NDACo’s Initial Involvement in GIS

- 911 GIS Dataset development began in 2013 - Part of the NG9-1-1 initiative
- 49 of 53 counties have been completed
  - Roads
    - Addressing Information
    - Functional Classification (according to NDDOT)
    - Speed Limits
  - Address Points
    - Addressing Information
  - Data continually maintained by 911 coordinators or their designee
What we found

• Used Google and Microsoft street views to assign the proper street names.
• Worn out street signs in many counties.
• Important for Emergency Response
• Important for Other Services
• Many using Google, Garmin, etc. instead
  • Problems with that
• Real World Scenario
What can be done?

- 911 Funds can be used for signs
  - Authorized by the Emergency Services Communications Coordinating Committee
  - Should be equitably distributed
    - County, Township, Incorporated/Unincorporated
- 7.6M in 911 funds carried over from 2021-2022
- 8.6 M in 911 funds carried over from 2019-2020
- 7.5 M in 911 funds carried over from 2017-2018

Is it enough? Probably not but it’s a start.
What ELSE is NDACo doing?

- Seeking additional funding sources if needed
  - First use what we have
- GIS Services (NEW)
GIS and Traffic Sign Database

Dana Larsen, P.E.
Ward County Engineer
Ways to Store and Display Data

- Database
- Spreadsheet
- Line Chart
- Bar Charts
- Pie Charts
- Pivot Tables
- Bubble Charts
- Venn Diagrams
- GIS (Geographic Information Systems) Mapping
Ward County Fuel and Oil Costs by Year
GIS - Geographic Information Systems
GIS Data I Use Routinely

- Road Data
  - Reconstructed
  - Graveled
  - Paved
  - Chip Sealed
  - Crack Sealed
  - Micro Surface
- Bridge Structures
- Minor Structures
- Culvert data
- Sign Data
- Parcel Information

- Imagery
- Lidar Data
- ADT Traffic Counts
- Floodplain/FIRM
- TE Routes and Missile Sites
- Control Points and Section Corners
- Gravel Pit Locations & Gravel Quantities
- Railroad and Railroad Crossing Info
- City Limits & Zoning Jurisdictions
GIS Data - Free

- North Dakota GIS Hub
  - https://www.gis.nd.gov/

- ND Department of Water Resources
  - https://www.dwr.nd.gov/info_edu/map_data_resources/mapservices.html

- Other GIS Servers
  - ND DOT - North Dakota Department of Transportation
  - USFWS - United States Fish and Wildlife Service
  - USGS - United States Geological Survey
  - ESRI - Environmental Systems Research Institute
Imagery

- **County Imagery**
  - 2010 - 1ft
  - 2015 - 9 inch
  - 2020 - 3 inch

- **State Data**
  - 1938
  - 1946
  - 1961
  - 1974
  - 1999
  - 2003-2020 NAIP

- 2021 - 6-inch State Wide (with shaded relief)
GIS Data

- Road Data
- Bridge Structures
- Minor Structures
- Culvert data
- Sign Data
Road Centerline Data

- County Road Number
- Segment Number
- Street/Avenue
- Federal Aid Number
- Road Surface Type
- Road Class
- Year Constructed
- Last Year Paved
- Last Year Chip Sealed or Micro Surfaced
- Last year Crack Sealed
- Last year Graveled
- Epoxy Striping Year
Last Year Graveled
ADT on Gravel Roads
Bridge Structure
### InspectX

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Name</td>
<td>North Dakota</td>
</tr>
<tr>
<td>Structure Number</td>
<td>511-15044.1</td>
</tr>
<tr>
<td>FHWA Structure Number</td>
<td>00000000D1 150441</td>
</tr>
<tr>
<td>Record Type</td>
<td>1 - Route carried &quot;ON&quot; the structure</td>
</tr>
<tr>
<td>Route Signing Prefix</td>
<td>4 - County highway</td>
</tr>
<tr>
<td>Designated Level of Service</td>
<td>1 - Mainline</td>
</tr>
<tr>
<td>Route Number</td>
<td>05146</td>
</tr>
<tr>
<td>Directional Suffix</td>
<td>0 - N/A</td>
</tr>
<tr>
<td>Highway Agency District</td>
<td>64 - DISTRICT 64</td>
</tr>
<tr>
<td>County (Parish) Code</td>
<td>101 - Ward</td>
</tr>
<tr>
<td>Place Code</td>
<td>SUNRISE TOWNSHIP</td>
</tr>
<tr>
<td>Features Intersected</td>
<td>SOURIS RIVER</td>
</tr>
<tr>
<td>Critical Facility Indicator</td>
<td>-</td>
</tr>
<tr>
<td>Facility Carried By Structure</td>
<td>COUNTY ROAD</td>
</tr>
<tr>
<td>Location</td>
<td>EAST EDGE LOGAN</td>
</tr>
<tr>
<td>Inventory Rte, Min Vert Clearance</td>
<td>99.99</td>
</tr>
<tr>
<td>Milepoint</td>
<td>6.718</td>
</tr>
<tr>
<td>Base Highway Network</td>
<td>0 - Inventory route is not on the Base Network</td>
</tr>
<tr>
<td>LRS Inventory Route</td>
<td></td>
</tr>
<tr>
<td>Subroute Number</td>
<td></td>
</tr>
<tr>
<td>Latitude</td>
<td>48.9333222222</td>
</tr>
<tr>
<td>Longitude</td>
<td>-98.1323611111</td>
</tr>
<tr>
<td>Bypass/Defour Length</td>
<td>2</td>
</tr>
<tr>
<td>Toll</td>
<td>3 - On free road: The structure is toll-free and carries a toll-free highway</td>
</tr>
<tr>
<td>Maintenance Responsibility</td>
<td>2 - County Highway Agency</td>
</tr>
<tr>
<td>Owner</td>
<td>2 - County Highway Agency</td>
</tr>
<tr>
<td>Functional Class Of Inventory Rte</td>
<td>7 - Rural Major Collector</td>
</tr>
<tr>
<td>Year Built</td>
<td>1967</td>
</tr>
<tr>
<td>Lanes On Structure</td>
<td>2</td>
</tr>
</tbody>
</table>

![Map and Satellite view of a bridge](image_url)
Bridge Structure linked to InspectX

https://nddot.inspectx.co/#/bridge-summary/4339

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>109A - Average Daily Truck Traffic</td>
<td>10</td>
</tr>
<tr>
<td>Cat29 - Deck Area</td>
<td>3419.91</td>
</tr>
<tr>
<td>27A - Bridge Age</td>
<td>1967</td>
</tr>
<tr>
<td>ExtraC - Status Without 10 Yr</td>
<td></td>
</tr>
<tr>
<td>0 - Bridge Id</td>
<td>4339</td>
</tr>
<tr>
<td>IX_FK1 - State Id</td>
<td>34</td>
</tr>
<tr>
<td>ExtraD - Recall Number</td>
<td>51-150-44.1</td>
</tr>
<tr>
<td>Cat10 - Bridge Condition</td>
<td>1 - undefined</td>
</tr>
</tbody>
</table>
Minor Structures
Culvert Layer
Sign Layer
Compliance Dates

January 2012

By this date, all agencies will have to establish a sign maintenance program addressing the minimum sign retroreflectivity requirements

This date was extended to June 2014

January 2015

By this date, all agencies must comply with the new retroreflective requirements for regulatory signs, including Stop Signs, Yield Signs, Speed Limit Signs, Warning Signs

This date was extended
Public agencies or officials having jurisdiction shall use an assessment or management method that is designed to maintain sign retroreflectivity at or above the minimum levels in Table 2A-3.

Compliance with the Standard in Paragraph 2 is achieved by having a method in place and using the method to maintain the minimum levels established in Table 2A-3. Provided that an assessment or management method is being used, an agency or official having jurisdiction would be in compliance with the Standard in Paragraph 2 even if there are some individual signs that do not meet the minimum retroreflectivity levels at a particular point in time.
Visual Nighttime Inspection - assessed by a trained sign inspector conducting a visual inspection from a moving vehicle during nighttime conditions.

Measured Sign Retroreflectivity—Sign retroreflectivity is measured using a retroreflectometer.

Expected Sign Life—When signs are installed, the installation date is labeled or recorded so that the age of a sign is known. The age of the sign is compared to the expected sign life.

Blanket Replacement—All signs in an area/corridor, or of a given type, should be replaced at specified intervals.

Control Signs—Replacement of signs in the field is based on the performance of a sample of control signs.
Sign Maintenance Program

- Sign Number
- Sign Type
- Description
- Sign Location
  - GPS Location
  - Distance from starting point
  - Distance from road
- Installation Date
- Last Inspection Data
- Sign Condition
- Sheeting Type
- Retroreflectivity Readings
- Post Type
- Sign Height
- Road Type
- Breakaway Type
- Side of the Road
- Direction Sign Faces
- Travel Direction
Ward County Hwy Dept.
Sign Inventory System

1. Date  1/28/03
2. Sign No.  2010
3. Segment  1342
4. Distance  453 Feet
   139 Meters  290 MILES
5. Side of Road  L R
6. Direction of Travel  N S E W
7. Sign Code  8 1 2
8. Message  \( \sqrt{15} \times 0 \)
9. Sign Shape:  T D SQ R C P O
10. Reflective Grade  C H I D
11. Sign Width:  36
12. Sign Height
13. Post Type  T U W
14. Post Size  1 1/2"  1 3/4"  2"  2 1/2"  2 3/4"  3"  2.75 lb.  4 x 4  4 x 6
15. Sign Condition:  1 2 3 4
16. Post Condition:  E F P
17. Post Distance From Road
18. Bottom Sign Height Above Road
19. Signs First Inventory:
# Sign Repair Form

## COUNTY ROAD SIGN REPAIR FORM

<table>
<thead>
<tr>
<th>DATE</th>
<th>SIGN #</th>
<th>SEGMENT</th>
<th>SIGN COND</th>
<th>REASON FOR REPAIR</th>
<th>ACTION &amp; MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/16</td>
<td>0120</td>
<td>1009</td>
<td>4</td>
<td>Shot up</td>
<td>Sign (HI)</td>
</tr>
<tr>
<td>6/23</td>
<td>0210</td>
<td>1052</td>
<td>4</td>
<td>Shot up</td>
<td>Sign (HI)</td>
</tr>
<tr>
<td>6/14</td>
<td>0130</td>
<td>1005</td>
<td>4</td>
<td>Shot up</td>
<td>replace sign (Hi)</td>
</tr>
</tbody>
</table>

| 7/6   | 0010    | 1516     | 4         | Ranover           | Anchor 12’ T-Post |
| 7/26  | 0010    | 1318     | 4         | Ranover           | 10’ T-Post        |
| 7/26  | 0071    | 0923     | 4         | Missing           | (Hi)              |

July 2007
WARD COUNTY HIGHWAY DEPT.

REFLECTOMETRY BY SIGN NUMBER/PASS-FAIL

FROM DATE: 8/12/2015
TO DATE: 8/12/2015

<table>
<thead>
<tr>
<th>SIGN NUMBER</th>
<th>DATE</th>
<th>TIME</th>
<th>SIGN TYPE</th>
<th>ROAD NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>13180010</td>
<td>08/12/2015</td>
<td>05:46:42</td>
<td>R1-2-36</td>
<td>1318</td>
</tr>
</tbody>
</table>

READING

PASS

.2 LEGEND .2 BACKGND

443 74.4

LEGEND COLOR: WHITE
LEGEND MIN: 35
BACKGND COLOR: RED
BACKGND MIN: 7
CONTRAST RATIO: 3:1

<table>
<thead>
<tr>
<th>SIGN NUM</th>
<th>SIGN TYPE</th>
<th>SIGN DESCRIPTION</th>
<th>ROAD NUM</th>
<th>ROAD LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>13180010</td>
<td>R1-2-36</td>
<td>YIELD</td>
<td>1318</td>
<td></td>
</tr>
</tbody>
</table>

INSTALLED: 04/03/2007
LATITUDE: 48.181985N
LONGITUDE: 101.565345W
REFR. DIST.: 43
SIDE OF RD.: LEFT
FACES: SOUTH
TRAVEL DIR.: NORTH

ROAD TYPE: COUNTY, GRAVEL
SIGN BLANK: ALUMINUM
SHEETING: HI PRISMATIC
SIGN HEIGHT: 6
POST TYPE: Telespar®
BRKAWY: YES
SIGHT DIST.:
GIS CAN GET YOU ANYWHERE
Culvert Database Planning - 2017

- Previously done in 2008 as points
- File type
- Fields to Consider
- Drop Downs with set parameters
- Data storage
- Collection methods
- Unique number

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FID</td>
<td>22</td>
</tr>
<tr>
<td>Shape</td>
<td>Polyline ZM</td>
</tr>
<tr>
<td>LOCATION</td>
<td>CL</td>
</tr>
<tr>
<td>MATERIAL</td>
<td>CMP</td>
</tr>
<tr>
<td>SHAPE_1</td>
<td>ROU</td>
</tr>
<tr>
<td>SIZE</td>
<td>18</td>
</tr>
<tr>
<td>END_SECTION</td>
<td>NONE</td>
</tr>
<tr>
<td>CONDITION</td>
<td>GOOD</td>
</tr>
<tr>
<td>INLET_COND</td>
<td>GOOD</td>
</tr>
<tr>
<td>OUTLET_C_1</td>
<td>GOOD</td>
</tr>
<tr>
<td>RCP_SEPA_1</td>
<td>N/A</td>
</tr>
<tr>
<td>RCP_SPAL_1</td>
<td>N/A</td>
</tr>
<tr>
<td>CMP_RUST_1</td>
<td>GOOD</td>
</tr>
<tr>
<td>SILT</td>
<td>CLEAN</td>
</tr>
<tr>
<td>SHOT</td>
<td>FLOW</td>
</tr>
<tr>
<td>SHOT_DATE</td>
<td>5/26/2017</td>
</tr>
<tr>
<td>USER</td>
<td>Cole</td>
</tr>
<tr>
<td>COMMENT</td>
<td></td>
</tr>
<tr>
<td>PHOTO</td>
<td>PHOTO_0042.jpg</td>
</tr>
<tr>
<td>Updated</td>
<td>0</td>
</tr>
<tr>
<td>VMIsComplete</td>
<td></td>
</tr>
</tbody>
</table>
Culvert Database Collection

- Used VRS (Virtual Base Station) via internet
- ArcPad
- Geo7x
- External antenna on GPS rod
- Camera built into collector
- Database created with drop downs
- Newer practices
  - iPad, external bluetooth antenna, field maps application.
Culvert collection use/maintenance

- Maintain internally for repairs/replacements/new
- Using ArcGIS for implementation of updates in database
- Forms for staff to complete in field and hand in
- Field Maps application for field collection to continue to have the most up to date database
Sign Database

- Data out of Reflectometer from Sign Technician
- AS400 layout from database
- Code inside excel to remove characters and make usable information
- Made them their own unique fields
- Joined into ArcGIS shapefile from KMZ file
- Used unique sign number created by Tech for join
Sign Database

- Sign technician database from vendor
- Grouped based off of road segments
- Sign history per individual sign
- Sign numbers
  - First four = Road Segment
  - Last four = first sign on segment number
  - Last four numbers have a 10 number gap for future added signs in between
Symbolize Sign database

- Create a symbology group layer for sign numbers from the Manual on Uniform Traffic Control Devices (MUTCD)
- Implement into a GIS layer and share to a hosted service for our internal basemap
- Collection done using Road Vista 922 reflectometer
  - < 3 meter position fix
Roadway Database

- **GRIT**
  - Keep updated yearly for construction and maintenance projects - Upper Great Plains
    - [https://dotsc.ugpti.ndsu.nodak.edu/GRIT/](https://dotsc.ugpti.ndsu.nodak.edu/GRIT/)
- Internal database inside of ArcGIS
  - Updated yearly for constructions and maintenance projects
- Use for planning internally for years to come for budgets
- Make sure roads don’t slip through cracks for maintenance
Ward County hosted GIS

- Public viewers
- ArcGIS online hosted
- Hosted imagery service
- External sources utilized from state/federal agencies
  - Federal USFWS layers
  - ND Voting Layers
  - NDSWC and ND Hub Imagery

- Ward County GIS Homepage