



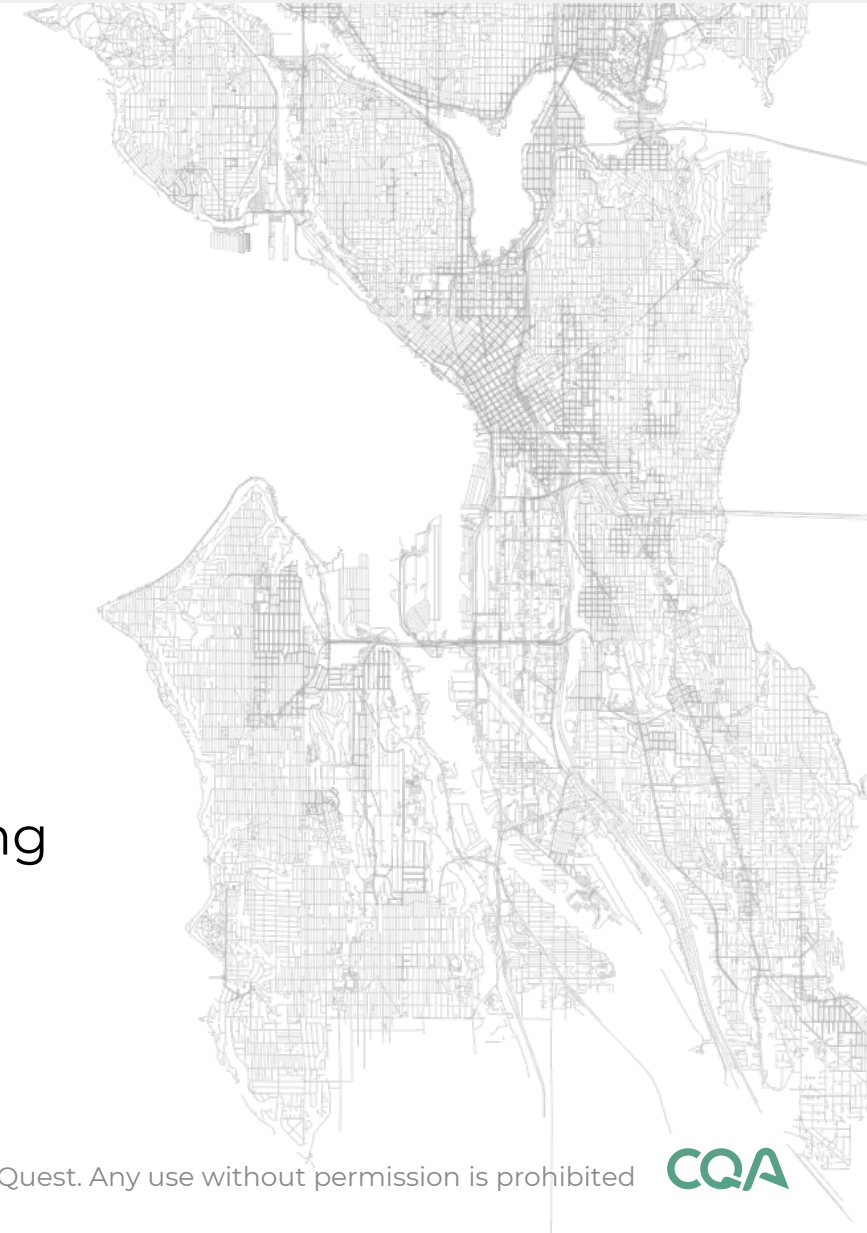
# Broadband Planning: An Overview of Fabric, BDC, Challenge, Cost, and Other Data

How to Leverage Location and Other Information for Planning to Close the Digital Divide

May 2023

# Webinar Overview

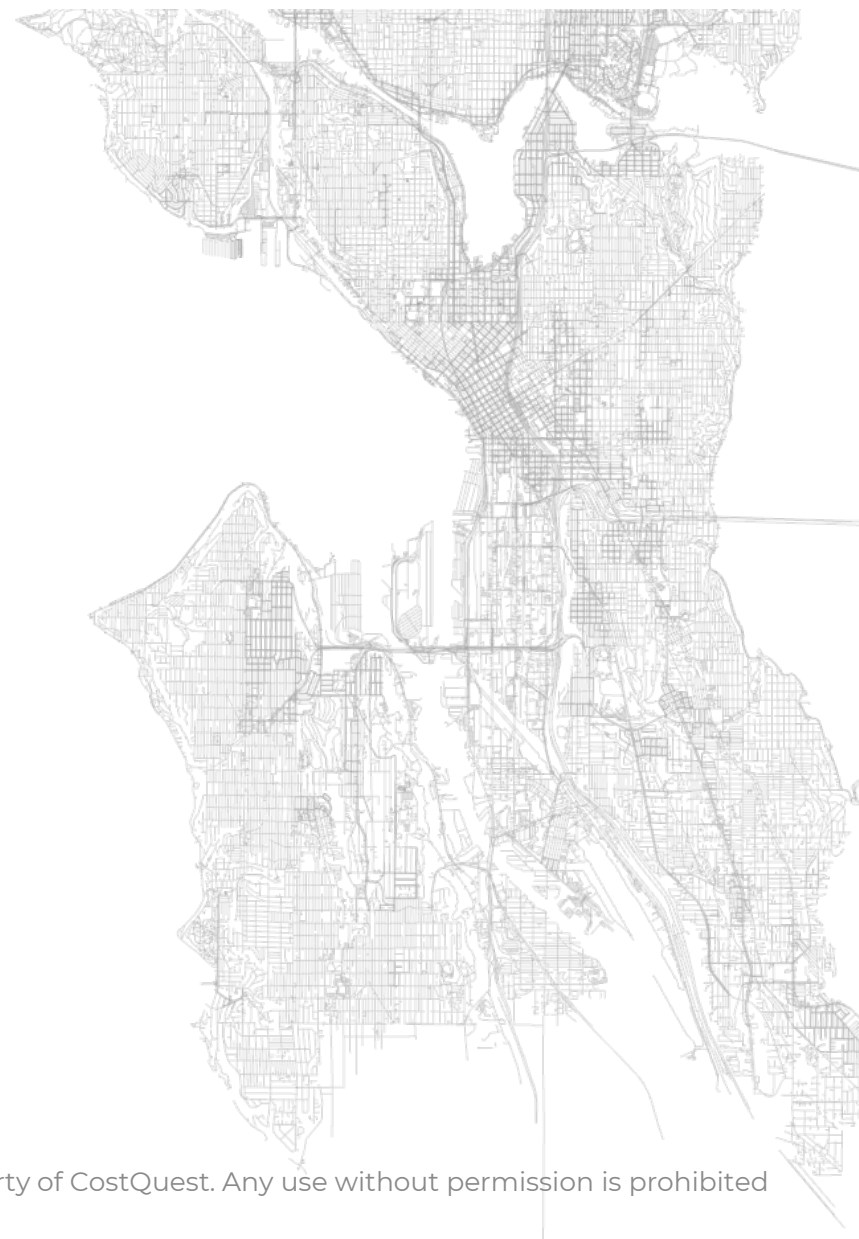
- Overview of CostQuest's National Fabric & role in the process of the iterative creation of the National Broadband Map
- Best practices for challenging the National Fabric Locations
- Economics of broadband deployment
- How to leverage location and other information for planning purposes relating to BEAD and other funding programs
- Use of the Fabric data
- Q&A





# Overview of CostQuest's National Fabric & role in the process of the iterative creation of the National Broadband Map

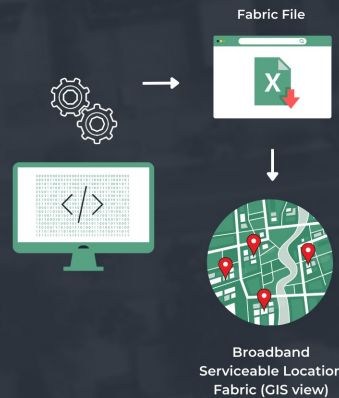
BUILT ON DATA





## COSTQUEST

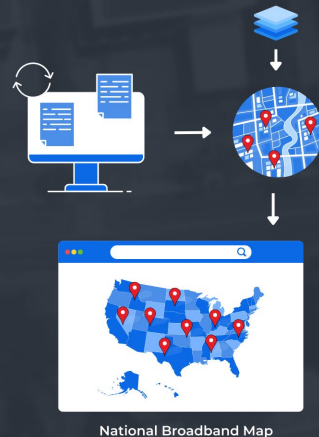
CostQuest identifies Broadband Serviceable Locations, builds the Fabric database, and conducts our own internal improvement processes to increase the accuracy of the Fabric data. CostQuest licenses and delivers the Fabric to the FCC for the BDC per the Broadband Serviceable Location Fabric contract between the FCC and CostQuest.



CQA

## FCC

The FCC layers the service availability data with the Fabric locations to create the underlying data in the National Broadband Map. CostQuest has no role in the creation or management of the service availability data or the National Broadband Map.



CQA

## WHAT'S ON THE NATIONAL BROADBAND MAP?

The National Broadband Map consists of 2 datasets, both of which can be challenged:

### FABRIC LOCATIONS

- **What is it?**
  - The Fabric is a dataset of all locations in the United States and Territories where fixed broadband internet access service is or could be installed.
- **Who creates it?**
  - The Fabric is developed by CostQuest in consultation with the FCC and in accordance with FCC rules.
- **Challenges and updates timeline?**
  - The Fabric is updated twice per year.
  - For the best opportunity for challenges to be included in version 3 of the Fabric, challenges should be submitted by March 15, 2023.
- **What's on the current map?**
  - Version 1 of the Fabric is the base of the current public map. Version 2 of the Fabric is available to license holders to submit challenges, and for ISPs to submit their updated availability data.

### BROADBAND AVAILABILITY

- **What is it?**
  - Broadband availability data shows what broadband services, if any, are available at locations included in the Fabric, as reported by internet service providers every 6 months.
- **Who creates it?**
  - Internet service providers report their availability data to the FCC every 6 months.
- **Challenges and updates timeline?**
  - Broadband availability data is updated consistently over time as challenges are resolved.
  - Challenges are accepted and resolved on a rolling and ongoing basis.
- **What's on the current map?**
  - The map shows availability data as-of June 30th, 2022. The map is also updated biweekly to reflect challenges that have been resolved.

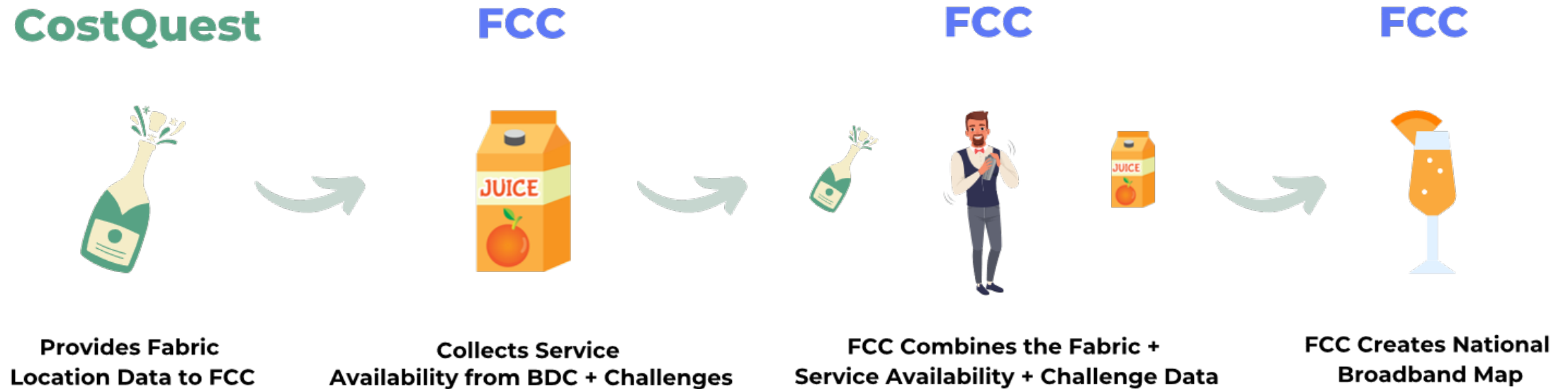
BroadbandMap.gov



Rev. 3/1/2023

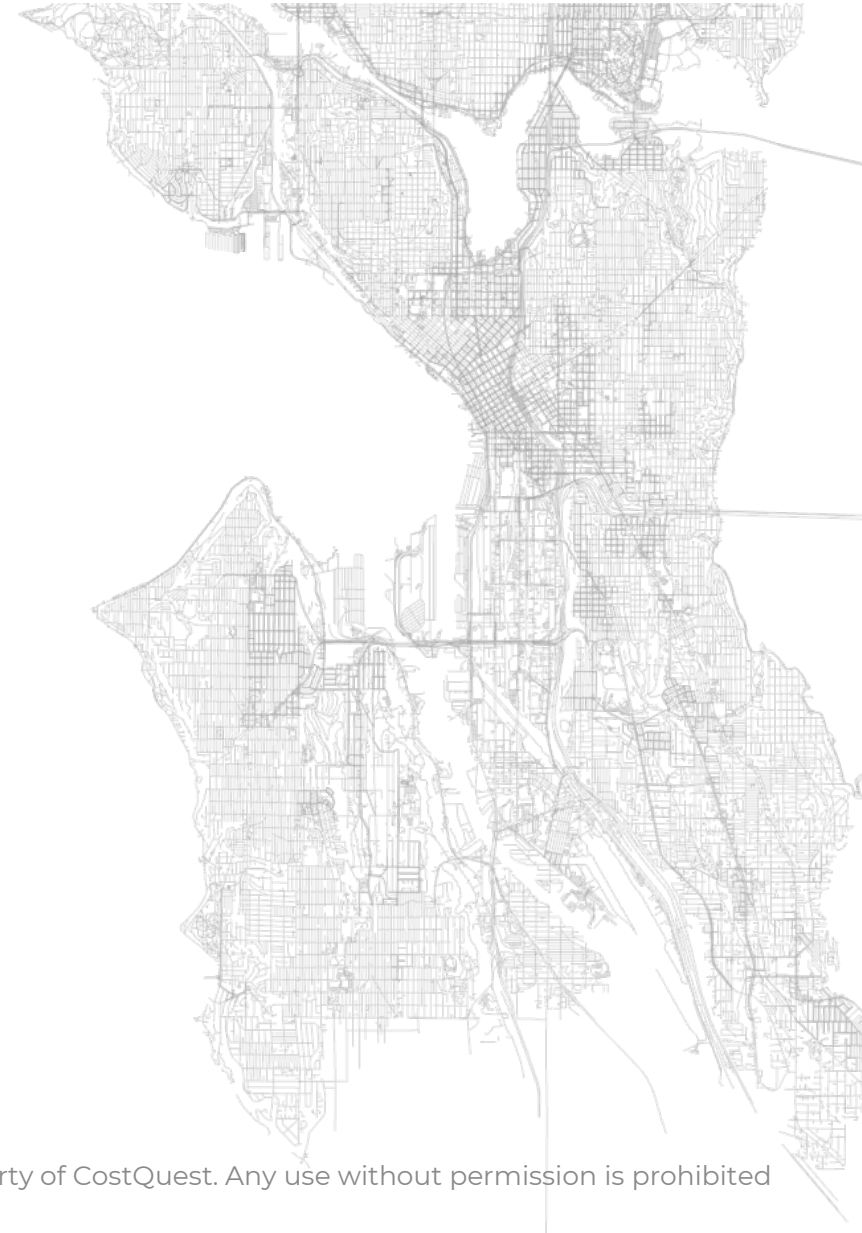


Think of this mapping process like making a mimosa:





# Overview of the Fabric



# What is the FCC Broadband Serviceable Location Fabric?

- **The FCC Broadband Serviceable Location Fabric (FCC Fabric) is a geospatial data set of all locations (or structures) in the U.S. where fixed broadband internet access service is or could be installed**
- These locations are defined by latitude and longitude coordinates and make up the location points that appear on the **National Broadband Map**, called "**Broadband Serviceable Locations**," as defined by the FCC
- ISP Fixed Service availability data submitted into the Broadband Data Collection (BDC) is overlaid on top of the Broadband Serviceable Location Fabric points
  - As we discussed earlier, CostQuest does not work on the availability side – we are only the data provider
- BSLs are NOT units or addresses - they are structures needing services
  - For example, a multi-dwelling unit such as an apartment building may have multiple addresses, however, the building structure is the BSL and will have the main address for that location
  - The BSL will capture the units in the structure as a separate field
  - **The BSL does include addresses**





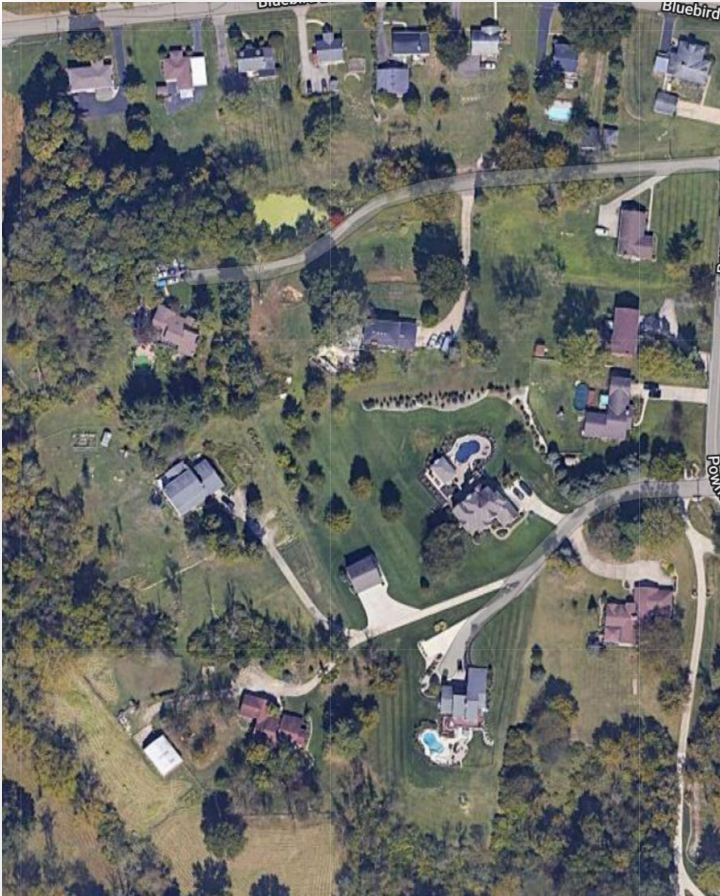
## Data Sources

- Parcels
- Satellite Imagery
- Commercial building footprints
- Tax Attributes
- Address datasets
- Roads

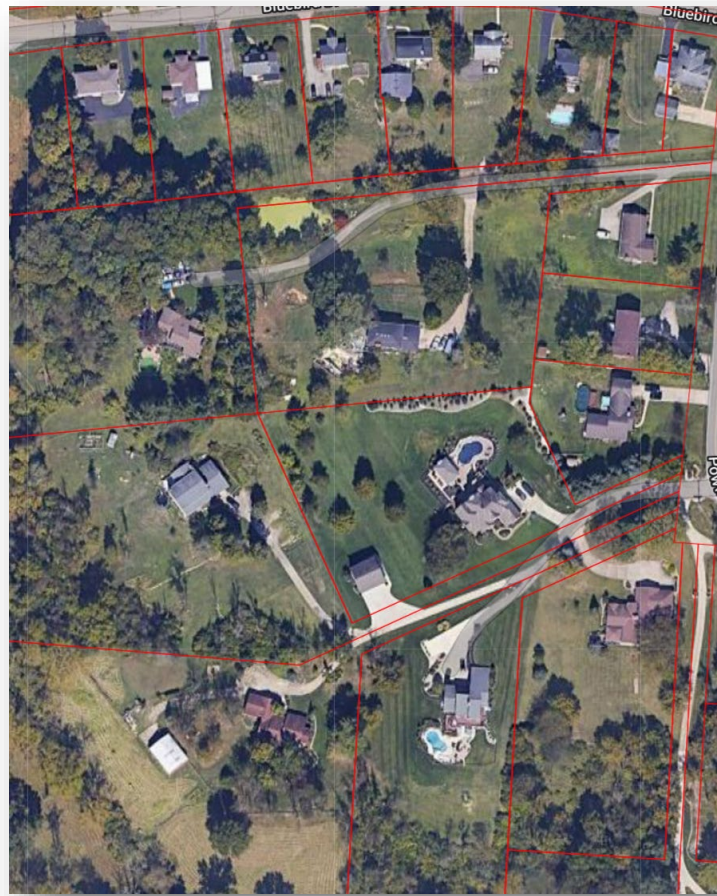


# Data and Steps to Identify BSLs

## Objective: Locate BSLs



## Process: Pull in Parcels



## Process: Pull in footprints

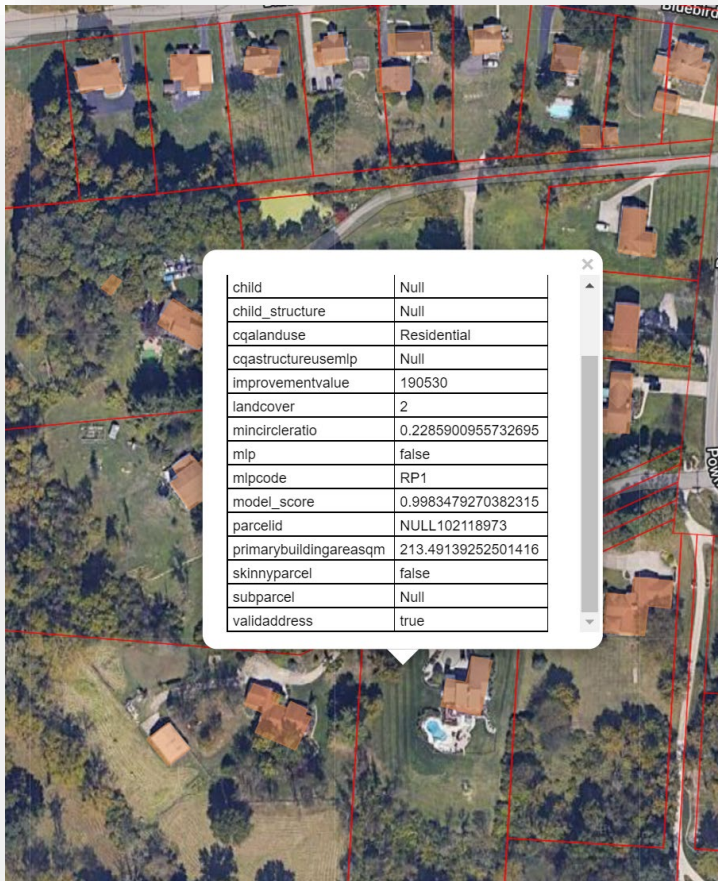




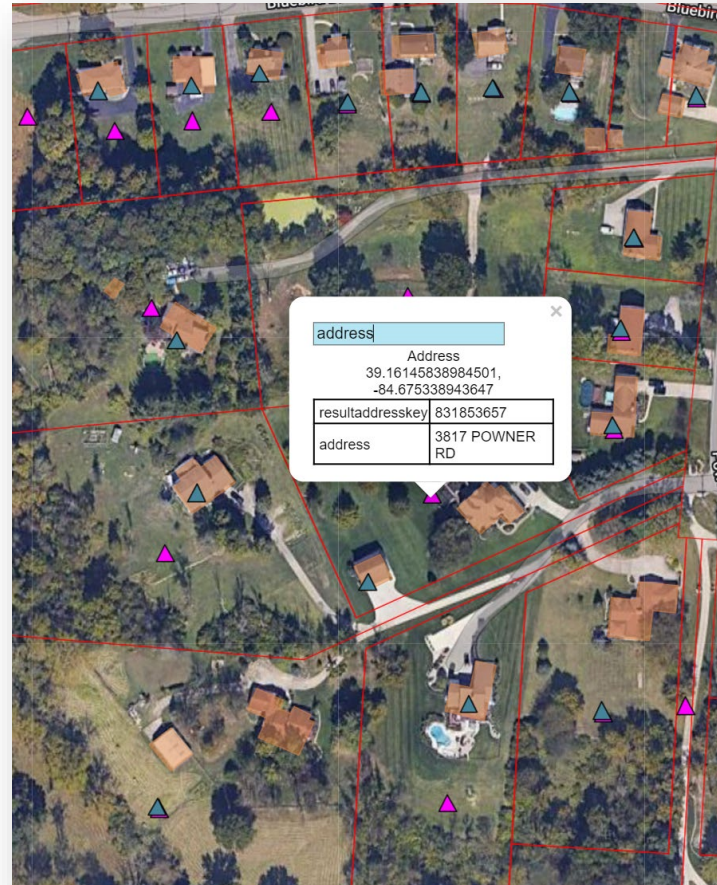
# Data and Steps to Identify BSLs

10

Process: Link tax assessor data



Process: Link addresses



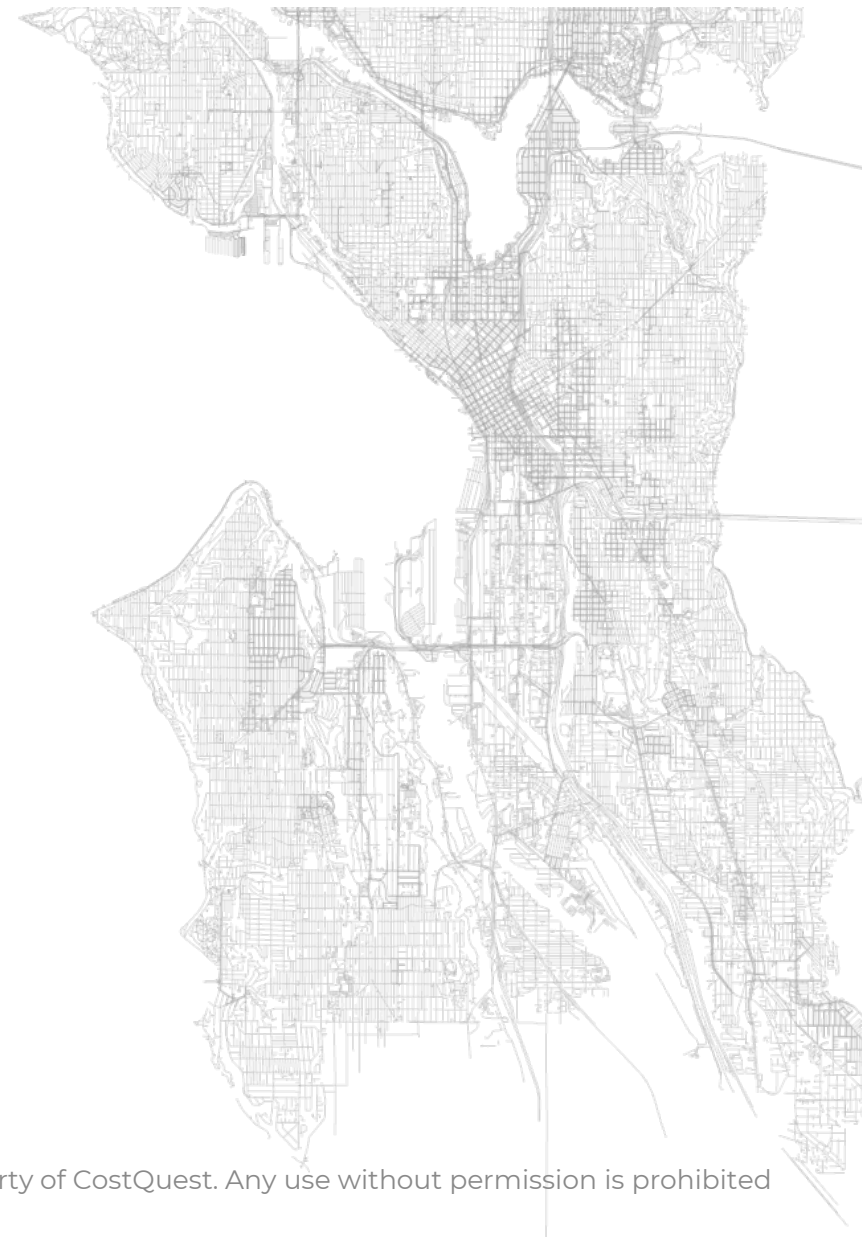
Process: Identify BSLs







# Fabric Continual Improvement



## **Outside of the FCC Fabric Challenge process, CostQuest conducts “self-challenges” to continually improve the Fabric dataset**

- **For each release we update source data**
  - Reduced non-parceled areas
  - Reduced parcel centroid locations
  - Better tax attribute match to parcels
  - Better match of tax assessor address to locations
- **Visually verified**
  - In V2, CostQuest, using our expert crowd, visually verified more than 800,000 records from the V1 dataset to verify our modeling conclusion
  - In V3, CostQuest again visually verified more than 800,000 records from the V2 dataset to verify our modeling conclusion
- **Improved approach to identify parcels as either multiple location or single location parcels**
  - In V2, 58,267 square miles of parcels were visually reviewed
    - Parcels reviewed were added to our MLP/SLP repository to automatically identify the nature of these parcels
    - Using the parcels reviewed, we improved our model for those large parcels not reviewed
  - In V3, we are using new situational awareness of the structures to better identify those that are BSLs

This image of WA capture large parcel areas and visually verified areas that will improve V3





- **Continually sourcing data to add footprints**

- In V2, CostQuest,
  - Using deep learning, was able to identify 316,832 building footprints across 446 communities in Alaska
    - Manually reviewed 20,843 1x1 mile grids in Alaska to improve output from deep learning model
    - This review cleaned up bad footprint data and captured additional buildings
  - In American Samoa, Northern Mariana Islands and Guam CostQuest identified 63,874 building footprints.
- In V3, CostQuest
  - Using deep learning, using the same process in V2, manually added in footprints in Alaska and Nevada
- Better footprint data results in improved identification of BSLs

- **Improved exclusion zones further by incorporating additional areas with cutouts**

- Exclusion zones prevent false positives in areas we know there cannot be active locations
  - Rocks in the desert, on glaciers, in forests
- To date, 227,263 square miles of land have been identified as exclusion zones.

- **Improved addressing**
  - In V2, added secondary addresses to capture all units in a building/location
    - Also, updated an address sip code logic step, reducing interpolated records
  - In V3, improvements to address assignment
- **New sources of information to improve identification**
  - In V2, data set added for demolished houses in Detroit, monuments and memorials in DC
  - In V3, data set added for new addresses to better identify new construction areas
- **Improved statistical models to better select parcels with BSLs and the structures on the parcel that are the BSL**
  - In V2,
    - Correctly Identify a parcel with BSL 99.4% of time (17% reduction from V1 in misses)
    - Correctly Identify correct structure as BSL on parcel ~98% of time (29% reduction from V1 in misses)
    - Overall Type I error rate (false positives) reduced 34% from V1
    - Overall Type II error rate (false negatives) reduced 19% from V1

CostQuest's Fabric captures new construction over time, as datasets are refreshed between releases

The slides that follow capture an area in Utah in the two current releases and the test output of the planned June release this year

- Note that in all slides, the background imagery is current and does not necessarily represent the nature of the area at the time of our data creation



# CostQuest Internal Continual Improvement – Temporal Change

19

June 22  
Version





# CostQuest Internal Continual Improvement – Temporal Change

20

Dec 22  
Version





# CostQuest Internal Continual Improvement – Temporal Change

21

Potential  
June 23  
Version



# Release Schedules

## BDC/Fabric

### Version 1

- Fabric release on 7/1/2022
- ISP Submissions of coverage by 9/1/2022
- Fabric challenges due ~ 11/15/2022
- BDC release 11/2022
- Coverage challenges due by 1/13/2023

### Version 2

- Fabric release on 1/3/2023
- ISP Submissions of coverage by 3/1/2023
- Fabric challenges due ~ 3/15/2023
- BDC release 05/2023
- Coverage challenges due date not announced

### Version 3

- Fabric release by 7/1/2023
- ISP Submissions of coverage by 9/1/2023
- Fabric challenges due - not announced yet
- BDC release 11/2023
- Coverage challenges due ~ Nov 2023

## BEAD

### Timing

- NTIA has announced the Initial Allocation of BEAD to States will occur in June 2023
- Expected to use V2 of the BDC

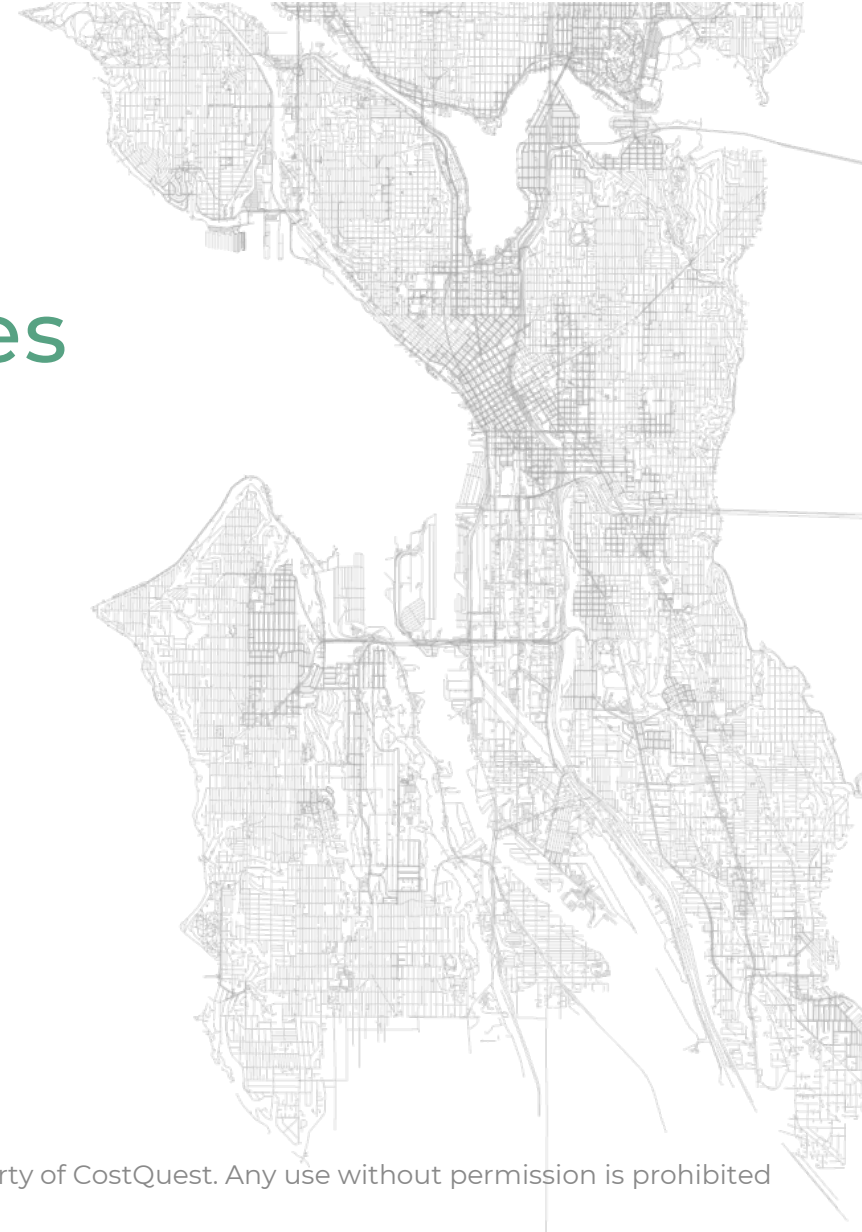
### Plans

- Each Eligible Entity (state/DC/Territories) will run its own program
- The Eligible Entities have set up Broadband Offices
- They will implement Grants/Auctions/Competitive grants
  - 56 different programs
- Fiber is preferred technology
  - Eligible Entity will set Extremely High-Cost Threshold, over which alternative technologies can be considered
- States may use the 3rd version of the BDC to identify eligibility for programs
  - Arguments being made to allow states to use their own maps
  - Areas receiving federal funding but not yet built will be excluded (e.g., RDOF, ARPA, ACAM, etc..)





# Fabric Challenges: Best practices for challenging the National Fabric Locations



## File in the correct challenge category

- **Type 1:** Missing Broadband Serviceable Location
- **Type 2:** Incorrect address
- **Type 3:** Incorrect unit count
- **Type 4:** Incorrect building type code
- **Type 5:** Location not within Footprint of correct building
- **Type 6:** Location is not broadband serviceable
- **Type 7:** Add an additional address for a location

## Must meet challenge criteria\*

- A location must be a residence or business that will purchase mass market broadband service
- Have a unique address we can validate
- Identify a new structure

*\* Process for adding new Fabric locations is rigorous, using a combination of automated checks and manual reviews to analyze challenges*

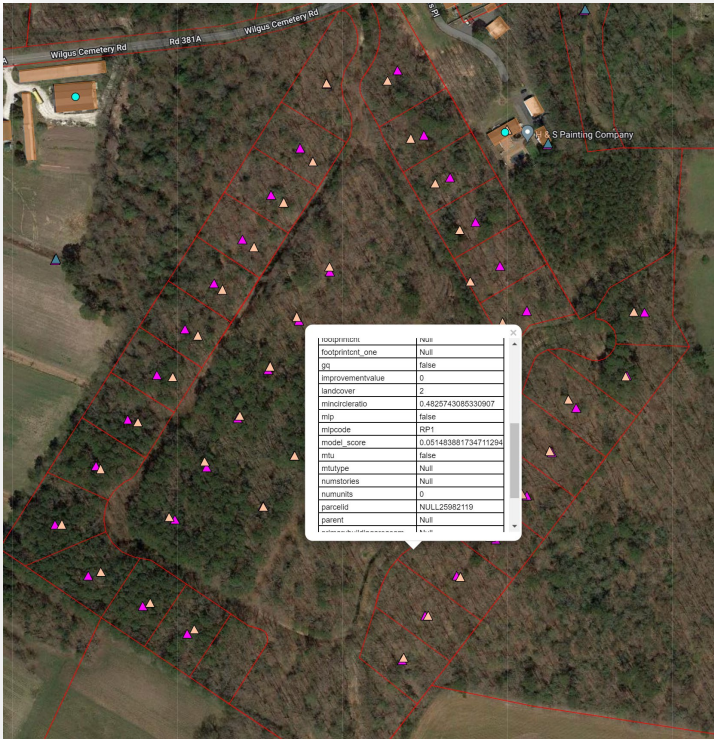
## Do you need to change an address? Or add a new BSL?

- **Correct or remove the address on that BSL by using a Type 2 challenge:**
  - Add correct address; or
  - Use a NULL address with the Null Address Flag set to True
- **Is there a BSL point already on the structure?**
  - Yes - Submit a Type 2 challenge to change the address
  - No - Submit a Type 1 challenge to add a new BSL

*\*All of these changes should be included in the same challenge submission file*

## Addresses and Parcels are not necessarily BSLs

Need evidence of BSL structure



## BSLs represent buildings

- Each BSL may have multiple units - each unit is not a BSL
- Each unit may have an address - all addresses may or may not be in the files provided



## New construction sites will lag

Due to timing of when the data is refreshed





# Considerations for Challenges

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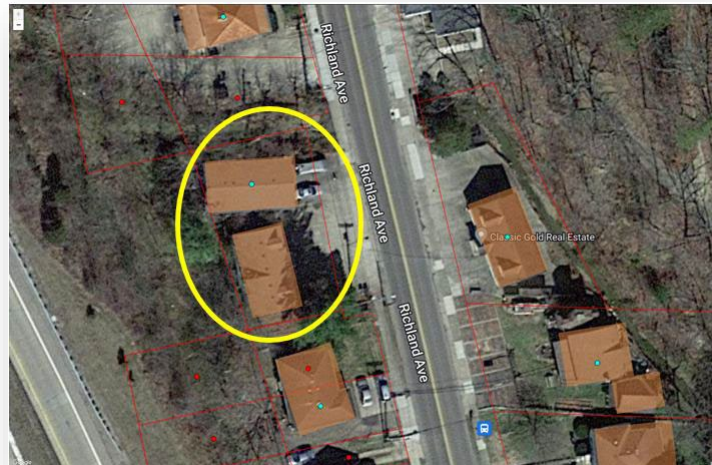
## Location point should fall on a structure - not the road

Verify the latitude and longitude point does not fall on a road



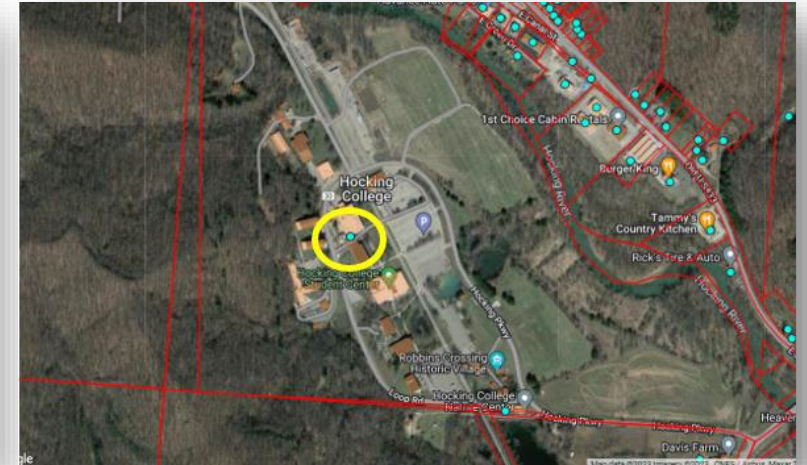
## Location point should fall on structure

The coordinates of a location must fall on a structure that is not an existing BSL and not a building on a single location parcel with an existing BSL



## The Fabric only recognizes one structure within certain boundaries

Is the point within a college/university, prison, or military boundary?



Total	Location count
Total Location Records – V1	113,501,003
Successful Bulk Challenges (Added)	178,009
CostQuest Self Challenges (Added)	859,383
<b>Total Location Records – V2</b>	<b>114,538,395</b>

## Reasons why challenges were rejected:

1. Challenge fell on existing BSL
2. Challenge fell on a single location parcel on which BSL has been selected
3. Invalid or duplicate address
4. Rejected in manual inspection
5. Latitude/longitude is invalid
6. Duplicate challenges



Parties have raised concerns about challenges being used by CostQuest in their commercial Fabric

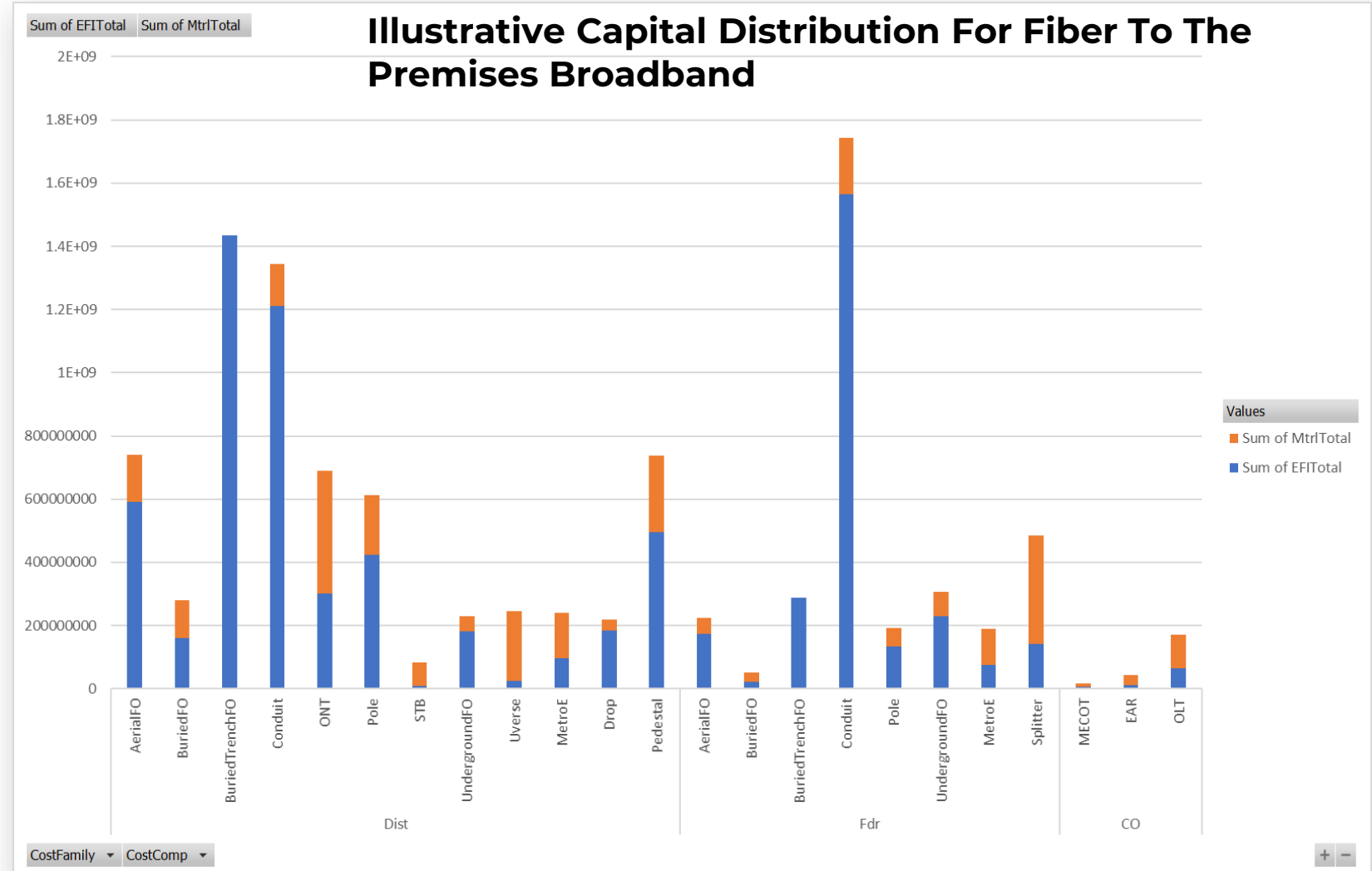
- Fabric challenges have been made public by the FCC and are available for use by any party
- Our goal is to continually improve the quality of the Fabric so that all licensees of the data benefit and while we can incorporate the challenges into the Fabric - parties have been well aware that ***challenge data is ultimately owned by the FCC***



# The Economics of Broadband

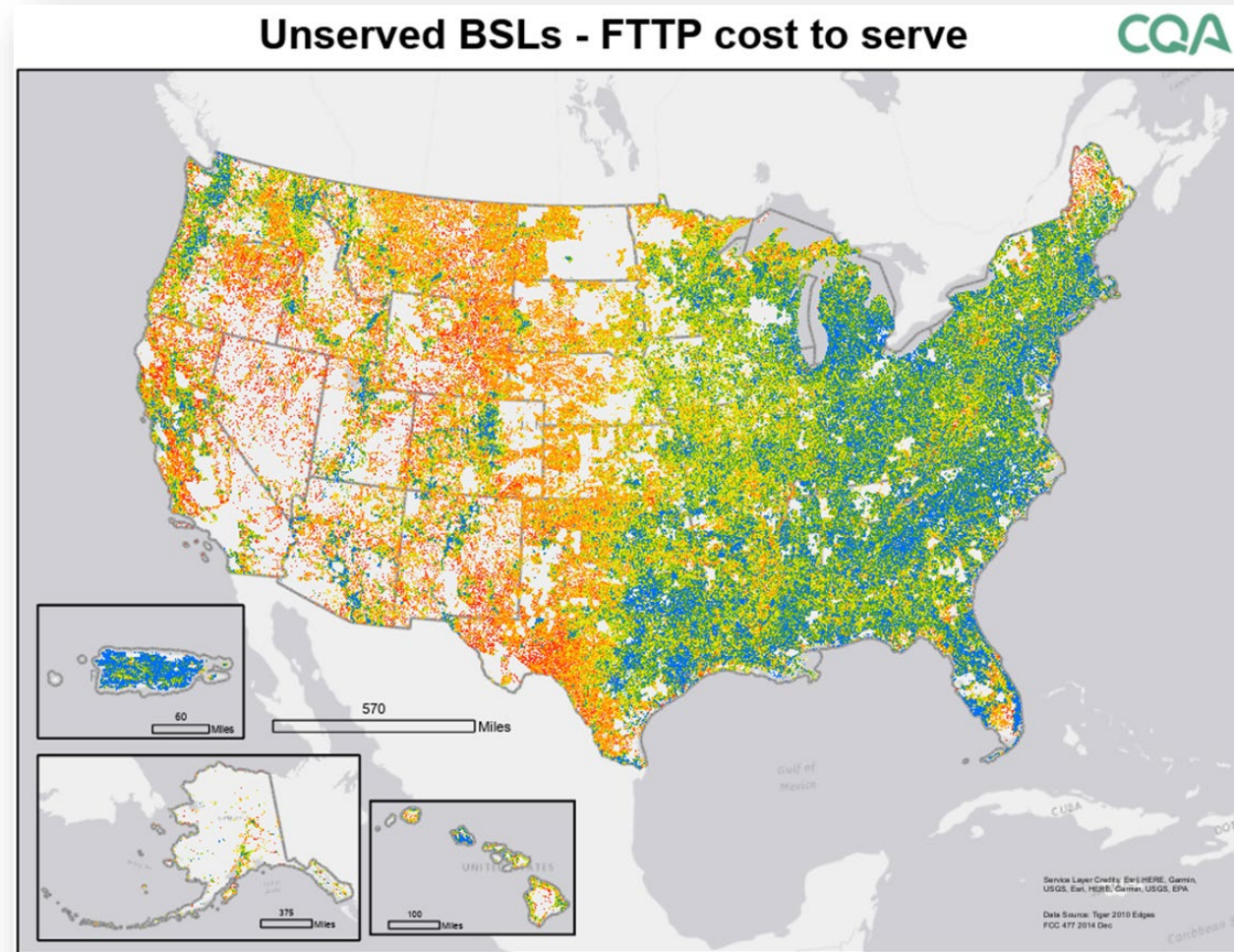
# Typical Project Costs

- Gain an understanding of what drives cost
- Develop key metrics that help cross check project bids



# Fiber Cost to Unserved Locations – Full Country

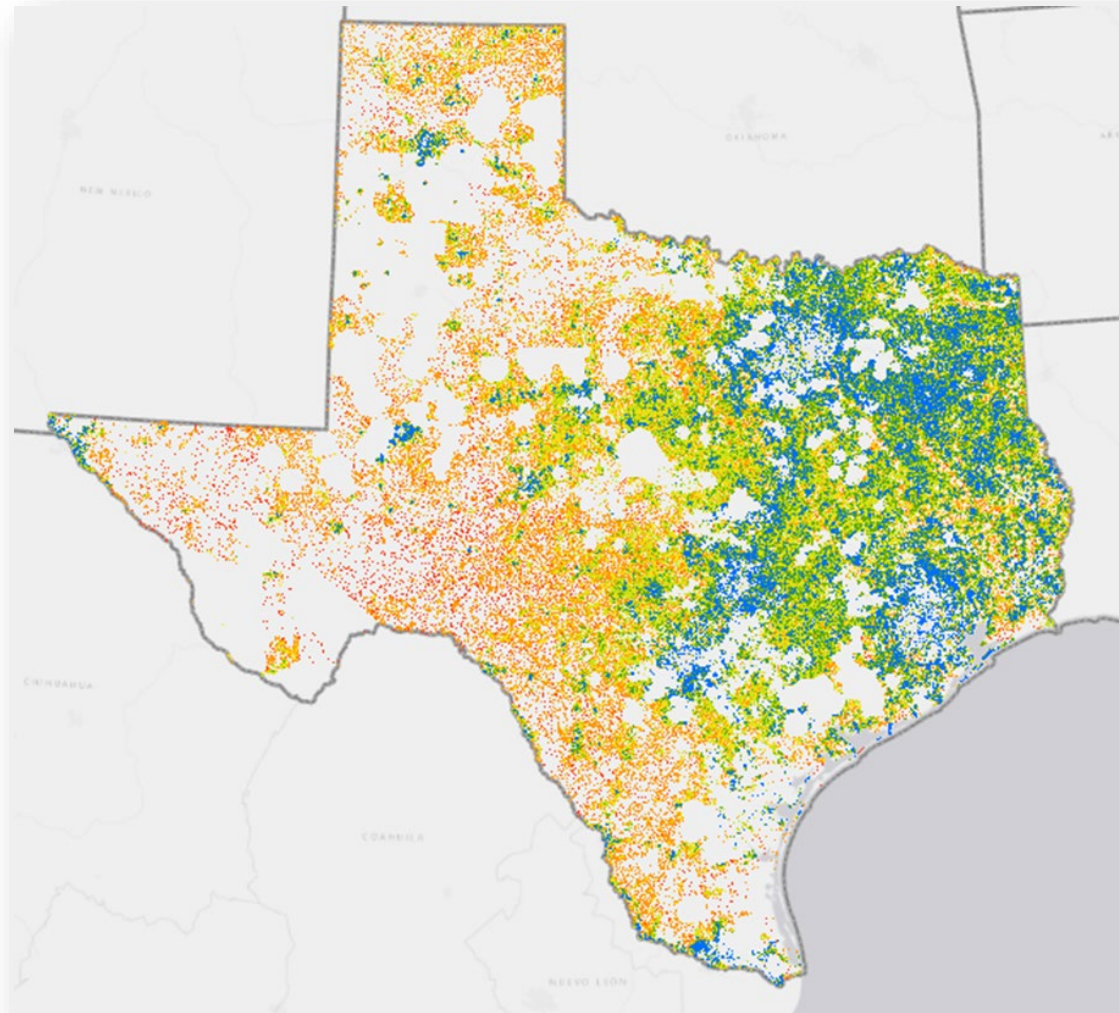
- As expected, most unserved locations face economic hurdles.
- However, there are edge locations that may be more attractive.



Legend – Dollar Values	
●	569.273595 - 2500.000000
●	2500.000001 - 5000.000000
●	5000.000001 - 10000.000000
●	10000.000001 - 20000.000000
●	20000.000001 - 100000.000000
●	100000.000001 - 2944452.448920

# Fiber Cost to Unserved Locations – Texas

- As expected, most unserved locations face economic hurdles
- However, there are edge locations that may be more attractive

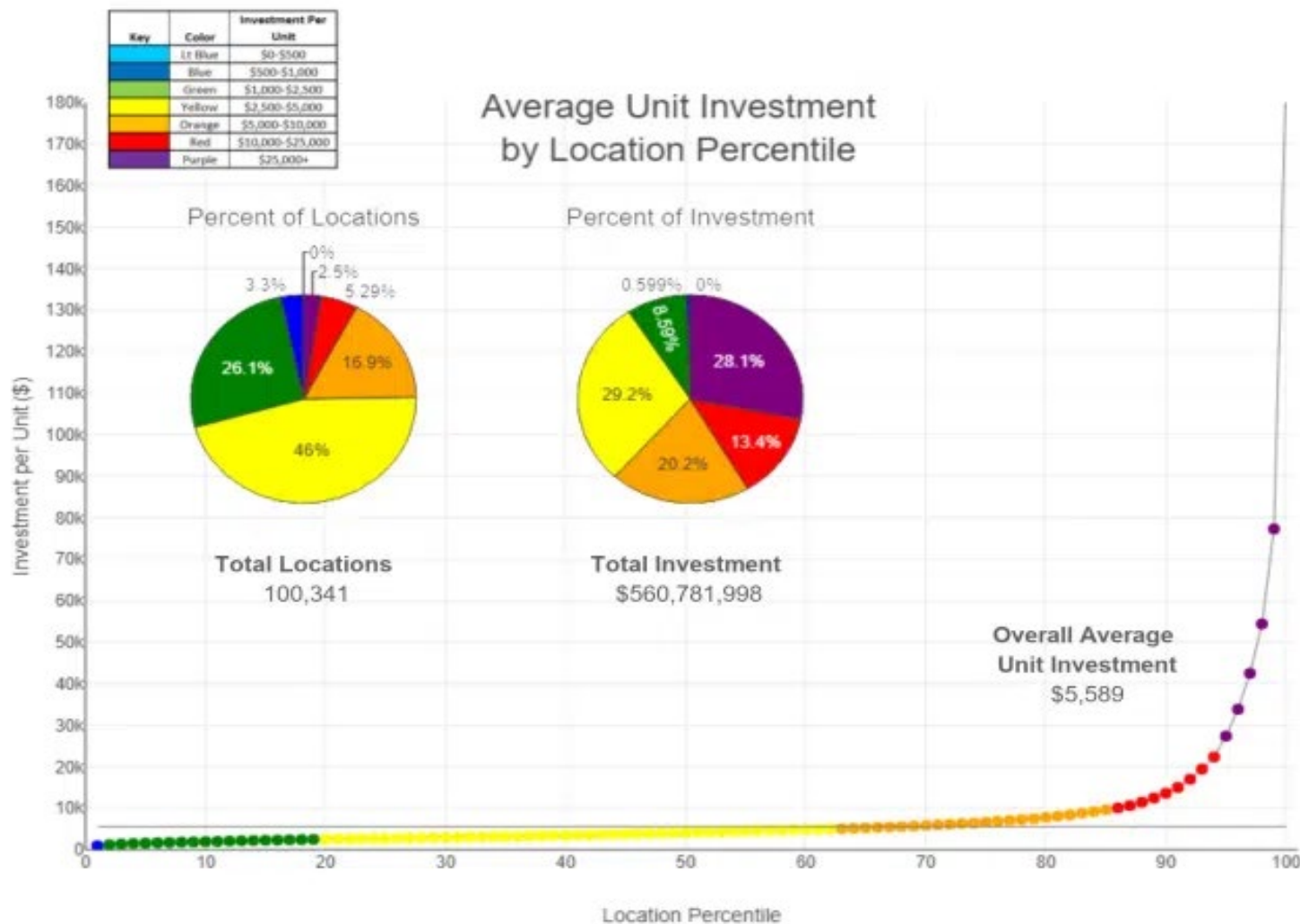


Legend – Dollar Values	
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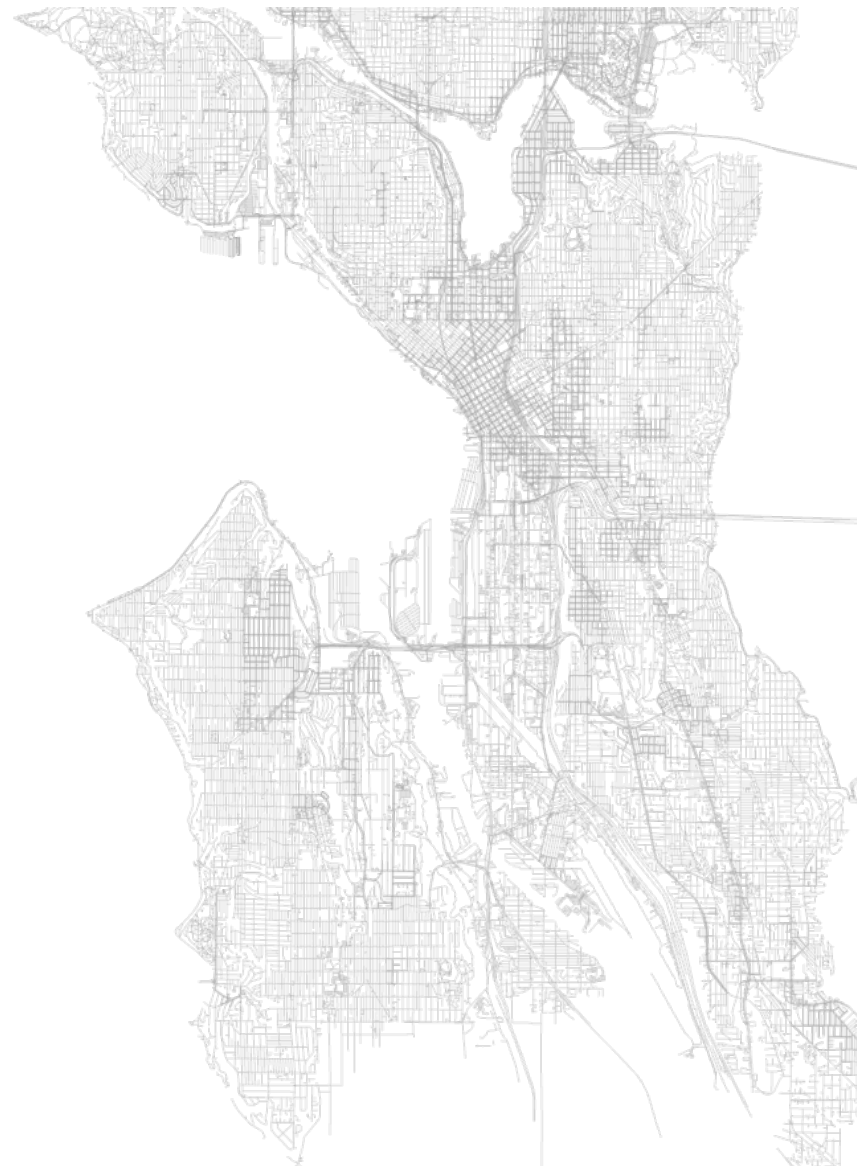
# Cost-Density Factor

For reference for sample State A, above is a graph showing the total investment and average unit investment to deploy Fiber to all the unserved locations. The purple dots represent the low-density areas with locations in the top percentile in terms of needed investment. In other words, for example, 2.5% of the locations in State A will require 28.1% of the total Fiber investment.



# CQA

How to leverage location and other information for planning purposes relating to BEAD and other funding programs





Comprehensive, granular, and reliable broadband information embedded into a broadband service map is crucial to effectively inform how to:

- **Invest**
- **Plan**
- **Design**

**A broadband network as effectively as possible.**

## Build a comprehensive business case and cost model outlining:



**Initial Investment**



**Capital Expenditure**



**Operating Expenses**



**Cost to Maintain Over Time**



**Adoption take rates**



**Revenue Potential**

Considerations of where and how to prioritize your network build can ultimately benefit your network business the most, identifying commercial viability holds the key.

What areas are the most feasible to build to? What areas are high-cost and have barriers to build to, factoring in protected lands, potential permits needed, and terrain? Certainly, density is typically at the top of the list of drivers for viability. The inverse relationship between cost and density needs to be understood, and the consideration of public funding opportunities needs to be measured.

## Net Present Value

Getting to the NPV allows an understanding of commercial viability and cost recovery needs

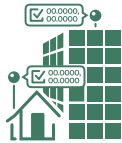




# Start Collecting Comprehensive Data to Guide Planning Decisions

**The success and quality of your broadband plans hinge upon the quality of the underlying data used to guide your decisions.** It's critical to feed broadband planning decisions with geographically accurate and insightful data that gives you a clear picture of the broadband needs across your region or state. Thus, effectively guiding the subsequent analysis and decisions sourced from the data.

When crafting broadband plans, **here are some suggestions on what data you should obtain for your broadband maps:**



## **Broadband Serviceable Location data:**

The geographic coordinates (exact placement) of all structures, including residences, businesses, CAIs, etc., where a broadband connection is or can be installed. Use the FCC definition of a Broadband Serviceable Location if you're looking for locations that are or will be covered under federal funding programs.

## **Broadband service availability & estimated units in demand:**

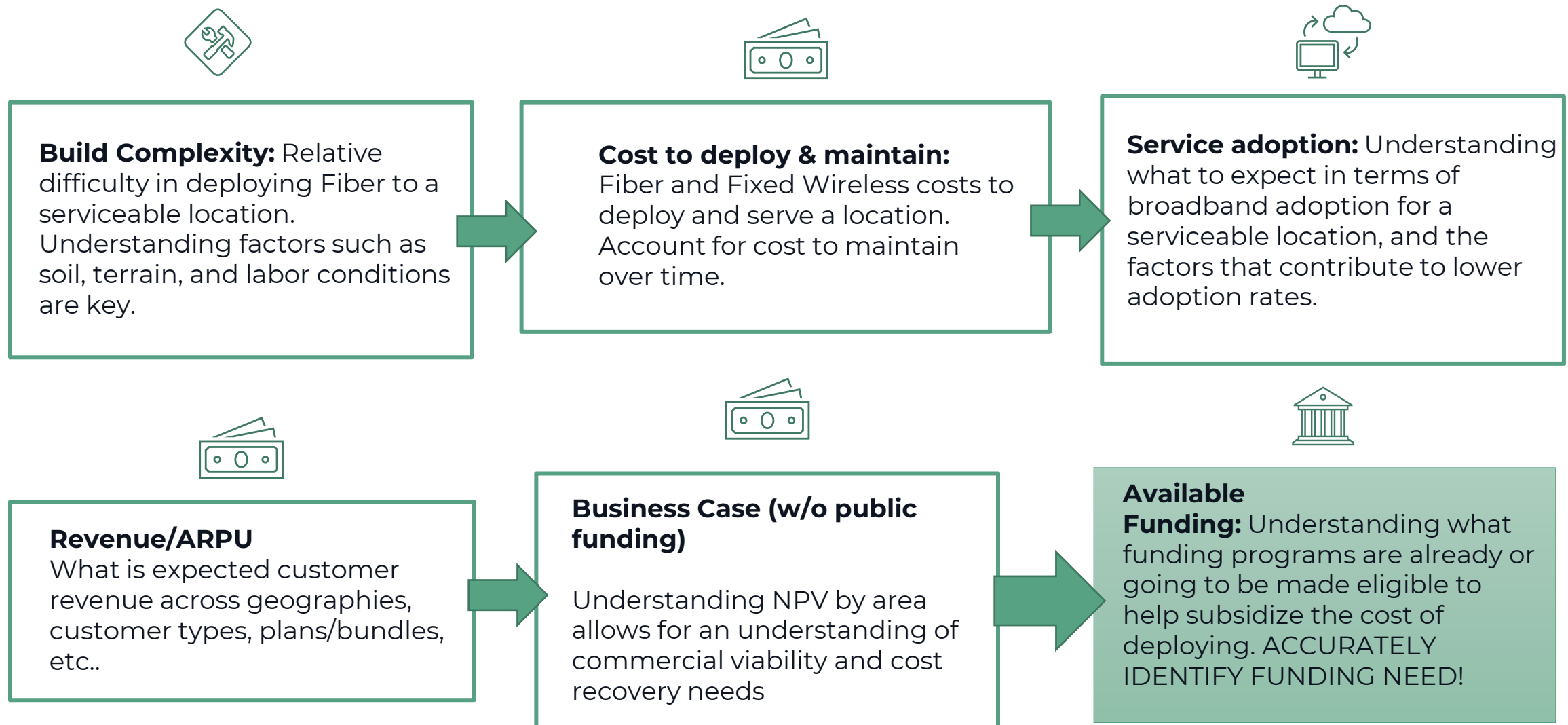
Where is broadband service likely or less likely to be available below the census block level, with what type of broadband technology, and how many serviceable locations are considered unserved and underserved with broadband?

## **Competitive landscape:**

How many, and what type of technology providers are within a certain proximity of a Broadband Serviceable Location?

# Start Collecting Comprehensive Data to Guide Planning Decisions

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**The higher the quality of the data you obtain for your broadband planning, the more accurately you can identify your funding need.**

You don't want your data to lead you in the wrong direction...

**Here's an example of data in a broadband map that could mislead decision-making: *Addresses vs. Coordinates***

- In picture on the right, we see a GIS application that displays locations on a broadband map based on an address.
- **This address data set (red dots)** marks locations along road segments, but the **actual serviceable structures** (green dots – coordinates of structures where a broadband connection can be installed) are approximately **50-100 meters away from where the address-based data set shows where that location structure is.**
- **This error generally occurs with address datasets that are geocoded.** Using address-based geocoding instead of identifying serviceable structures through coordinates, is one way to potentially mislead decision-making when broadband planning, including project investments (material + labor), and build-out timelines.



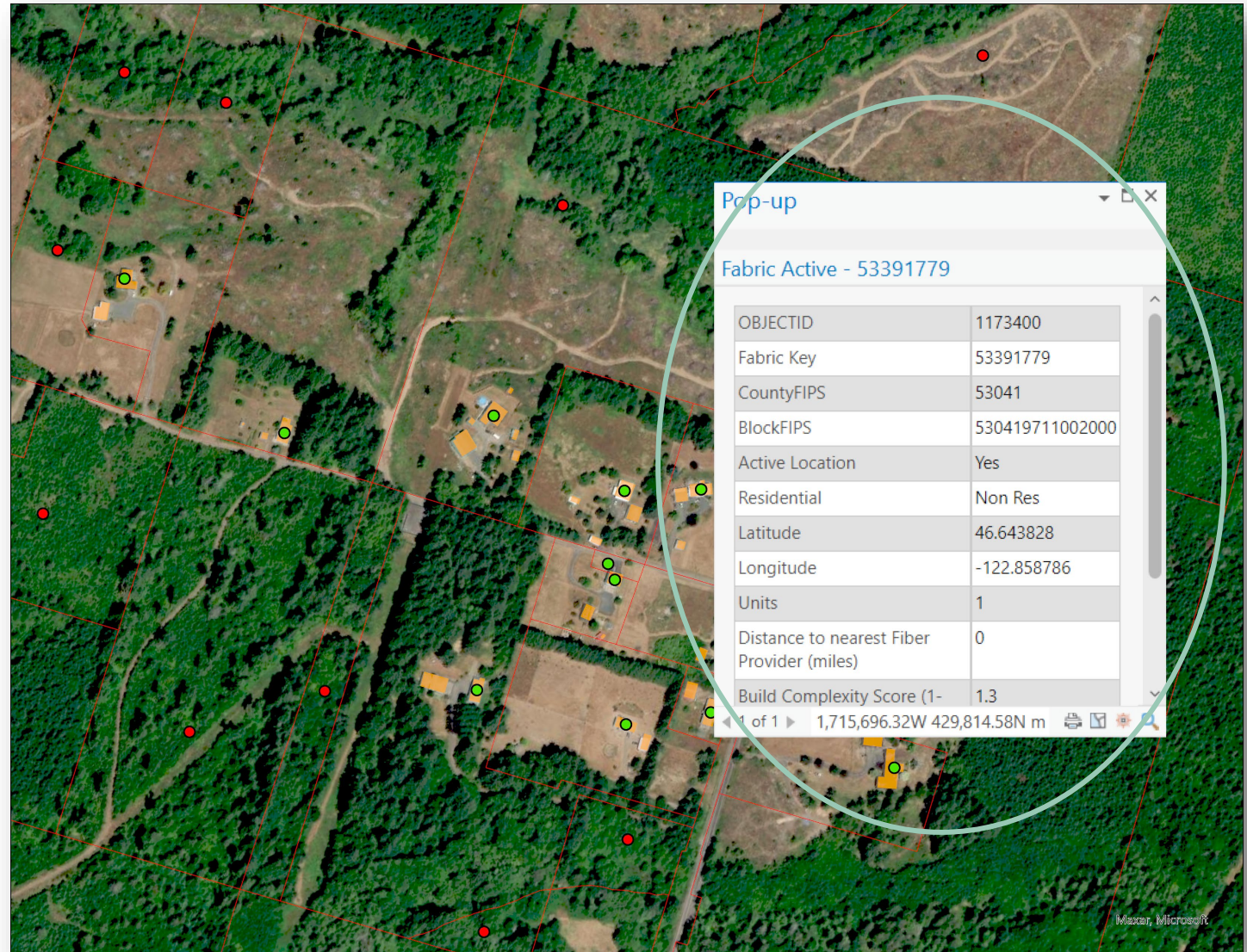
**Red: Address data      Green: Coordinate data**



## Identify and qualify locations near your existing service area that need broadband services

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- Where are the unserved and underserved locations, how many are there, and what type of location is it – residence, business, multi-dwelling unit (MDU)?
- Are there service adoption concerns due to socioeconomic factors?
- Could you implement a lower-cost services pricing plan to drive more adoption?
- Can you aggregate demand in a way that allows cross subsidization?







# Use of the FCC and NTIA Licensed Data by States



## **Tier 1: FCC**

- Rights to use in BDC and on Broadband Map, publish summary results of coverage, publish served, unserved and underserved locations

## **Tier 2: ISPs, State, Local and Tribal Government Entities**

- Rights to create BDC filing data, create challenge data, share with other licensees

## **Tier 2a: Designated Entities**

- Tier 2 rights + ability to create consumer facing Broadband coverage maps, create derivative reports, collect coverage information from other Tier 2 entities

## **Tier 3: US Government Entities**

- Rights to publish summary results of coverage, rights to create online map, rights to create challenges

## **Tier 4: Other parties**

- Rights to create challenge data

## **Tier 4R: Research**

- Rights to use the Fabric data for Research efforts

*In general, Licensee is prohibited from using Licensed Material for any other use including commercial use, publication, and other non-commercial, including internal, uses for purposes beyond their efforts for the FCC as part of the Broadband Data collection as required by the Broadband DATA Act, 47 U.S.C. § 641 et seq.*

In general, FCC Licensees are prohibited from using Licensed Material for any other use including commercial use, publication, and other non-commercial, including internal, uses for purposes beyond their efforts for the FCC as part of the Broadband Data collection as required by the Broadband DATA Act, 47 U.S.C. § 641 et seq.

Under all licenses, the License allows the use of the data by the Licensee and their Authorized Users (i.e., subcontractors) for use in BDC efforts

- If third parties are not “subcontractors”, they can license the data under a Tier 4 license and, per the License terms, they can share information with other Licensees
  - This includes sharing BDC submission data with other Licensees

As license rights are expanded, CostQuest sends out notices to all licensed users in concert with the FCC issuing Public Notices



## NTIA Contract

- Covers BEAD planning and implementation
- The agreement includes both the use of our Fabric data and our Network Costing data
- In regard to the Fabric data, the agreement provides an expanded use over the FCC agreement
  - The expanded use allows NTIA and any Federal Broadband Granting Agency the rights to use the data for IJJA, the ACCESS BROADBAND Act, the Internet for All Initiatives and any future federal broadband deployment programs
- In regard to the Cost data, we understand that NTIA plans use the Network Costing data in creating the allocation of BEAD funding to states and plans to release the Network Costing data in the future to support states in the planning and management of BEAD programs
- In regard to State and Territory access, based on our understanding, NTIA has been in touch with the State Broadband leaders about the upcoming data that will be provided and the rights that they will receive
  - We have finalized the licensing terms
  - States are currently working through licensing

## Covers National Fabric and CostQuest's Fiber and Fixed Wireless Cost model data

### License rights broadly cover:

#### Tier A: NTIA

- Rights to use in Federal Broadband Programs

#### Tier B: Federal Broadband Grant Administrators (e.g., USDA, Treasury, etc..)

- Rights to use in Federal Broadband Programs

#### Tier C: Pass Through Entities (e.g., States and Territories)

- Rights to use in Federal Broadband Programs

#### Tier D: Subgrantees (e.g., ISPs that participate in the program)

- Agreement being drafted – extended use of the just the Fabric Locations for BEAD program

*In general, Licensee is prohibited from using Licensed Material for any other use including commercial use, publication, and other non-commercial, including internal, uses for purposes beyond their efforts for Federal Broadband Programs*

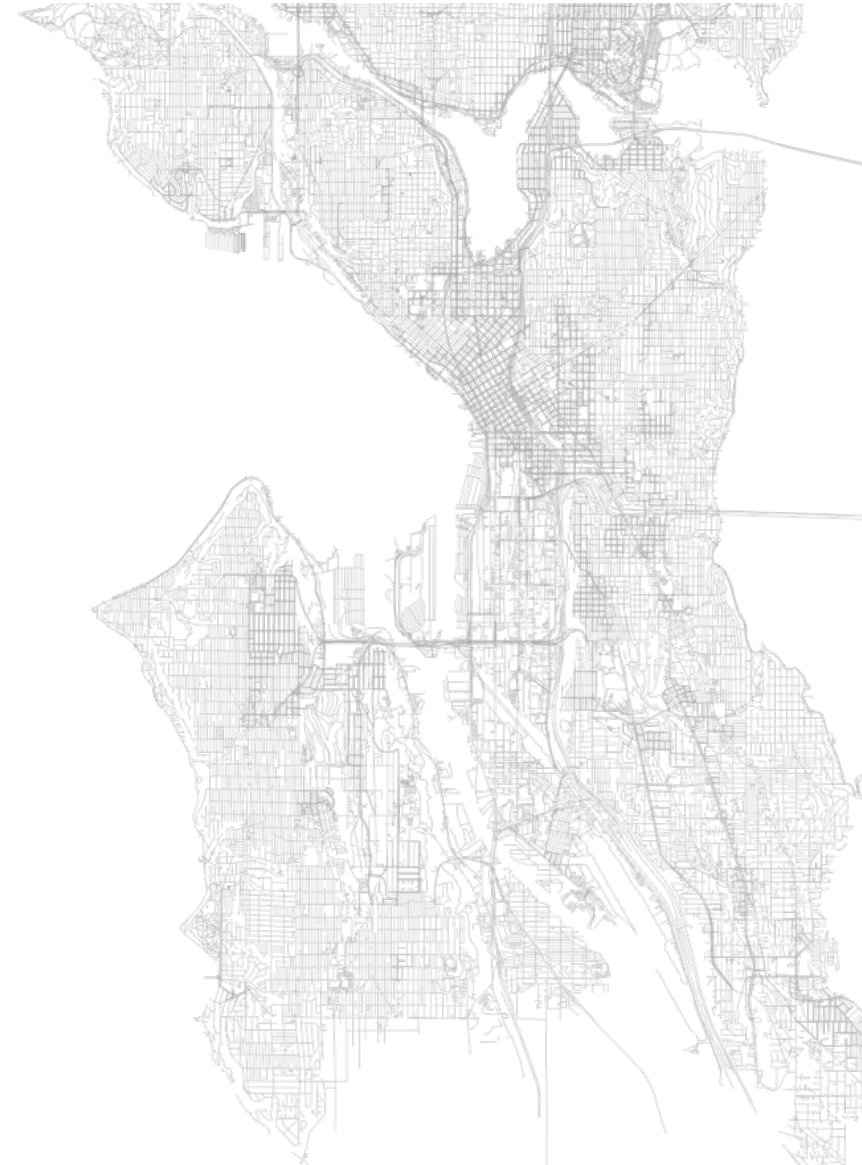
### **The NTIA license rights can be used across agencies under the Federal Broadband Granting Authority (FBGA):**

- Department of Agriculture
- Department of Commerce
- Department of Education
- Department of Housing and Urban Development
- Department of Labor
- Department of the Interior
- Department of Treasury
- Federal Communications Commission
- Institute of Museum and Library Services (IMLS)
- National Science Foundation
- Northern Border Regional Commission (NBRC)
- Appalachian Regional Commission
- Delta Regional Authority
- Denali Commission



# CQA

## Q&A



## Contact Us

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# A Review of the Locational Data Sources



## Data Sources

- Parcels
- Satellite Imagery
- Commercial building footprints
- Tax Attributes
- Address datasets
- Roads



## Parcel Points

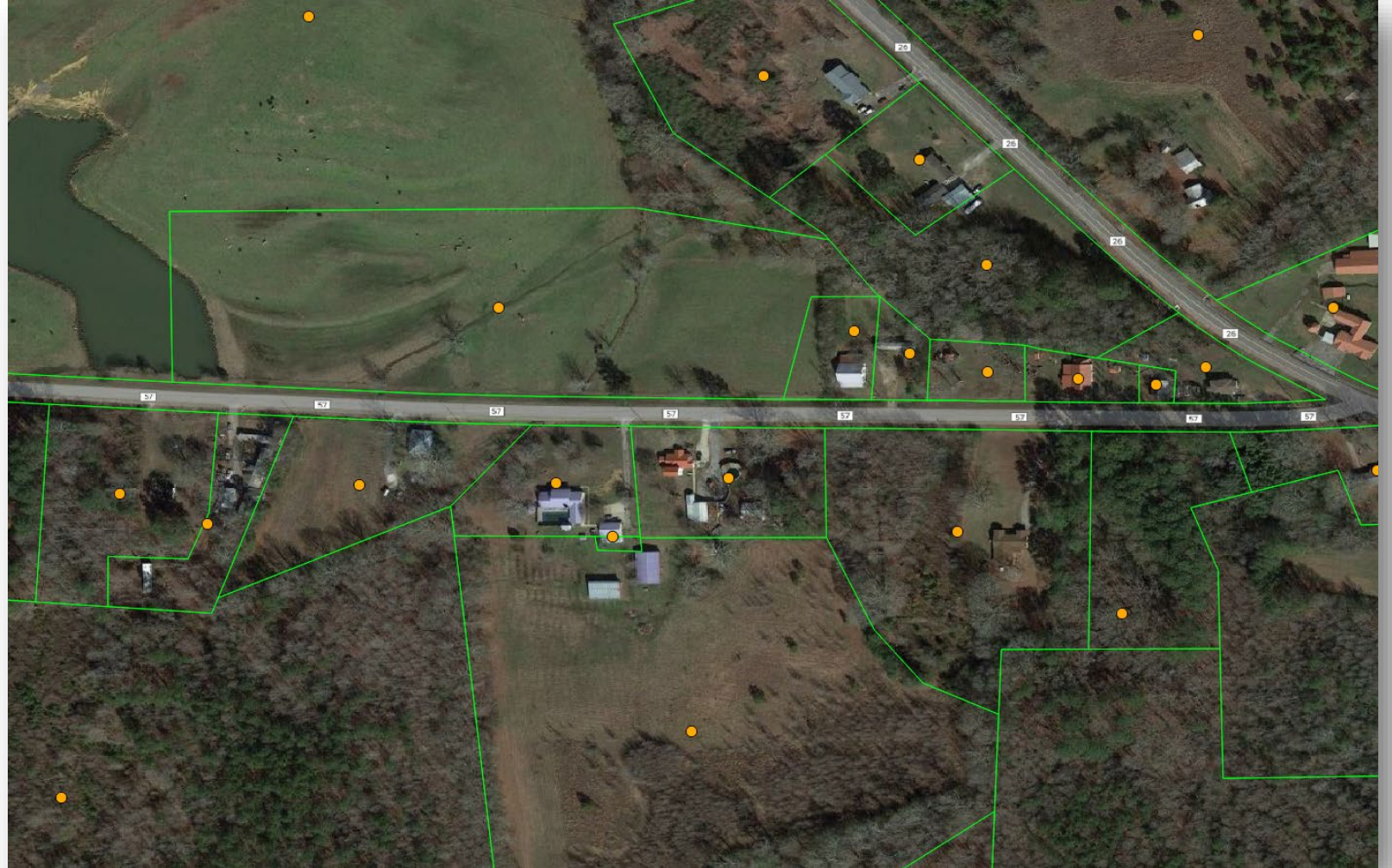
- Parcels may have multiple serviceable structures or none at all
- The location of a parcel point is not representative of a given structure's location
- Nationally, more than 20% of parcels do not have a serviceable structure.





## Address Points

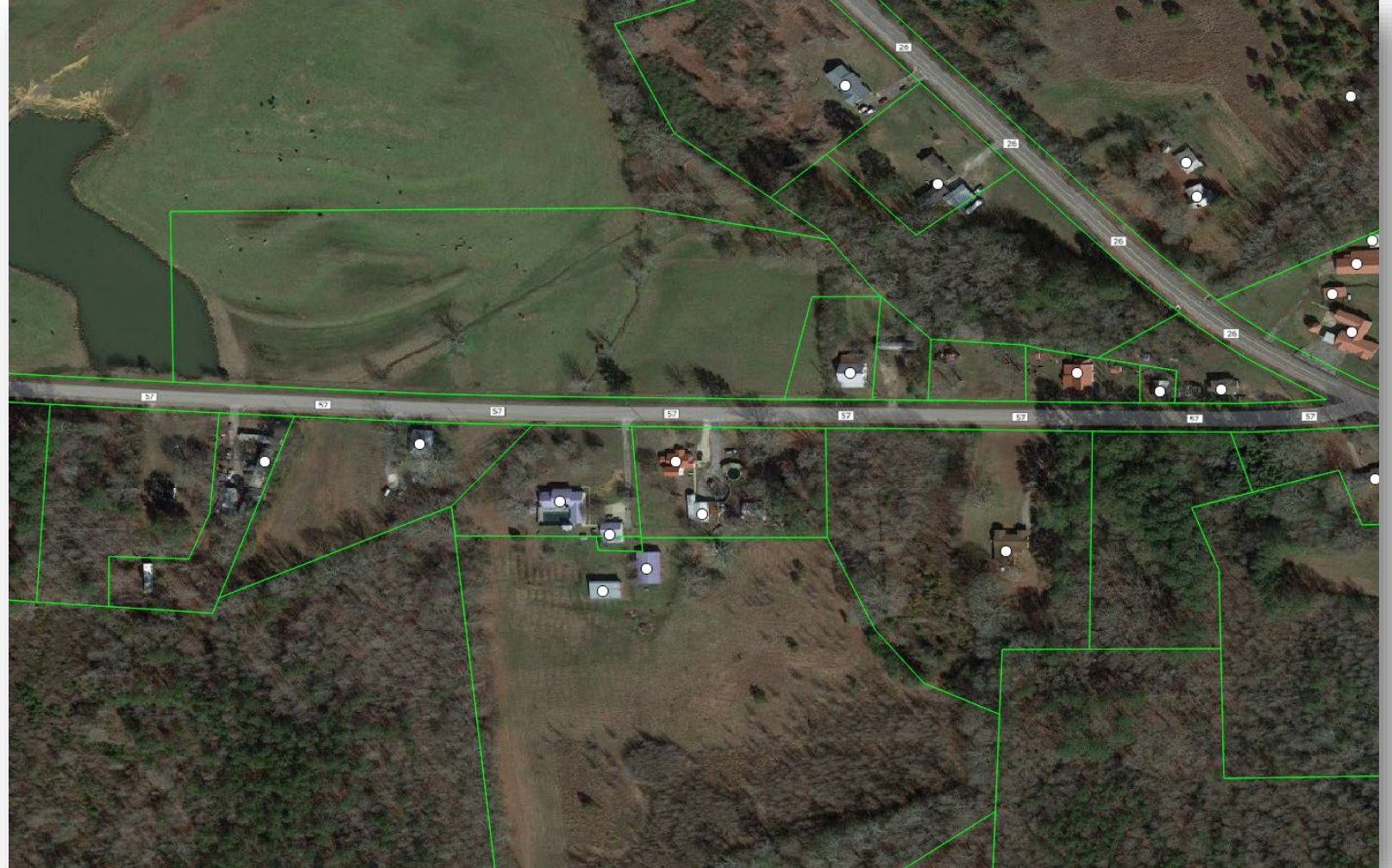
- Address data only relevant for locations where the structure is addressable
- Address data often represents units, not structures
- Assessors' address data is incomplete
- Third party address data has to be georeferenced





## Footprints

- Accurate depiction of an actual structure location
- Not all structures need service (sheds, garages, out-buildings, etc.)
- Some structures represent multiple service locations (strip mall, office building)
- Nationally, 25% of building footprints are non-serviceable structures





## CostQuest Fabric

- Combines multiple data sets to generate a more accurate depiction of where a serviceable structure resides geospatially
- 9/24 building footprints identified a non-serviceable structure -->

