# Modernizing Utility GIS: Unlocking the Power of ESRI's Utility Network

THE CITY OF MORGANTON:
UTILITY NETWORK IMPLEMENTATION
& ASSET CONVERSION/COLLECTION

AN EXISTING DATA PROBLEM

- FULL SYSTEM MAPS BUILT IN CAD IN EARLY 2000'S

- FULL SYSTEM GIS INVENTORY OF POLES AND OTHER ASSETS FROM 2004-2010

- PARTIAL CONVERSION OF ADDITIONAL CAD MAP DATA TO GIS IN 2010

- SPORADIC MAINTENANCE IN BOTH SYSTEMS AFTERWARD

- DESIRE TO MOVE DATA TO GIS ONLY WHILE UPGRADING TO A SMARTER SOLUTION – THE ESRI UTILITY NETWORK

- THE CITY SELECTED AVINEON TO EXECUTE THIS PROJECT
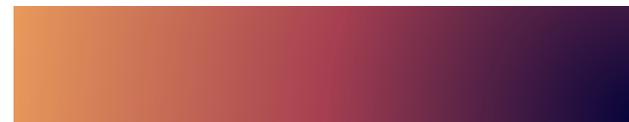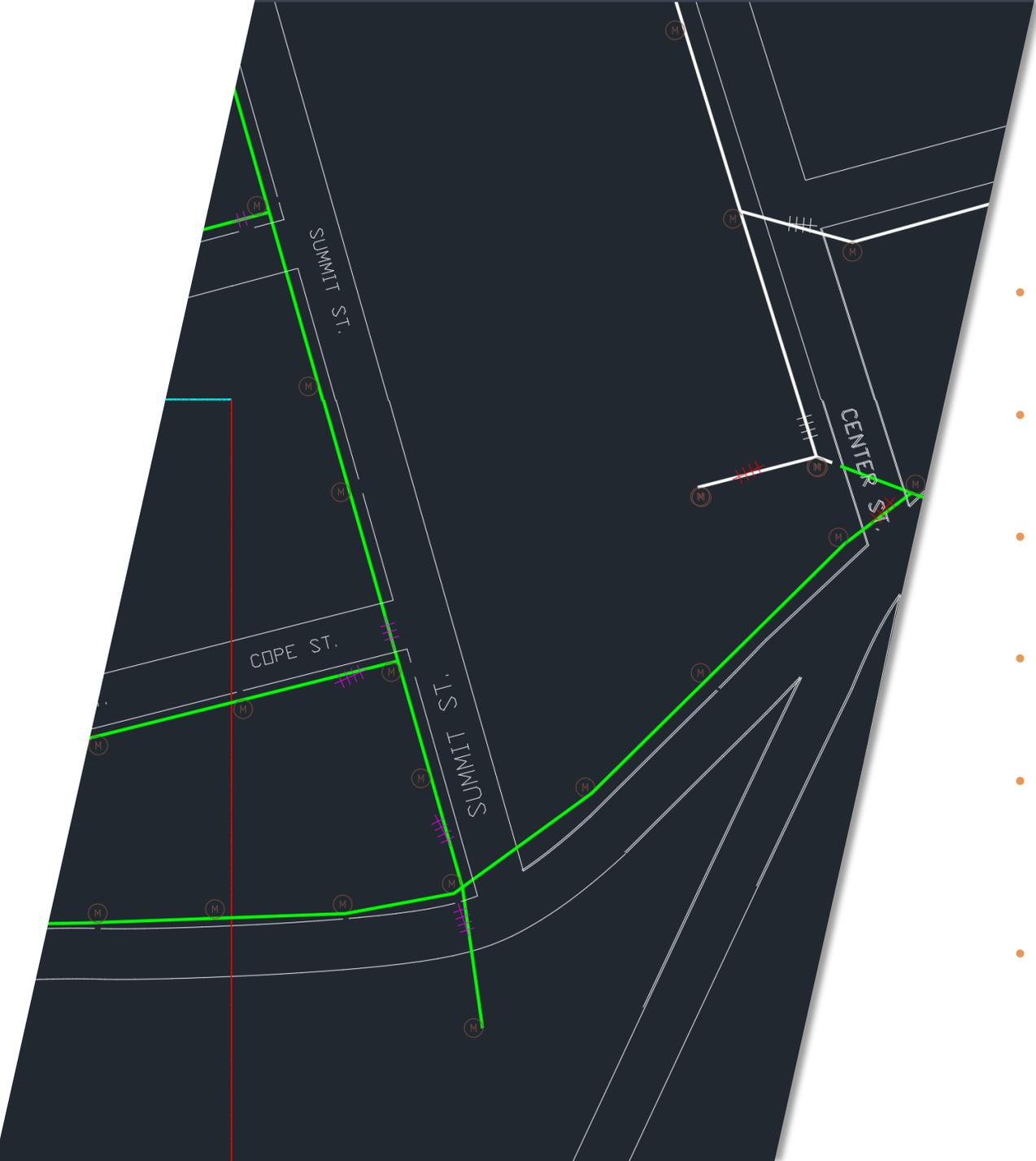
INITIAL PHASES

- ## MAP & DATA ASSESSMENT
  - CAD maps and GIS data analyzed by Avineon, gaps for utility network implementation identified.
  - In-person discovery session helped Avineon identify new data sources to help in conversion and in bridging gaps.

- ## HARDWARE & NETWORK ASSESSMENT
  - City had an ESRI Enterprise Agreement and an existing Enterprise setup with multiple federated virtual servers.
  - City's Enterprise was upgraded by Avineon to a version with greater online functionality for the Utility Network.
  - ArcGIS Portal and server access provided to Avineon for setup of test and production environments for both database and online tools.
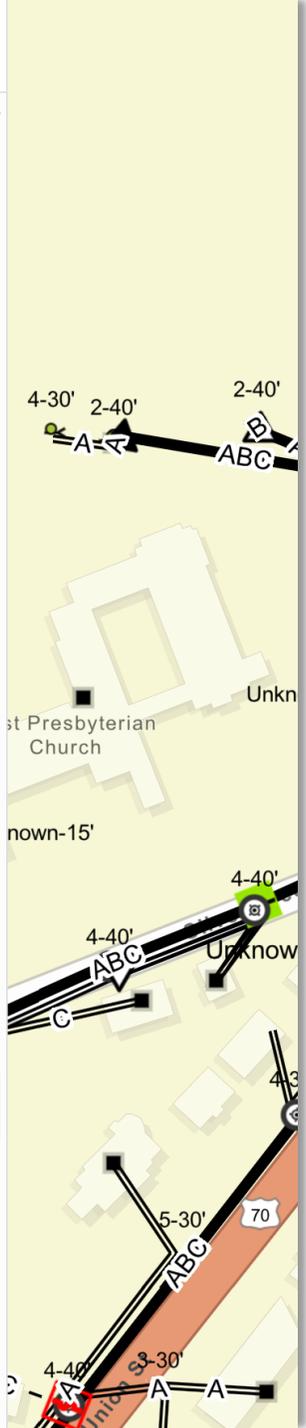
INITIAL PHASES

- ## UN MODEL ADJUSTMENTS

  - Model adjusted and simplified to fit City's needs.

  - In-person sessions helped City users better understand the model and assist in making decisions about what would be migrated.

- ## SYMBOLOGY

  - City was consulted on symbology preferences

  - Industry standard symbols were chosen and customized to the City's exact needs.

  - Included constructed and planned contingencies.

DATA CONVERSION / MIGRATION

- ITERATIVE APPROACH
  - CAD & GIS data merged and spatially reconciled in iterative generations, with each iteration reducing utility network errors and improving traceability.
  - City reviewed and signed off on every iteration.
- FUNCTIONALITY
  - Avineon established assorted tools and rules to gain efficiencies with UN editing, viewing & analysis, which included:
    - Editing templates
    - Attribute rules
    - Contingent values
    - Network traces
    - Reports

Alphabet Ln

FIELD VERIFICATION & ASSET COLLECTION

- ASSET COLLECTION WAS PERFORMED IN DATABASE VERSIONS FOR EACH SYSTEM CIRCUIT WITH CITY REVIEW AND SIGN OFF AFTER EACH WAS COMPLETED

- UTILITY NETWORK GAPS CLOSED BY COLLECTING MISSING ASSET TYPES AND BY CLOSING GAPS IN EXISTING ASSETS

- FUSES AND OPEN POINTS WERE AMONG FEATURES COLLECTED TO CLOSE DATA GAPS

- FIELD CREWS CAPTURED SECONDARY AND TRANSFORMER FEEDING EACH CUSTOMER

- SYSTEM WIDE PHASE ORIENTATION WAS COLLECTED

- RAW FIELD DATA INCLUDED PHOTOGRAPHS OF ASSETS FOR CITY RECORDS AND REVIEW
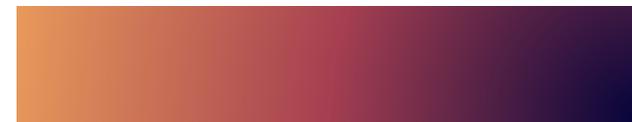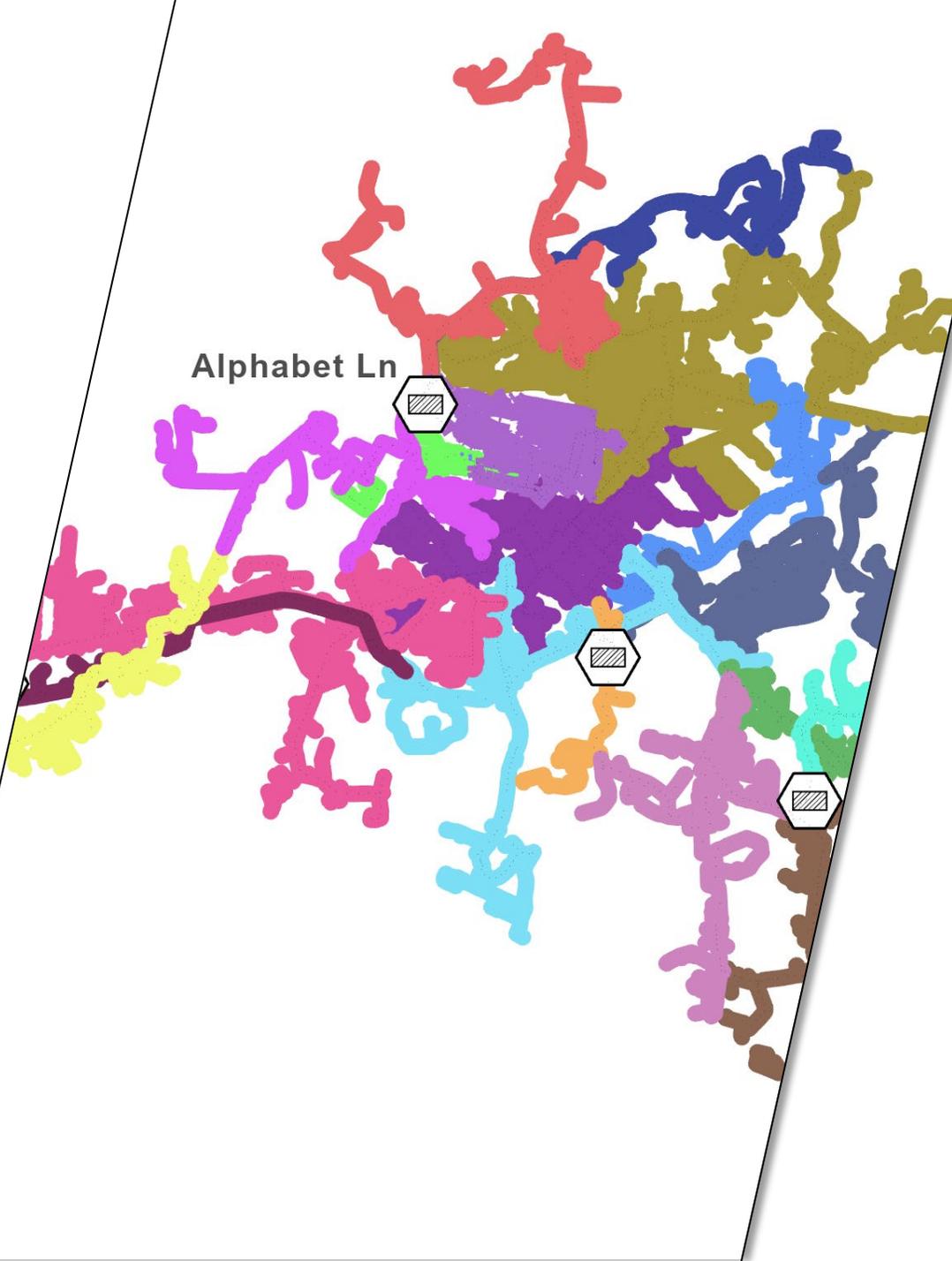
TRAINING & SELF-RELIANCE

- ## DOCUMENTATION
  - Avineon produced Quick Reference Guides built on City data to give end users help materials to fall back on post-project.
  - Guides covered all critical aspects of operating and maintaining an ESRI Utility Network.

- ## TRAINING
  - In person training sessions gave City GIS & electric users hands-on experience with using and maintaining the ESRI Utility Network in ArcGIS Pro.
  - Further training demonstrated tracing abilities using ArcGIS Field Maps on mobile devices.
  - Avineon supervised user acceptance testing, cutover activities, and tuning, giving City staff more hands-on experience.
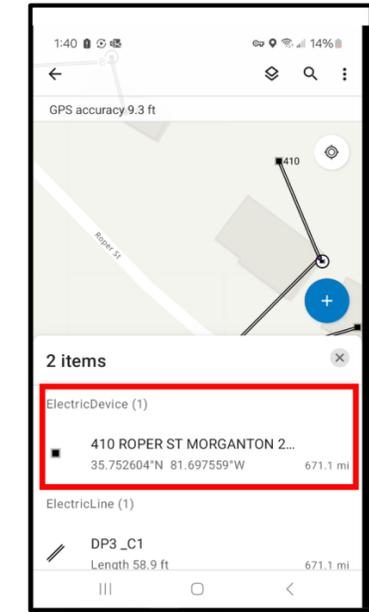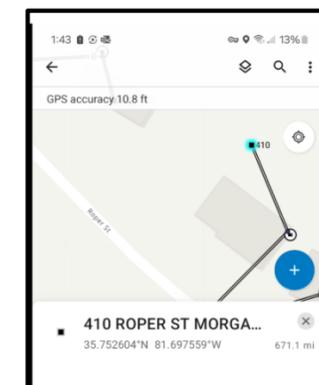

Page 3 of 5

Network Implementation and Asset Collection

K REFERENCE GUIDE: TRACE-FIELD

Select the arrow to collapse the attribute values to see the available traces.

FINAL RESULTS / TAKEAWAYS

- Fully functioning Utility Network

- CAD & GIS data finally merged

- All existing data thoroughly updated via field asset collection and verification

- ArcGIS Field Maps projects and online dashboards

- New capabilities that include:

  - Phase loading analytics

  - Transformer loading analytics

  - Tracing at all network levels both in-office and on mobile devices.

- Trained, self-sufficient staff who can maintain both the data and utility network

THANK YOU

Stephen Fox – GIS Analyst

sfox@morgantonnc.gov

John Steel – Electric Engineering Services Manager

jsteel@morgantonnc.gov
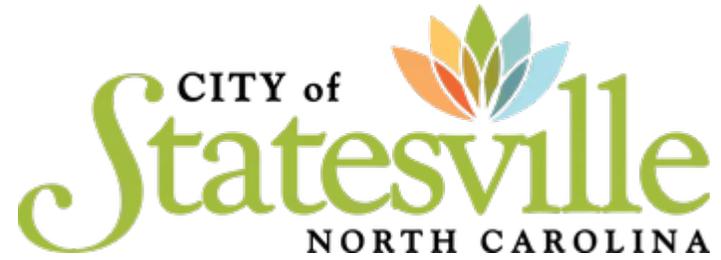
City of Statesville Electric Utility Management and GIS Modernization Story

ENHANCED GIS MAPPING TECHNOLOGY
FOR EFFICIENT ELECTRIC MANAGEMENT

EMILY GARRIGUES, ELIZABETH STANCIK, CITY OF STATESVILLE

ZACH LAWLOR, LANGAN ENGINEERING

ELECTRI**CITIES**
of NORTH CAROLINA, INC.
Connections Summit 2026

Agenda

- Introductions

- About Statesville & Langan

- Goal & Purpose

- GIS Background

- Electric Utility Data Story

- Utility Network GIS & Outage Management System

- Infrastructure

- Lessons Learned

Introductions

Emily Garrigues | GIS Analyst

- B.A Geography & GIS at University of South Florida

- Pursuing Masters of Geospatial Information Science & Technology at North Carolina State University

- Two years of professional experience working with ESRI products.

    o ArcGIS Pro

    o ArcGIS Fieldmaps

    o Esri Utility Network

- 3 years of FAA Part 107 Remote Pilot's License

Elizabeth Stancik | GIS Specialist

- B.S Natural Resources at North Carolina State University

- Pursuing Masters of Geospatial Information Science & Technology at North Carolina State University

- Three years of professional experience working with ESRI products.

    o ArcGIS Pro

    o ArcGIS Fieldmaps

    o Field Verification

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

# Introductions

Zach Lawlor, GISP | GIS Manager

- Geographic Information Systems Professional (GISP)

- Esri Utility Network Technical Certification (20-001)

- Extensive experience with configuring and deploying ESRI Utility Networks for different utility types, having worked with a variety of utility providers and campus Clients.

Charlie Charping | Project Manager & GIS Consultant

15 years of professional GIS experience covering a broad spectrum of industries including infrastructure and asset management, local government, and telecoms. He has worked on projects ranging from logistical analysis to field data collection solutions to enterprise design and implementation for state and local governments, educational institutions, and commercial entities.
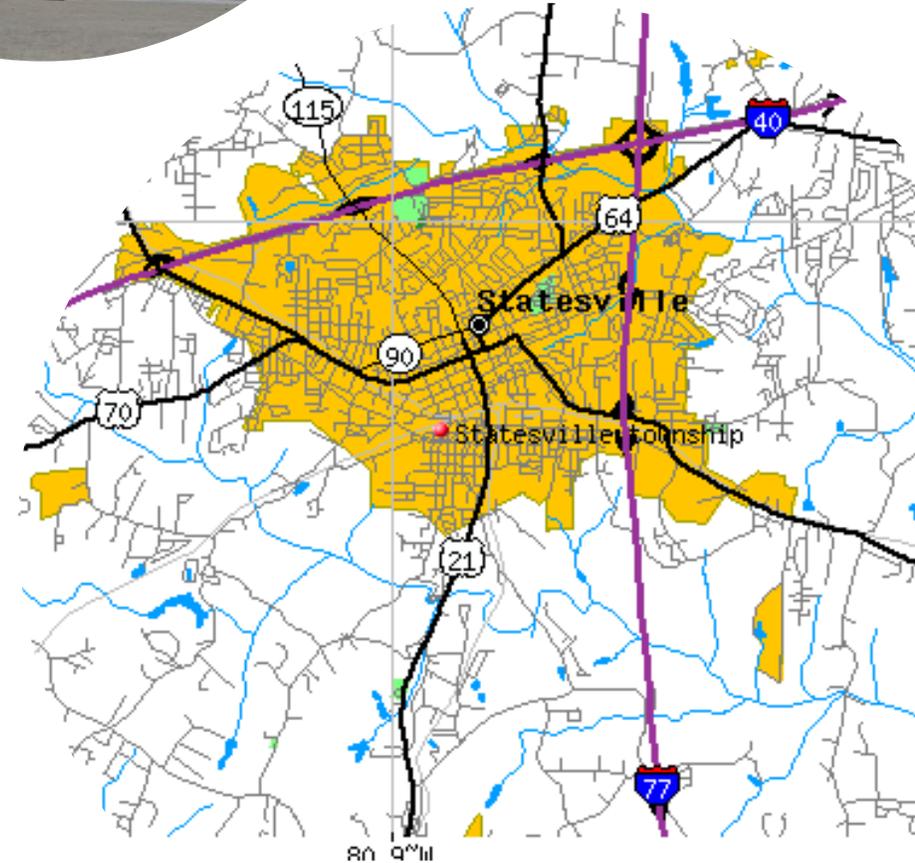
About

CITY of Statesville
NORTH CAROLINA
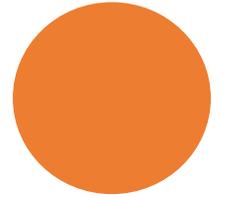
- Population Demographics
  - Located 45 minutes Northwest of Charlotte, NC

  - City ~25 square miles
  - ~31,500 Residents

City of Statesville Electric Customers

	# of Meters
Residential	12,308
Commercial	2,793
Industrial	46
Other	132

About Langan

Integrated Engineering, Survey & Digital Solutions

- Carolina's Office Based in Charlotte, NC

56 Years in Business

1,900 Employees

46+ Office Locations

100+ Awards

LANGAN SERVICES

- Site/Civil
- Geotechnical
- Environmental
- ESG Consulting
- Traffic/Transportation
- Surveying/Geospatial
- Waterfront & Marine
- Environmental Compliance
- Regulated Building Materials
- EHS Management & Compliance
- Sustainable Design
- Natural Resources & Permitting
- Digital Solutions
- Landscape Architecture

esri Partner Network Gold

esri ArcGIS System Ready Specialty

esri Indoor GIS Specialty

esri Network Management Specialty

Microsoft Partner

OPENGOV

eptura

Nuvolo Partner

LANGAN

TECHNICAL EXCELLENCE | PRACTICAL EXPERIENCE | CLIENT RESPONSIVENESS

Purpose & Goal

- Purpose
  - Ability to quickly respond to service interruptions and power outages.
    - GIS as the foundation for identifying locations and assets related to or contributing to an outage.
- Goal
  - Establishing a master GIS electric dataset in the ESRI Utility Network data model.
    - Workflow Framework for keeping GIS data up-to-date.
    - GIS data that is traceable and has electric flow established.
    - Accessible to office personnel and field crews
      - Desktop, Web and Mobile

Project Background

- 5 years ago…
  - Internal GIS Team attempt at building ESRI Utility Network GIS datasets
    - Did not go well…
  - Data was disaggregated, some in GIS some only in CAD drawings, some not up-to-date in either.
  - The electric GIS data we had was stored in older ESRI formats, not in a relational database, and did not have connectivity/flow established.
- Today…
  - Langan Engineering hired to establish and support Electric Utility Network GIS and modernize Statesville's GIS infrastructure.

Data Story

- Started with rough and disaggregated spatial datasets and diagrams.
  - CAD DWG, GIS Shapefiles & gdb(s), duplicate copies of assets, etc.
- Field Verification
  - Check for new assets
  - Confirm accuracy of existing GIS data
- Spatial Data Migration to UN
  - Rules established
  - Data loaded and validated
  - Refine and establish connectivity
    - This is an on-going process!
- We are translating what we learned with electric UN to other city utilities.
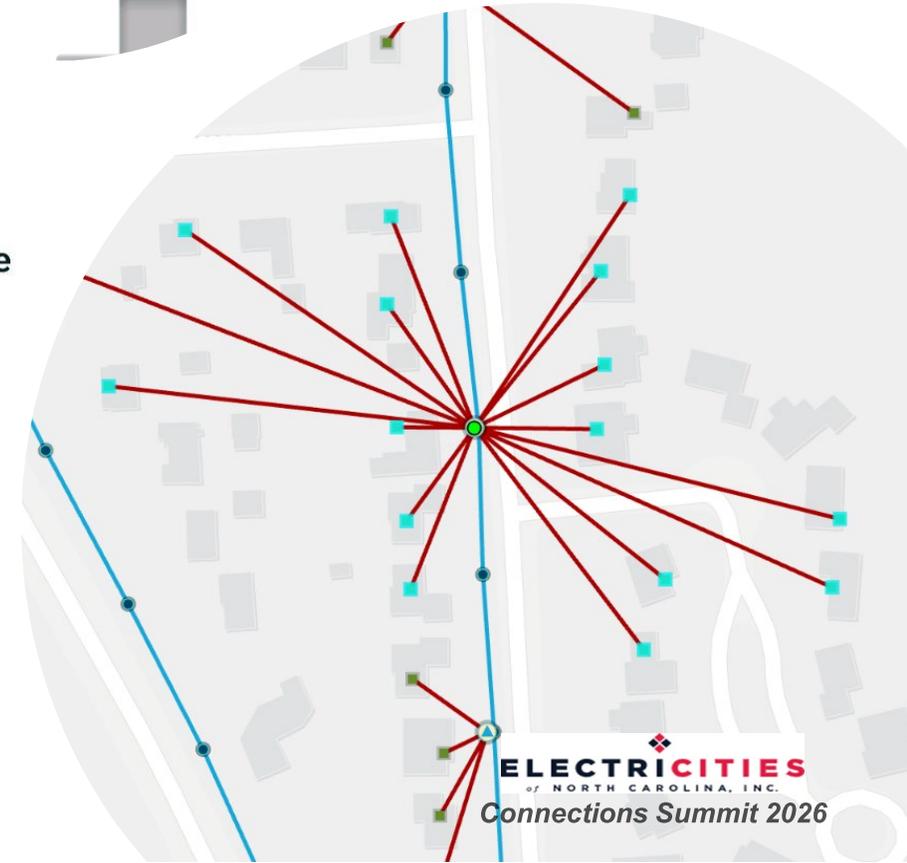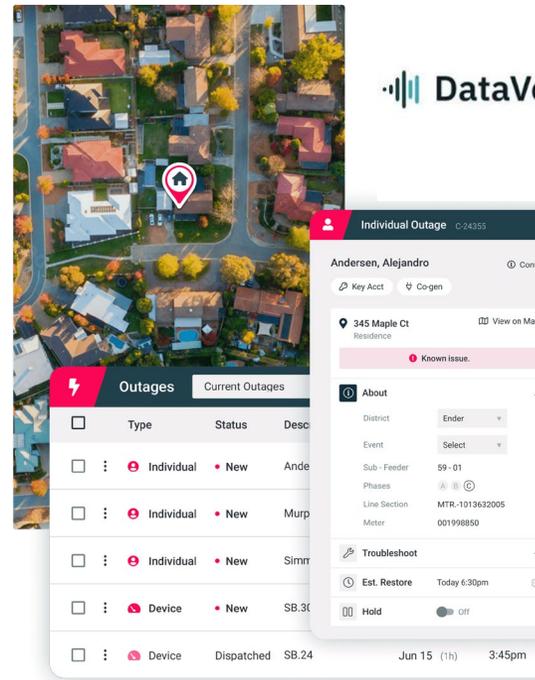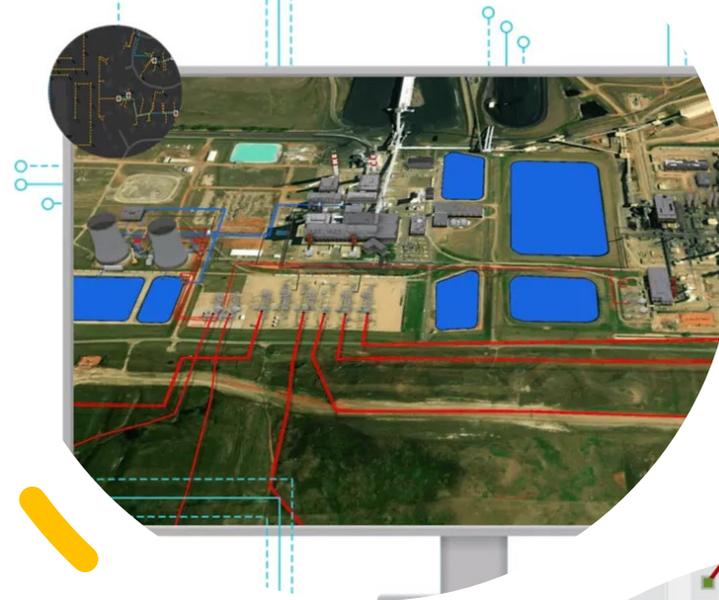 - Water, Sewer, Storm Water
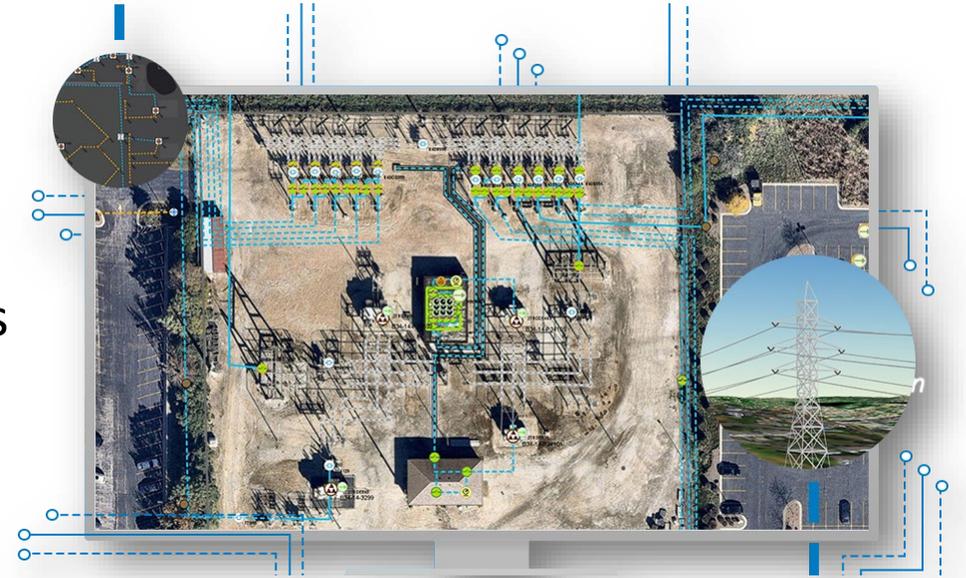
Field Verification

- Created Electric Dept Map in Fieldmaps and used iPad

- Drove the entire city and stopped to draw in secondary lines and transformers from missing areas. Drew connectivity to houses.

- Worked with Staking crew to map difficult neighborhoods

- Goal of field verification: Clean up data and fill in missing gaps

- Would have done this differently

What is the Utility Network?

- Benefits of UN
  - Web Based
  - Traceability
  - Data Management/Cleanliness
  - Complimentary to OMS

DataVoice

Outages Current Outages

	Type	Status	Desc
☐	⦙ 👤 Individual	• New	Ande
☐	⦙ 👤 Individual	• New	Murp
☐	⦙ 👤 Individual	• New	Simm
☐	⦙ 👤 Device	• New	SB.3(
☐	⦙ 👤 Device	Dispatched	SB.24

Individual Outage C-24355

Andersen, Alejandro   ⓘ Contact

🔑 Key Acct   ⚡ Co-gen

📍 345 Maple Ct   🗺 View on Map
Residence

🔴 Known issue.

ⓘ About

District   Ender
Event   Select
Sub - Feeder   59 - 01
Phases   Ⓐ Ⓑ Ⓒ
Line Section   MTR-1013632005
Meter   001998850

🔧 Troubleshoot
⏱ Est. Restore   Today 6:30pm
⏸ Hold   Off

Jun 15 (1h)   3:45pm

ELECTRICITIES
of NORTH CAROLINA, INC.
Connections Summit 2026

UN Entry Process

- Steps to Entry
  1. Existing data analysis/review
  2. Data model design
  3. Data loading prep
  4. Data loading
  5. Any additional cleanup
  6. Subnetwork construction
  7. Tracing (the fun part)
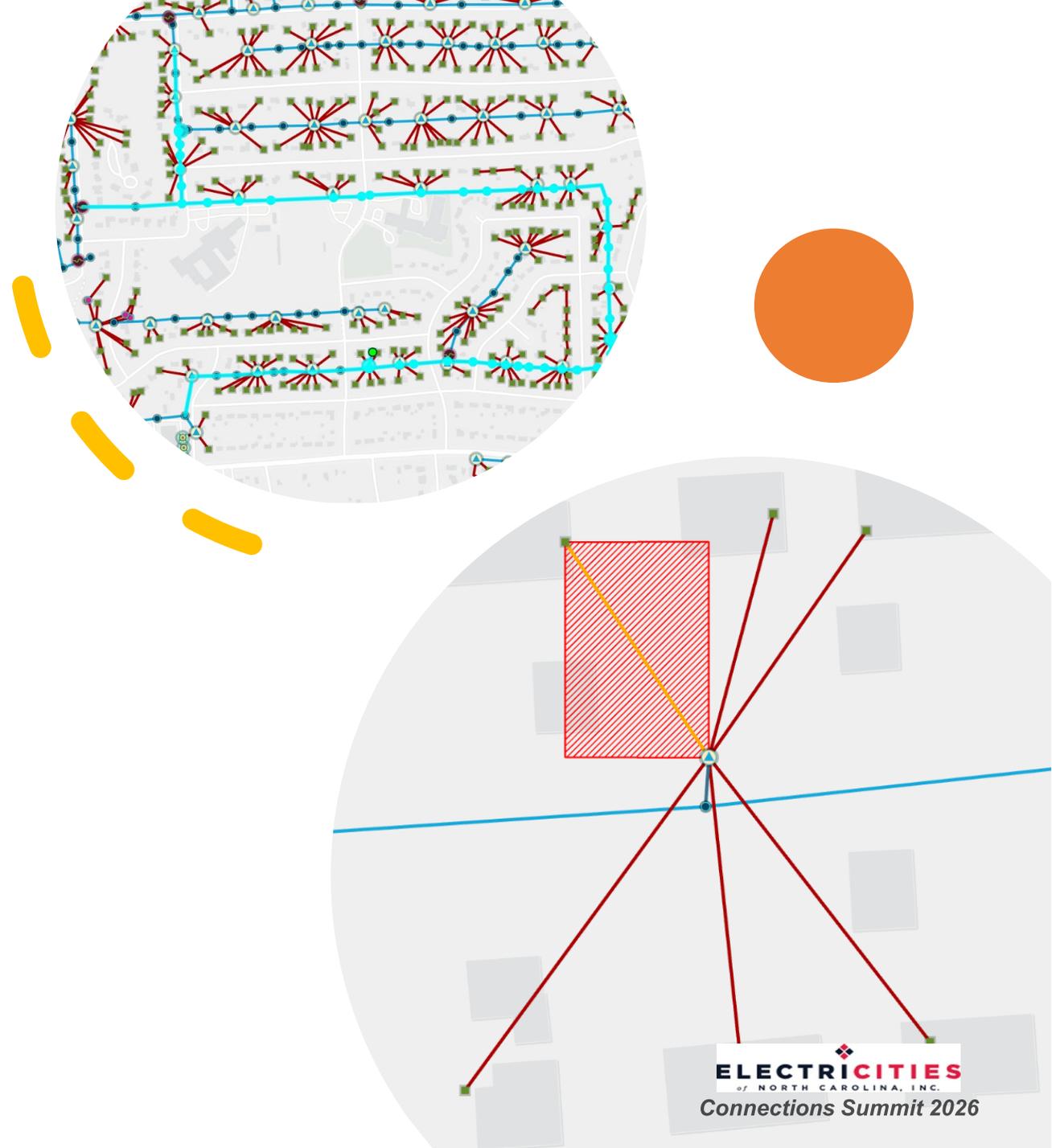
Infrastructure

- When the Project Began…
  - ArcGIS 10.7
    - Internal GIS Server and SDE GIS Database
    - No Enterprise Portal for content management
    - No Utility Network GIS (UN)
    - No Outage Management System (OMS)

- Fast Forward…GIS Modernization
  - Langan Deployed ArcGIS Enterprise
    - Currently on version 11.5
  - ArcGIS Portal established
    - In the DMZ, secured, yet a publicly accessible URL - VPN no longer required!
  - Licensed for ESRI Utility Network
  - New SDE GIS Database(s)
  - ArcGIS Monitor Implemented – Advanced analytics for server performance observations
  - Disaster Recovery Established – Automatic Backups
  - Datavoice OMS Deployed
    - UN GIS automation scripting in place to keep OMS up-to-date

Modernized GIS
Technical Components and Deployment

Core System Components

Portal for user collaboration, ArcGIS Server for hosting, and Data Store for data management.

Automation and Monitoring

Notebook Server automates workflows, while Monitor provides alerts and performance metrics for system health.

Security and Access Control

Secure identity management (SSO) and role-based access controls protect sensitive data in the system.

Deployment and Integration

Advanced deployment strategies w/ Powershell DSC ensure minimal downtime and compatibility with existing systems for seamless migration.

ArcGIS Enterprise 11.3
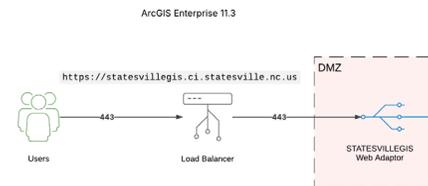
| Host	IP	OS	CPU	RAM
STATESVILLEGIS	100.100.0.2	Win 2019	2 Cores	16 GB
GISENTERPRISESRV	10.10.0.10	Win 2019	2 Cores	32 GB
GISFILESRV	10.10.0.11	Win 2019	2 Cores	8 GB
GISIMAGE	10.10.0.12	Win 2019	4 Cores	16 GB
GISMONITOR	10.10.0.13	Win 2019	4 Cores	16 GB
GISBUSINESSSRV	10.10.0.14	Win 2019	4 Cores	16 GB
GISSQL	10.10.0.15	Win 2019	4 Cores	32 GB
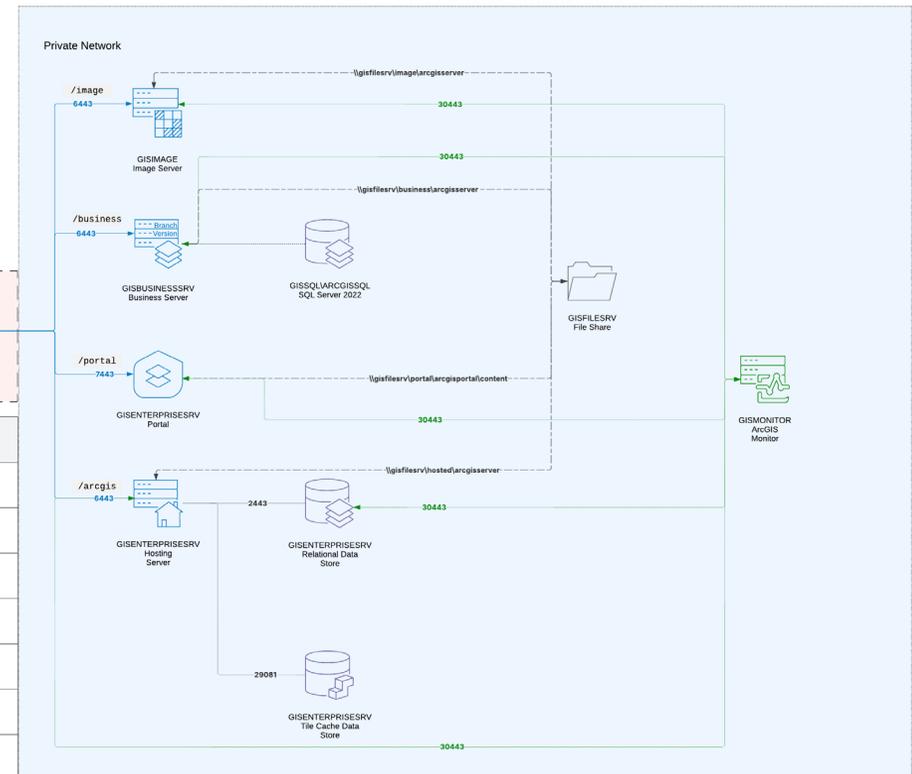
Lessons Learned

- What we Would do Better:
  - Direction of drawn lines matters
    - We would make sure lines were drawn correctly the first time
  - Taps Matter
    - Draw in your taps originally. Do not wait until the end
    - Little details matter
  - Three different ways to view the data
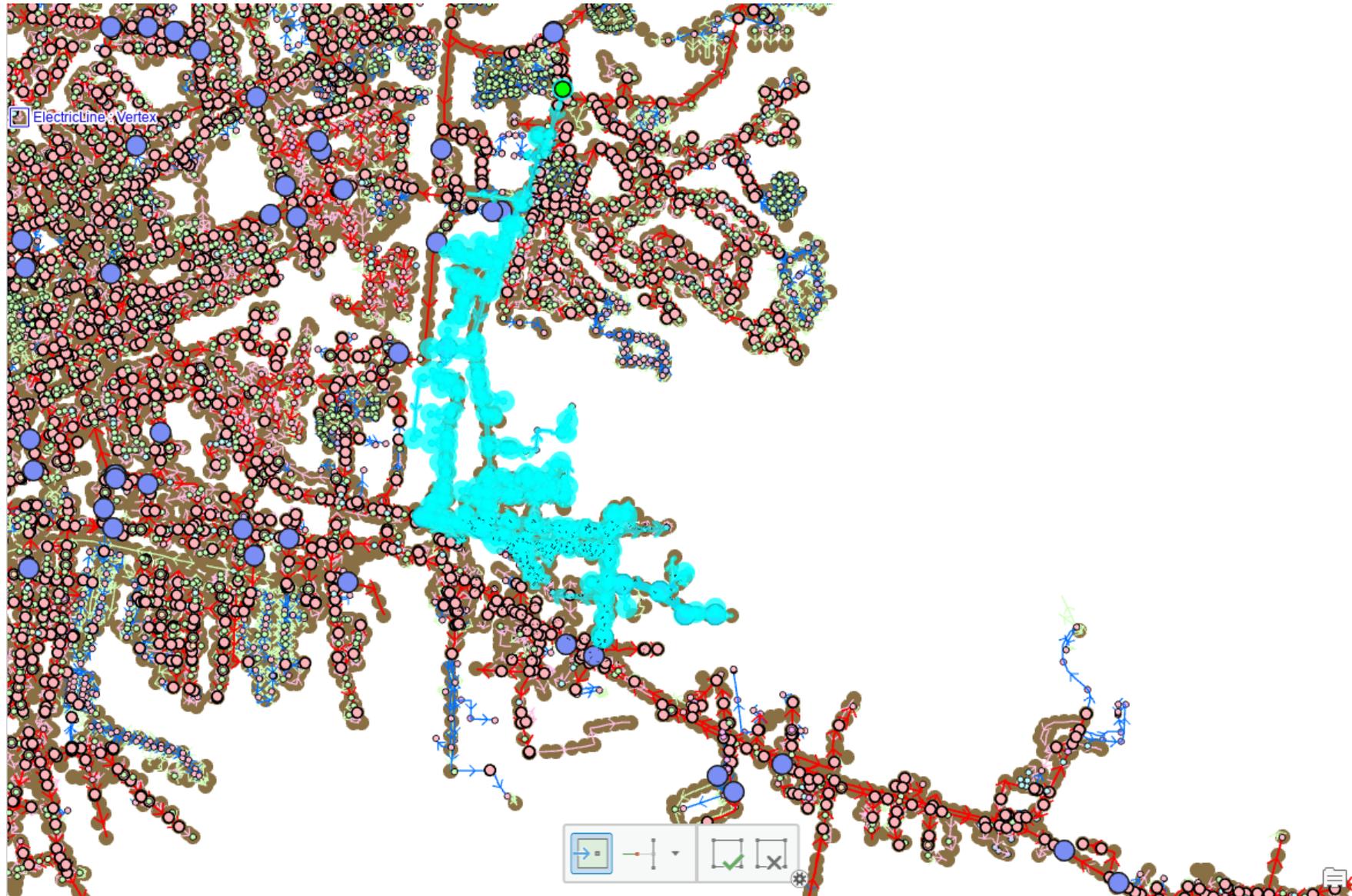   - UN, OMS, and Fieldmaps

Next Steps

- Translating UN to other departments
  - Water and Sewer (for example)
- Fine tuning
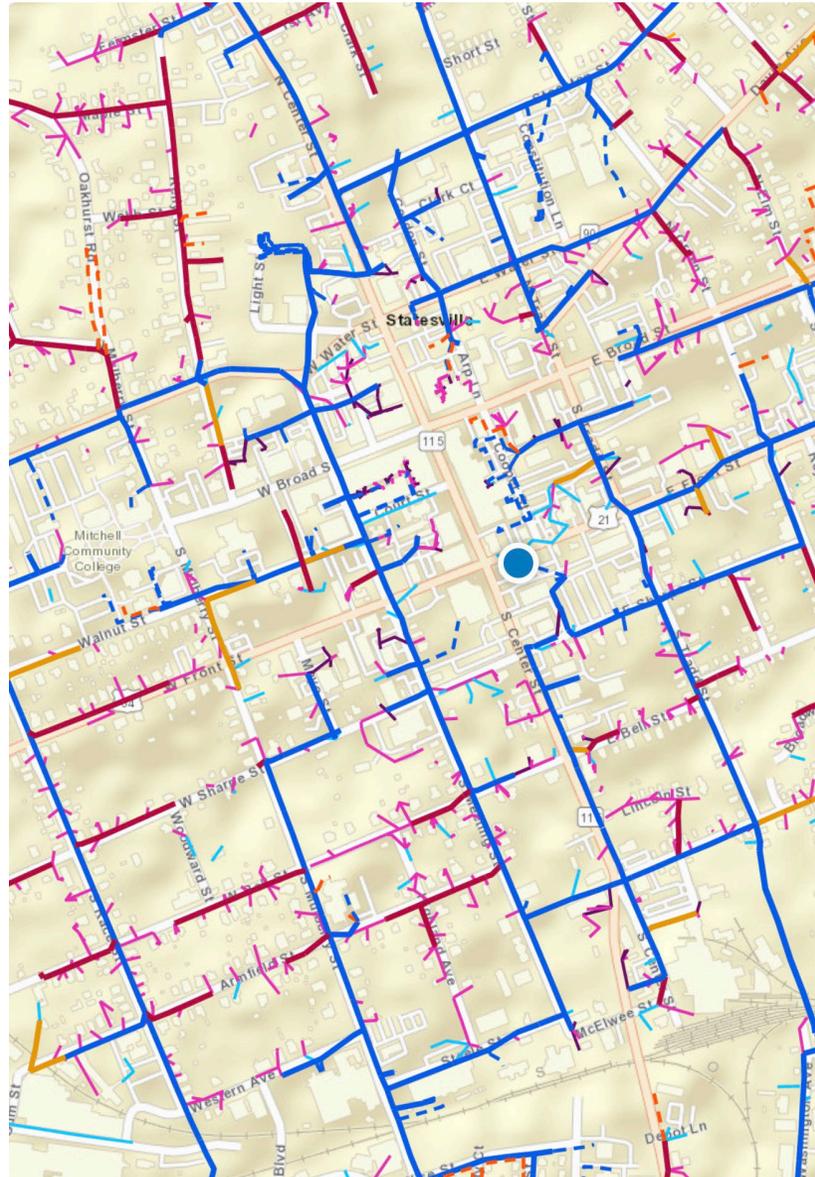 - More cleanup and establishing associations

Utility Network
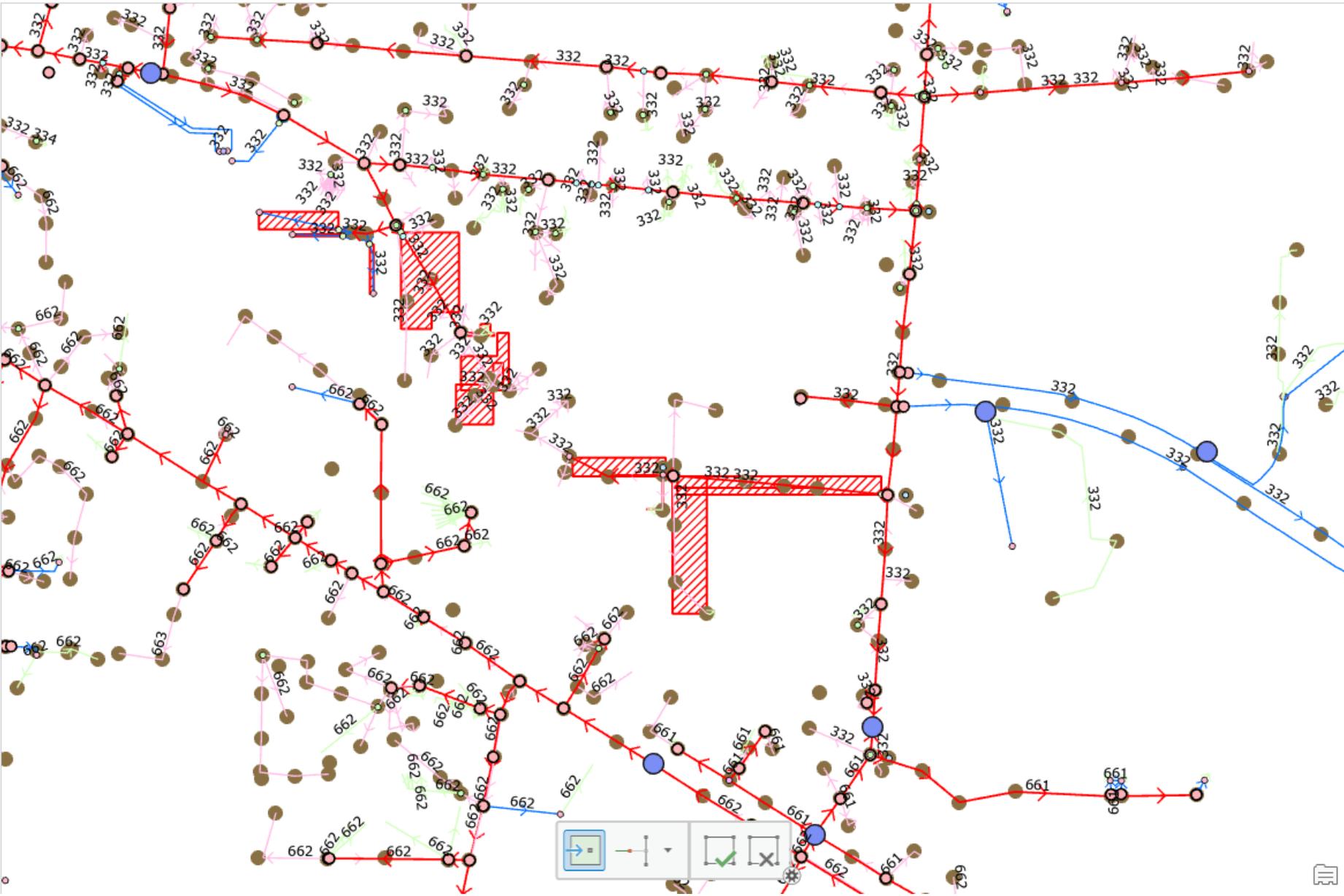
Utility Network Trace

Fieldmaps

Questions?

GIS Working Group

Thursday February 19th

10am – 12pm Virtual

ESRI will join us for the first hour to provide industry insights and an update on the ArcMap to ArcGIS Pro transition. They will also be available for Q&A.

Please contact Greg Flinn for more information

gflinn@electricities.org