construction documents, conduct AARs, create audit documentation	Up to 90 Days

Note that some of these phases may overlap, while others must be completed sequentially. Unforeseen circumstances or delays might impact the overall timeline.

Minimum duration: 30 days (HLD) + 60 days (fielding and LLD) + 180 days (permitting) + 90 days (construction) = 360 days (about 1 year) for full turn-key implementation.

If some phases can be completed concurrently, the duration could be shortened. For example, construction can be started on certain segments of the broadband build that have approved permits much sooner than the predicted 180 days, shortening the original estimate for the overall project duration.

It is crucial to account for potential delays and other factors that may affect the project schedule. Regular communication with relevant stakeholders and close monitoring of progress can help mitigate risks and keep the project on track.

5.5 ESTIMATED COST FOR UNIVERSAL SERVICE

An estimated cost for the project is calculated using GIS analysis, incorporating data from various sources such as the State of Utah's roads layer and address points, as well as FCC data on served, underserved, and unserved points. The length attribute from the roads layer is used to determine the distance, considering several key parameters including aerial percentage, aerial cost, and underground cost (can vary based on the location geology).

The estimated cost for materials, design, and installation can vary. Costs for aerial fiber hung on power poles can range up to $10/FT. Underground fiber costs range from $30/FT when installing in easy-to-bore areas, up to $35-$60/FT when boring in rocky or hilly areas.

The formula for calculating the total cost of construction is as follows:

Total Cost of Construction = ((Road Length * Aerial Cost * Aerial Percentage) + (Road Length * Underground Cost * (1 – Aerial Percentage)))

For this estimate, the following numbers were used:

Aerial Cost: $10/FT

Underground Cost: $30/FT

Aerial Percentage: See **Table 16** below

To obtain the cost per passing, the total cost of construction is divided by the count of address points (in some instances FCC points) within a defined geographic area, as determined by a polygon selection.

This methodology ensures that the estimated cost is derived from reliable data sources and considers the specific characteristics of the project area, providing an accurate and comprehensive financial projection for the implementation of universal services.

Table 16 explains in detail the areas comprising Alpine City and their respective costs. Each of Alpine City's identified underserved and unserved polygon areas are highlighted in **Figure 20.**

Table 16. Estimated Cost for Broadband Deployment in Alpine City

MEASURE	EAST	SOUTH	CENTRAL	NORTHWEST
Total Length (Miles)	19.2	27	21.3	19.7
% Aerial	10%	73%	42%	10%
Total Cost (Dollars)	$5,576,756.96	$3,356,327.93	$4,394,568.93	$5,734,109.18
Cost Per Passing (Dollars)	$9,388.48	$2,626.23	$5,010.91	$11,678.43
# Of Locations (Number)	594	1,278	877	491
Underserved (Number)	21	16	11	6
Unserved (Number)	1	9	1	2
Cost for Just Unserved & Underserved Locations	$206,546.56	$65,655.75	$60,130.92	$93,427.44

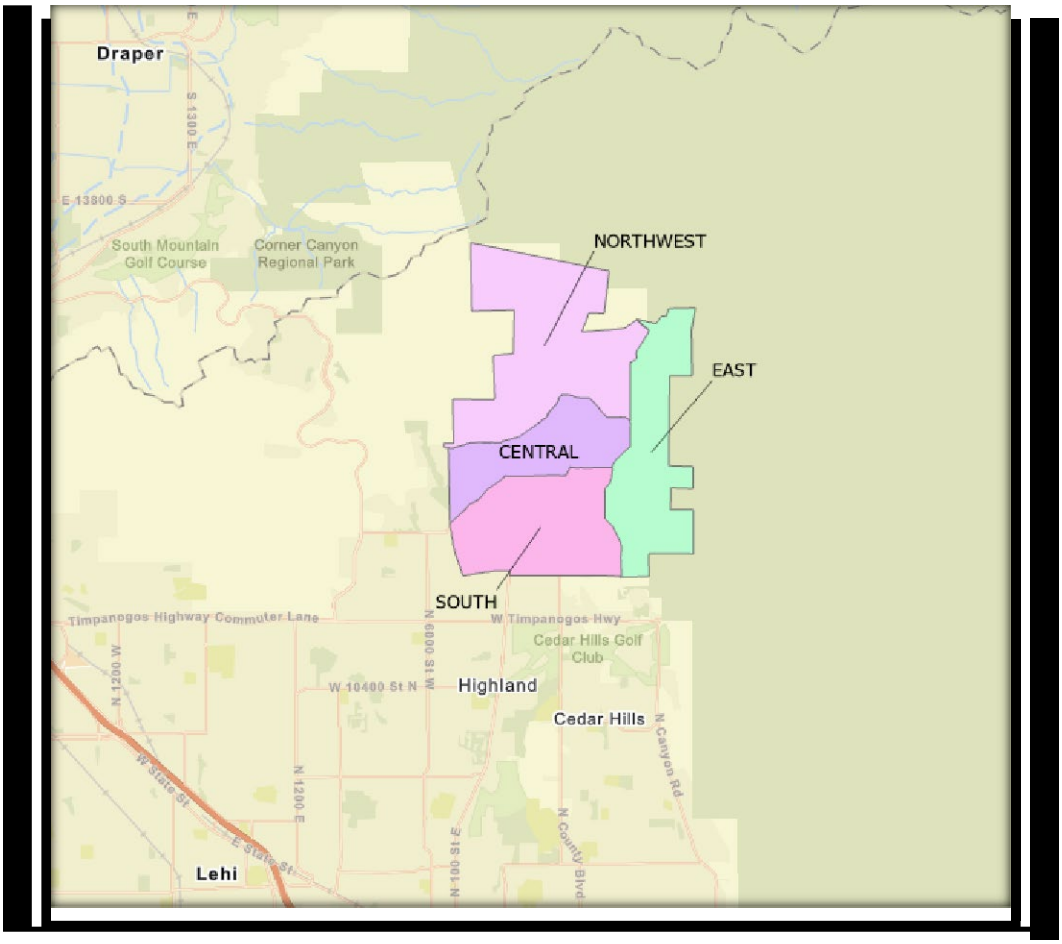


Figure 20. Identified Polygon Areas

5.6 ALIGNMENT

The Local Broadband Plan will align with community priorities and plans by collaborating with stakeholders, conducting needs assessments, adopting a multi-sector approach, integrating into policies, and monitoring progress. This ensures that broadband initiatives complement existing community frameworks and address specific needs in sectors like education, health care, and economic development. The plan aims to create a coordinated and comprehensive approach that maximizes the benefits of broadband connectivity for the overall development of the community.

5.7 TECHNICAL ASSISTANCE

Alpine City may seek support and technical assistance from the UBC to effectively implement the Local Broadband Plan. The UBC can provide guidance in planning, securing funds, navigating regulations, offering technical expertise, coordinating vendors and partners, providing training, and facilitating performance monitoring. By leveraging the UBC's assistance, the community can enhance its implementation capabilities, address challenges, and achieve successful broadband deployment for improved connectivity and access.

6 CONCLUSION

In conclusion, the broadband strategic plan outlined above serves as a comprehensive road map for maximizing the potential of broadband technology to drive economic growth, enhance connectivity, and foster innovation. By expanding infrastructure, affordability, reliability, and accessibility, the plan aims to connect households and create a more prosperous Alpine City. Through collaboration among government entities, private sector partners, agencies, and community stakeholders, this Local Broadband Plan establishes a solid foundation for harnessing the transformative power of high-speed internet to empower individuals, businesses, and communities alike.

Priorities

The top priority is to establish high-speed internet in all unserved areas. This involves connecting all residences in the northern part of town to ensure access to reliable broadband services. The second priority focuses on ensuring existing areas have adequate download and upload speeds. The goal is to increase the service level in areas that currently experience inadequate coverage levels. The third priority aims to provide fiber optic internet to all residents, emphasizing the importance of fiber connectivity for enhanced performance and reliability. These priorities were informed by stakeholder input and technical analysis. As the plan is implemented, other strategic focus areas may arise, and this plan may be updated to meet that need.

Appendix A: Survey Data

The following pages include the individual responses from surveys gathered as part of the Alpine local broadband planning outreach. Survey responses gathered as part of the Connecting Utah statewide survey in the Alpine area are also included as part of this appendix.

Q1 What is your address?

Answered: 53 Skipped: 1

ANSWER CHOICES	RESPONSES	
Name	0.00%	0
Company	0.00%	0
Address	98.11%	52
Address 2	0.00%	0
City/Town	100.00%	53
State/Province	0.00%	0
ZIP/Postal Code	100.00%	53
Country	0.00%	0
Email Address	0.00%	0
Phone Number	0.00%	0

#	NAME	DATE
	There are no responses.	

#	COMPANY	DATE
	There are no responses.	

#	ADDRESS	DATE
1		6/25/2023 4:13 PM
2		6/15/2023 6:35 PM
3		6/14/2023 9:12 PM
4		6/14/2023 12:33 PM
5		6/13/2023 7:13 PM
6		6/13/2023 2:13 PM
7		5/6/2023 12:23 AM
8		5/4/2023 9:01 PM
9		5/3/2023 2:08 AM
10		5/1/2023 10:01 PM
11		5/1/2023 7:48 PM
12		5/1/2023 7:30 PM
13		5/1/2023 6:45 PM
14		5/1/2023 6:23 PM
15		5/1/2023 6:03 PM
16		5/1/2023 5:18 PM

17	5/1/2023 5:06 PM
18	4/24/2023 10:11 PM
19	4/23/2023 9:34 PM
20	4/22/2023 7:28 PM
21	4/22/2023 3:22 PM
22	4/22/2023 9:46 AM
23	4/22/2023 7:14 AM
24	4/21/2023 11:09 PM
25	4/21/2023 10:01 PM
26	4/21/2023 11:18 AM
27	4/21/2023 10:25 AM
28	4/21/2023 7:03 AM
29	4/20/2023 10:55 PM
30	4/20/2023 10:43 PM
31	4/20/2023 10:39 PM
32	4/20/2023 10:34 PM
33	4/20/2023 10:21 PM
34	4/20/2023 10:18 PM
35	4/20/2023 10:14 PM
36	4/20/2023 10:07 PM
37	4/19/2023 7:23 PM
38	4/19/2023 6:31 PM
39	4/19/2023 5:22 PM
40	4/19/2023 1:00 PM
41	4/19/2023 11:53 AM
42	4/19/2023 11:48 AM
43	4/19/2023 11:35 AM
44	4/19/2023 10:48 AM
45	4/19/2023 10:44 AM
46	4/19/2023 10:00 AM
47	4/19/2023 9:49 AM
48	4/19/2023 9:42 AM
49	4/13/2023 9:38 PM
50	4/13/2023 3:16 PM
51	4/13/2023 2:40 PM

52 4/13/2023 2:37 PM

#	ADDRESS 2	DATE
	There are no responses.	

#	CITY/TOWN	DATE
1	Alpine	6/25/2023 4:13 PM
2	Alpine	6/15/2023 6:35 PM
3	Alpine	6/14/2023 9:12 PM
4	Alpine	6/14/2023 12:33 PM
5	Alpine	6/13/2023 7:13 PM
6	Alpine	6/13/2023 2:13 PM
7	Alpine	5/6/2023 12:23 AM
8	Alpine	5/4/2023 9:01 PM
9	Alpine	5/3/2023 2:08 AM
10	Alpine	5/2/2023 7:36 AM
11	Alpine	5/1/2023 10:01 PM
12	Alpine	5/1/2023 7:48 PM
13	Alpine	5/1/2023 7:30 PM
14	Alpine	5/1/2023 6:45 PM
15	Alpine	5/1/2023 6:23 PM
16	Alpine	5/1/2023 6:03 PM
17	Alpine	5/1/2023 5:18 PM
18	Alpine	5/1/2023 5:06 PM
19	Alpine	4/24/2023 10:11 PM
20	Alpine	4/23/2023 9:34 PM
21	Alpine	4/22/2023 7:28 PM
22	ALPINE	4/22/2023 3:22 PM
23	Alpine	4/22/2023 9:46 AM
24	Alpine	4/22/2023 7:14 AM
25	Alpine	4/21/2023 11:09 PM
26	Alpine	4/21/2023 10:01 PM
27	Alpine	4/21/2023 11:18 AM
28	Alpine	4/21/2023 10:25 AM
29	Alpine	4/21/2023 7:03 AM
30	Alpine	4/20/2023 10:55 PM
31	Alpine	4/20/2023 10:43 PM
32	Alpine	4/20/2023 10:39 PM
33	Alpine	4/20/2023 10:34 PM
34	Alpine	4/20/2023 10:21 PM
35	Alpine	4/20/2023 10:18 PM
36	Alpine	4/20/2023 10:14 PM
37	Alpine	4/20/2023 10:07 PM

38	Alpine	4/19/2023 7:23 PM
39	Alpine	4/19/2023 6:31 PM
40	Alpine	4/19/2023 5:22 PM
41	Alpine	4/19/2023 1:00 PM
42	Alpine	4/19/2023 11:53 AM
43	Alpine	4/19/2023 11:48 AM
44	Alpine	4/19/2023 11:35 AM
45	Alpine	4/19/2023 10:48 AM
46	Alpine	4/19/2023 10:44 AM
47	Alpine	4/19/2023 10:00 AM
48	Alpine	4/19/2023 9:49 AM
49	Alpine	4/19/2023 9:42 AM
50	Alpine	4/13/2023 9:38 PM
51	Alpine	4/13/2023 3:16 PM
52	Alpine	4/13/2023 2:40 PM
53	Alpine	4/13/2023 2:37 PM

#	STATE/PROVINCE	DATE
	There are no responses.	

#	ZIP/POSTAL CODE	DATE
1	84004	6/25/2023 4:13 PM
2	84004	6/15/2023 6:35 PM
3	84004	6/14/2023 9:12 PM
4	84004	6/14/2023 12:33 PM
5	84004	6/13/2023 7:13 PM
6	84004	6/13/2023 2:13 PM
7	84004	5/6/2023 12:23 AM

8	84004	5/4/2023 9:01 PM
9	84004	5/3/2023 2:08 AM
10	84004	5/2/2023 7:36 AM
11	84004	5/1/2023 10:01 PM
12	84004	5/1/2023 7:48 PM
13	84004	5/1/2023 7:30 PM
14	84004	5/1/2023 6:45 PM
15	84004	5/1/2023 6:23 PM
16	84004	5/1/2023 6:03 PM
17	84004	5/1/2023 5:18 PM
18	84004	5/1/2023 5:06 PM
19	84004	4/24/2023 10:11 PM

20	84004	4/23/2023 9:34 PM
21	84004	4/22/2023 7:28 PM
22	84004	4/22/2023 3:22 PM
23	84004	4/22/2023 9:46 AM
24	84004	4/22/2023 7:14 AM
25	84004	4/21/2023 11:09 PM
26	84004	4/21/2023 10:01 PM
27	84004	4/21/2023 11:18 AM
28	84004	4/21/2023 10:25 AM
29	84004	4/21/2023 7:03 AM
30	84004	4/20/2023 10:55 PM
31	84004	4/20/2023 10:43 PM
32	84004	4/20/2023 10:39 PM
33	84004	4/20/2023 10:34 PM
34	840”4	4/20/2023 10:21 PM
35	84004	4/20/2023 10:18 PM
36	84004	4/20/2023 10:14 PM
37	84004	4/20/2023 10:07 PM
38	84004	4/19/2023 7:23 PM
39	84004	4/19/2023 6:31 PM
40	84004	4/19/2023 5:22 PM
41	84004	4/19/2023 1:00 PM
42	84004	4/19/2023 11:53 AM
43	84004	4/19/2023 11:48 AM
44	84004	4/19/2023 11:35 AM
45	84004	4/19/2023 10:48 AM
46	84004	4/19/2023 10:44 AM
47	84004	4/19/2023 10:00 AM
48	84004	4/19/2023 9:49 AM
49	84004-1974	4/19/2023 9:42 AM
50	84004	4/13/2023 9:38 PM
51	84004	4/13/2023 3:16 PM
52	84004	4/13/2023 2:40 PM

53	84004	4/13/2023 2:37 PM

#	COUNTRY	DATE

There are no responses.

#	EMAIL ADDRESS	DATE

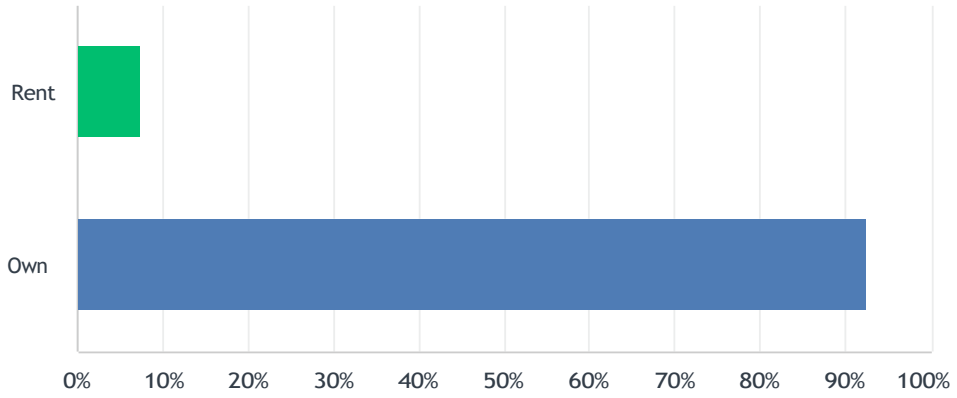
There are no responses.

#	PHONE NUMBER	DATE

There are no responses.

Q2 Do you rent or own this property?

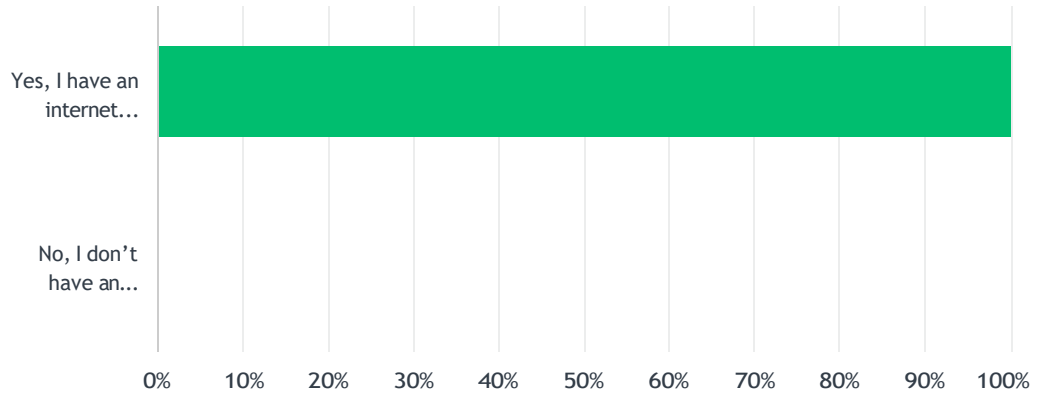
Answered: 53 Skipped: 1



ANSWER CHOICES	RESPONSES	
Rent	7.55%	4
Own	92.45%	49
TOTAL		53

Q3 Do you have an internet connection at your residence?

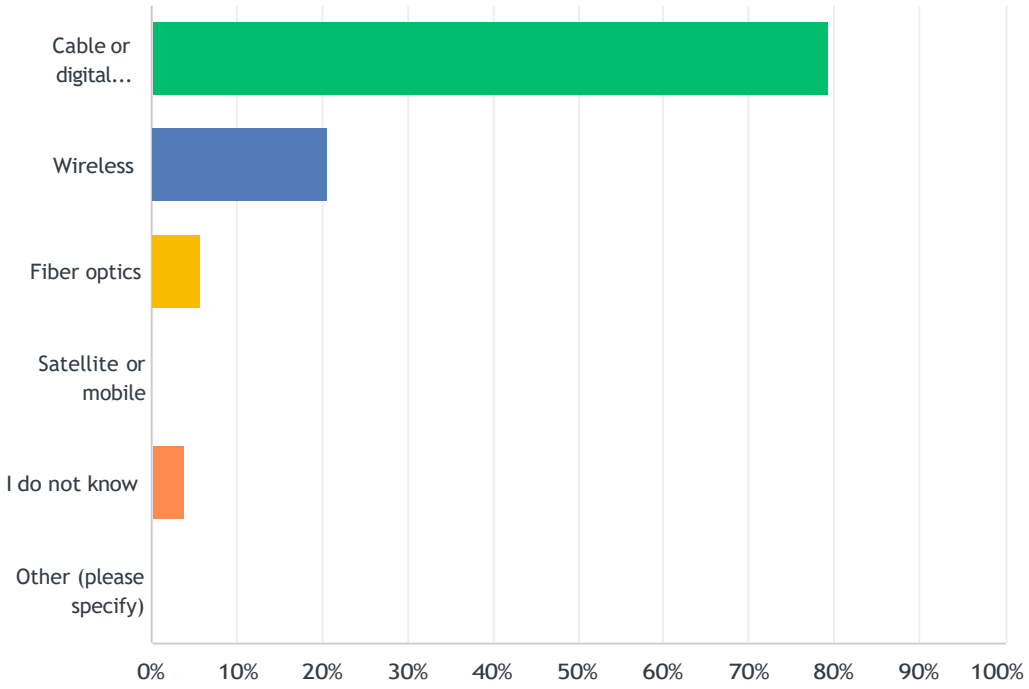
Answered: 53 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes, I have an internet connection at my residence.	100.00%	53
No, I don't have an internet connection at my residence (if selected, skip to question 10).	0.00%	0
TOTAL		53

Q4 What kind of internet connection do you have? Select all that apply.

Answered: 53 Skipped: 1

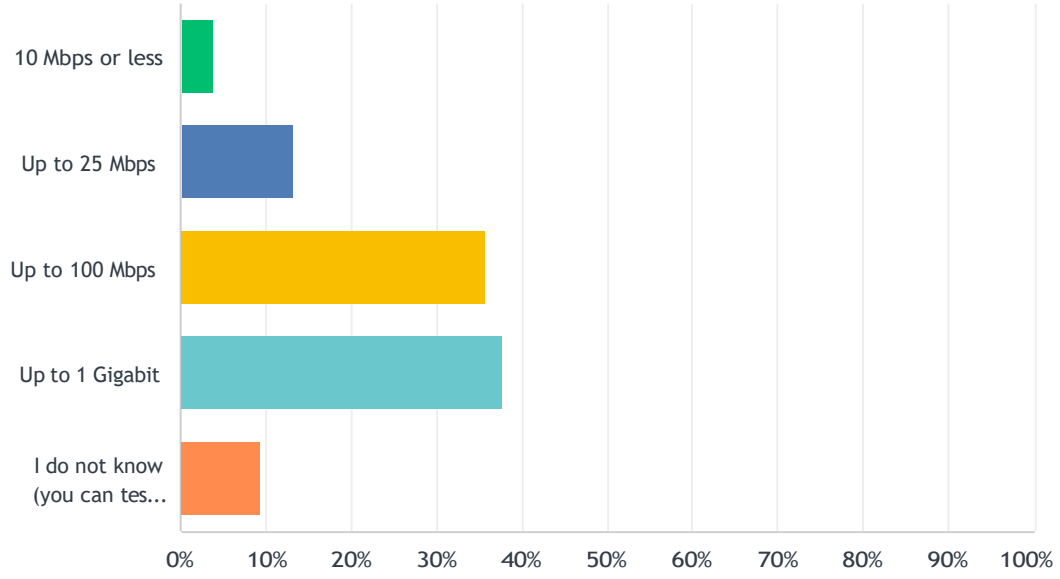


ANSWER CHOICES	RESPONSES	
Cable or digital subscriber line (DSL-telephone line)	79.25%	42
Wireless	20.75%	11
Fiber optics	5.66%	3
Satellite or mobile	0.00%	0
I do not know	3.77%	2
Other (please specify)	0.00%	0
Total Respondents: 53		

#	OTHER (PLEASE SPECIFY)	DATE
1	Xfinity	6/15/2023 6:35 PM

Q5 What speed is your internet service (download speed)? (Megabits per second = Mbps)

Answered: 53 Skipped: 1



ANSWER CHOICES	RESPONSES	
10 Mbps or less	3.77%	2
Up to 25 Mbps	13.21%	7
Up to 100 Mbps	35.85%	19
Up to 1 Gigabit	37.74%	20
I do not know (you can test your internet speed at speedtest.utah.gov)	9.43%	5
TOTAL		53

Q6 Which company do you use for internet? (E.g., Xfinity, Google Fiber, Connext, Emery Telecom,CenturyLink, etc.)

Answered: 53 Skipped: 1

#	RESPONSES	DATE
1	Xfinity	6/15/2023 6:35 PM
2	Xf8	6/14/2023 9:12 PM
3	Verizon	6/14/2023 12:33 PM
4	Xfinity	6/13/2023 7:13 PM
5	Xfinity	6/13/2023 2:13 PM
6	XFINITY	5/6/2023 12:23 AM
7	Xfinity	5/4/2023 9:01 PM
8	Xfinity	5/3/2023 2:08 AM
9	Xfinity	5/2/2023 7:36 AM
10	Xfinity	5/1/2023 10:01 PM
11	Xfinity	5/1/2023 7:48 PM
12	Xfinity	5/1/2023 7:30 PM
13	Xfinity	5/1/2023 6:45 PM
14	Xfinity	5/1/2023 6:23 PM
15	Xfinity	5/1/2023 6:03 PM
16	Xfinity	5/1/2023 5:18 PM
17	Xfinity	5/1/2023 5:06 PM
18	Xfinity	4/24/2023 10:11 PM
19	TMobile	4/23/2023 9:34 PM
20	Xfinity	4/22/2023 7:28 PM
21	Comcast	4/22/2023 3:22 PM
22	Xfinity	4/22/2023 9:46 AM
23	CentraCom	4/22/2023 7:14 AM
24	Xfinity	4/21/2023 11:09 PM
25	Comcast	4/21/2023 10:01 PM
26	Xfinity	4/21/2023 11:18 AM
27	Xfinity	4/21/2023 10:25 AM
28	Xfinity	4/21/2023 7:03 AM
29	Xfinity	4/20/2023 10:55 PM
30	xfinity	4/20/2023 10:43 PM
31	Xfinity	4/20/2023 10:39 PM

32	Xfinity	4/20/2023 10:34 PM
33	Xfinity	4/20/2023 10:21 PM
34	Xfinity	4/20/2023 10:18 PM
35	Xfinity	4/20/2023 10:14 PM
36	Xfinity	4/20/2023 10:07 PM
37	Xfinity	4/19/2023 7:23 PM
38	Xfinity	4/19/2023 6:31 PM
39	Xfinity	4/19/2023 6:13 PM
40	Xfinity	4/19/2023 5:22 PM
41	Xfinity	4/19/2023 1:00 PM
42	Xfinity	4/19/2023 11:53 AM
43	Xfinity	4/19/2023 11:48 AM
44	Xfinity	4/19/2023 11:35 AM
45	Xfinity	4/19/2023 10:48 AM
46	CenturyLink	4/19/2023 10:44 AM
47	Xfinity	4/19/2023 10:00 AM
48	XFINITY	4/19/2023 9:49 AM
49	TMobile	4/19/2023 9:42 AM
50	Centracom	4/13/2023 9:38 PM
51	Xfinity	4/13/2023 3:16 PM
52	Google Fiber	4/13/2023 2:40 PM
53	Xfinity	4/13/2023 2:37 PM

Q7 What is the monthly charge for your internet service? Write "Unknown" if unknown.

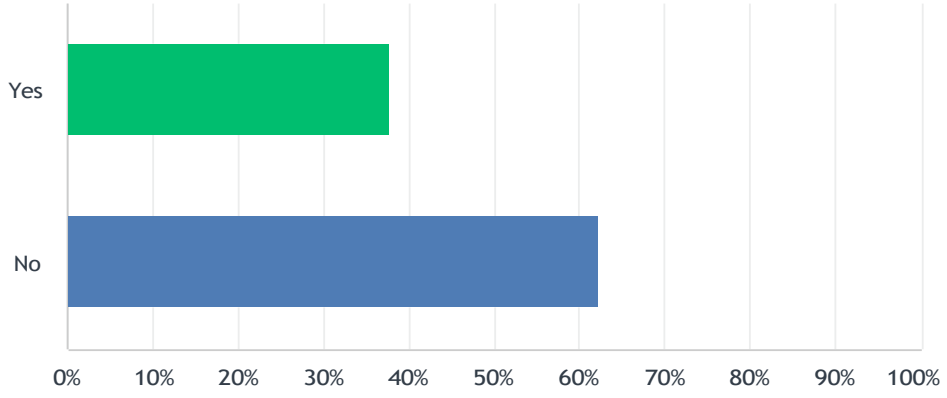
Answered: 52 Skipped: 2

#	RESPONSES	DATE
1	100	6/15/2023 6:35 PM
2	Xfinity	6/14/2023 9:12 PM
3	$50	6/14/2023 12:33 PM
4	70	6/13/2023 7:13 PM
5	Unknown	6/13/2023 2:13 PM
6	$100.00	5/6/2023 12:23 AM
7	130	5/4/2023 9:01 PM
8	$95	5/3/2023 2:08 AM
9	$133	5/2/2023 7:36 AM
10	Too Much	5/1/2023 10:01 PM
11	20	5/1/2023 7:48 PM
12	$75	5/1/2023 7:30 PM
13	$230	5/1/2023 6:45 PM
14	Approx $100	5/1/2023 6:23 PM
15	86	5/1/2023 6:03 PM
16	254.72	5/1/2023 5:18 PM
17	50	5/1/2023 5:06 PM
18	$100	4/24/2023 10:11 PM
19	$50	4/23/2023 9:34 PM
20	103	4/22/2023 7:28 PM
21	$133	4/22/2023 3:22 PM
22	75	4/22/2023 9:46 AM
23	$89	4/22/2023 7:14 AM
24	$55	4/21/2023 11:09 PM
25	100	4/21/2023 10:01 PM
26	Unknown	4/21/2023 11:18 AM
27	Unknown	4/21/2023 10:25 AM
28	75	4/20/2023 10:55 PM
29	85	4/20/2023 10:43 PM
30	Unknown	4/20/2023 10:39 PM
31	Alot	4/20/2023 10:34 PM

32	223.00	4/20/2023 10:21 PM
33	Unknown	4/20/2023 10:18 PM
34	260	4/20/2023 10:14 PM
35	75	4/20/2023 10:07 PM
36	130	4/19/2023 7:23 PM
37	$78	4/19/2023 6:31 PM
38	$100	4/19/2023 6:13 PM
39	$100	4/19/2023 5:22 PM
40	$100	4/19/2023 1:00 PM
41	289	4/19/2023 11:53 AM
42	120	4/19/2023 11:48 AM
43	115	4/19/2023 11:35 AM
44	$103	4/19/2023 10:48 AM
45	$70	4/19/2023 10:44 AM
46	$70	4/19/2023 10:00 AM
47	120	4/19/2023 9:49 AM
48	$50	4/19/2023 9:42 AM
49	$500	4/13/2023 9:38 PM
50	100.00	4/13/2023 3:16 PM
51	$395	4/13/2023 2:40 PM
52	$230.00	4/13/2023 2:37 PM

Q8 Does your internet bill include other services such as phone, TV, or premium content?

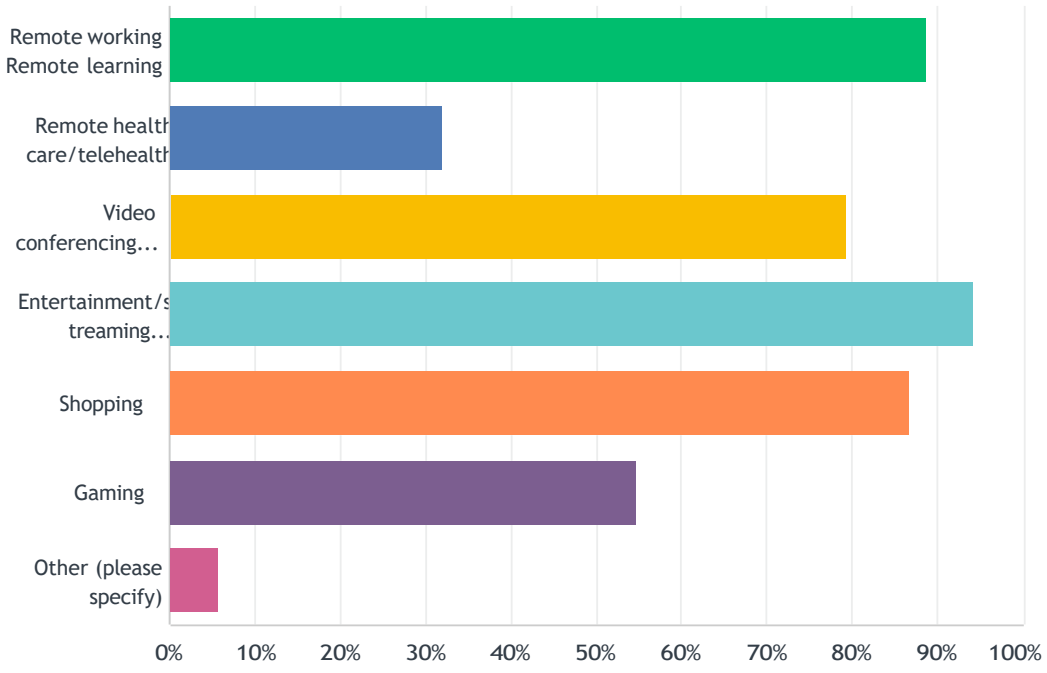
Answered: 53 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	37.74%	20
No	62.26%	33
TOTAL		53

Q9 What do you use the internet for? Select all that apply.

Answered: 53 Skipped: 1

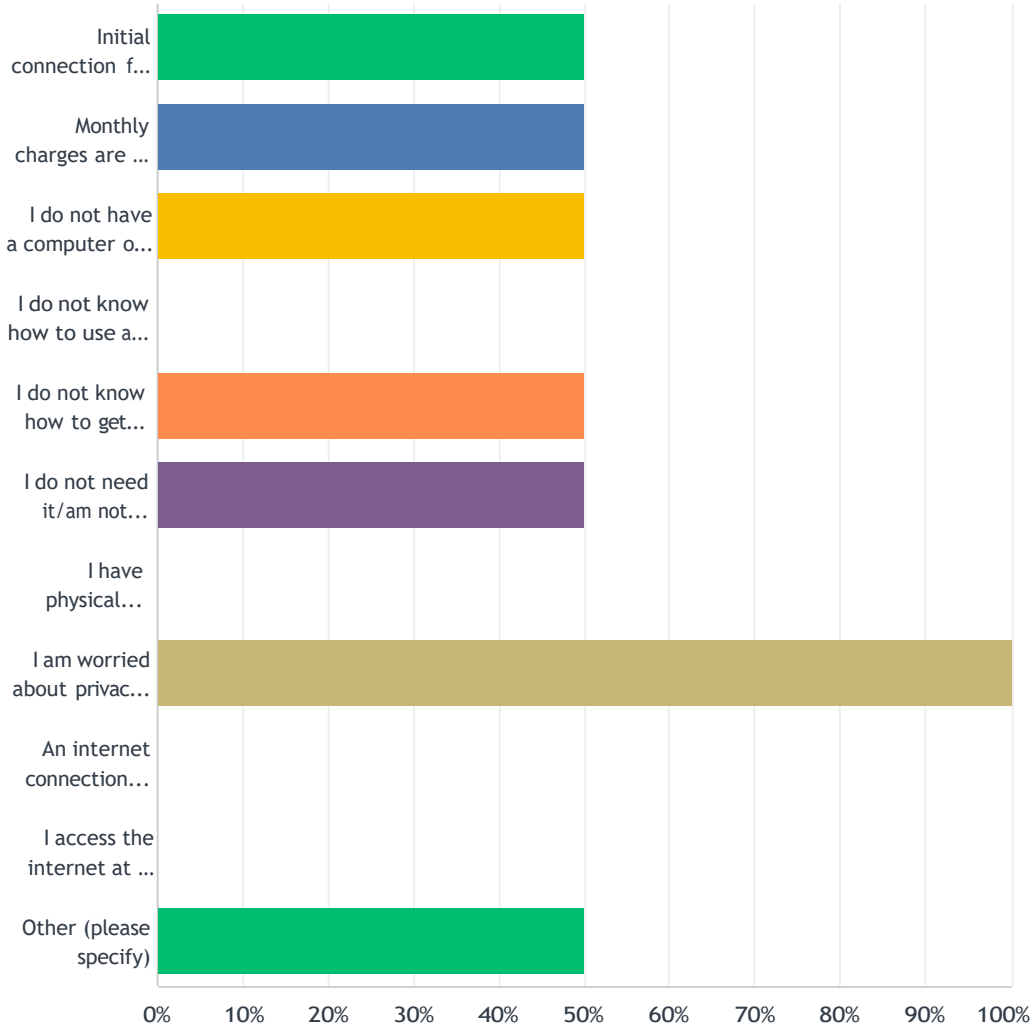


ANSWER CHOICES	RESPONSES	
Remote working Remote learning	88.68%	47
Remote health care/telehealth	32.08%	17
Video conferencing/chatting	79.25%	42
Entertainment/streaming services	94.34%	50
Shopping	86.79%	46
Gaming	54.72%	29
Other (please specify)	5.66%	3
Total Respondents: 53		

#	OTHER (PLEASE SPECIFY)	DATE
1	Email, research	4/21/2023 11:18 AM
2	Running a small business	4/19/2023 7:23 PM
3	Research	4/19/2023 10:48 AM
4	work	4/13/2023 9:38 PM

Q10 Why don't you have internet access at your residence? Select all that apply. (If question 3 wasanswered with “a” skip to question 13.)

Answered: 2 Skipped: 52



ANSWER CHOICES	RESPONSES	
Initial connection fees are too expensive	50.00%	1
Monthly charges are too expensive	50.00%	1
I do not have a computer or tablet to use	50.00%	1
I do not know how to use a computer or tablet	0.00%	0
I do not know how to get internet service	50.00%	1
I do not need it/am not interested in it	50.00%	1
I have physical limitations	0.00%	0
I am worried about privacy and others getting my information	100.00%	2
An internet connection isn't available in my area	0.00%	0
I access the internet at a public internet source, such as a library or a community center	0.00%	0
Other (please specify)	50.00%	1
Total Respondents: 2		

#	OTHER (PLEASE SPECIFY)	DATE
1	The city won't help me out	4/13/2023 9:38 PM

Q11 How much would you pay for internet per month if it was accessible to you at your residence?

Answered: 7 Skipped: 47

#	RESPONSES	DATE
1	50	4/21/2023 11:09 PM
2	$100	4/20/2023 10:18 PM
3	50-75	4/20/2023 10:07 PM
4	$60	4/19/2023 5:22 PM
5	alot	4/13/2023 9:38 PM
6	$150	4/13/2023 2:40 PM
7	$100	4/13/2023 2:37 PM

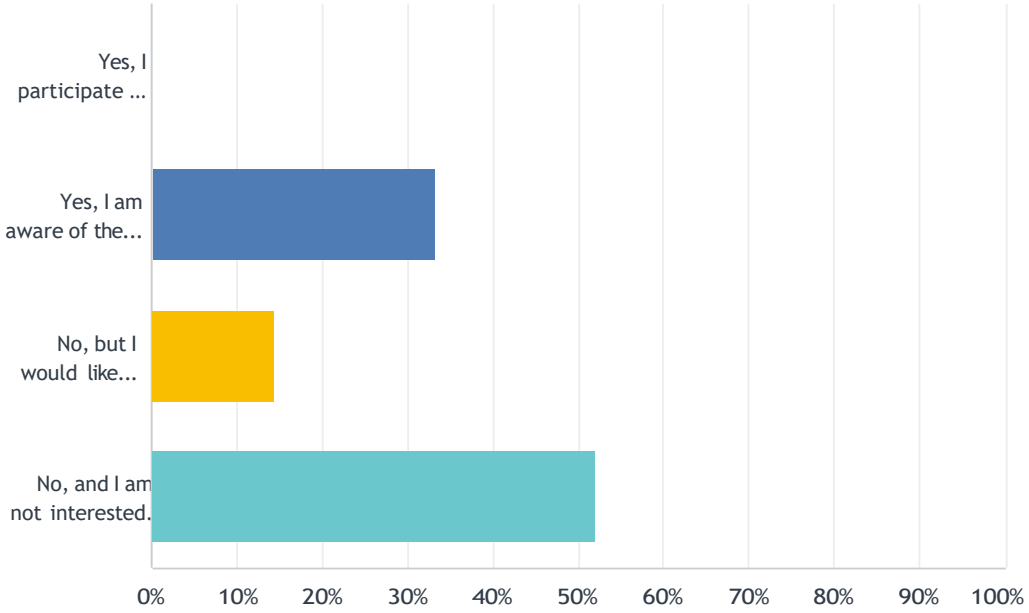
Q12 If you are willing, please share how a high-speed internet connection would improve yourquality of life.

Answered: 10 Skipped: 44

#	RESPONSES	DATE
1	Fiber would be ideal. I have had it in the past and all services were amazing. Much easier to work from home.	6/14/2023 12:33 PM
2	No change	5/4/2023 9:01 PM
3	Better ability for remote work	5/1/2023 10:01 PM
4	Better work/schoolwork functionality	4/22/2023 7:14 AM
5	As someone with physical disabilities, I'd have no life at all without internet.	4/21/2023 7:03 AM
6	Better through out and less latency for remote work	4/20/2023 10:21 PM
7	It's critical for work and important for all aspects of living - being connected	4/20/2023 10:18 PM
8	Better connectivity	4/20/2023 10:07 PM
9	Would love to have other options than Xfinity/Comcast…. They are too expensive but my home can't access broadband	4/19/2023 5:22 PM
10	my wife would quit complaining about slow internet	4/13/2023 9:38 PM

Q13 Are you aware of the Affordable Connectivity Program, which provides a $30 monthly discountfor internet to low-income households?

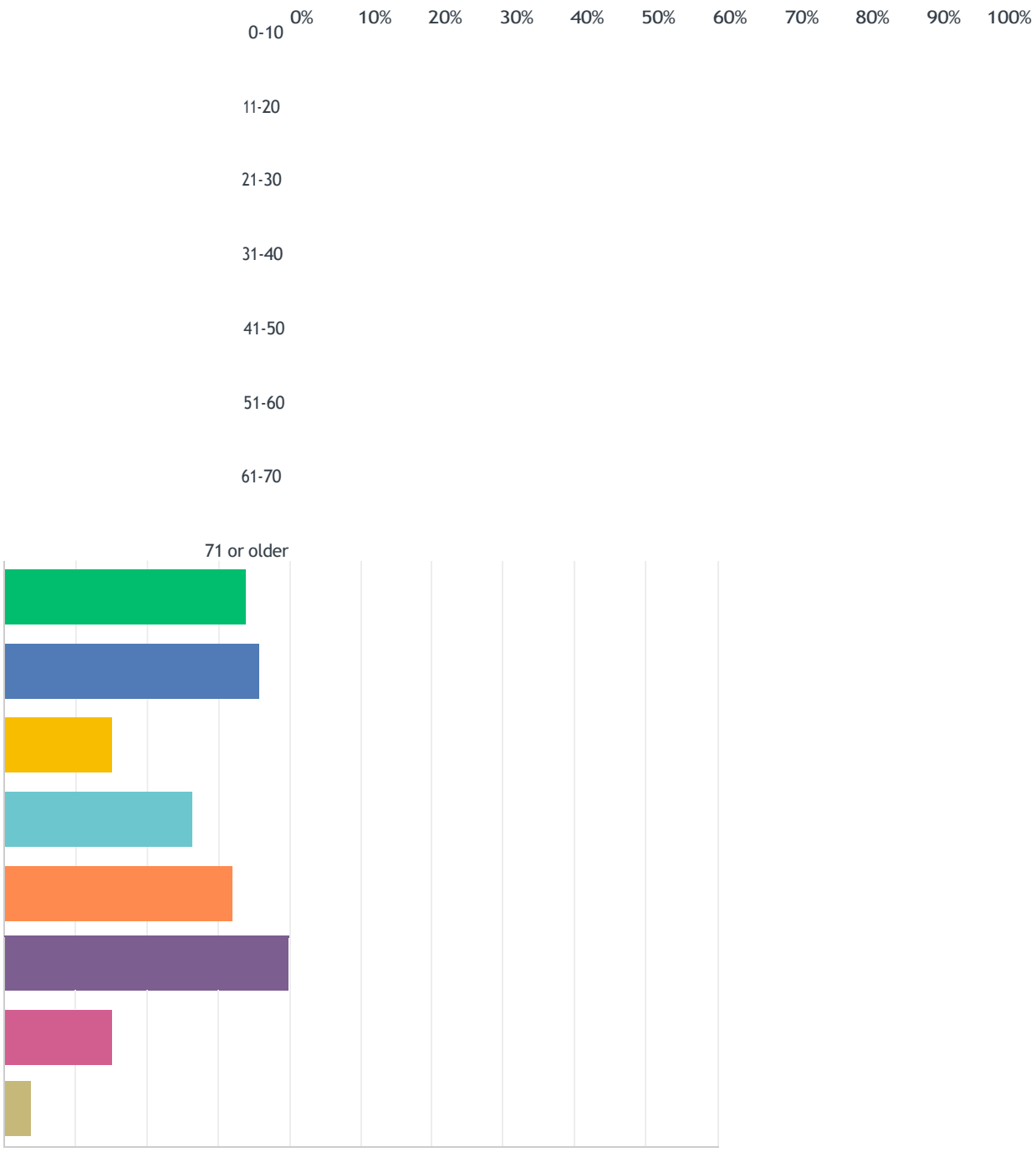
Answered: 48 Skipped: 6



ANSWER CHOICES	RESPONSES	
Yes, I participate in the Program.	0.00%	0
Yes, I am aware of the Program, but do not participate in it or am not eligible.	33.33%	16
No, but I would like information to learn if my household qualifies. If this option isselected, please complete the “Get Involved” form following this survey.	14.58%	7
No, and I am not interested.	52.08%	25
TOTAL		48

Q14 Which age groups live in your home? Select all that apply.

Answered: 53 Skipped: 1

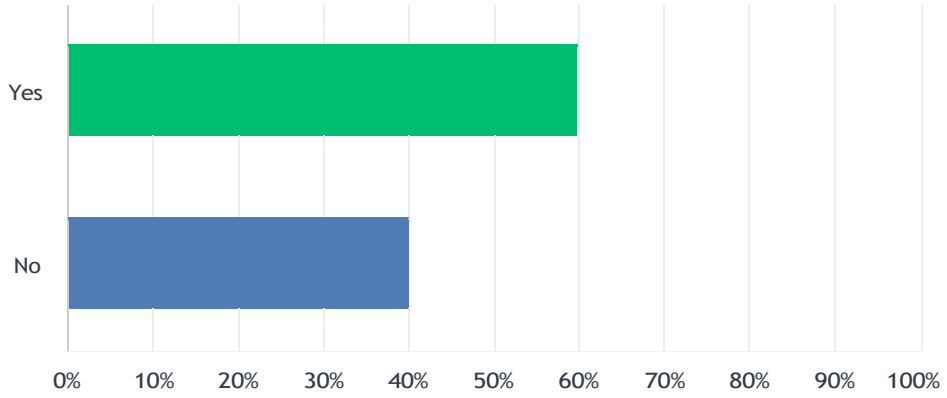


ANSWER CHOICES	RESPONSES	
0-10	33.96%	18
11-20	35.85%	19
21-30	15.09%	8

31-40	26.42%	14
41-50	32.08%	17
51-60	39.62%	21
61-70	15.09%	8
71 or older	3.77%	2
Total Respondents: 53		

Q15 Do students live at your household?

Answered: 54 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	59.26%	32
No	40.74%	22
TOTAL		54

Appendix A. UBC Statewide Survey: City of Alpine Residents Responses

UBC Statewide Survey Resident Response #	Date		Do you rent or own this property?	Do you have an internet connection at your residence?	What kind of internet connection do you have? (Select all that apply)	What speed is your internet service (download speed)? (Megabits per second = Mbps)	Which company do you use for internet?	What is the monthly charge for your internet service? Write "Unknown" if unknown.	Does your internet bill include other services such as phone, TV, or premium content?	What do you use the internet for? Select all that apply.							
		City/Town	Response	Response	Response	Response	Open-Ended Response	Open-Ended Response	Response	Remote working	Remote learning	Remote health care/telehealth	Video conferencing/ chatting	Entertainment/streaming services	Shopping	Gaming	Other (please specify)
1	2/2/2023 14:46	Alpine	Own	Yes, I have an internet connection at my residence.	Cable or digital subscriber line (DSL- telephone line)	Up to 25 Mbps	Comcast	120	Yes	Remote working	Remote learning		Video conferencing/ chatting	Entertainment /streaming services	Shopping		
2	1/29/2023 20:30	Alpine	Own	Yes, I have an internet connection at my residence.	Wireless	Up to 25 Mbps	Utah Broadband	$100	No	Remote working	Remote learning	Remote health care/telehealth	Video conferencing/ chatting	Entertainment /streaming services	Shopping		

Appendix A. UBC Statewide Survey: City of Alpine Residents Responses

UBC Statewide Survey Resident Response #	Why don't you have internet access at your residence? Select all that apply.											How much would you pay for internet per month if it was accessible to you at your residence?	If you are willing, please share how a high-speed internet connection would improve your quality of life.	Are you aware of the Affordable Connectivity Program, which provides a $30 monthly discount for internet to low-income households?	What is your race/ethnicity? Select all that apply.	
	Initial connection fees are too expensive	Monthly charges are too expensive	I do not have a computer or tablet to use	I do not know how to use a computer or tablet	I do not know how to get internet service	I do not need it/am not interested in it	I have physical limitations	I am worried about privacy and others getting my information	An internet connection isn't available in my area	I access the internet at a public internet source, such as a library or a community center	Other (please specify)	Open-Ended Response	Open-Ended Response	Response	Response	Multiple ethnicity / Other (please specify)
1														No, and I am not interested.	White	
2														No, and I am not interested.		

Appendix A. UBC Statewide Survey: City of Alpine Residents Responses

UBC Statewide Survey Resident Response #	What language is spoken most often in your household?		What is your household's gross annual income?	Which age groups live in your home? Select all that apply.								Do students live at your household?	Which education level? Select all that apply.					What is the highest level of education completed by someone in your household?
	Response	Other (please specify)	Response	0-10	10-20	21-30	31-40	41-50	51-60	61-70	71 or older	Response	Elementary school (kindergarten to 6th grade)	Middle school (7th grade to 9th grade)	High school (9th grade to 12th grade)	College or university	Adult education or technical training	Response
1	English		$150,000 or more			21-30				61-70		No						Master's degree or doctorate
2																		

Appendix B: Notes from Stakeholder Meetings

The following pages include notes from stakeholder meetings and workshops gathered as part of the Alpine local broadband planning outreach. Stakeholder meeting and workshop notes gathered as part of the Connecting Utah statewide outreach in the Alpine area are also included as part of this appendix.

Local Broadband Planning Kick-off Meeting | April 6, 2023

1. Introductions
    a. Shane Sorenson - City administrator
    b. Ryan Robinson - Assistant City administrator, planning and zoning
    c. Heidi - Communications
    d. Horrocks - Shane, Jason, Eleise, Rachel
2. Template review
    a. Vison, goals, and objectives
        i. What is your vision for connectivity in your community?
            1. Identify pockets in the town that aren't covered
            2. Better, cheaper, faster internet
            3. Mayor - fiber to the home if money were no object
            4. Speeds were barely above dial-up during Covid
    b. Current state of broadband
        i. Asset inventory
            1. Where are your community anchor institutions? Libraries, hospitals, workplaces, town offices, police/fire stations
                1. City Hall - Centricom provides fiber
                2. Firestation
                3. Public works building - Centricom provides fiber
                4. Club-houses
                5. No library or senior center
                6. 2 elementary schools, middle schools - have fiber
                7. Charter school - don't know connectivity
            2. Who are your primary business partners? Have they expressed the need for high-speed internet?
                1. Dentists, doctor, vet, gas station, donut shop
                2. Population 10,000
                3. Community bank - largest business partner
            3. Have you assessed what infrastructure is currently in your city?
                1. Comcast is the only provider, some neighborhoods held hostage by them
                2. Northwest, northeast side of town - low connectivity - comcast is connecting those areas
                3. Northeast trunk line that didn't connect - rocky area making hard to connect - qualify for last-mile grants
                4. Backbone between schools - Centricom - 7-10 yrs ago - have connected to a few homes over the last 2 yrs
            4. Have you conducted any asset mapping?
            5. Do you have any other mapping available?
                1. Just utility master plans
            6. What progress or changes have happened since your last broadband plan? Successes? Areas to improve?
            7. What existing partnerships do you have?

1. Contract with Centricom for service
8. Which ISP are in the city?
    1. Utah Broad band - requires large financial investment
    2. Starlink
    3. Century link limited - has box but won't connect

ii. Needs and gaps.
1. What does broadband availability look like in your area?
    1. South 2/3 of city has service
2. What is the cost of a typical broadband plan?
    1. 1.2 gig = $130
3. What digital equity considerations should be built into the plan?
    1. Working on getting senior center
    2. 15% seniors over 65
        a. Could use training

iii. Stakeholder outreach
1. Stakeholder list
    1. City
    2. School District
    3. Charter school

c. Obstacles or barriers
i. Northwest/northeast
ii. Rocky
iii. Cost
iv. Large houses on 1 acre - 150 ft of frontage

d. Implementation plan
i. Priorities
1. What locations are the highest priority for high-speed internet?

1. Timeline and deliverables
a. Outreach and data gathering:
b. Draft plan and provide to Alpine for review/approval: May 25
c. Draft plan to UBC: June 1
d. Final plan to UBC: Aug 1
e. Other internal deadlines? Town council, etc. - 2nd and 4th Tuesdays @ 6pm
i. First june mtg - present to town council

Appendix C: Notes from Internet Service Provider Meetings

The following pages contain notes from meetings held with ISPs as part of the Alpine local broadband planning efforts.

Comcast | April 25, 2023

Attendees:

- Comcast – Jennifer Somers, Kate Sneed, Joseph Silverzweig
- Horrocks Engineers – Jason Libert, Eleise Lowe, Shane Eller

Meeting Summary:
Plans to build – Showed maps where Comcast has plans to build within Alpine, adding 100 additional passings in Alpine, they will be 90% built out

Plan to cover unserved areas with their private company funds

Hybrid builds with fiber backbones and co-ax to the home

Will build fiber to the home on any BEAD funded projects

Additional information shared from Comcast via email July 18, 2023:

1. Internet Essentials Plan

Comcast's Internet Essentials Plan is low-cost, high-speed internet for anyone on Federal Assistance. It's $9.95 a month for a 50/20 Mbps plan and $29.95 a month for a 100/20 Mbps plan. With the Federal $30/month ACP benefit, that means that high speed internet is free to qualifying income constrained-income Xfinity customers. Internet Essentials also comes with access to a brand-new laptop computer for just $150 as well as a full suite of digital literacy training through the website.

2. ACP questions- Ioana Platon is our Community Impact specialist and best point of contact for ACP partnerships and questions. Deneiva Knight is the Director of External Affairs for the market.

3. Community Impact- Comcast partners with many regional organizations that serve Alpine City. Contact Ioana Platon to create additional community partnerships.

CentraCom | April 25, 2023

Attendees:

- Centracom – Brad Welch
- Alpine City – Ryan Robinson
- Horrocks Engineers – Jason Libert, Eleise Lowe, Shane Eller

Meeting Summary:
Centracom connects the city's building and schools in fiber, discussed expansion for fiber to the home in Alpine. Centracom is interested in building there

Centracom wants to know if Alpine allows microtrenching. Alpine City needs to decide internally if they would like to do that. They are willing to use other construction methods as well, but microtrenching is the most feasible for cost and timing.

Lumen (CenturyLink) | April 26, 2023

Attendees:

- Lumen – James Farr, Max Backlund
- Alpine City – Ryan Robinson
- Horrocks Engineers – Jason Libert, Eleise Lowe, Shane Eller

Meeting Summary:
Reviewed Alpine's unserved and underserved locations. There does not appear to be much unserved/underserved customer locations in the Alpine area because of Comcast and other providers. The BEAD grant program will first focus on unserved (less than 25/3) and then underserved (under 100/20). Lumen does not have much existing fiber infrastructure in Alpine.

However, the company continues to build Fiber to the Premise (FTTP) at its own expense in various locations within Utah, where a business case can be made to support FTTP.

The company is interested in considering/evaluating potential broadband grants and partnerships with local governments to expand FTTP.

Appendix D: Sample Specifications and Policies

Attachments in this section include:

1. UDOT specifications for fiber conduit
2. UDOT standard drawing for fiber junction box and utility vault
3. “Dura-line Dig Once Best Practices” with state legislation examples

SECTION 13553

ATMS CONDUIT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. ATMS conduit for communications and fiber optic cables.

B. Detectable pull tape, conduit, and all materials, labor, workmanship, equipment, and incidental items required for a complete system of conduit.

1.2 RELATED SECTIONS

A. Section 02056: Embankment, Borrow, and Backfill

B. Section 02221: Remove Structures and Obstruction

C. Section 02705: Pavement Cutting

D. Section 02741: Hot Mix Asphalt (HMA)

E. Section 02776: Concrete Sidewalk, Median Filler, and Flatwork

F. Section 02842: Delineators

G. Section 03575: Flowable Fill

1.3 REFERENCES

A. ASTM D 2241: Poly-Vinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)

B. ASTM F 2160: Solid Wall High Density Polyethylene (HDPE) Conduit based on Controlled Outside Diameter (OD).

C. National Electrical Code (NEC)

D. National Electrical Manufacturers Association (NEMA)

E. State of Utah Administrative Rules

F. Underwriters Laboratories (UL)

1.4 DEFINITIONS Not Used

1.5 SUBMITTALS

A. Manufacturer's product data sheets and recommended installation instructions.

B. Manufacturer's warranties and parts lists

C. Conduit Mandrel Test Form prior to substantial completion.

D. Refer to http://www.udot.utah.gov/go/standardsreferences for blank forms for this Section.

PART 2 PRODUCTS

2.1 MATERIALS

A. Conduit and fittings for ATMS communication and fiber optic conduit
   1. Schedule 40 PVC rated at 194 degrees F as specified in NEMA TC-2, NEMA TC-3, ASTM D 2241,
   2. High Density Polyethylene (HDPE) SDR11 rated complying with ASTM F 2160.
      a. HDPE conduit with smooth outer wall and ribbed or smooth interior wall.
      b. Fittings and couplers rated for a minimum of 130 psi.
      c. Mechanical type couplers when joining HDPE and PVC conduits.
   3. Microduct
      a. HDPE microduct with an outside/inside diameter of 0.500/0.394 inch (12.7/10 mm) or 0.630/0.512 inch (16/13 mm) or 0.709/0.551 (18/14 mm), as shown.
      b. Microduct having a ribbed interior.
      c. Watertight couplers rated for a minimum of 200 psi.
      d. Microduct bundle within a single 0.100 inch thick polyethylene oversheath.
      e. Microduct bundles must contain a factory installed #14 AWG solid, insulated locate wire and a minimum of two rip cords for removal of oversheath.

B. Conduit Banks
   1. New, prefabricated
   2. ATMS Multi-duct Conduit Types
      a. 1D = four 1.25-inch conduits

b. 2D = eight 1.25-inch conduits
c. 4D = sixteen 1.25-inch conduits

3. Color-code each conduit or cell as follows:
   a. One, two, or three conduits gray
   b. 1D Bank 1 blue, orange, green and brown
   c. 2D Bank 1 blue, orange, green, and brown
      Bank 2 slate, white, red, and black
   d. 4D Bank 1 blue, orange, green, and brown
      Bank 2 slate, white, red, and black
      Bank 3 same as bank 1 with a contrasting stripe
      Bank 4 same as bank 2 with a contrasting stripe
4. Microduct types:
   a. Individual 0.500/0.394 inch (12.7/10 mm) or 0.630/0.512 inch (16/13 mm) microducts installed loosely within new or existing conduit.
   b. MD2, MD3, MD4 and MD7: microduct bundle containing two, three, four or seven 0.709/0.551 inch (18/14 mm) microducts respectively.
   c. Factory-assembled bundles for bundled applications.
5. Color-code microducts and oversheaths as follows:
   a. Individual microducts installed loosely within conduit or bundled within oversheath:
      1) blue
      2) orange
      3) green
      4) brown
      5) slate
      6) white
      7) red
      8) black
   b. Oversheaths:
      Bundle #1 blue
      Bundle #2 orange
      Bundle #3 green
      Bundle #4 brown

C. Meet or exceed all of the conduit manufacturer's recommendations for materials used in the installation of conduits including sweeps, adapters, couplings, glue, plugs, and fittings.
   1. Conduit plugs must seal the conduit and allow the secure fastening of detectable pull tape.

D. PVC conduit sections – Nominal 20 ft sections. Couplings and fittings must provide watertight integrity.

E. Sweeps – factory manufactured sweeps (11¼, 22½, 45, and 90 degree angles) complete with bell and spigot.

F. Detectable Pull Tape – flat profile, low stretch polyester, detectable, sequential footage marked, 1,200 lb tensile strength pull tape in each conduit.

G. Backfill
   1. Flowable Fill – Refer to Section 03575.
   2. Free Draining Granular Backfill – Refer to Section 02056.
   3. Sand
      a. Friable natural river or bank aggregate, free of loam, detrimental, or soluble or organic matter.
      b. 3/8 inch minus, well graded.
   4. Hand-mix grout
      a. Minimum strength – 50 psi
      b. Maximum strength – 150 psi
      c. Slump – 5 inches to 10 inches

H. Rigid Metal Conduit (RMC) complying with UL-6. Zinc galvanized exterior coating complying with ANSI C80.1.

I. Liquidtight Flexible Metal Conduit (LFMC), -30 degrees C to 80 degrees C rated, UL 360 listed.

J. Liquidtight Flexible Nonmetallic Conduit (LFNC), 80 degrees C dry, 60 degrees C wet rated, sunlight resistant, UL 1660 listed.

PART 3 EXECUTION

3.1 GENERAL

A. Maximum spacing between junction boxes and vaults
   1. 500 ft for electrical cable.
   2. 1,000 ft for fiber optic cable on tangent surface street installations.
   3. 2,500 ft for fiber optic cable on tangent highway installations.
   4. Reduce maximum spacing if horizontal or vertical deflection incurred during installation prevents the installation of cable within maximum pulling tension rating of the cable.
   5. Notify the Engineer if utility avoidance requires junction box and conduit locations differing from requirements for deflection in this Section, article 3.2.

B. Minimum Cover of Conduit
   1. Minimum cover under pavement is 4ft and minimum cover under sidewalks is 3 ft.
   2. Minimum cover in highway right-of-way, greater than 20 ft from the edge of the pavement is 3 ft.
   3. Minimum cover in highway right-of-way, within 20 ft of the edge of the pavement is 5 ft.
   4. Refer to State of Utah Administrative Rule 930-7

3.2 INSTALLATION

A. Prevent conduit from deflecting vertically or horizontally along its length by a ratio greater than 10:1, (no more than 4-inch deflection per 40 inch in length) when installing conduit that houses communication cable.

B. Prevent sum total of the vertical and horizontal conduit deflection or bend between any two junction boxes from exceeding 270 degrees when installing conduit.

C. Install conduit within 1 ft of existing parallel conduit run if the planned location of conduit is parallel to the existing traffic signal or ATMS conduit.

D. Obtain approval for field bending of conduit with the Engineer in cases where factory sweeps are not appropriate. Field bending must be performed using a heat box or heat blanket. Torch heating conduit is prohibited. Install all conduit bends to have a radius that is not less than the following:
   1. 24 inches within the cabinet and pole foundations
   2. 36 inches in all other locations
   3. 46 inches for MD7 microduct bundle
   4. 40 inches for MD4 microduct bundle
   5. 36 inches for MD3 microduct bundle
   6. 32 inches for MD2 microduct bundle
   7. 12 inches for individual microduct

E. Install conduits that cross finished curbs and gutters, sidewalks, concrete flatwork, or textured or decorative surfaces by boring, jacking, or drilling. Replace any damaged concrete sections, joint to joint. Refer to Section 02221.

F. Proof all conduit before installation of cabling and detectable pull tape.
   1. Use a mandrel at least 80 percent of the conduit diameter, at least twice as long as the conduit diameter, and composed of rigid material.
   2. Schedule proofing with the Engineer at least 5 working days in advance of performing the work.

3. Proof all conduit with a Department representative witness present.
4. Complete and submit a completed Conduit Mandrel Test Form for all ATMS conduit.
5. Proof microducts using proofing balls.
6. Proofing balls must maintain a minimum 80 percent fill ratio of inside diameter of the microduct being tested.
7. Proofing must occur after all junction boxes have been installed to final grade, including placement of flowable fill or hand-mix grout at junction box walls, and after all excavation in the immediate proximity of the conduit system has been completed.
    a. Re-proof any conduit segment where excavation has occurred near the conduits following initial proof testing.

G. Provide detectable pull tape in all conduits.
1. Install continuously between junction boxes.
2. Fasten securely to conduit plug and leave 6 ft of pull tape slack inside of the conduit.
3. Do not splice detectable pull tape in conduit.
4. Use flat profile, low stretch polyester, 1,200 lb tensile strength detectable pull tape that is sequential footage marked.
5. Verify that the pull tape is detectable throughout its entire length by performing a continuity test or equivalent verification.
6. Detectable pull tape not required in microducts.

H. Encase open trench conduit in sand backfill covered by flowable fill within existing roadway, proposed roadway and sidewalk pavement areas only.
1. Seal junction box wall around conduits using flowable fill or approved hand-mix grout.
2. Use 6 inches of sand backfill covered with native material in all other areas.
3. Refer to AT Series Standard Drawings.

I. Use rigid metal conduit or schedule 80 PVC conduit for above ground application.
1. Liquidtight flexible metal conduit (LFMC) or liquidtight flexible non-metallic conduit (LFNC) is permitted in lengths not exceeding 6 ft where not subject to physical damage.
2. Apply corrosion protection to any portion of rigid metal conduit buried in the ground or encased in concrete.

J. Use PVC or HDPE conduit for underground application.

K. Warning Tape
1. Install orange warning tape with black legend “Caution - Buried Communication Cable,” in all trenches containing multi-duct conduit or conduit containing communication cables.

2. Install red warning tape with black legend “Caution - Buried Electric” in all other trenches.
3. Not required when flowable fill is directly overlaid with asphalt pavement or PCCP.
4. Not required when boring or plowing conduit.

L. Install a bushing or adapter at ends of all conduits that contain a conductor according to the NEC.

M. Furnish and install Utility Marker Posts along the longitudinal conduit running line. Refer to AT Series Standard Drawings and Section 02842.

N. Install a #14 AWG solid, insulated locate wire inside of new or existing conduit with individual microducts.
1. Verify that all locate wires are detectable throughout their entire length by performing a continuity test or equivalent verification.

3.3 TRENCH

A. Paved Asphalt Surface
1. Install T-patch over trenched area according to AT Series Standard Drawings.
2. Cut pavement from roadway surface to roadway base on both sides of trench to provide a clean, straight wall for T-patch before any backhoe use according to Section 02705.
3. Refer to AT Series Standard Drawings for depth of flowable fill under paved surfaces.
4. Evenly apply tack coat on final backfill before installing T-patch.
5. Place restoration patch – match the composition, density, and elevation (±¼ inch), of the existing surface according to Section 02741.
6. Apply a hot-pour rubberized asphalt joint sealant or approved equal after the patch is installed.

B. Sidewalk or Decorative Pavement
1. Use flowable fill to bottom of new pavement or sidewalk.
2. Match existing pavement thickness. New pavement thickness must be 3½ inches minimum and 8 inches maximum.
3. Restore sidewalk or decorative pavement to original condition or better after work is completed. Refer to Section 02776.

C. Unpaved Surface
1. Backfill using native material, if suitable, that matches the composition, density, and elevation (±0.2 inch), of the existing surface according to Section 02056.

2. Dispose of surplus material promptly.
3. Sand Backfill
    a. Use sand backfill in trench sections outside of existing roadway, proposed roadway, and sidewalk pavement areas, including exposed conduit locations when plowing or boring.
    b. Provide 6 inches of sand backfill above conduit in trench.
        1) Backfill trench above sand to finished grade using native material.
            a) Backfill and tamp in 6 inch lifts.
    c. Compaction of sand backfill is not required.

D. Sleeve foreign utilities that cross a trench so they are not encased in flowable fill.

E. Place all conduits in the same trench whenever possible.

F. Flowable Fill or Hand-mix Grout
1. Install flowable fill or approved hand-mix grout to the wall of junction box to seal conduit entry into junction box.
2. Clean excess flowable fill or hand-mix grout from the inside of the junction box.

G. Install all conduits so the flowable fill or sand backfill completely encases all exterior surfaces of the conduit.
1. Separate multi-duct conduits using a commercially available conduit spacer or approved equivalent.
2. Place spacers no more than 4 ft apart and not more than 2 ft from each coupler.

H. Anchor the conduit in trench at 16 ft intervals to maintain the required conduit depth during flowable fill placement.

I. Minimum separation between all conduits and the wall of the trench is 1½ inches.

3.4 BORE OR PLOW

A. Immediately contain, remove, and properly dispose of all excess drilling fluid.

3.5 USE OF EXISTING OR OCCUPIED CONDUIT

A. Maintain the physical condition and functional integrity of all cabling and wiring in existing or occupied conduit.

B. Cable or wire installation in an existing or occupied conduit.

1. Remove any existing fiber optic cable or copper wire.
2. Test the integrity and clean the conduit by successfully pulling a Department-approved mandrel through the conduit.
3. Re-pull existing and new fiber optic cable or copper wire together.
4. Perform all necessary splices and replace any impacted fiber cable and spider fan-out kits according to Section 13594.

C. Use existing conduit in-situ only if shown and as approved by the Engineer.

D. Intercept individual microducts from existing microduct bundle mid-span and reroute to new junction box location:
   1. Type II-PC junction box
      a. Bury at existing microduct bundle depth.
      b. Notch the 24-inch box walls and install junction box over existing microduct bundle.
      c. Provide 12 inches of free draining granular backfill borrow underneath junction box.
      d. Encase all conduit in flowable fill orhand-mix grout where the conduit enters the junction box.
      e. Place locate ball or disk in junction box.
      f. Ground rod, and grout floor are not required.
   2. Conduit and microduct bundle inside of buried Type II-PC junction box.
      a. Install conduit from buried junction box to new junction box location for rerouting of individual microducts. Provide #14 AWG solid, insulated locate wire inside of new conduit between junction boxes.
      b. Extend conduit and microduct oversheath 6 inches beyond inside wall of the junction box.
      c. Expose microducts by removing no more than 20 inches of oversheath.
      d. Identify and cut only the individual microducts to be rerouted.
      e. Use approved couplers and extend microducts to new junction box using corresponding microduct color.
      f. Splice all locate wires together using an approved waterproof connector.
         1) Verify that the locate wire conductors are not exposed.
   3. New junction box location
      a. Install new junction box within 20 ft of buried junction box or within 20 ft of edge of roadway when existing microduct bundle is underneath roadway, to provide access to locate wire for mapping and locating purposes.

3.6 REPAIR OR RESTORATION

A. Restore all areas, including landscaping, concrete pavement, asphalt, finished curbs and gutters, box culverts, sewers, underground water mains, sprinkler systems, sidewalks, concrete flatwork, colored, textured, or decorative surfaces damaged during conduit and junction box installation.

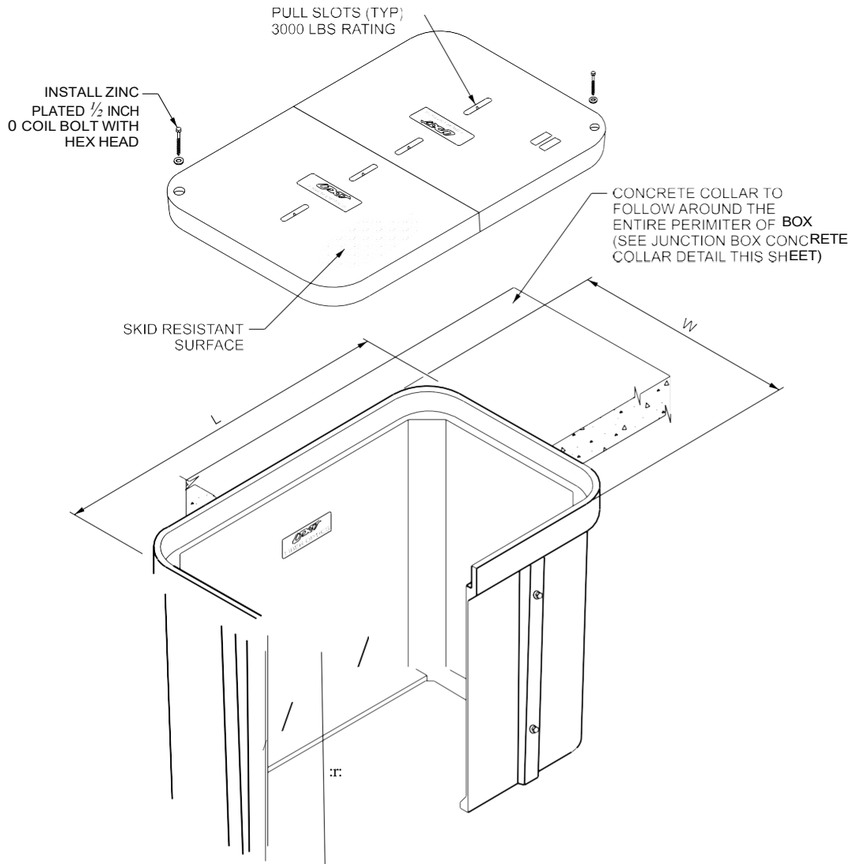
B. Coordinate with local utilities for utility repair.

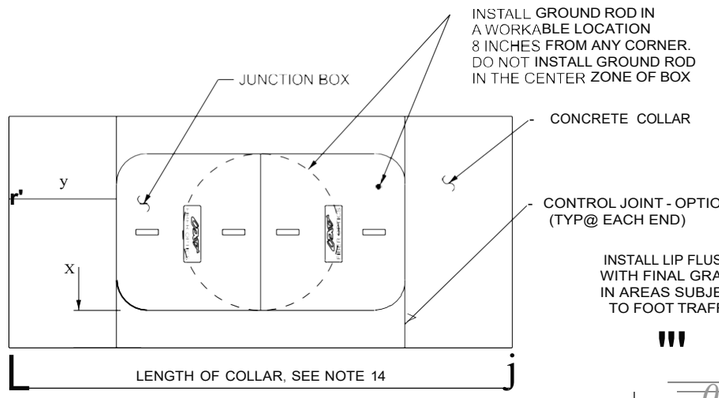
C. Notify the Engineer of all necessary repairs.

D. Replace all damaged facilities in kind.

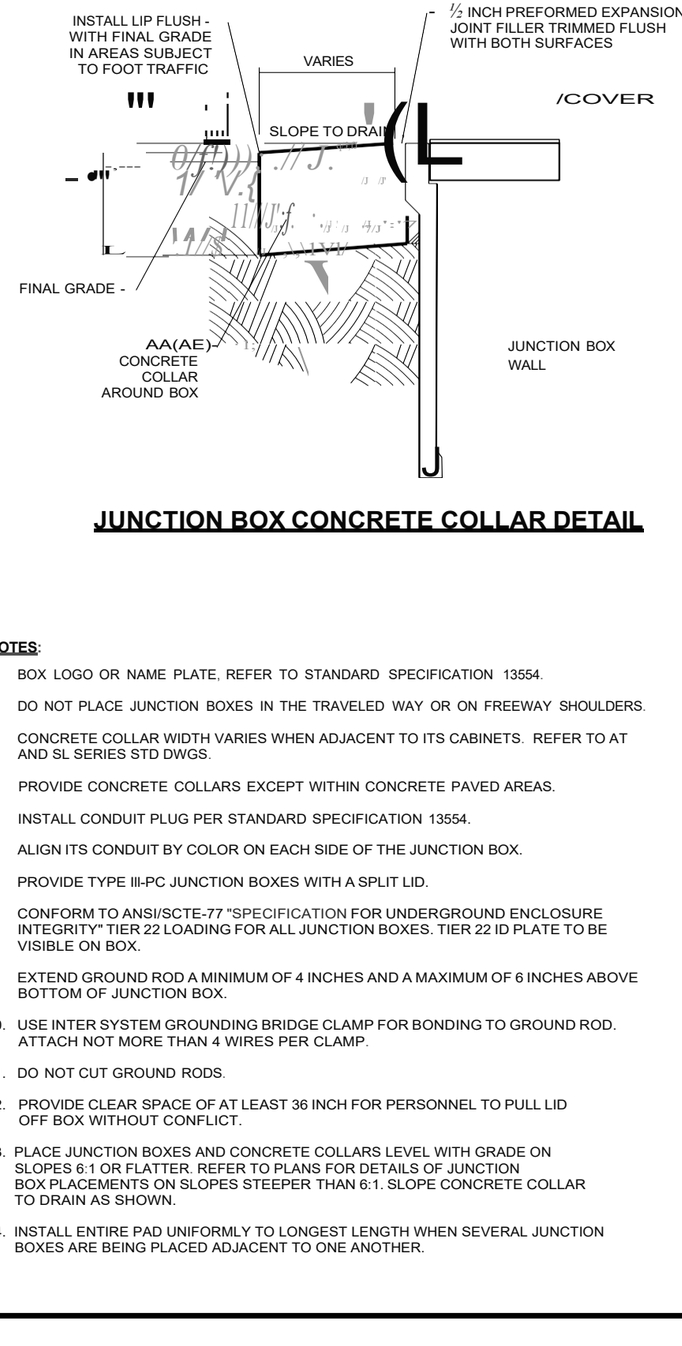
E. Buried microduct bundle coupling and repair:
   1. Expose microducts by removing no more than 12 inches of oversheath beyond area to be coupled or repaired.
      a. Trim microducts to length as necessary to eliminate all bends and deflection.
   2. Use approved couplers.
   3. Splice the locate wires together using an approved waterproof connector.
      a. Verify that the locate wire conductors are not exposed.
   4. Protect exposed microducts, couplers and locate wire using split duct.
      a. Seal split duct joints and split duct ends around microduct bundle oversheath using approved waterproof sealing tape or other approved methods prior to backfill.
      b. Do not use heat-shrink or cold-shrink protection methods.

END OF SECTION





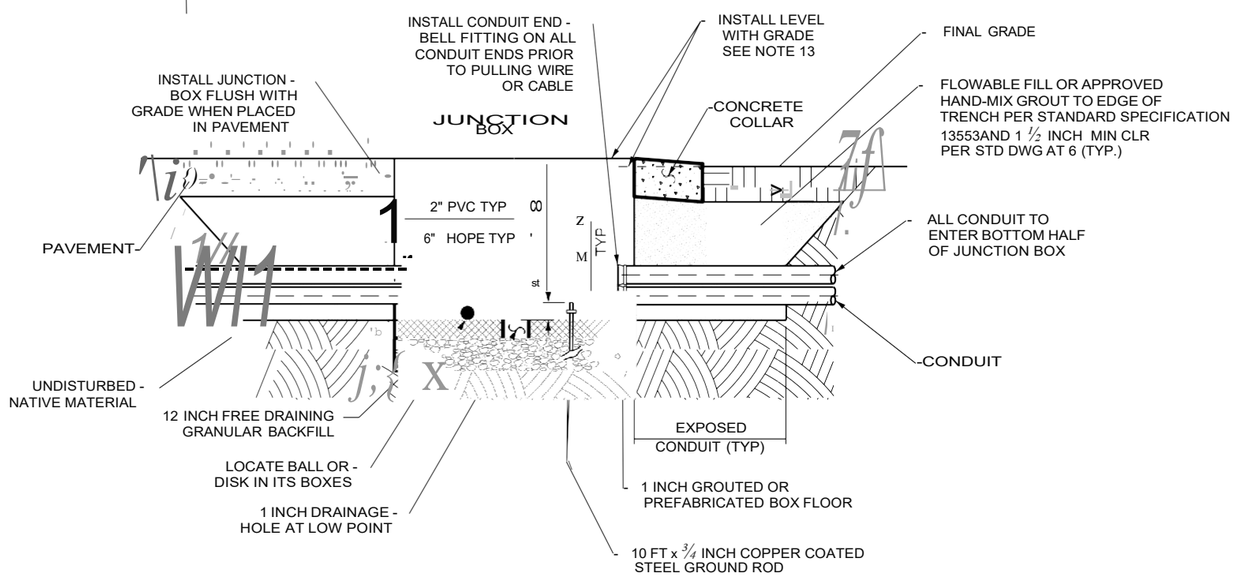
PLAN VIEW - JUNCTION BOX AND CONCRETE COLLAR



JUNCTION BOX CONCRETE COLLAR DETAIL

TABLE OF DIMENSIONS

BOX TYPE	"W" inch	"L" inch	"H" inch	"X" inch	"Y" inch	LOADING
I-PC	13	24	24	10	10	TIER 22
II-PC	24	36	36	10	24	TIER 22
III-PC	30	48	36	10	24	TIER 22



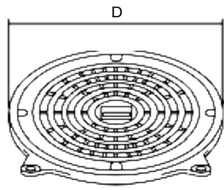
JUNCTION BOX CONDUIT PENETRATION DETAIL

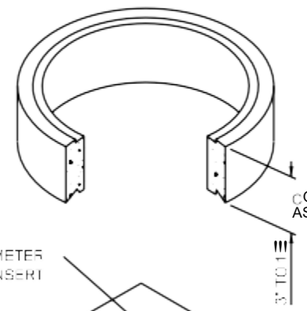
NOTES:

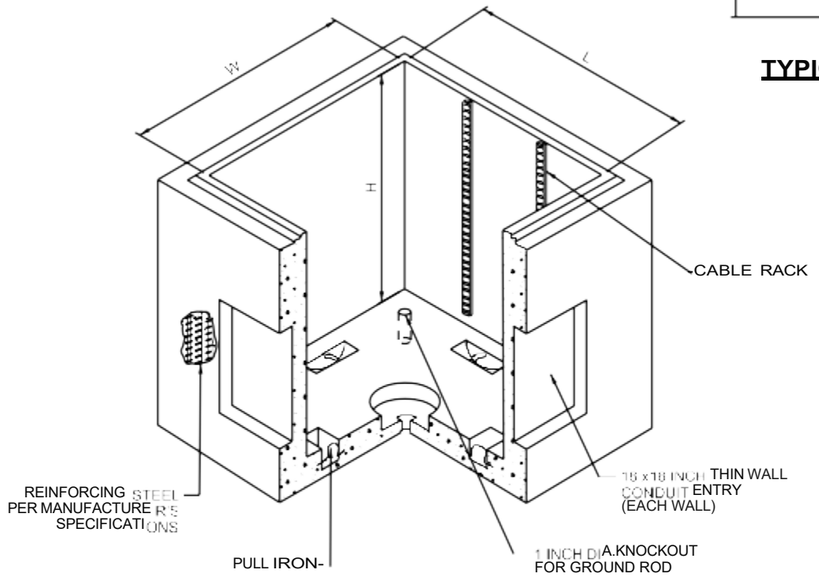
1. BOX LOGO OR NAME PLATE, REFER TO STANDARD SPECIFICATION 13554.
2. DO NOT PLACE JUNCTION BOXES IN THE TRAVELED WAY OR ON FREEWAY SHOULDERS.
3. CONCRETE COLLAR WIDTH VARIES WHEN ADJACENT TO ITS CABINETS. REFER TO AT AND SL SERIES STD DWGS.
4. PROVIDE CONCRETE COLLARS EXCEPT WITHIN CONCRETE PAVED AREAS.
5. INSTALL CONDUIT PLUG PER STANDARD SPECIFICATION 13554.
6. ALIGN ITS CONDUIT BY COLOR ON EACH SIDE OF THE JUNCTION BOX.
7. PROVIDE TYPE III-PC JUNCTION BOXES WITH A SPLIT LID.
8. CONFORM TO ANSI/SCTE-77 "SPECIFICATION FOR UNDERGROUND ENCLOSURE INTEGRITY" TIER 22 LOADING FOR ALL JUNCTION BOXES. TIER 22 ID PLATE TO BE VISIBLE ON BOX.
9. EXTEND GROUND ROD A MINIMUM OF 4 INCHES AND A MAXIMUM OF 6 INCHES ABOVE BOTTOM OF JUNCTION BOX.
10. USE INTER SYSTEM GROUNDING BRIDGE CLAMP FOR BONDING TO GROUND ROD. ATTACH NOT MORE THAN 4 WIRES PER CLAMP.
11. DO NOT CUT GROUND RODS.
12. PROVIDE CLEAR SPACE OF AT LEAST 36 INCH FOR PERSONNEL TO PULL LID OFF BOX WITHOUT CONFLICT.
13. PLACE JUNCTION BOXES AND CONCRETE COLLARS LEVEL WITH GRADE ON SLOPES 6:1 OR FLATTER. REFER TO PLANS FOR DETAILS OF JUNCTION BOX PLACEMENTS ON SLOPES STEEPER THAN 6:1. SLOPE CONCRETE COLLAR TO DRAIN AS SHOWN.
14. INSTALL ENTIRE PAD UNIFORMLY TO LONGEST LENGTH WHEN SEVERAL JUNCTION BOXES ARE BEING PLACED ADJACENT TO ONE ANOTHER.

STD. DWG. NO.

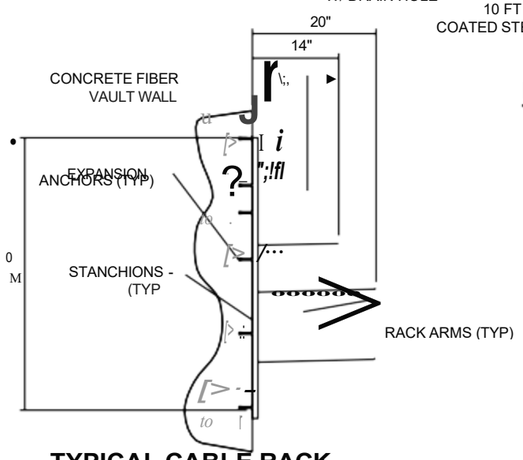
AT?A



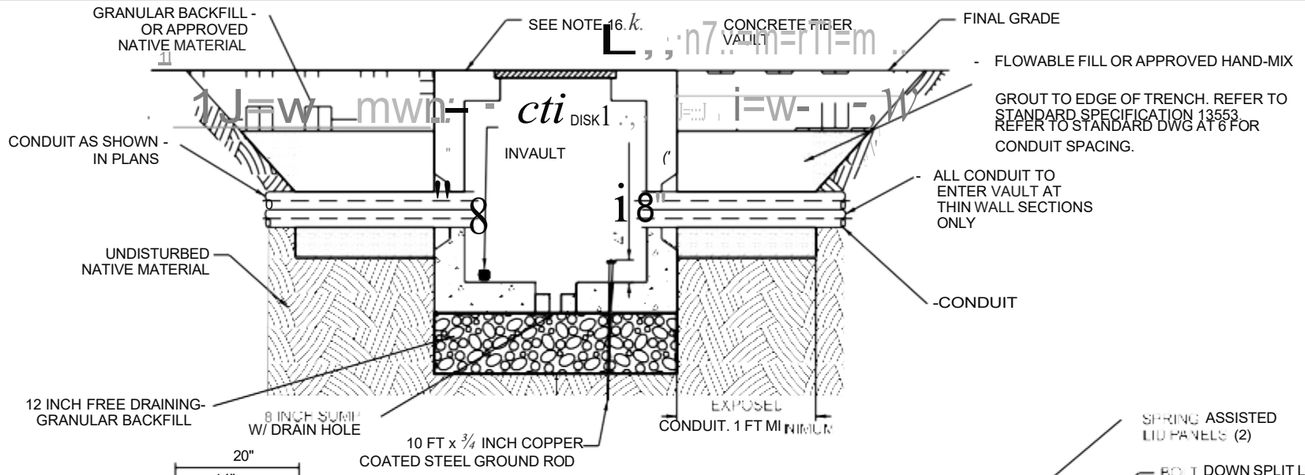




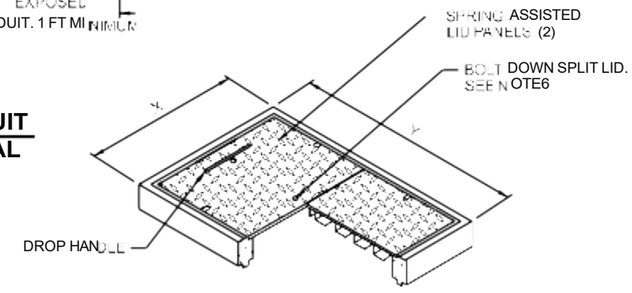
CONCRETE FIBER VAULT WITH MANHOLE LID



TYPICAL CABLE RACK



FIBER VAULT CONDUIT PENETRATION DETAL



METAL LID FOR TYPE IV-CV FIBER VAULT

VAULT DIMENSIONS

VAULT TYPE	"L" INCH	"W" INCH	"H" INCH	"T" INCH	LID	"X" INCH	"Y" INCH	"D" INCH
IV-CV	48	48	48	6 MIN	HINGED OR MANHOLE	24	36	36
V-CV	48	72	72	6 MIN	MANHOLE ONLY	N/A	N/A	36

NOTES:

1. SUPPLY TYPE IV FIBER VAULT WITH A TAMPERPROOF HINGED METAL LID FOR UNPAVED AREAS, OR A TAMPERPROOF HEAVY DUTY MANHOLE-STYLE LID IN PAVED AREAS. SUPPLY FIBER VAULTS, LIDS, AND COVERS RATED FOR AASHTO LRFD HL-93 LOADING.
2. SUPPLY TYPE V-CV FIBER VAULT WITH A MANHOLE-STYLE LID ONLY.
3. SUPPLY MANHOLE LIDS WITH A HOLE OR SLOT FOR REMOVAL WITH A LEVER OR HOOK. SUPPLY HINGED METAL LIDS WITH DROP HANDLES.
4. SUPPLY VAULTS WITH A PERMANENT INTERNAL LADDER.
5. PROVIDE FIBER VAULT LIDS MARKED, "UDOT FIBER OPTIC" USING MIN 3 INCH HIGH LETTERING WITH 1/a INCH THICKNESS. FORM LETTERS BY ENGRAVING, CASTING, STAMPING, OR WITH A PRECISE WELD BEAD.
6. PROVIDE HINGED METAL LID WITH A MINIMUM OF ½2 INCH HIGH DIAMOND PATTERN OR SIMILAR SURFACE.
7. PROVIDE FIBER VAULTS WITH A HEAVY-DUTY NON-METALLIC CABLE STORAGE RACK SYSTEM. PROVIDE RACK ARMS AND STANCHIONS CAPABLE OF SUPPORTING A MINIMUM OF 250 LB FOR TYPE IV-CV FIBER VAULT RACKS, INCLUDE A MINIMUM OF 36 INCH RACK STANCHIONS AND 4 RACK ARMS. FOR TYPE V-CV FIBER VAULTS, INCLUDE A MINIMUM OF 45 INCH RACK STANCHIONS AND 5 RACK ARMS.
8. CONDUITS PENETRATE FIBER VAULT AT THIN WALL SECTIONS ONLY. CORE DRILL HOLE IN THIN WALL SECTION TO CONDUIT SIZE PLUS ¼ INCH. DO NOT "KNOCK OUT" THE THIN WALL SECTION.
9. COMPLY WITH OSHA REQUIREMENTS FOR ENCLOSED WORK SPACES.
10. BOND AND GROUND ALL EXPOSED METALLIC COMPONENTS OF THE FIBER VAULT PER NEC 250 IF ARMORED FIBER OPTIC CABLE IS USED.
11. INSTALL CONDUIT PLUGS ACCORDING TO STANDARD SPECIFICATION 13553.
12. ALIGN ATMS CONDUIT BY COLOR ON EACH SIDE OF FIBER VAULT.
13. EXTEND GROUND ROD A MINIMUM OF 4 INCHES AND A MAXIMUM OF 6 INCHES ABOVE BOTTOM OF FIBER VAULT.
14. USE GROUND ROD BRIDGE CLAMP FOR BONDING TO GROUND ROD. ATTACH NOT MORE THAN 4 WIRES PER CLAMP.
15. DO NOT CUT GROUND RODS.
16. INSTALL VAULT PLUMB AND LEVEL. GRADE BACKFILL FLUSH WITH VAULT.

STD. DWG. NO.

AT7B

Dig Once Best Practices Overview

SECTION 1: GOALS OF THE LEGISLATION

Economic Viability Exists in a Digital Connection
No one can predict the demand for data in the next 10 to 20 years, but we know our lives are going to be even more connected. By consolidating the installation of broadband infrastructure at the time of road construction, communities are positioned to participate in the digital economy in the most cost-effective way for the taxpayers.

Saving Tax-Payers Dollars
The U.S. DOT's Intelligent Transportation Systems Joint Program Office estimates the average cost of deploying fiber-optic cable is about $27,000 per mile. According to the Federal Highway Administration, the Dig Once legislation has the potential to eliminate up to 90 percent of the cost of deployment.

Dig Once U.S. Federal Legislation
In an effort to make high speed broadband more affordable and accessible, the U.S. Federal Government passed "Dig Once" legislation. After a decade of various versions of the concept, the bill received overwhelming bi-partisan support with more than 30 co-sponsors.

Eliminating Duplicate Expenses
Essentially, the legislation provides for the notification of federally funded road construction projects where conduit or fiber could be included at the same time. Digging one time for two or more projects and enabling future upgrades without additional expense brings tremendous added value and efficient use of resources.

Digging Deeper into Saving Taxpayer's Money
The law allows for some flexibility: installation of fiber, conduit, or both fiber and conduit. If fiber is direct buried alone, it will still be a leap forward in streamlining and investing in broadband infrastructure. However, when an upgrade is needed, it eventually means more digging to replace the fiber cable.

The Federal Communications Commission, or FCC, recommended State policies should require contractors to install spare fiber and empty conduit to accommodate "reasonably anticipated" future demand. The use of a conduit network system provides the flexibility of upgrading (adding additional fiber) without the cost of digging. Fiber can be placed by air-jetting into the conduit quickly and easily without the expense and disruption of construction. Burying empty conduits in the ground at the time of road construction allows the potential for expansion when it is necessary and can be immediately revenue-generating by leasing or renting.

SECTION 2: BEST PRACTICES OF DIG ONCE POLICIES

The law allows for some flexibility: installation of fiber, conduit, or both fiber and conduit. The Federal Communications Commission, or FCC, recommended State policies should require contractors to install spare fiber and empty conduit to accommodate "reasonably anticipated" future demand.

Best Practice #1: Education

- The extra effort spent on educating the stakeholders will result in on-going cooperation
- Explain the cost-savings benefits
- Demonstrate the high-speed broadband connectivity economic impact
- Clarify the definition of "reasonably anticipated" future demand in conjunction with the installation of fiber, conduit, or both fiber and conduit
- Describe the ability to upgrade for the future (if conduit is used)

Best Practice #2: Ordinances (see pages 3-9: https://broadbandnow.com/report/dig-once-digital-divide/)

- Use existing laws and practices and integrate ideas into statutes and processes
- Explain expectations for compliance and how to cope with expectations
- Underscore who is responsible in the text of ordinance
- Encourage or require companies to use your conduit
- Maintain public ownership of conduit as much as possible

Best Practice #3: Coordination

- Establish relationships and expectations by keeping track of private projects and streamlining bureaucratic systems
- Create effective coordination committees
- Provide clear explanation of costs
- Line up departments' budgets for potential large projects

Best Practice #4: Installation of Conduit Network Systems (see pages 10-13)

- Create a master plan
- Publish clear and consistent guidelines (with engineering standards)
- Choose the type of conduit that makes sense for your community — plan for the future
- Do not underestimate the added value of MicroTechnology and MicroTrenching *(Note: MicroTrenching is different than NanoTrenching, which puts the conduit only a few inches below the surface and is unproven. MicroTrenching has been around 10+ years and is a proven installation method with the correct reinstatement material.)*
- Document and verify your conduit

NOTE: Incremental funding required to pass 90 percent of U.S. households with high-speed fiber broadband by 2025 is estimated at a cost of $70 billion.* Dig Once has the potential to reduce that expense significantly. *(*Source: Cartesian, FCC Form 477, US Census, American Community Survey, Company Presentations)*

SECTION 3: STATE LEGISLATION EXAMPLES
(SOURCE: https://broadbandnow.com/report/dig-once-digital-divide/)

NORTH CAROLINA
Law(s): Executive Order 91 forming the Task Force on Connecting North Carolina
Date enacted: 2019
Description: The Governor of North Carolina formed the Task Force on Connecting North Carolina in March 2019, aimed at increasing Internet access to North Carolina residents and aligning state agencies policies in order to remove barriers to broadband deployment. It's comprised of officials representing an array of state departments, including the department of transportation (DOT) and the department of information technology (DIT). The governor asked representatives from the DOT and DIT to jointly develop and implement a statewide "Dig Once" policy promoting the installation of broadband conduit or cables during road construction projects by July 1st, 2019.

UTAH
Law(s): R907-64. Longitudinal and Wireless Access to Interstate System Rights-of-Way for Installation of Telecommunication Facilities; Section 72-7-108
Date enacted: 1999
Description: Utah's state government began implementing Dig Once policies ahead of the 2002 Salt Lake City Olympics. The state's DOT has since expanded the policy, requiring the installation of oversized conduit for certain road construction projects, while interested telecom parties can then extend that infrastructure to neighboring communities. The state's DOT owns the conduit and leases it to telecom companies that want to use it. The state's Telecommunications Advisory Council reviews and approves valuations and trades between the state's DOT and telecom companies for access to conduit, and maintains a map of fiber locations.

ARIZONA
Law(s): Arizona REV. STAT. ANN. § 28-7381
Date enacted: 2012
Description: Arizona's Dig Once policies are targeted specifically at expanding broadband access to rural communities. The policy states that during road construction projects along rural highways, the DOT can coordinate with telecom companies to install conduit and it enables the agency to lease the conduit to telecom providers at a cost-based rate.

MINNESOTA
Law(s): 116J.39-116J.40: Coordination of Broadband Infrastructure Development
Date enacted: 2013
Description: Minnesota's state laws encourage the state's Office of Broadband Development to coordinate with the state's DOT for "Dig Once" measures in planning, relocation, installation, or improving broadband conduit within a right-of-way. It enables the Office of Broadband Development to evaluate procedures and criteria for contracts or lease agreements with telecom companies, as well as pricing requirements. It also allows for co-location of fiber and conduit with other utilities in the same trench.

NEVADA

Law(s): SB 53, creating the Nevada Telecommunications Advisory Council

Date enacted: 2017

Description: Nevada state legislature formed the Telecommunications Advisory Council within the state's DOT in 2017, outlining parameters and regulations for the DOT in coordinating with telecom companies for access to rights-of-way for installing telecommunications equipment. The law charges the council with seeking input from telecommunications providers and the public relating to broadband access, providing recommendations to the state DOT on offering access to rights-of-way to telecommunications providers, as well as approving or denying proposed fiber trade agreements between the DOT and a telecom provider. The DOT is also authorized to enter into agreements with telecom companies and charge fees to access to public rights-of-way or receive in-kind compensation.

MARYLAND

Law(s): SB 717 –Connecting Rural Maryland Act of 2017, creating the Task Force on Rural Internet, Broadband, Wireless, and Cellular Service; HB 961-Rural Broadband Communication Services

Date enacted: 2017-present

Description: Maryland's DOT coordinates with telecom providers and local utilities for installing conduit. The Connecting Rural Maryland Act created the Task Force on Rural Internet, Broadband, Wireless and Cellular Service, which was charged with facilitating cooperation between telecom providers to reduce redundancy, save money, and ensure that the all fiber assets are being used efficiently. The task force focused on facilitating cooperation between electric cooperatives and telecom companies. The task force's last report recommended the state include fiber optic cable as part of the state's definition of telecommunications equipment, and that it allow utilities to lease excess fiber and/or pole attachment rights for telecommunications, including broadband, without obtaining a separate easement, in order to promote broadband access in rural parts of the state. It has requested that the state's legislature draft authority for electric cooperatives to coordinate with telecom providers in laying fiber. That bill was expected to be introduced in 2019. HB 961, meanwhile, specifies that nonprofit telecommunications services providers in rural and underserved areas of the State must be allowed to use the right-of-way or easement of specified State agencies for the installation of broadband communication infrastructure without being charged to do so.

GEORGIA

Law(s): SB 402 — Achieving Connectivity Everywhere (ACE) Act

Date enacted: 2018

Description: Georgia state legislature passed the ACE bill in 2018, which enables the state DOT to develop and implement a long-term policy allowing public rights-of-way to be used for the deployment of broadband services and other "emerging communication technologies" either by the state or private providers. It also requires local governments' comprehensive plans to include elements to facilitate the deployment of broadband services, and it amends the OneGeorgia Authority Act to include broadband services. Finally, the bill authorizes the Georgia Technology Authority to establish policies and programs necessary to coordinate

statewide efforts to promote broadband deployments between state agencies, local governments and industry representatives.

WEST VIRGINIA
Law(s): HB 4447, creating new codes §17 – 2 E- 1-E-9
Date enacted: 2018
Description: West Virginia's state government has developed a uniform system for conduit installation for telecom companies that are applying to install telecom infrastructure. Telecom companies must enter into an agreement with the state's Division of Highways for installing conduit in public rights-of-way; companies must also notify the West Virginia Broadband Enhancement Council and all other carriers on record within the state of their installation permit. Other telecom companies that are interested in installing their own fiber have 30 days to notify the applicant of interest in sharing the trench. The telecom company is also required to run an advertisement in the relevant media for two weeks advertising the project to allow other carriers the opportunity to respond. The law also allows the Division of Highways to charge fees for access to public rights-of-way, or accept in-kind compensation from sources such as conduit, dark fiber, access points, other telecom equipment or services, or even bandwidth.

MAINE
Law(s): Chapter 344, Sec. 1. 35-A MRSA §2503, sub-§2
Date enacted: 2018
Description: Maine's law requires any public entity involved in a construction project to install broadband conduit and authorizes that entity to lease the conduit to telecom companies for installing broadband and/or wireless facilities for the purpose of providing service.
The law states that telecom companies proposing broadband deployments must notify the ConnectME Authority with the location and description of the proposed facility and that the Authority must then disseminate that information to all other telecom companies or other entities that may be interested in installing broadband at the same time. The Authority is also tasked with maintaining a map of broadband conduit installations through the state.

ILLINOIS
Law(s): 605 ILCS 5/9-131) Sec. 9-131.
Date enacted: 2009
Description: Illinois state law requires the state DOT and the Department of Central Management Services (DCMS) to collaborate in installing fiber network conduit, where it does not already exist, in every new state-funded construction project that opens trenches along state-owned roadways. Either department is authorized to allow a third-party company to manage the leasing of the conduit to telecom companies, as long as the state can receive market-based pricing for the lease. The state's DOT also coordinates with the Illinois Broadband Deployment Council to compile Dig Once best practices and draft ordinances for county and city agencies within the state.

CALIFORNIA
Law(s): Section 14051 of the Government Code
Date enacted: 2016
Description: California requires the state DOT to notify telecom companies of state-led highway construction projects through its website to enable companies to collaborate with the state on installing conduit in public rights-of-way during each project.

SECTION 4: CITY AND COUNTY LEGISLATIONS EXAMPLES
(SOURCE: https://broadbandnow.com/report/dig-once-digital-divide/)

LOMA LINDA, CA
Law: Ord. 629 §1
Date enacted: 2004
Description: The city of Loma Linda requires all new construction to connect to the city's existing fiber network through ordinances laid out in their Loma Linda Connected Community Program. Residential and commercial builders in Loma Linda are required to include broadband-capable internal wiring and fiber-optic interfaces in new structures. Loma Linda was one of the first communities in the US to adopt a comprehensive future-facing dig once construction policy, and one of the only ones to extend the ordinance to building wiring specifications.

BRENTWOOD, CA
Law: Ordinance No. 609
Date enacted: 1999
Description: Brentwood began implementing Dig Once policies 20 years ago. The city requires developers to design and install two advanced technology system conduits dedicated to the city within public rights-of-way during new construction and to each lot line within the development. It goes on to require developers to install a fiber optic system in one of the two conduits designed to serve the development by either the city itself or a licensed franchisee. The second conduit must remain empty and is reserved for future use by other franchisees. Over the last 20 years, the city now has 150 miles of conduit passing over 8,000 homes. ISP Sonic.net has relied heavily on the conduit to provide broadband service to residents.

SANDY, OR
Law: Development code 17.84.60
Description: The city of Sandy requires private developers to install conduit when disturbing existing roads or building new ones and offers maps of existing installations so that developers can be strategic in how they install conduit. The city has added broadband fiber to the list of municipal infrastructures (such as water, sewer, power lines and mailboxes) that all new developments must include.

BOSTON, MA
Date enacted: 1998; expansion in 1994
Description: Boston is possibly the very first city to implement a Dig Once policy, back in 1988. Initially, the city required all construction projects that involved excavators in a public right-of-way to install conduit and the city then leased that conduit to telecom companies through a one-time fee plus a $5 per foot annual charge. However, the city found its offering wasn't attractive enough to telecom companies, who had begun building their own conduit along parallel streets. The city has since revised its laws to require telecom companies to lease space from the installed conduit before being allowed to install their own conduit, thereby encouraging companies to make use of what's already been installed. In 1994, Boston implemented a policy that required all telecom companies to install conduits in the same trench at the same time, on a shared-cost basis. This policy requires a lead company to

coordinate with other telecom entities in drafting engineering plans and estimating costs for the trenching and conduit installation.

BERKELEY, CA

Law: Ord. 7083-NS § 4 (part) Excavations for video and telecommunications systems

Date enacted: 2009

Description: Berkeley has implemented a suite of policies and procedures outlining best practices for telecom companies in order to minimize the inconveniences of installation, maintenance, and removal of telecom facilities in public rights-of-way. The city requires existing facilities be moved underground alongside new facilities when feasible, and that telecom companies coordinate construction projects with utilities installing infrastructure in public rights-of-way. Telecom companies must also alert the city to any excess or surplus conduit to be installed, and that new facilities be installed within existing facilities where there is sufficient excess capacity.

BELLEVUE, WA

Description: The city of Bellevue doesn't have a formal Dig Once policy in place, but the city has set Dig Once conditions within some of its development projects in the past. The city asks excavator projects include installing conduit along roads when feasible, as well as during street lighting and traffic signal upgrades. It also requires transportation projects that interrupt public sidewalks to include installed conduit.

GONZALES, CA

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

Date enacted: 2016

Description: Gonzales city government has implemented a Dig Once policy for public works projects that requires the city to install conduit during projects such as construction and maintenance of utility infrastructure or public roadways, or during excavations for installing communications, in public rights-of-way. The conduit is owned by the city.

ARLINGTON COUNTY, VA

Description: Arlington County does not have a specific Dig Once policy, but the county has reached "Dig Once" agreements with utility providers in the past. The county entered into one such agreement with electric utility Dominion Virginia Power. The utility needed to install underground conduit along a congested urban public right-of-way. The county required the utility to install fiber in parallel conduit for the county's use. The county is in the midst of installing a fiber network and is building extra capacity for use at a later date.

SAN FRANCISCO, CA

Law: Ordinance 220-14

Date enacted: 2014

Description: San Francisco laws requires any government-led construction project involving a public right-of-way to include improvements to communications infrastructure when feasible. It also requires a telecom company applying to install communications infrastructure to notify the city's Department of Technology so the department can participate in installing conduit at

the same time. The law encourages the department to participate to create a more efficient delivery of broadband services to the public and for the city's needs.

MONTEREY, CA
Law: MBEP/CCBC Shadow Conduit Specifications version 1.0
Date enacted: 2016
Description: The city of Monterey and the Central Coast Broadband Consortium (CCBC) have developed a set of conduit specifications and guidelines for reducing redundancy in installation. Its recommendations range from the conduit size and number of conduits to install, whether future conduit installation would be problematic or impossible, and whether any partners or customers will make immediate use of it. However, the specifications leave out guidance on when conduit installation is required and who should be required to install it.

SANTA CRUZ, CA
Law: Telecommunications Improvement Ordinance
Date enacted: 2014
Description: The city of Santa Cruz, also part of the Central Coast Broadband Consortium (CCBC), adopted the Santa Cruz county's ordinance in 2014, which in turn, was based on the city of San Francisco's Dig One policy. It requires that any entity proposing construction projects in public rights-of-way for utility improvements also install conduit or other telecommunications equipment when practical and feasible. City staff will work with contractors to identify the most cost-effective approach to installing conduit to meet the city requirements and will notify and coordinate with other telecom companies to join the project.

SAN BENITO COUNTY, CA
Law: Multi-use streets policy
Date enacted: 2015
Description: San Benito County, part of the CCBC, implemented a Dig Once practice as part of its multi-use streets policy. It requires county roadway construction projects to include installation of underground utility conduit. The county, which is part of a municipal broadband network, can then use the conduit to expand the network. The county may also utilize the CCBC's shadow conduit policy, which recommends trenching digging projects include a 60-day window so other telecom or utility providers who may be interested in installing conduit at the same time may be notified. The county encourages local jurisdictions to adopt similar policies.

CHICAGO, IL
Description: The City of Chicago has created a specific office that handles coordinating construction projects across agencies and companies to minimize disruptions to the public. The Project Coordination Office, within the city's DOT, was formed in 2012 at the direction of Mayor Rahm Emanuel to coordinate projects within public rights-of-way between different service providers and utilities. In 2013, the mayor expanded the scope of the office to include telecommunications. The office has helped the city save an estimated $150 million in construction costs since 2012.

CELINA, TX
Law: Subdivision Ordinance; Division 4. Design Standards; Section 10.03.126: Improvements; Subsection 10.03.126(i)
Date enacted: 2017
Description: The city of Celina has adopted a conduit ordinance that requires any city-led or developer-led construction project that includes underground excavation to install conduit and fiber-optic cable at the same time to accommodate future telecommunications uses. Private developers must pay for the conduit installation, which then becomes the property of the city. The city also requires that telecom companies looking to install fiber make use of the city's fiber assets when available first and pay fees to the city for access to the infrastructure.

MOUNT VERNON, WA
Law: Municipal code 12.20.015 Construction standards for the regulation of use of public rights-of-way and public property.
Date enacted: 1999
Description: Mount Vernon requires private developers to install conduit when engaging in construction projects that either disturb existing roads or create new roads. The city maintains maps of conduit installations so developers can strategically place the conduit.

EL DORADO COUNTY, CA
Law: Broadband Infrastructure Installation Policy
Date enacted: 2018
Description: El Dorado County adopted a conduit installation requirement for capital improvement projects. The policy requires construction projects from the county's Department of Transportation, the Facilities Division and the Parks, Trails and Rivers Division to include installing conduit when digging trenches or excavating underground as part of the construction.

HUMBOLDT COUNTY, CA
Law: General Plan
Date enacted: 2017
Description: Humboldt county's 2017 updated general plan includes provisions to expand broadband access that include implementing Dig Once policies. The plan recommends that new residential and commercial development projects include requiring developers to install conduit within joint utility trenches for future telecommunications use. It also recommends flexibility in conduit placement requirements in order to allow for retrofitting of communications systems.

POULSBO, WA
Law: 12.02.010 Construction and development standards
Date enacted: 2003
Description: Poulsbo requires any new public street construction, by either the city or a private developer, to include the installation of conduit that can accommodate two telecom companies' fiber infrastructures. The law requires that the conduit be dedicated to the city upon completion and any telecom company looking to deploy infrastructure must first lease conduit space from the city if available.

SECTION 5: CONDUIT NETWORK SYSTEMS

A well-engineered plan will ensure the application can achieve benefits well in excess of the costs of the plan and the conduit network system deployment. Generally, the actual cost of the conduit network systems is only approximately three percent of the overall project costs. Conduit is widely used in most industries, accommodating simpler initial installations and providing a Dig Once permanent pathway.

It is common for cables to be buried in ducts to provide further protection, allowing for simple repair, and potentially providing upgrade paths. In some circumstances, ducts are only used for sections of deployment (e.g. under roads or rivers) where excavation would pose a difficulty, but increasingly ducts are being used for the entire route. This is possible because conduits can provide several benefits without a significant project cost impact.

Brief History of Conduit Network Systems

In the early to mid-1980s, tremendous growth occurred in the deployment of fiber optic cables, linking major metropolitan areas. Fiber optic cables were quickly becoming the technology of choice for streaming huge amounts of voice, video, and data. These cables were installed in very long lengths, up to 30,000 feet, with the goal of using as few splice points as possible to minimize signal attenuation. Because of the more fragile qualities of these long, thin strings of glass, individually no thicker than a strand of human hair, they needed more protection and different handling procedures than traditional jacketed metallic cables. There was an immediate need for a conduit system that offers improved installation efficiencies and cable protection.

Existing conduit network systems typically were 3.5 inches to 6 inches in diameter to accommodate the very large diameter of copper cables that filled the duct banks. As copper cables were being replaced with fiber optic cables, which are much smaller in diameter, smaller high-density polyethylene (HDPE) conduits ranging from 1 inch to 1.25 inches were pulled into the vacated conduit creating multiple pathways to be used for initial and future fiber optic cable placement and for redundancies if a cable got damaged.

This new method of deployment using MicroDucts in existing pathways was called “innerducts” and is still used today. Additionally, now conduit suppliers offer bundled MicroDucts under one oversheath for ease of placement and to maximize fiber count in limited underground and aerial spaces. Multiple variations of standard HDPE conduit and bundled HDPE MicroDucts are available. The installation methods and tools are the same for both.

In addition to traditional trenching, over the years newer installation methods also evolved to minimize the above and below ground surface damage, restoration requirements, and disruption to traffic: plowing, horizontal directional drilling (HDD), and MicroTrenching.

In 1999, new technology was introduced to help solve the issue of overcrowded right-of-ways. Using the same installation methods and tools as traditional HDPE standard conduit, bundled MicroDucts under one oversheath maximized the fiber count in the same space. As technology advances, fiber optic cables are higher capacity in a smaller size, called MicroCables, and conduits are following in size, called MicroDucts. Multiple configurations allow for easy connection to existing networks and efficient transition to current technology.

All conduit is not created equal, and the type of conduit can determine which type of fiber cable you need. Conduit has an inner diameter (ID) and an outer diameter (OD); the standard is to refer to the outer diameter when describing the conduit. A common engineering practice is to not fill each conduit subduct more than about 65 percent full of fiber cables. This space is necessary to air-jet, or pull, the fiber through the conduit without damaging the fiber.

As fiber technology continues to evolve, the fiber cable diameter will continue to get smaller. Microfiber cables can fit many strands of fiber in small diameter conduit. MicroTechnology continues to improve. For decades, conduit has been the preferred manner of installing fiber cable underground and now even in aerial applications.

Installation Advantages

It is easier to install, as it can be put in section-by-section between access points, with the fiber cable later air-assisted and pushed or pulled in as a continuous run.

It is also easier to handle unexpected changes in the route, such as having to go around an obstacle, as compared to directly placing fiber cable.

The continuous run of fiber cable can help reduce the cost of splice points and improve the fiber loss budget and performance for the total system.

The conduit itself can be locatable, which allows the fiber cable to be constructed with only non-conductive dielectric materials which can allow easier access to the fibers.

Protection of the Fiber

The conduit provides mechanical protection of the fiber cable, both during installation of the fiber cable and over the entire life of the fiber cable.

Typically, direct buried fiber cables require additional design enhancements to withstand environmental conditions, whereas the conduit can provide that environmental, tensile and crush protection itself. This enables the fiber density to increase significantly for a given outer diameter cable.

Permanent Pathways

Conduit provides for an always-present pathway for upgrades and changes whenever needed. For example:

1. Remove and change out a fiber cable that is damaged
2. Swap out with improved technology
3. Use the additional empty conduits for increasing capacity
4. Re-route the conduit pathway if there is a change in route

The Dig Once legislation stresses the importance of burying conduit once, with the possibility to add new cables, upgrade existing ones, and increasing capacity. By planning for the future by installing extra permanent pathways, the networks are able to adapt to changes more quickly.

Communication Needs

Communication needs could be for telecommunications, cameras, data transfer, security and many others.

Revenue Opportunity

There is a financial opportunity that network and right-of-way owners are realizing and planning whereby empty pathways can be used, to grant access to difficult right-of-ways or be leased to carriers.

By installing multiple MicroDucts, take full advantage of the new high-density MicroCables that fiber cable providers are shrinking and improving year over year.

It is important to realize that there are different types of conduits suited for different purposes:

- In a more traditional system, 1, 2, or 3 standard conduits could be installed together. However, the outside diameter of these conventional ducts is often quite large compared to the smaller outer diameter of MicroDucts now available. While these large dimensions, perhaps 1.5 inches or 2 inches in diameter, are still used in the industry, they were developed at a time when fiber cables were of much larger diameter with lower fiber density. Since typically only one cable is placed per duct, they actually limit the number of fiber cables that can be placed in a right-of-way.

- Smaller diameter MicroDucts are designed to take advantage of the advances the higher fiber density MicroCables that have much smaller outer diameter. Amazingly, there are 288 and 432 fiber cable diameters on the market on the order of 8 to 10mm, so by sizing the MicroDucts for better space utilization, you can achieve much greater overall fiber density in any right-of-way space.

SECTION 6: ADDED VALUE OF FIBER OPTIC SENSING OPPORTUNITIES

Distributed Acoustic Sensing in Conduit

Optical fiber sensing (FOS) interrogator companies have been installing commercial sensing system in conduit of many years. Information from several market leading companies has indicated that as approximately 50 percent of sensing systems are comprised of fiber cables installed within conduit pathways. The reasons for doing this included conduit pathways provide tremendous added protection, easier installation, flexibility for changes, repairs, and technology upgrades, as well as added capacity for additional use and monetization. When it comes to distributed acoustic sensing, however, an additional reason is that commercially sensitive systems work extremely well in conduit. FOS use is increasing in many vertical markets, with new applications and use cases growing with experience. The following presents an overview of common applications and finding relative to sensing using the advantages of conduit.

Predominant Vertical Markets

- The Security and Asset Integrity Market
- The Pipeline Market
- Emerging Smart City applications

Monitor Assets

- Manual excavation (perimeter security)
- People walking
- Traffic flow
- Leak prevention (oil and gas line)

Research Shows

- Standard telecom-grade fiber is well suited for DAS installations
- Cable design specifically engineered for FOS purposes does impact DAS performance
- For current commercial quality Fiber Optic Sensing systems, there is a negligible difference between performance of a cable in a duct and a cable not in a duct. The protection and advantage the conduit offers far outweighs any difference in signal sensitivity in most all commercial cases.
- The cable to conduit fill-ratio should be considered when selecting a conduit and cable mix, in that an overly large conduit with too much air gap may impact performance. The conduit can be sized for both easily installation through jetting or pulling into the conduit, with sensing consideration also accommodated.
- Typical cable Installed in conduit: Gel-filled, loose tube, unarmored

About Dura-Line

At Dura-Line we aspire to a more connected world, because we believe every company, every community, every person deserves the chance to advance their lives through better access to high-speed broadband. Strengthening our fiber optic network and conduit system infrastructure is critical to supporting the next wave of digitization. And, Dura-Line is at the forefront of the industry creating strategic solutions that solve the issue of the unpredictable needs of tomorrow's fiber cable requirements.

As a TL 9000 and ISO 9001 rated manufacturer, Dura-Line takes pride in our state-of-the-art quality products and being recognized a key partner with all of the major telecommunications companies across the world. In one year, Dura-Line produced over 1.4 billion feet of digital network infrastructure. Through our innovative product solutions and unparalleled customer insight, we are the ones who enable the physical build-out of this new technology realm that impacts education, healthcare, agriculture, energy, transportation, industry, and more.

SILICORE™

Several advanced manufacturing techniques set Dura-line apart as an industry-leader, including low friction SILICORE™ permanently lubricated lining. SILICORE™ is proven to reduce installation time, thus reducing installation costs.

Advantages of Dura-Line's FuturePath (multi-bundled MicroDuct conduit)

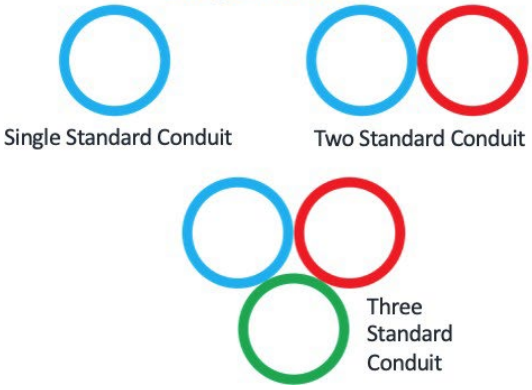
Dura-Line manufactures FuturePath, which are smaller MicroDucts are packaged together under one sheath. There are combinations of FuturePath all the way from 2-MicroDucts, under a single sheath to 24-MicroDucts under a single sheath. Other configurations have mixed sizes of MicroDucts and standard conduit to accommodate both smaller and larger diameter cables.

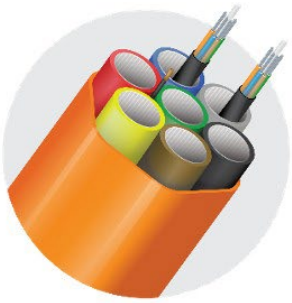
Dura-Line's FuturePath HDPE Product Line is Sustainable

- Supports Dig Once initiatives
- Saves space in overcrowded right-of-ways
- Requires fewer and smaller handholes
- Reduces manpower and machine power for installation
- Reduces fuel consumption, gas emissions, and lower material handling requirements
- Lessens soil displacement Environmental Benefits of HDPE
- Non-leaching
- Flexible, non-rusting materials minimizes leaks common in corroded steel pathways
- Resin and pipe have a superior resistance to failure, corrosion, tuberculation, deposits, and rapid crack propagation (RCP)
- Modern manufacturing methods allow for hundreds, or even thousands, of feet of continuous extrusion, which results in fewer joints
- High performance in extreme temperatures, which greatly reduces compromised pathways Reduced transportation, handling, and installation due to quick installation with less heavy machinery which reduces fuel and labor usage as well as ground disturbance when compared with installation of steel counterparts

- Joints typically use a mechanical coupler, rather than a glue-based solvent which gives off noxious fumes
- Fewer and smaller handholes required
- Low lifecycle costs
- Useful life of HDPE is estimated at 50+ years
- Studies have shown that HDPE can withstand scratching and gouging up to 10-20 percent with no detrimental effects to the long-term performance of the pipe
- Versatility of design allows for multiple applications in several industries

Standard Conduit with a single fiber cable





MicroDucts or FuturePath with high-density fiber cables