

# Tightening the shoestrings getting ready for ArcGIS Online

Robert Borchert

Senior GIS Technician

Great River Energy





- PUT DOWN YOUR CELL PHONE



# O Robertovi: Na začátku

- Senior GIS technik @ Velká řeka energie
- 18 let v GIS pro elektrickou distribuci a přenos
- Nikdy nepracoval s mylarem
- Převedená distribuční družstva z AutoCADu na ArcMap



# About Robert: In the beginning

- Senior GIS Technician @ Great River Energy
- 18 years in GIS for Electric Distribution & Transmission
- Never worked with mylar
- Converted Distribution Cooperatives from AutoCAD to ArcMap



# About Robert: In the interum

- Maintained GIS for Cooperatives
  - Map updates
  - Developed and printed map books
    - Paper
    - PDF
- Developed offline solutions for cooperatives
  - CarryMap, ArcReader



# About Robert: These days

- Develop ArcGIS Online solutions for Great River Energy's Telecom Department
  - Collector
  - Web App Builder
  - Looking forward to explorer with 10.7 release
- Integrating Great River Energy departments into a GIS online experience
  - ArcGIS Online
  - Server
  - Portal



# In olden days: paper map books

- PDF's and the time before PDF's
- Map books: 17" x 22", 11" x 17", 11" x 14", and 8.5" x 11"
  - Thousands of hours of work
  - Tens of thousands of pages and more than a few trees
  - Off the glass
  - No mylars will killed in this process
- Wall and truck maps

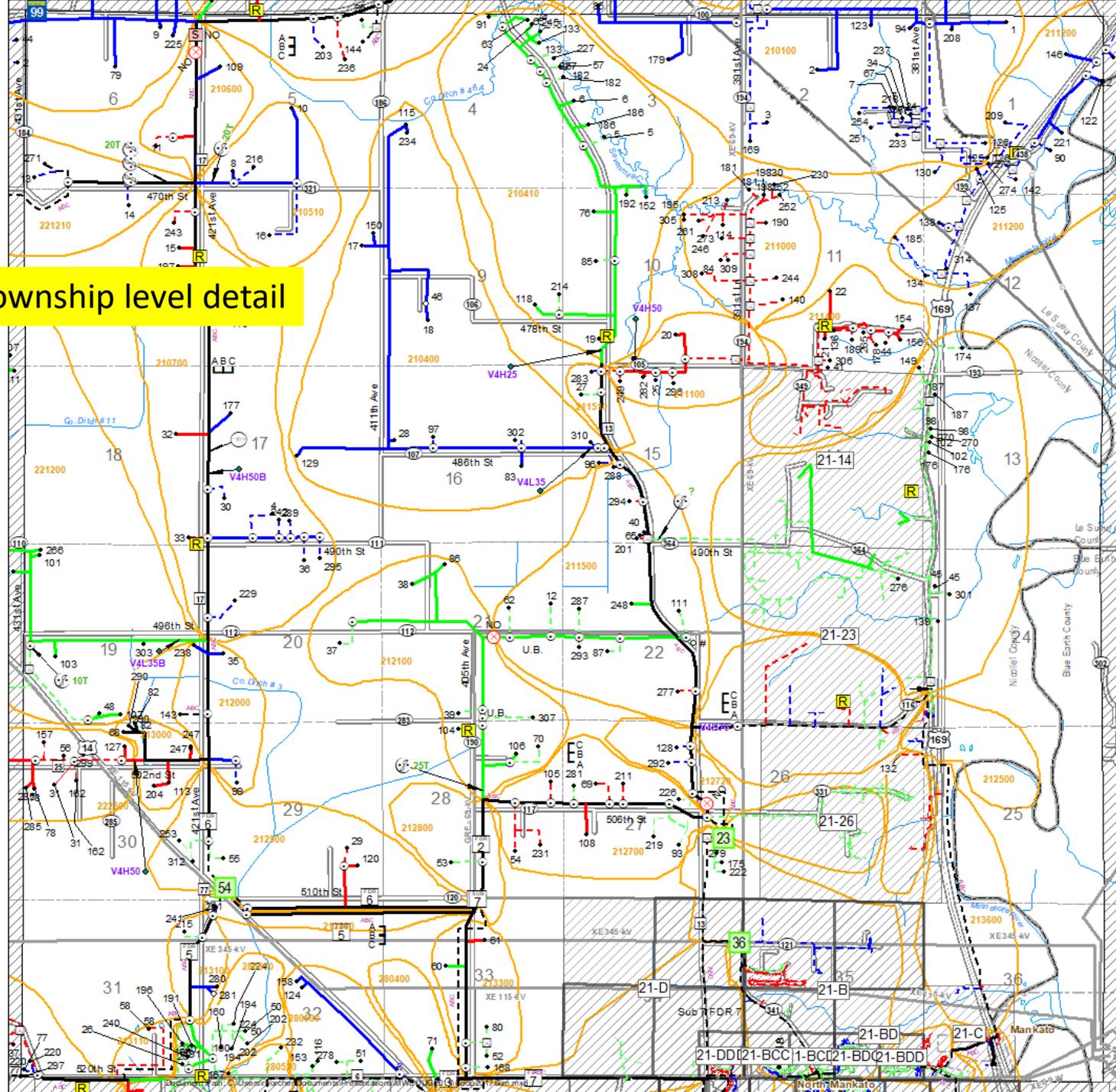


# Paper GIS Products

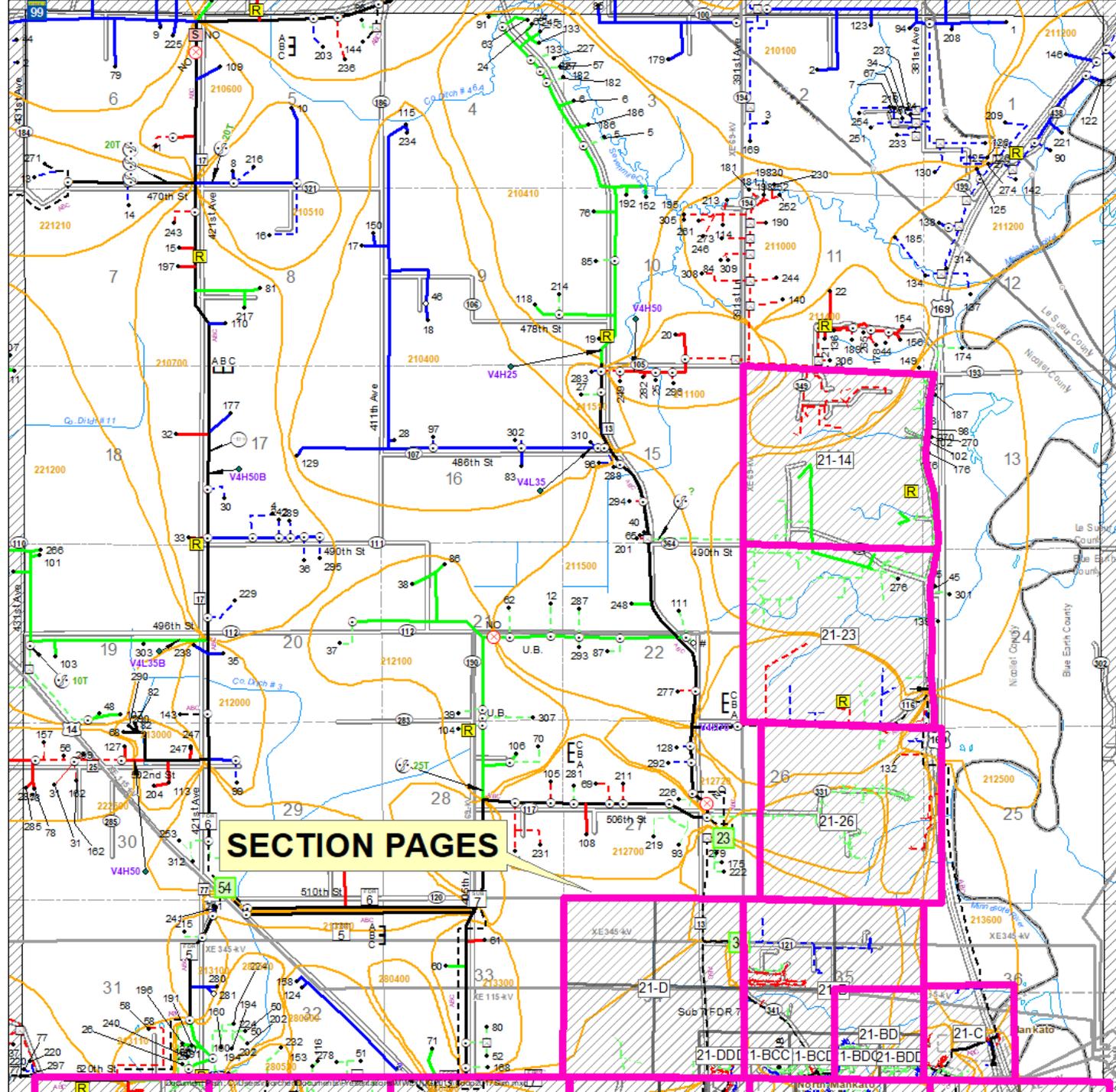
- Very labor intensive
  - There is not good automatic anything for everything
    - Maplex ☺
- Multiple Scales
  - Township
  - Section
  - Quarter Section
  - Quarter Quarter Section
  - Substation/Cabinet

# Map Anatomy

Township level detail



# Map Anatomy









- PUT DOWN YOUR CELL PHONE

# Map Anatomy

**ROAD CENTERLINE,  
SECTIONS,  
WATER FEATURES  
ETC, ETC, ETC**

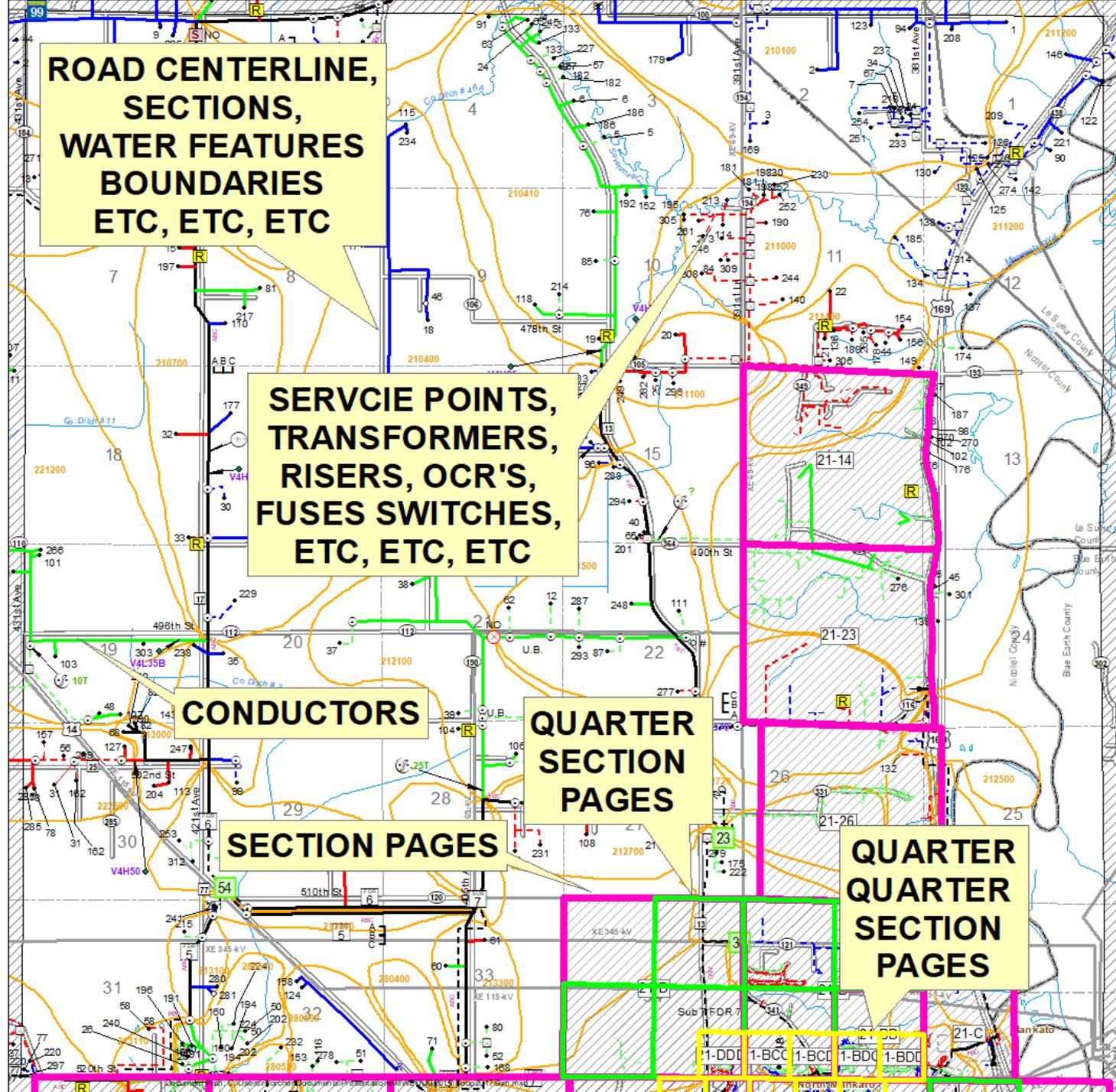
**SERVICIE POINTS,  
TRANSFORMERS,  
RISERS, OCR'S,  
FUSES SWITCHES,  
ETC, ETC, ETC**

**CONDUCTORS**

**QUARTER  
SECTION  
PAGES**

**SECTION PAGES**

**QUARTER  
QUARTER  
SECTION  
PAGES**



1-DD 1-BCC 1-BCC 1-BCC 1-BCC



# Paper GIS Products

- Thousands of features
- Various scales
  - Definition Queries: one for each detail level
  - Annotation at various scales
  - A single feature class represented many ways
- Everything moves when you change scale
  - Symbol sizes
  - Labels
- Multiple MXD's
  - One for each size product



# Paper GIS Products

- End user requests just a simple little change
  - Can effect quite a few other variables
  - # \$ % ^ & \* ( ) Ø
- It often is not just a one and done
  - Multiple MXD's
  - Multiple detail levels
- Then they decide they liked it better the other way
  - # \$ % ^ & \* ( ) Ø<sup>2</sup>



# GIS Online

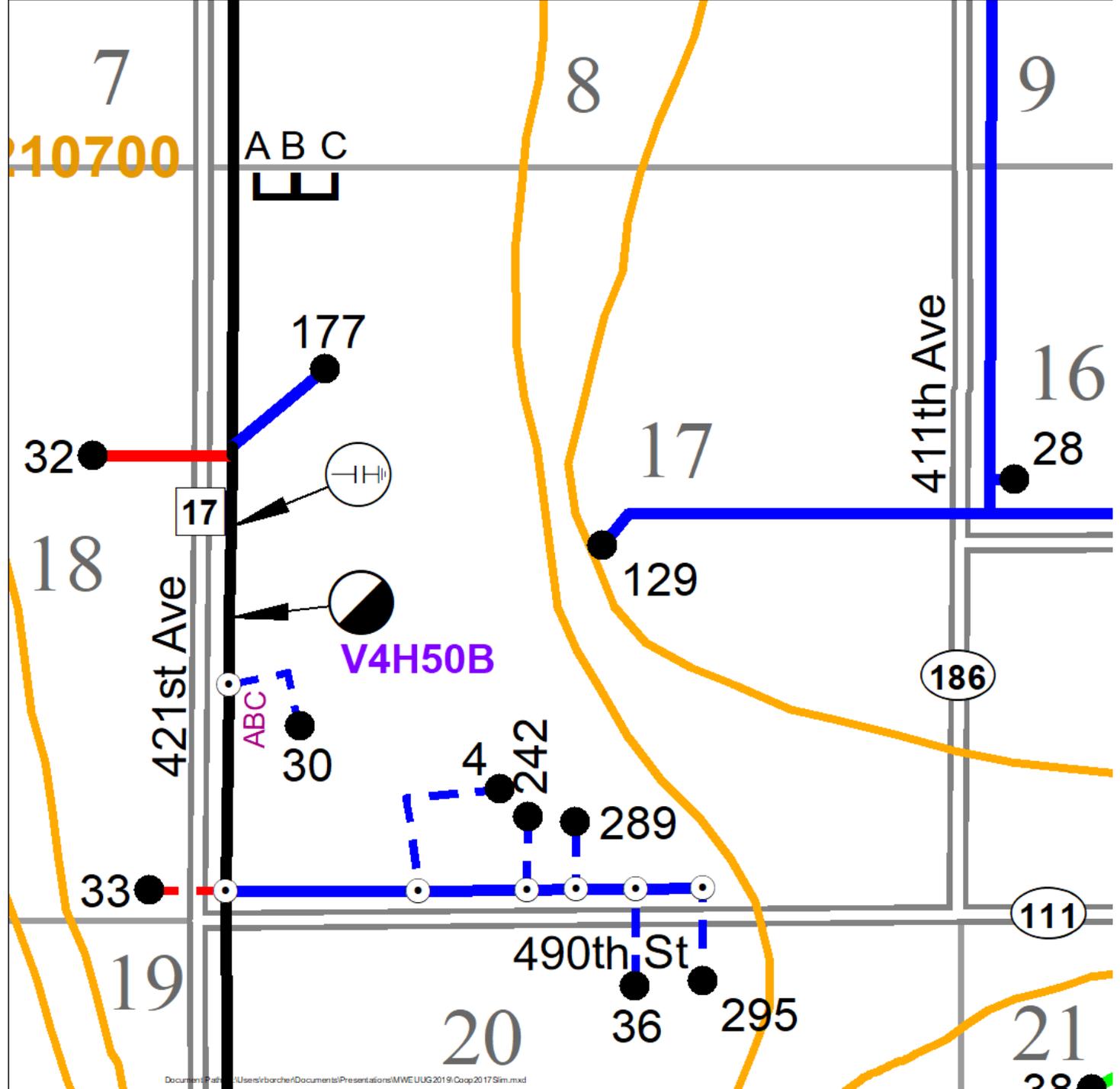
- You make the move to ArcGIS online
- Updates immediately realized
  - Can instantly be seen by all users
- No more out dated information
  - Annual map books move towards extinction
- More forgiving
  - Topic for a different discussion
- Less forgiving
  - Yet another new topic for discussion



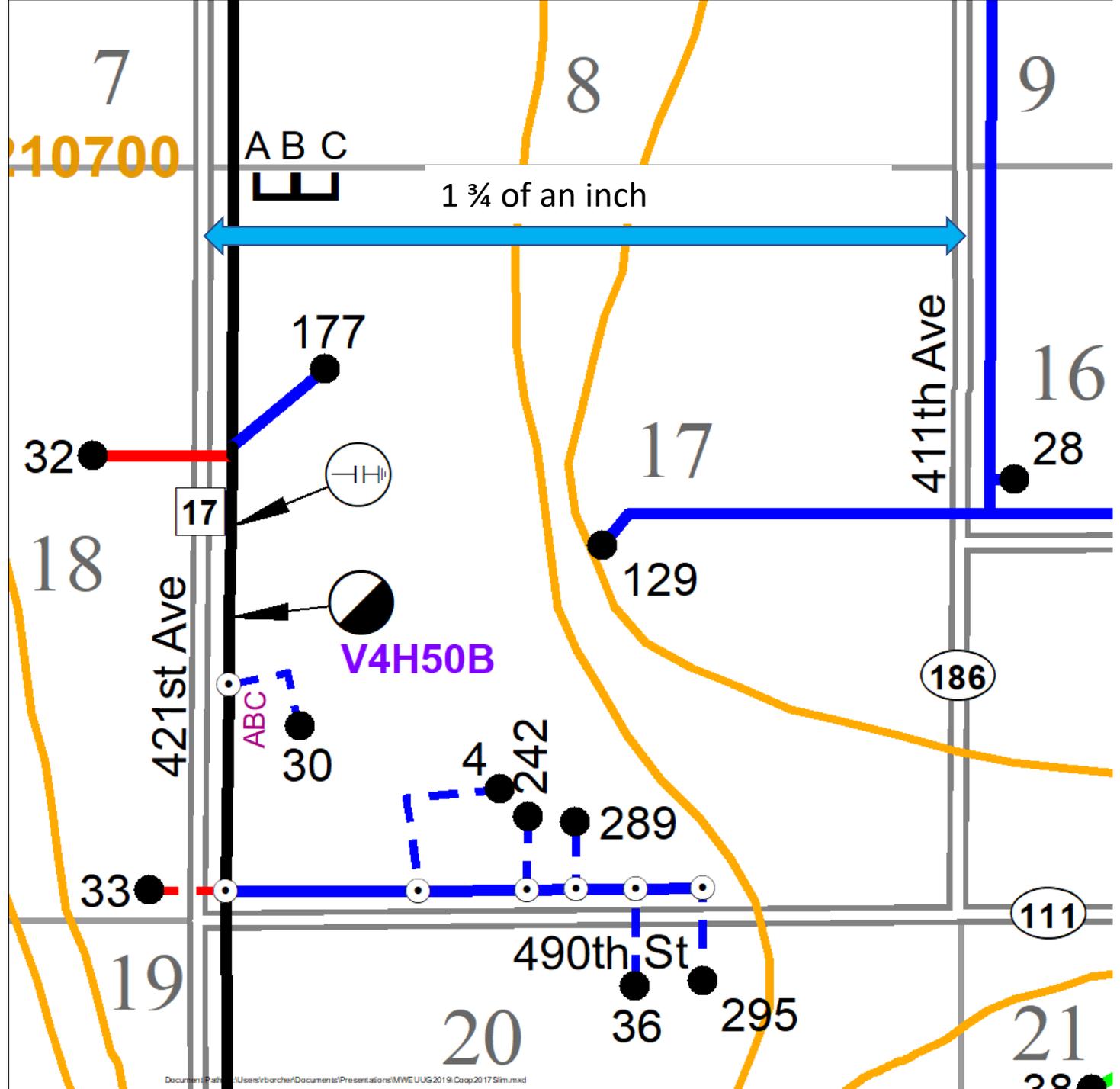
# Moving to ArcGIS Online

- Whole new set of issues to fix
- Can be very labor intensive
- Initial issues
  - This is our topic of conversation
- Moving facilities issues
  - This is also a topic of this conversation
- **YOU WILL NOT RETURN**

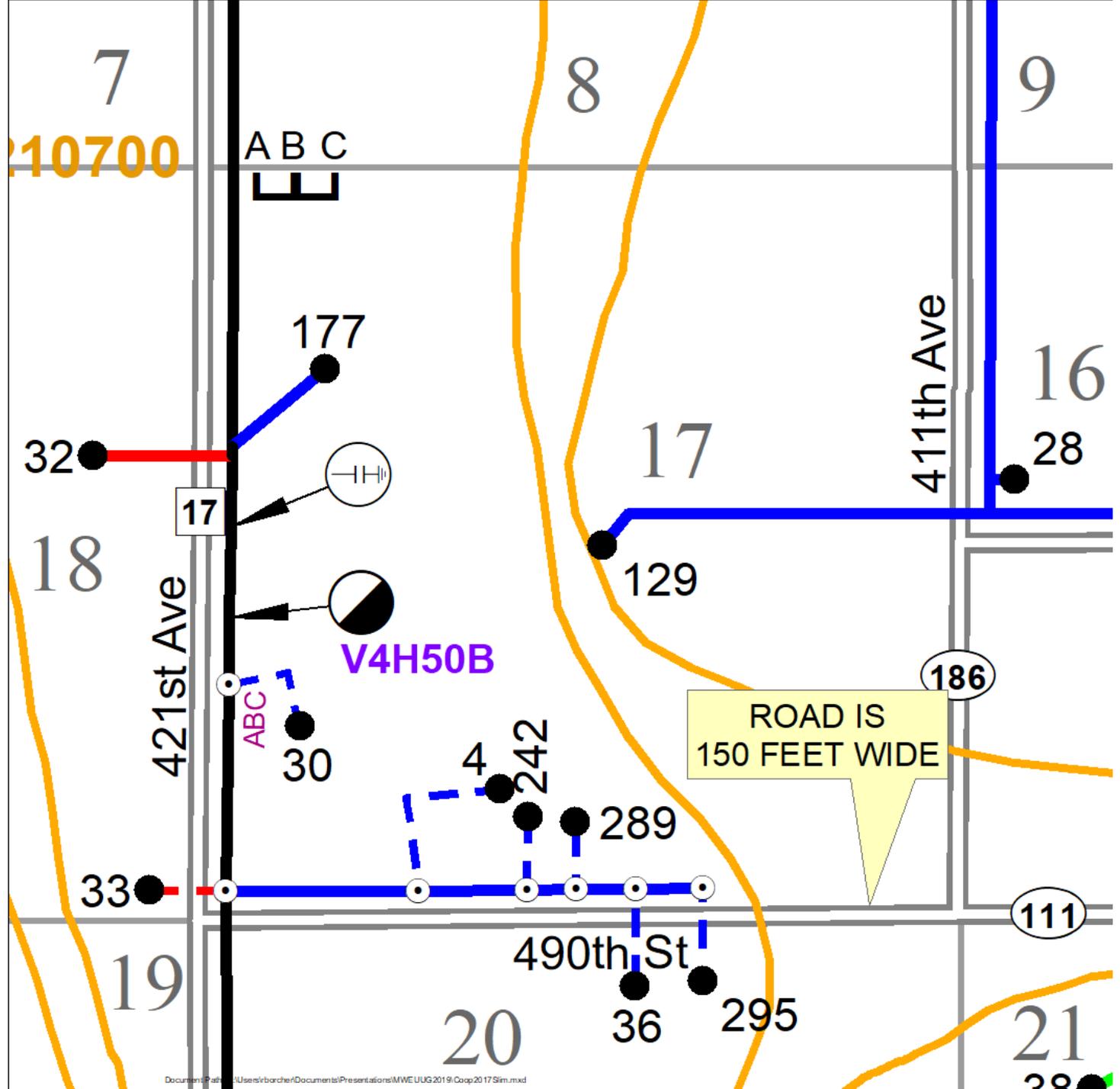
Map  
Just how  
bad is it



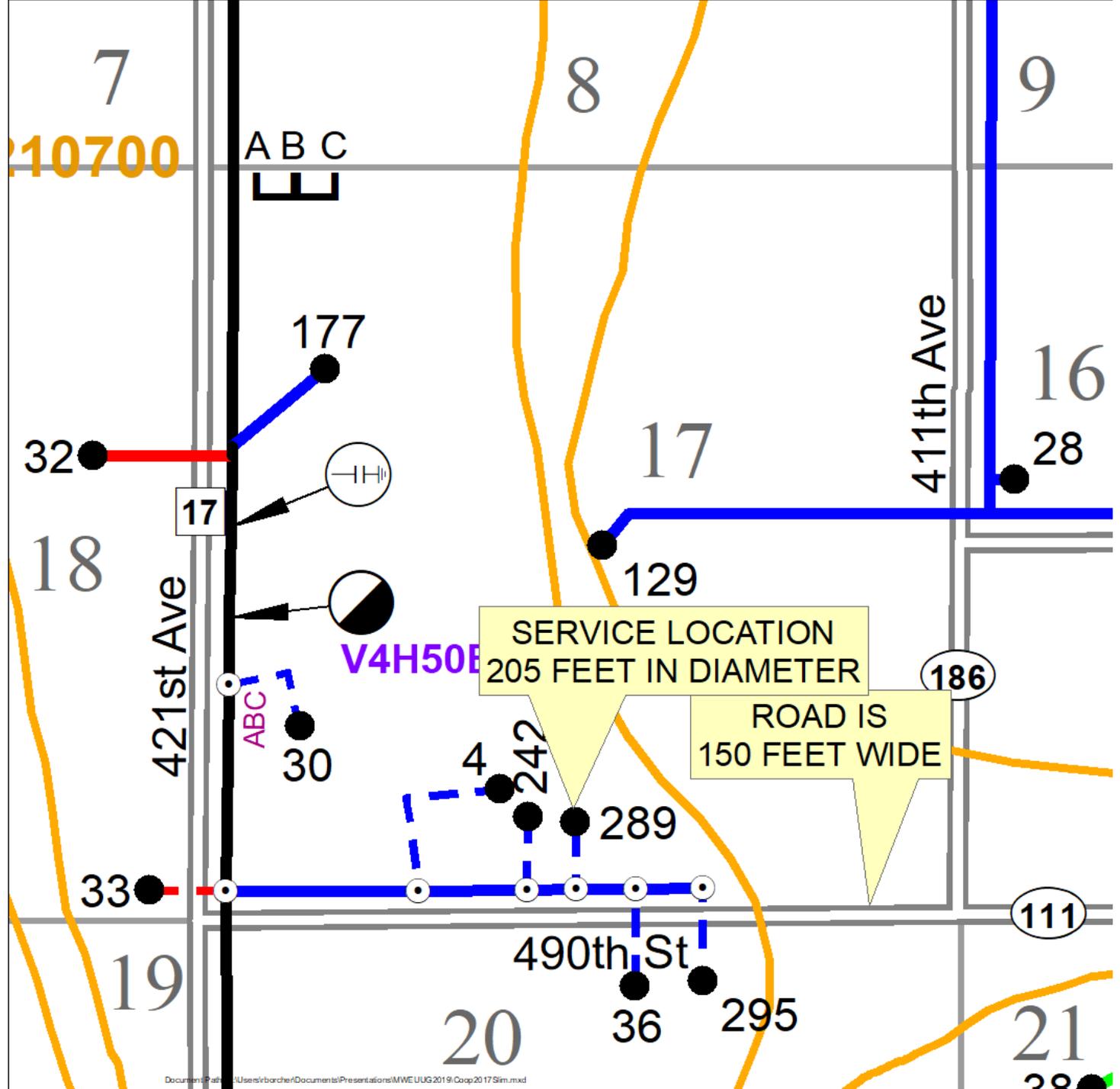
Map  
Just how  
bad is it



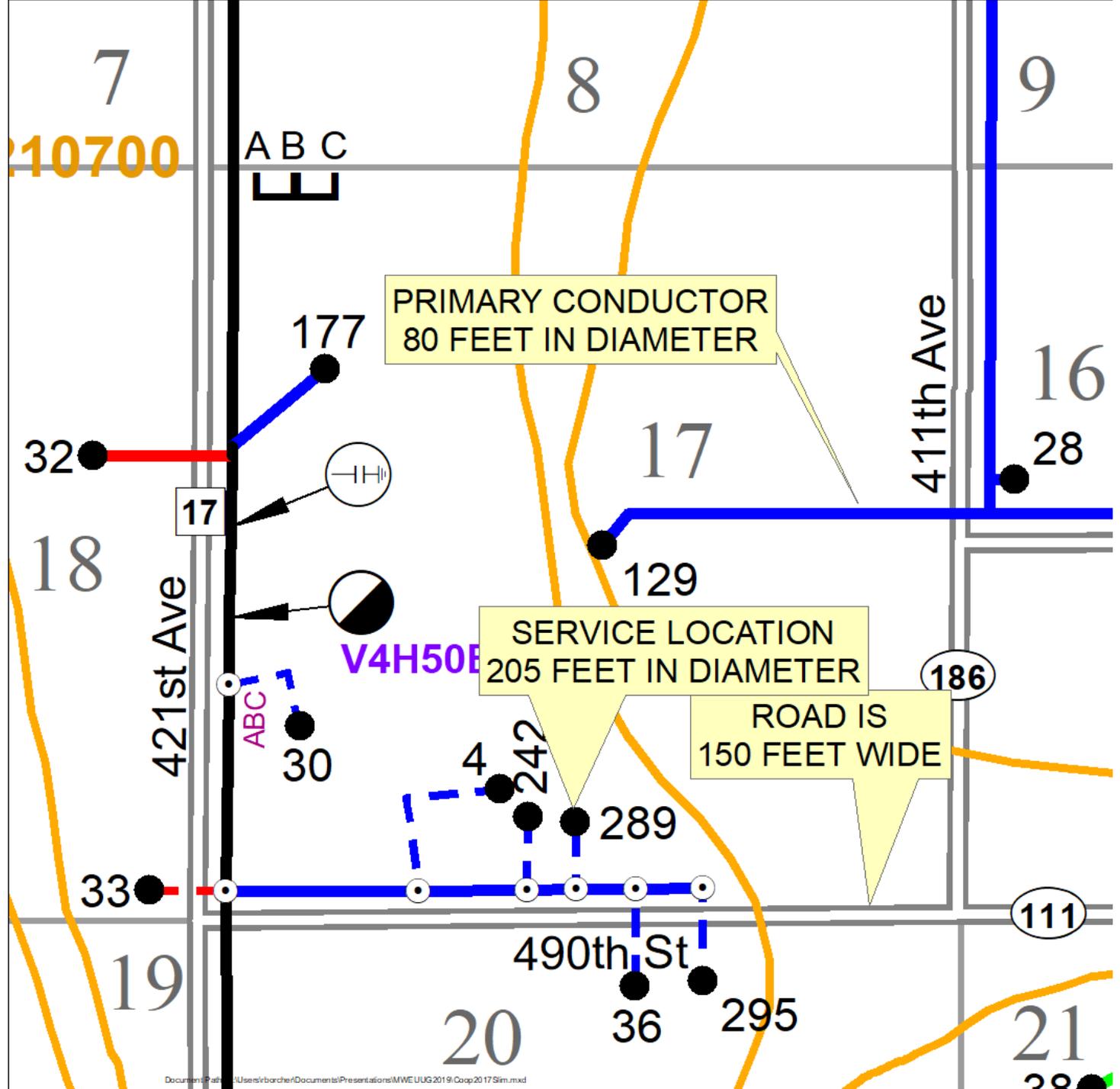
Map  
Just how  
bad is it



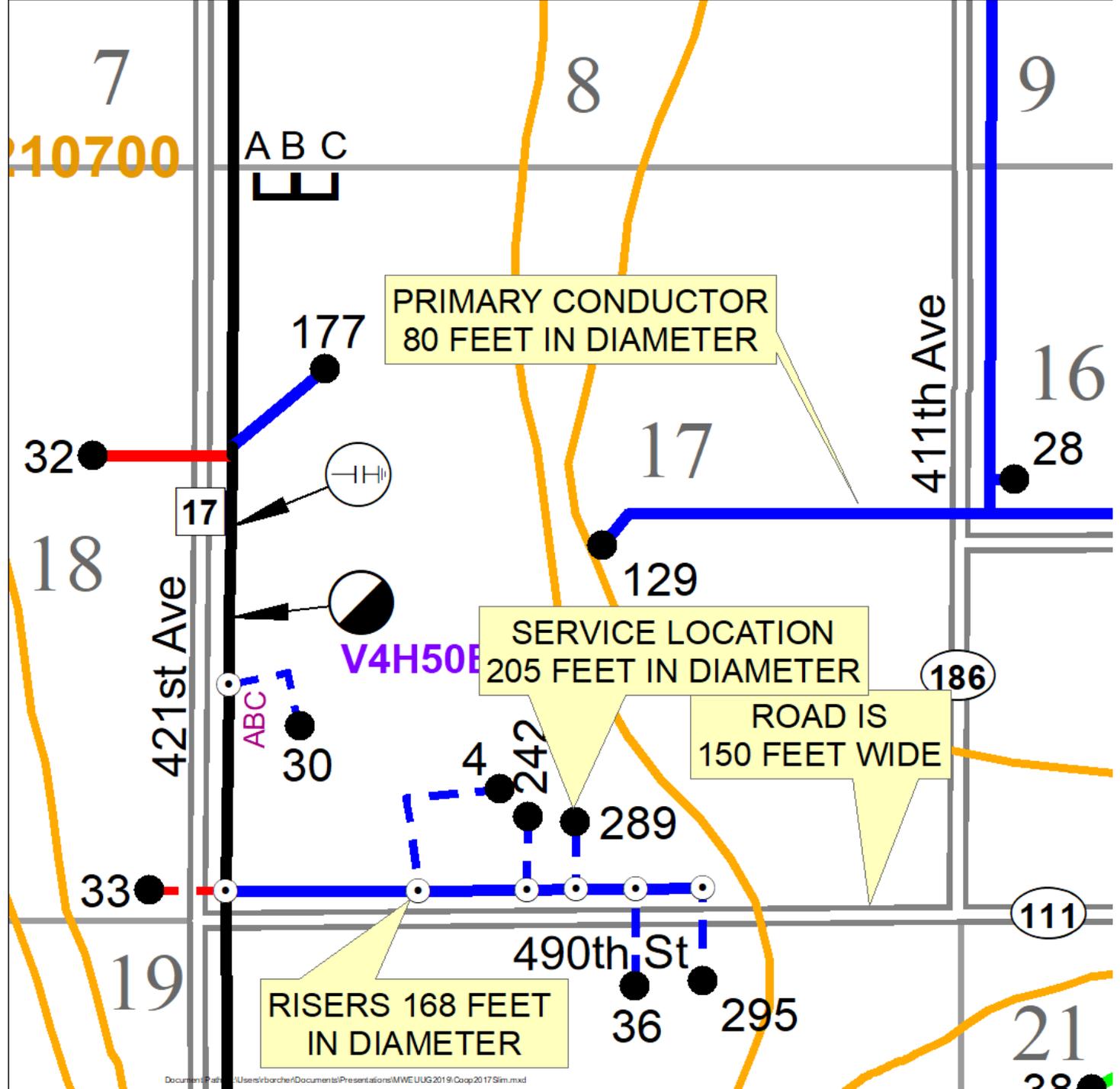
Map  
Just how  
bad is it



Map  
Just how  
bad is it



Map  
Just how  
bad is it









# This is where the work begins...

- It is the way it had to be so features could be distinguished on a paper map
- Move conductor (and poles if you have them) to where they are in the real world.
- Move meters to actual structure on photos
- I started to think of this as tightening the shoe strings
- Making features tighter and closer to their actual location



# Tightening the shoe strings





# Options...

- Live with it
- Move it
  - Over time
    - Years
  - Quickly
    - Months



# Over time

- GPS
  - Poles
  - Meters
  - Pad mounted structures
  - Accuracy?
- Snap features to GPS points
- Inspections (5 year cycle?)
  - Combined with pole inspections
  - May take a number of years to inspect the entire system



# Over time

- Very expensive and time consuming
  - Take a long time to accurately GPS and inspect the entire system
- Accuracy is dependent on the quality of GPS work and consistency of crews over the years
  - May be more accurate
  - May be less accurate
- Existing pole inventory



# Quickly

- Quickly in this case means months
- Do you need perfect accuracy
  - Do you really need a pole to be placed within 2 cm of actual location
  - Do you really need that cabinet placed within 2 cm of actual location
- My answer is no



# What to accomplish

- Move the conductor and pole as close to their real world location
  - Risers
  - Street crossings
- Move meters and pad mounted devices to their locations in the real world
- Bonus content
  - Find and correct other issues
    - Deep cleaning



# The tools

- ArcMap/ArcCatalog
- Air photos
  - ESRI Basemap photos
  - Bing photos
- Working knowledge of electric systems
- Geometric Network
- Internet connection
- Web browser
- Parcels if you have them



# Working knowledge

- Assumptions
  - Powerlines follow the road, normally
  - Powerlines follow parcel lines, normally
  - Pad mounted devices are placed on parcel intersections, normally
- Some devices are tapped off the main line and are not in line
  - Transformers are tapped
  - Sectionalizers are in line or tapped



# Working knowledge

- Road Right of Way (ROW) is a boundary from a road **centerline**. Typically distribution is placed on or near that boundary to avoid easements
- Typical ROW on county, township, and other rural single line road is 33'
- Typical ROW on state highways is 75'
- Typical ROW on Interstate and US Highways is 184' or more
- Inside ROW = no easements 😊



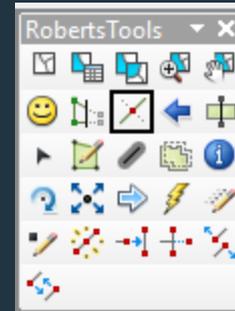
# More on tools

- Parcels
  - Can be used to place facilities in urban areas
  - Air photo resolution not good enough
- Air photos
  - Online Air photos: MapLink (covered in a few slides)
    - Google
    - Bing
  - ESRI Base Map air photos



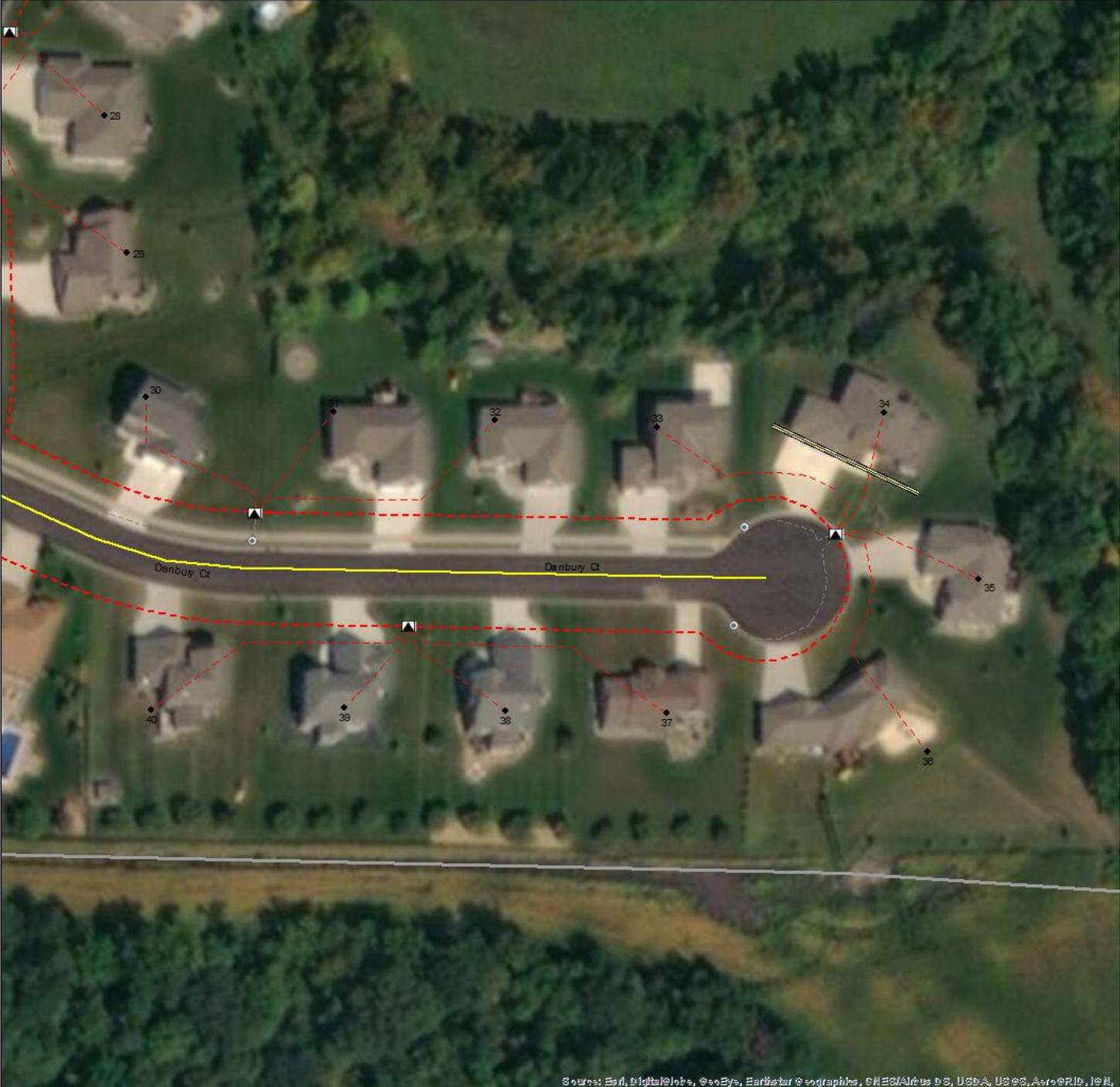
# More on tools

- HOT KEYS HOT KEYS HOT KEYS HOT KEYS
- CUSTOM TOOLBAR CUSTOM TOOLBAR CUSTOM TOOLBAR CUSTOM TOOLBAR



- Reshape: <CTRL> a
- Edit Tool: <CTRL> x
- Split Tool: <CTRL> s
- Previous Extent: <CTRL> w

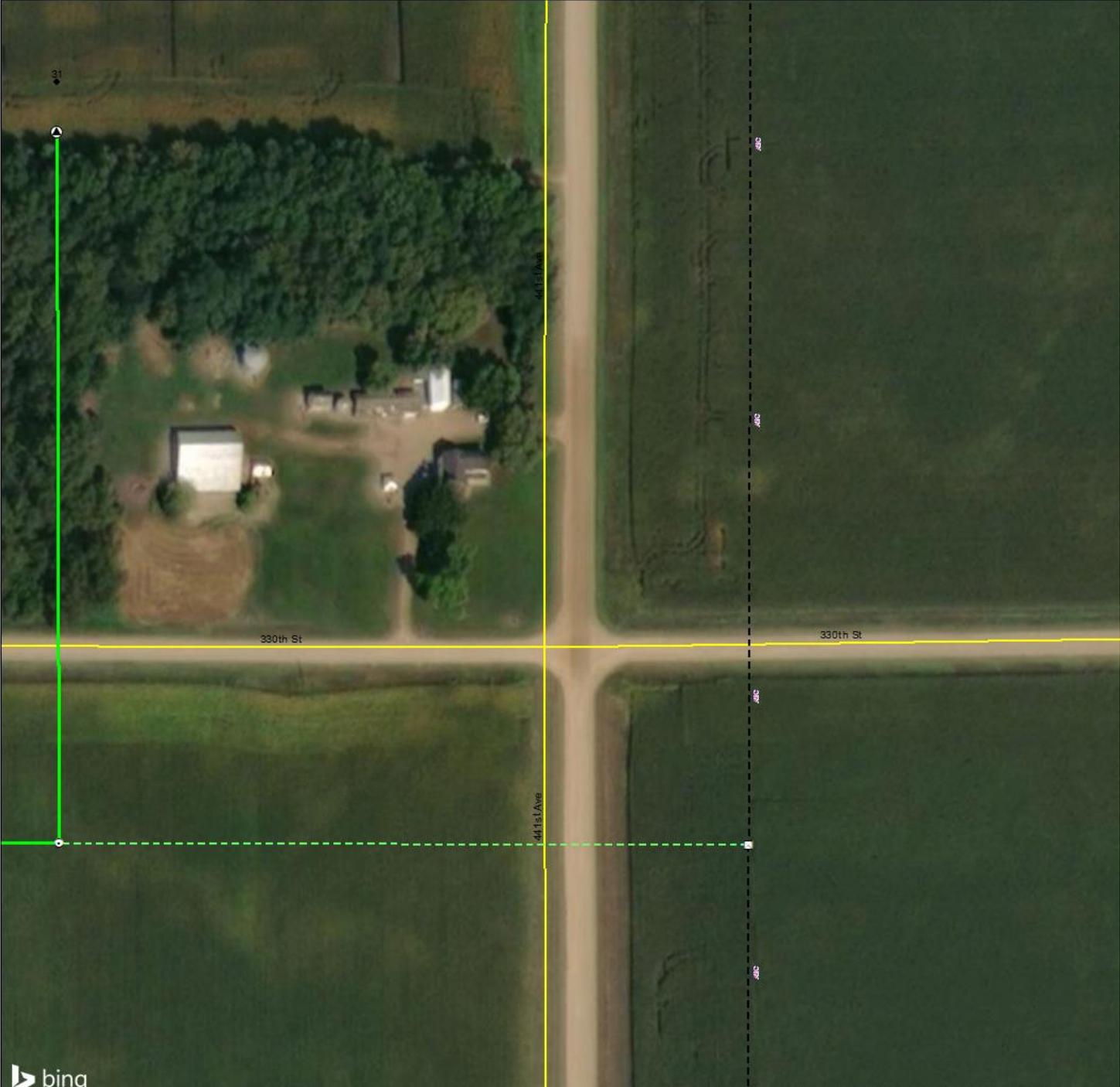
# Air Photos



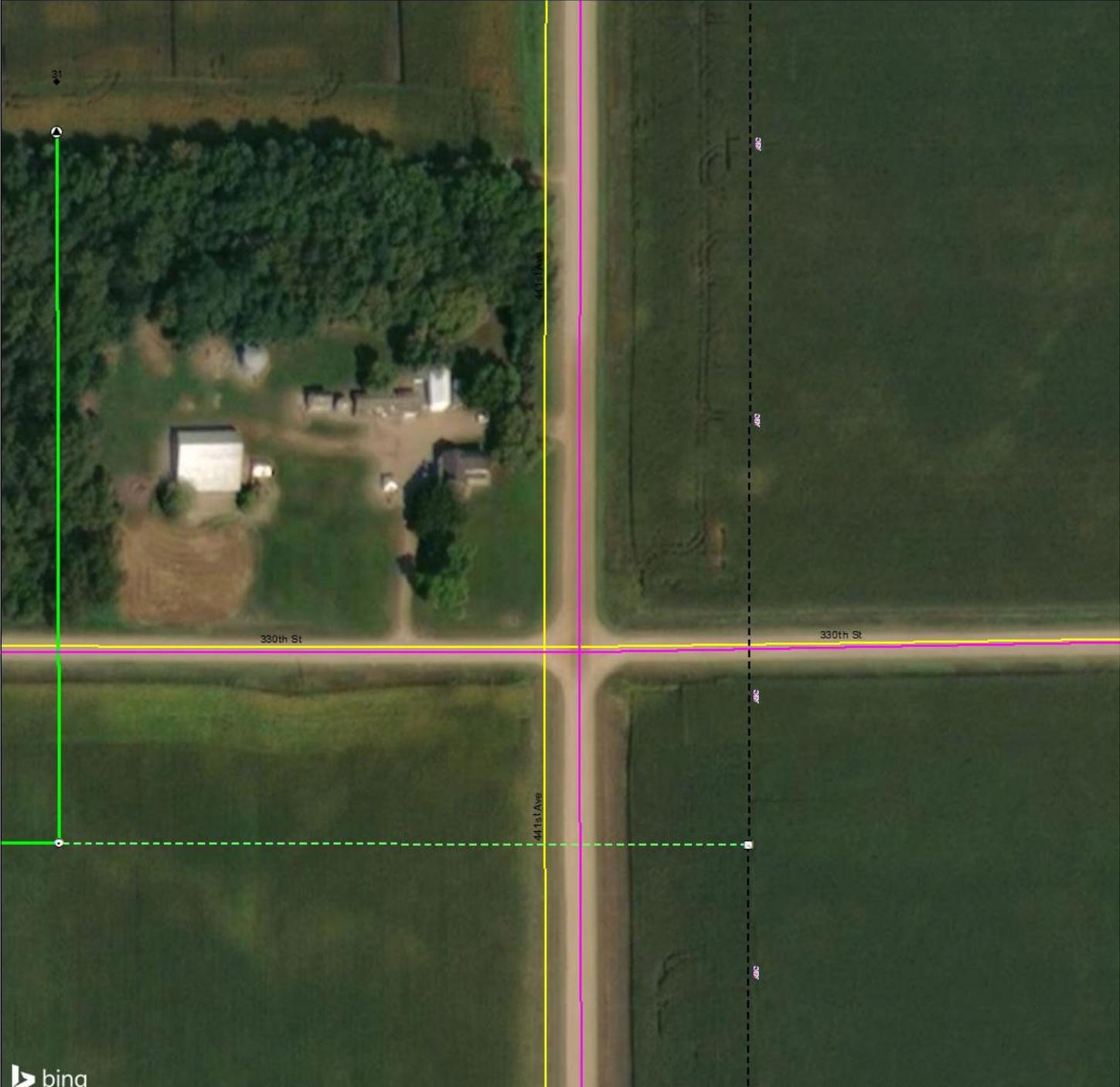
# Air Photos



# Air Photos



# Air Photos





# Setting things up

- Geometric Networks
  - Electric
    - Source (Substations)
    - Simple edge
  - Road centerlines
    - No source or sink
    - Complex edge
- New polygon layer for data driven work flow
  - Suggestion: polygons of 6 sections at a time
    - 1, 2, 3, 10, 11, 12, 13, 14, & 15 and 4, 5, 6, 7, 8, 9, 16, 17, & 18. etc



# Setting things up

- Buffer on road centerlines
  - Dissolved
  - Variety of widths
    - 5', 10', 20', 33', 66', 75', etc
  - Convert Polygons to polylines
    - Faster drawing
    - Classic Snapping
    - Easier than snapping to parcel lines
  - Use for snapping
- Simplified MXD
  - Much faster



# Setting things up

- Xing, Ying, Maplink
  - Sections, parcels, **primaries**, etc. (choose one)
  - Create two attributes as double (Xing, Ying)
  - Create an attribute as text 250 characters long: **MapLink**
  - Calculate geometry on Xing & Ying with the centroid in **Decimal Degrees**



# Setting things up

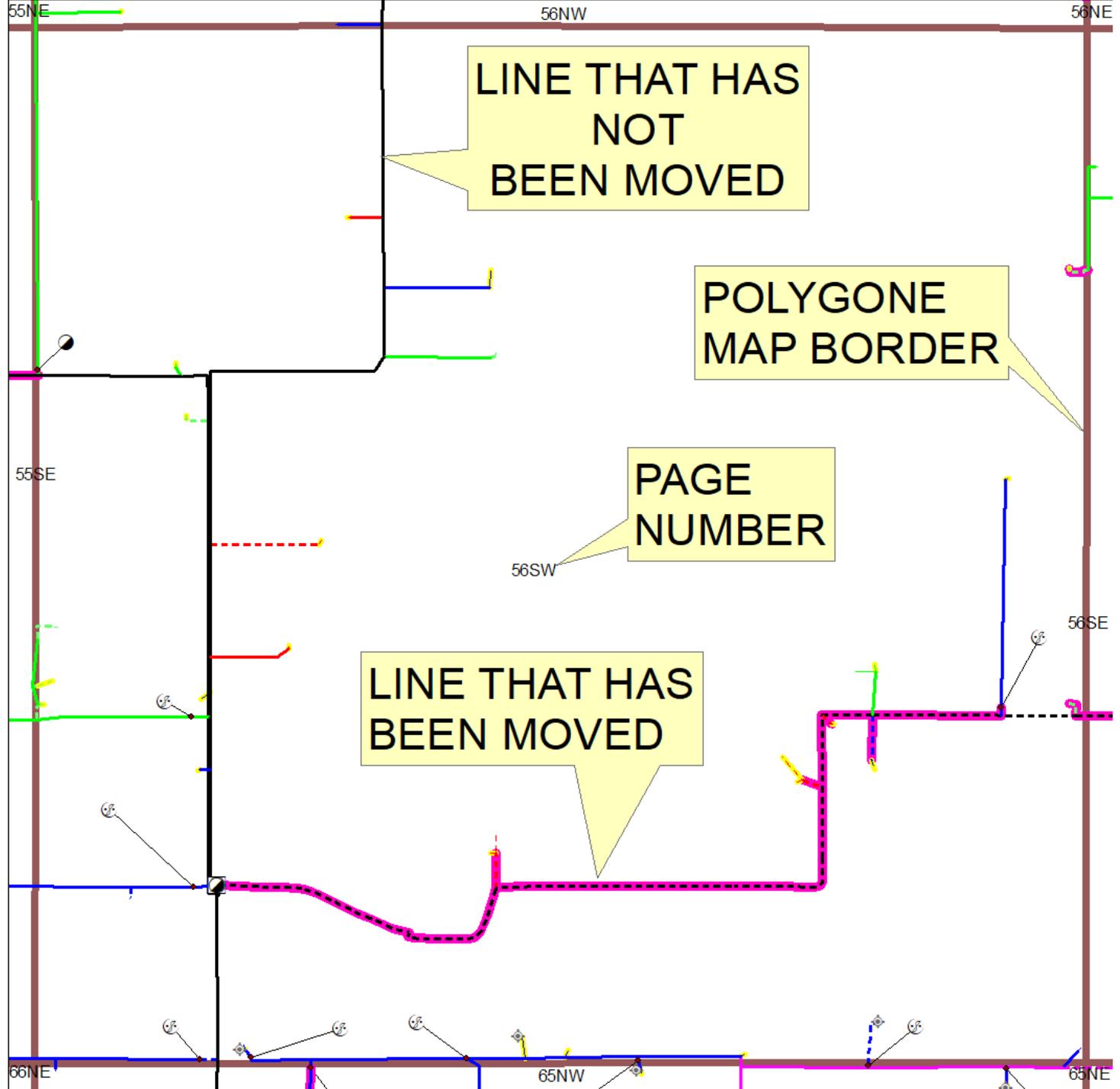
- Xing, Ying, Maplink
  - Field calculate the Maplink as
    - "https://www.google.com/maps/place/@" & [Ying]&", " & [Xing]&", 800m/data=!3m1!1e3!4m5!3m4!1s0x0:0x0!8m2!3d44.0762756!4d-94.2078106"
    - [Xing] & [Ying] will be populated from your double fields
    - 800m is the scale you will be centered at. In meters
  - <https://www.google.com/maps/place/@43.7672038992549,-94.1099813272454,800m/data=!3m1!1e3!4m5!3m4!1s0x0:0x0!8m2!3d44.0762756!4d-94.2078106>
- Set your hyperlink to the MapLink attribute



# Setting things up

- New attribute's for conductor
  - OrigLen as double
    - Primary and Secondary
    - Field calculate with Shape\_Length
  - You will use this to keep track of what has already been moved
  - Add the conductor in a second time
    - Definition queries
      - Shape\_Length <> OrigLen
        - » Not selectable, bottom layer, extra wide highlight

Setting up



LINE THAT HAS NOT BEEN MOVED

POLY-GONE MAP BORDER

PAGE NUMBER

LINE THAT HAS BEEN MOVED

55SE

56SW

56SE

66NE

65NW

65NE

56NW

56NE



# Statistics

- 3760 Miles of conductor at the start
- Change in miles of conductor
  - Primary OH: -219 miles
  - Primary UG: -241 miles
  - Secondaries: +32 miles
  - Total change: -428 miles
- Change in physical location (for 19695 Meters)
  - Service Points: 552 miles
  - Transformers: 440 miles



# Getting going

- Start at...
  - The first map page: in this project it was 06NE
  - Substation 01
    - Feeder 01
- Does not matter where you start
  - Use changing conductor symbology to see where you have been
  - Query Shape\_Length <> OrigLen to find those you missed



# Getting going

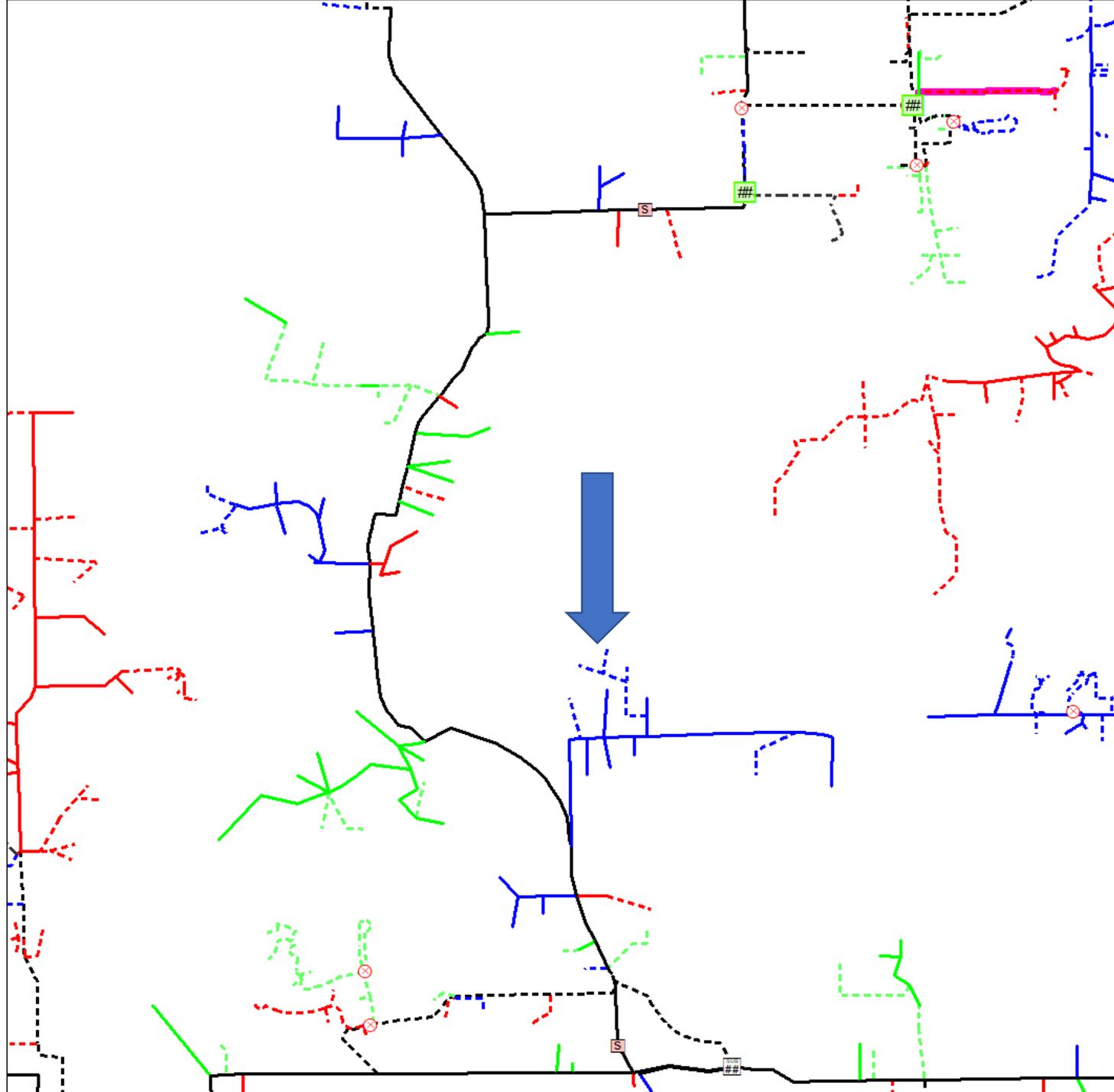
- How you progress
  - Follow a line to completion
  - Go back to a tap and continue
  - Substation circuits
- Started at an intersection
  - Followed it to the first major tap
    - Is it shorter or longer than the line your following
    - Finish the tap and go back to the start of the tap
- Go to extents of map page
  - Find the next tap that has not been visited
    - First segment will appear moved



# Visuals

- Now lets explore this visually
- Map 34 NW

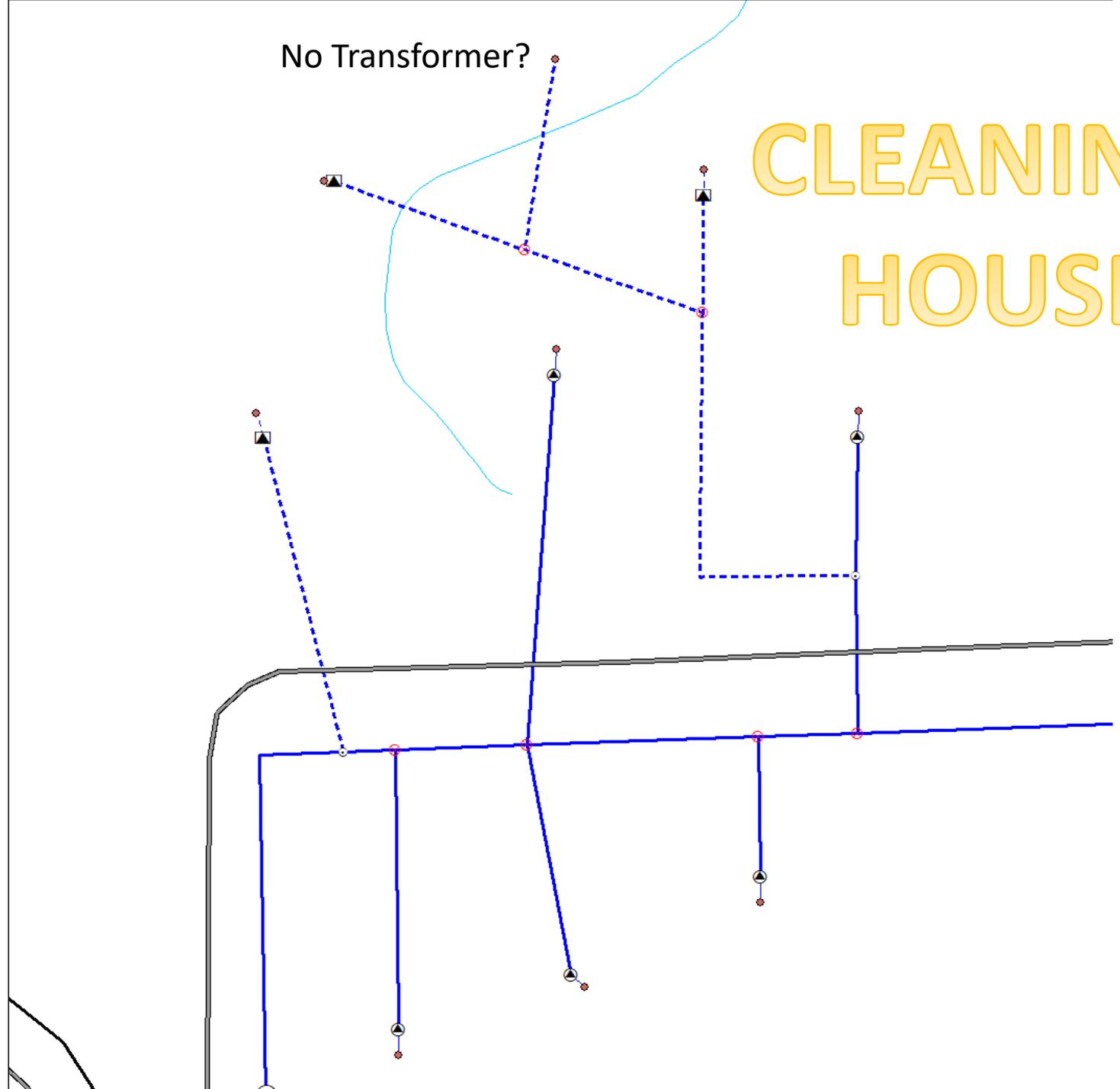
In Map  
34 NW



In Map  
34 NW

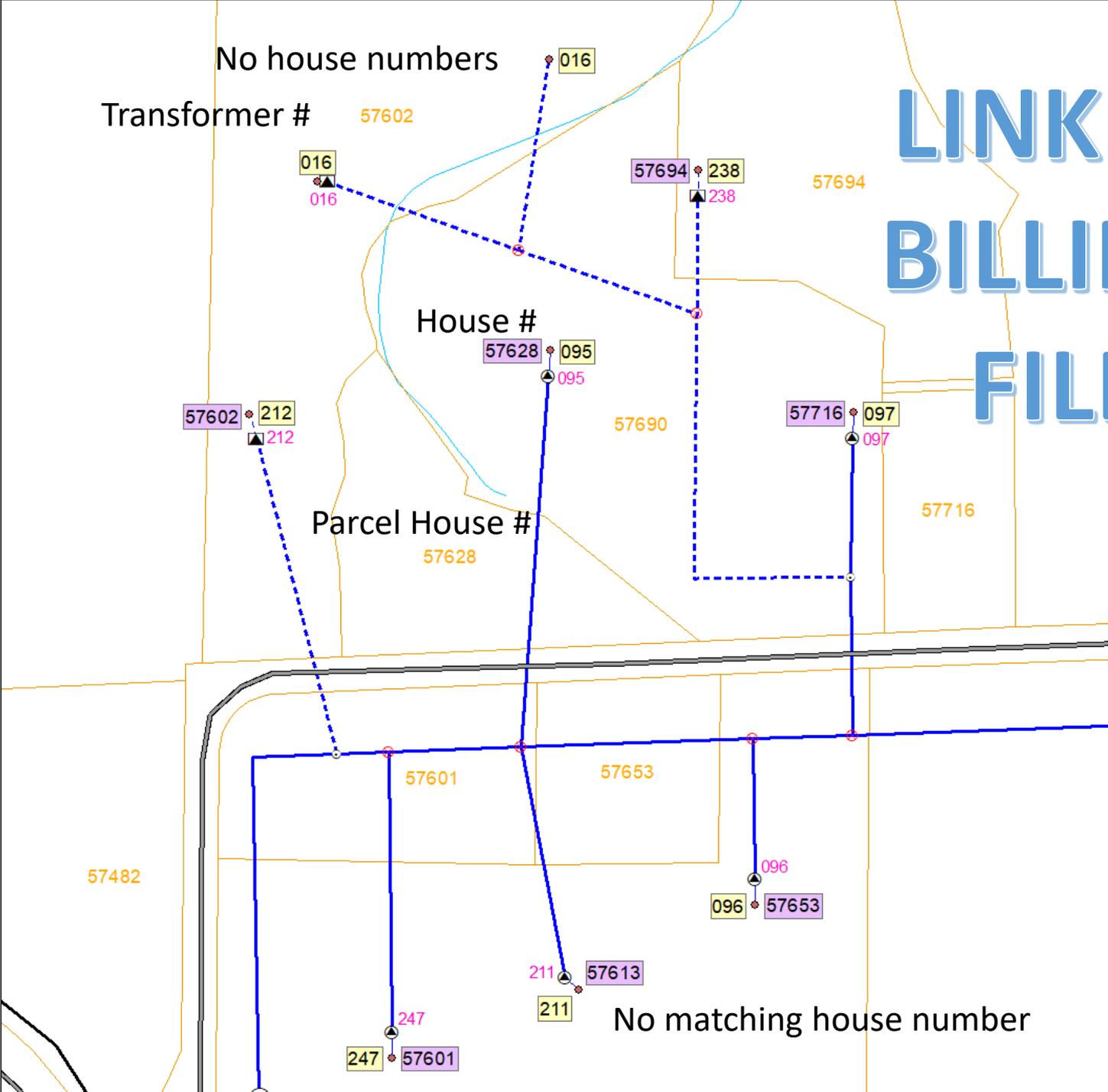
No Transformer?

# CLEANING HOUSE



In Map  
34 NW

# LINKED BILLING FILE



No house numbers

Transformer # 57602

016

016

016

57694

238

238

57694

House #

57628

095

095

57602

212

212

57690

57716

097

097

57716

Parcel House #

57628

57482

57601

57653

096

096

57653

211

57613

211

No matching house number

247

247

57601

In Map  
34 NW



No # 57613



In Map  
34 NW



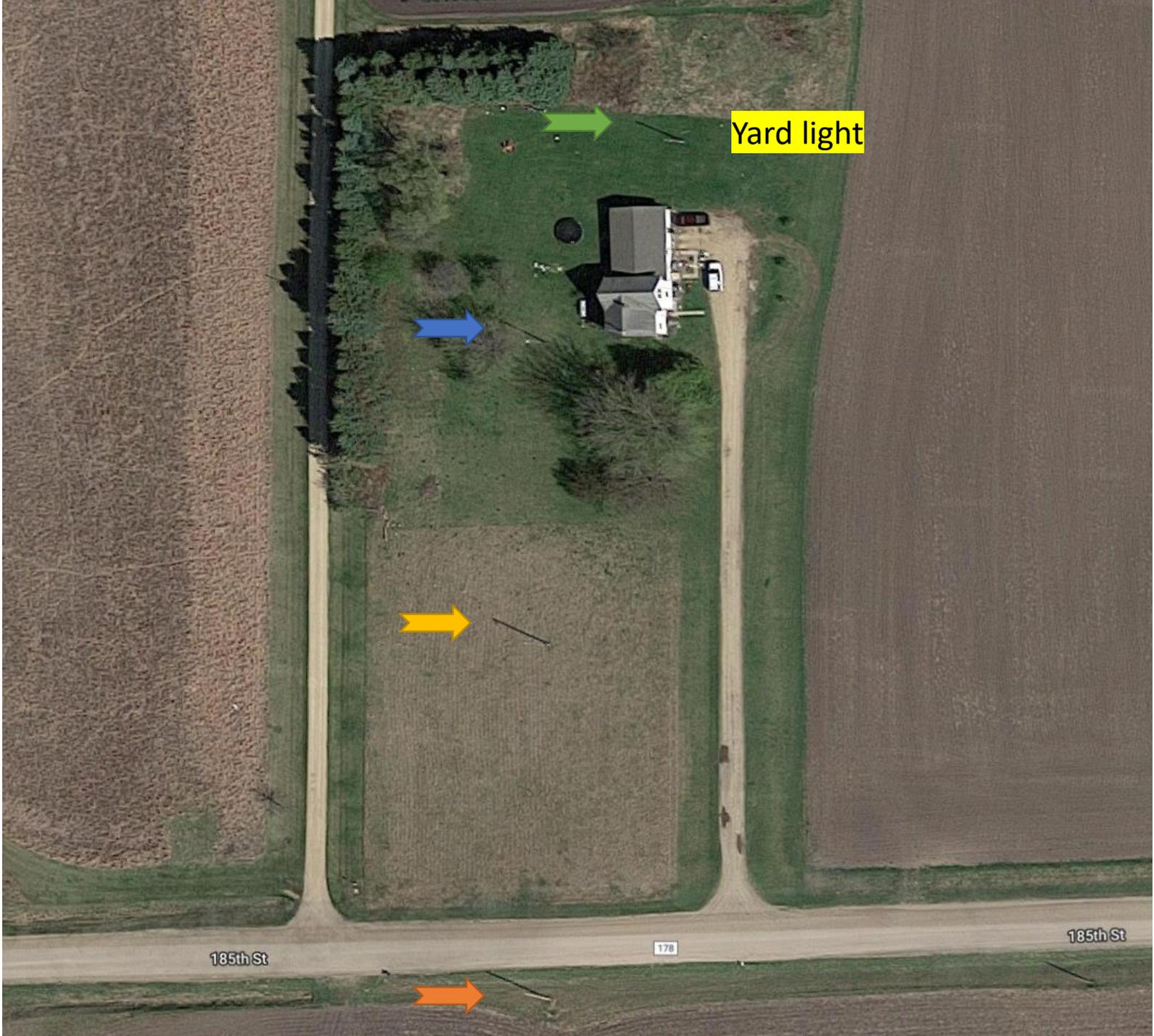
How do you know this?

No # 57613

In Map 34 NW



In Map  
34 NW



Yard light

185th St

178

185th St

In Map  
29 NE  
Rural



Bad road

181  
21366

181

21366

21304

21407

054

054

21407

In Map  
29 NE  
Rural



Good road  
New Buffer

181  
21366

181

21366

21304

21407

054

054

21407

In Map  
29 NE  
Rural

READY TO  
START  
MOVING  
FACILITIES

181  
21366

181



21366

21304

21407

054



054

21407

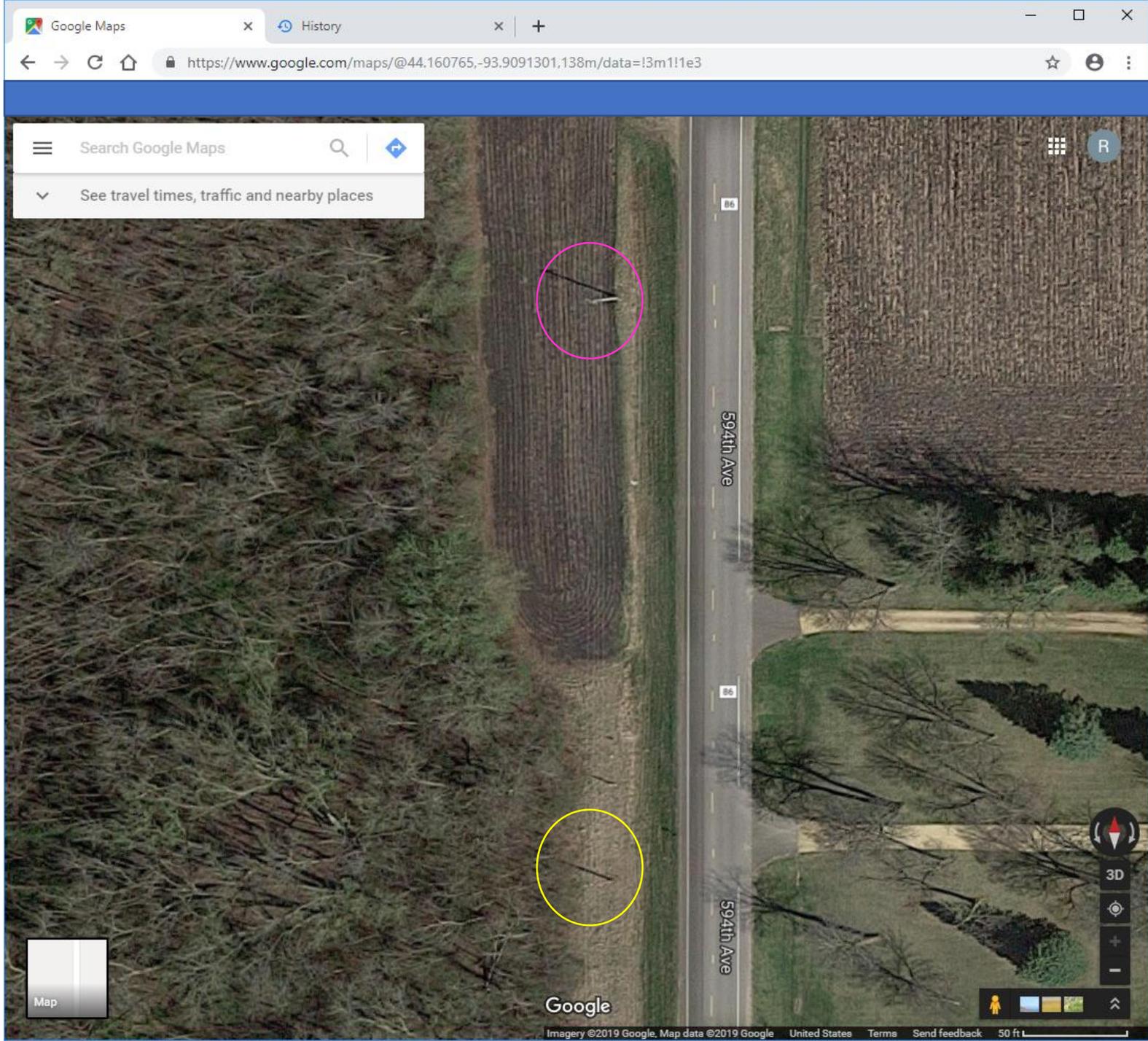
In Map  
29 NE  
Rural



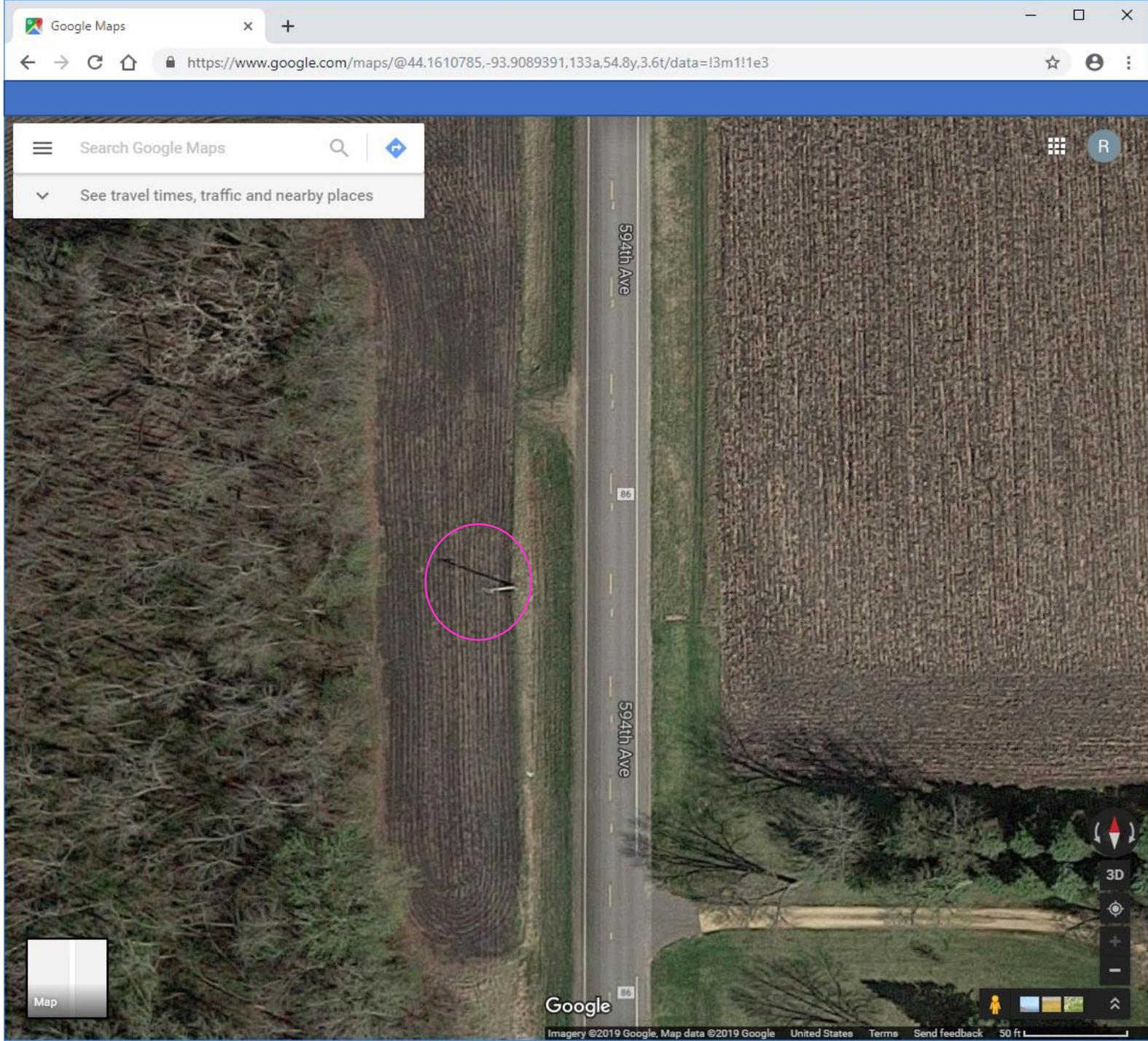
In Map  
29 NE  
Rural



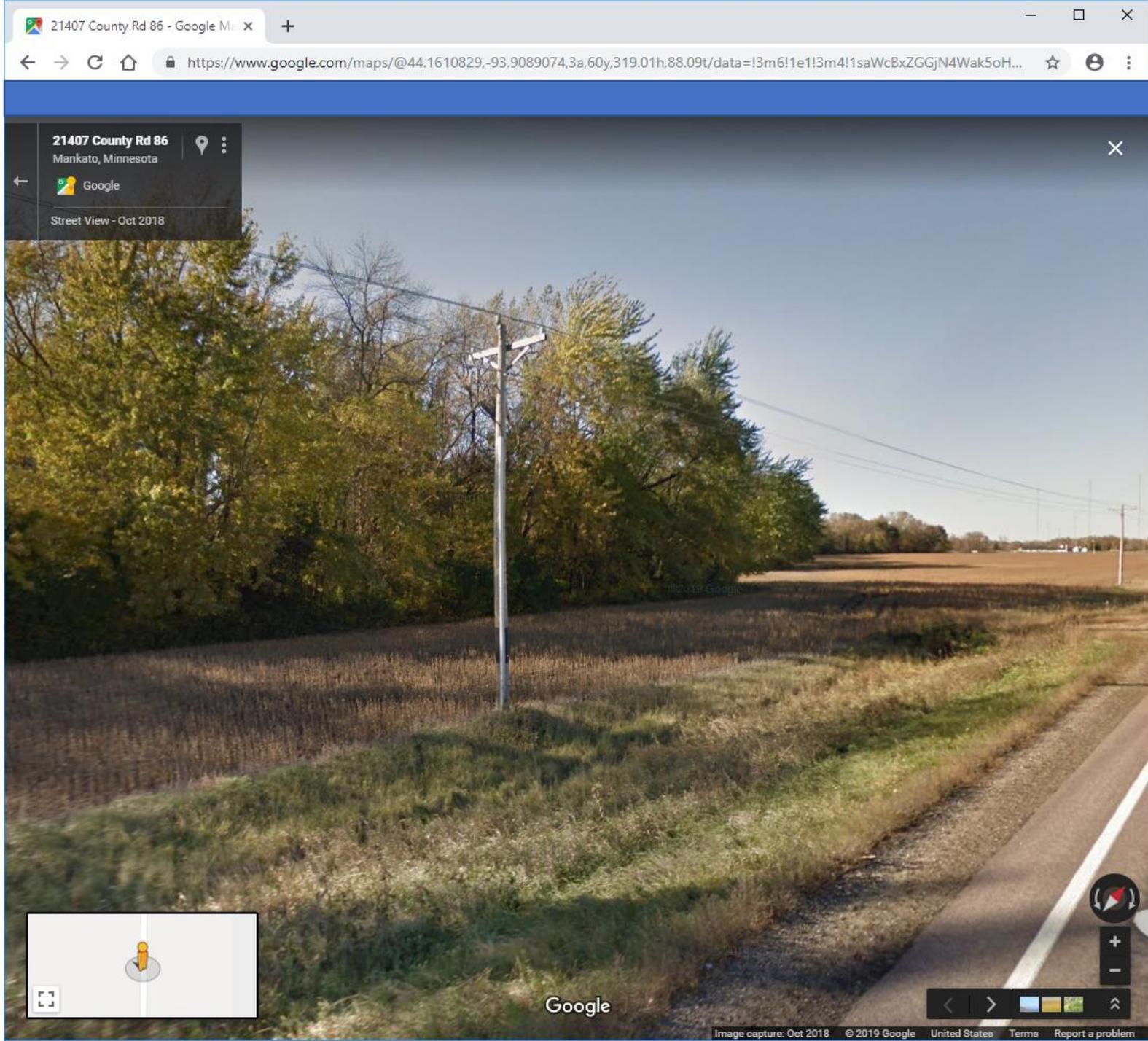
# In Map 29 NE Rural



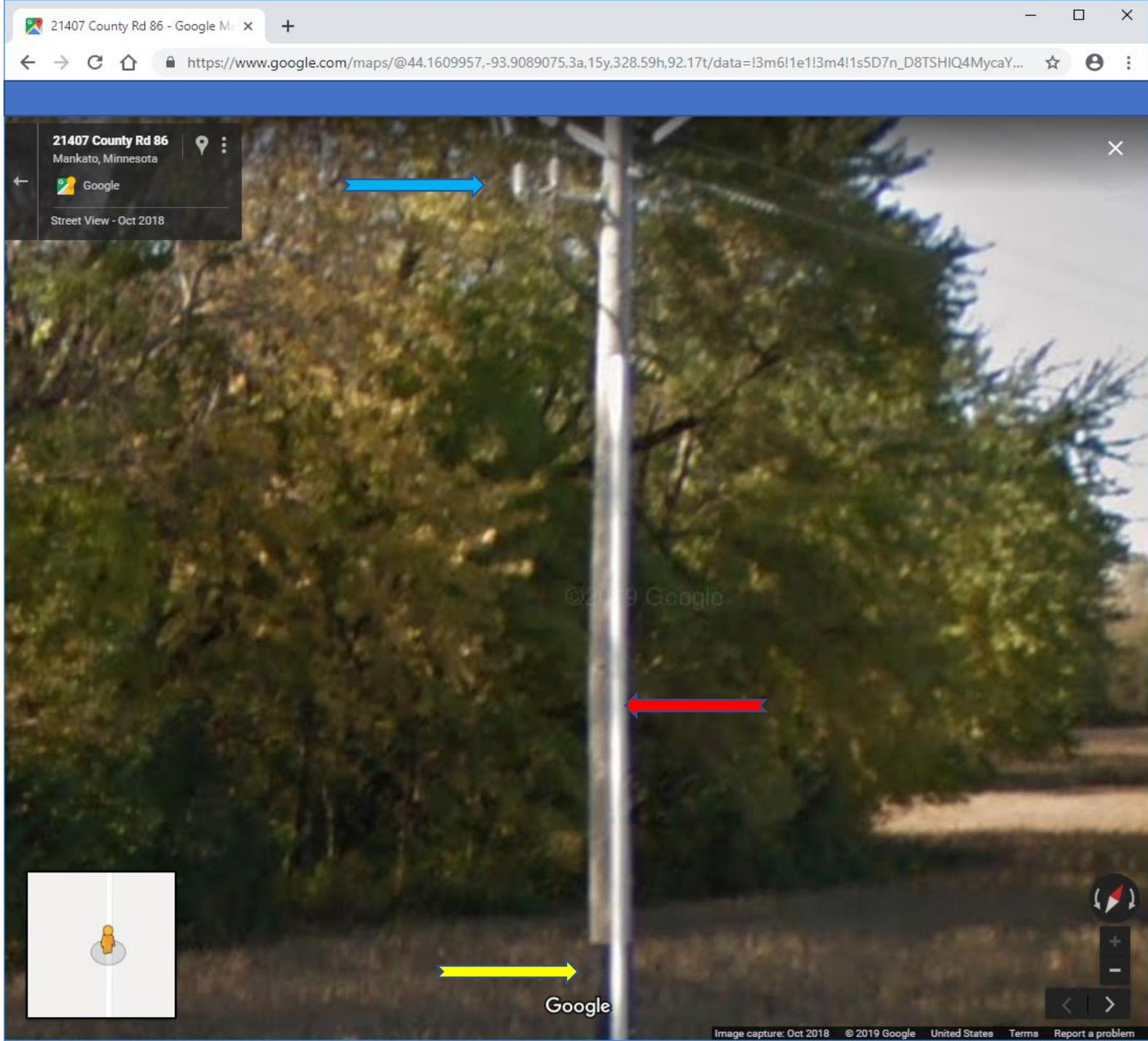
# In Map 29 NE Rural



In Map  
29 NE  
Rural



In Map  
29 NE  
Rural



In Map  
29 NE  
Rural



181  
21366

21366

21304

21407

054  
21407

In Map  
29 NE  
Rural



181  
21366

21366

21304

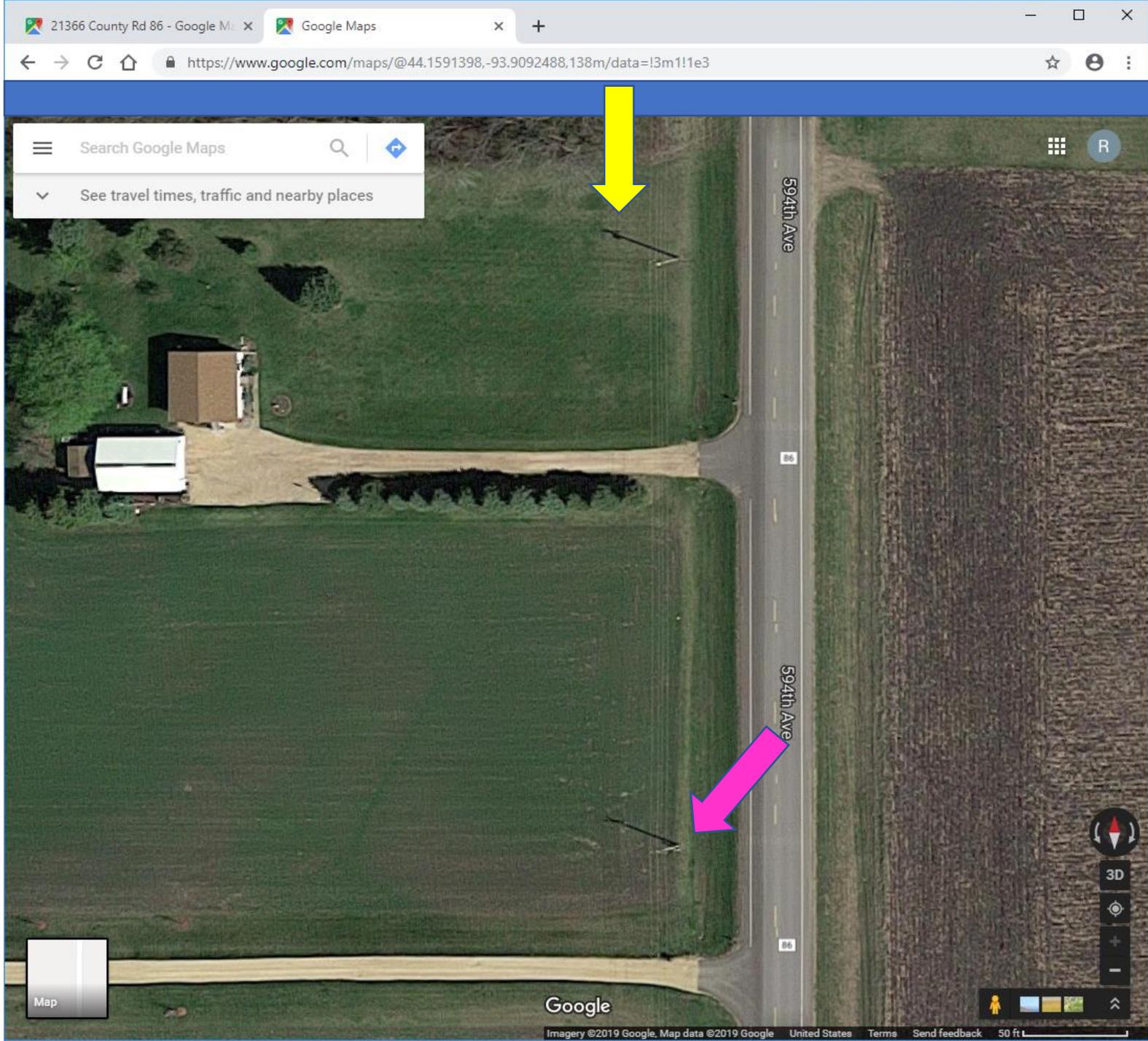
21407

054  
21407

RobertsTools

- Map navigation icons: Home, Back, Forward, Full Screen, Print, Measure, etc.
- Utility icons: A lightning bolt icon is circled in red.

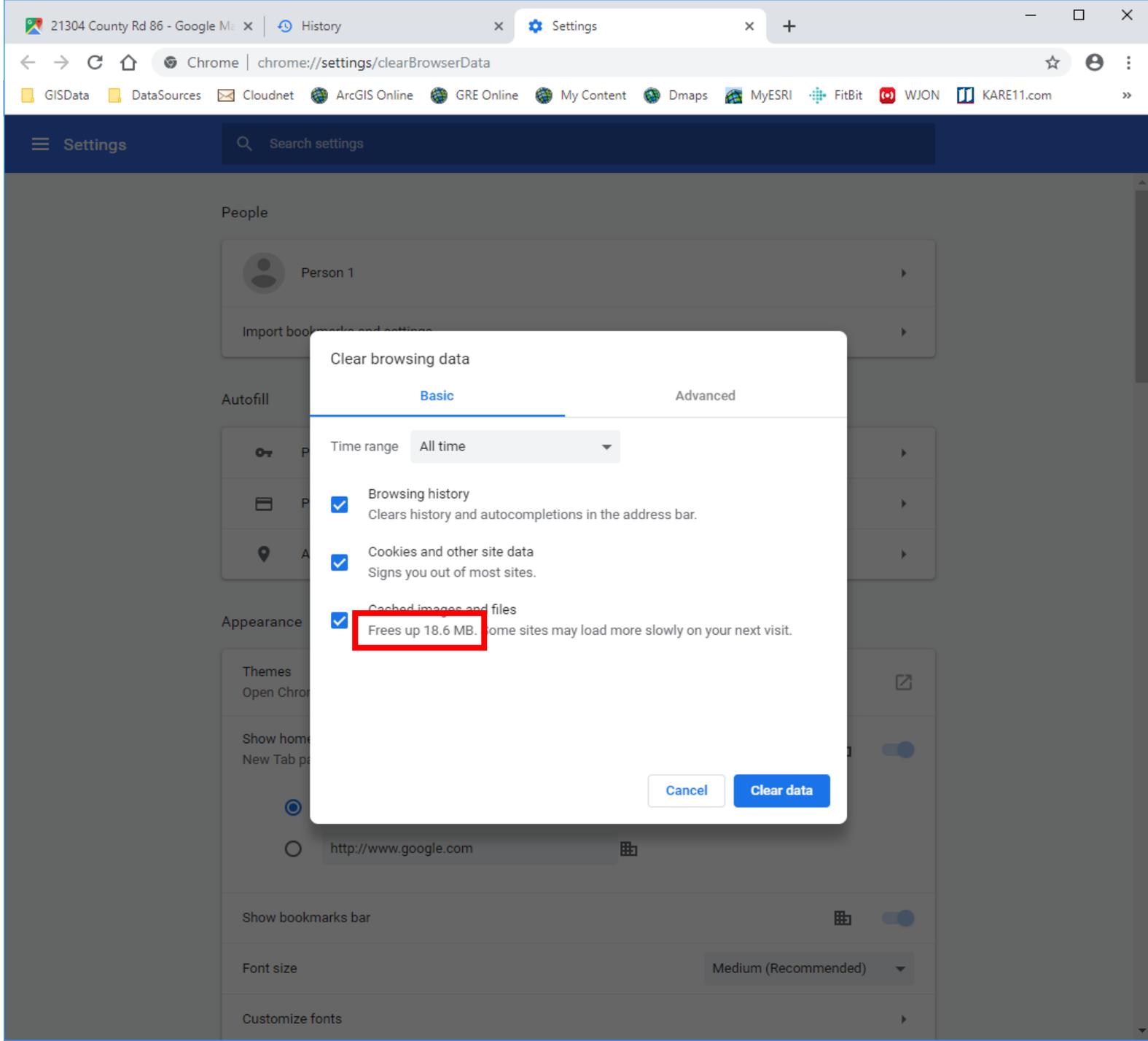
In Map  
29 NE  
Rural



In Map  
29 NE  
Rural







### Clear browsing data

Basic

Advanced

Time range: All time

- Browsing history  
Clears history and autocompletions in the address bar.
- Cookies and other site data  
Signs you out of most sites.
- Cached images and files**  
Frees up 18.6 MB. Some sites may load more slowly on your next visit.

Cancel

Clear data



# Keeping it efficient

- Delete browser history
- Regularly compact database
- Regularly use
  - ArcGIS document defragmenter
  - MXD Disk Doctor
- Stay consistent
- Regularly save



# Keeping it efficient

- Batch file
- Daily compact and back up of database
  - Create python script in ArcCatalog to compact. Activate with batch file
  - copy C:\COOPName\Database\CoopGIS.mdb C:\CoopName\Database\Backup\CoopGIS\_Backup\_%date:~-10,2%\_%date:~-7,2%\_%date:~-4,4%.mdb
- Logical progression
  - Start at the first page
  - Follow a line to its end



# If time allows

- Demo and or questions