Leveraging the Power of GIS Technology for Project Management

Pole Replacement Tracking Tool

11/12/15
Presenters

- Scott Hafner – Xcel Energy, strategic resource planner
- Sean Walker - Xcel Energy, field operations manager
- Dan Haglund – Ulteig, GIS analyst
Overview

- Background
  - Pole replacement program evolution and challenges
- The GIS solution
  - Demonstration
- The results
- Questions
Xcel Energy Corporate Overview

- Investor owned utility operating in 8 States
  - NSPM – MN, ND & SD
  - NSPW – WI & MI
  - PSCo – CO
  - SPS – TX & NM
- 3.5 million electric customers
- 2.0 million gas customers
- 12,469 employees
Ulteig Corporate Overview

- Founded in 1944
- 350 Employees
- Public and Private Sector Clients
  - Power
  - Communications
  - Renewables
  - Government
- Office Locations
  - North Dakota- Fargo, Bismarck, Williston
  - Minnesota- St. Paul, Detroit Lakes
  - Colorado- Denver
  - South Dakota- Sioux Falls
  - Iowa- Cedar Rapids
Background
1.5M customers across MN, SD and ND
Distribution workforce
Local resources
6 areas and approximately 20 service centers each with design and construction capabilities
Decentralized work management
Supplemental resources
Contracting and utility services (C&US)
Centrally located in St Paul
Procures and manages distribution design and construction contractors
Pole Replacement Program

- Xcel – NSPM owns approximately 500,000 poles
- Approximately 12 year test and treat cycle
- Approximately 20,000 – 40,000 poles inspected every year
  - Approximately 10% of tested poles fail and need to be replaced
- Relatively short cycle jobs – approx. 1 pole / 3-person crew / day

<table>
<thead>
<tr>
<th>Poles Replaced in</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>3,026</td>
</tr>
<tr>
<td>2014</td>
<td>1,932</td>
</tr>
<tr>
<td>2013</td>
<td>1,308</td>
</tr>
<tr>
<td>2012</td>
<td>1,710</td>
</tr>
</tbody>
</table>
Process Prior to 2014

- Areas are identified for testing by area engineers
- The pole inspection and treatment program is managed across all OpCo’s by the vegetation management group
- Vegetation management distributes the final test results (the “pole workload”) to the approx. 12+ area engineers
- Local areas responsible for design and construction
  - Track workload and progress themselves
  - Spreadsheets managed by design, engineering, supervisors, or some other method as determined by the area.
- C&US responsible for forecasting and overall progress tracking
Challenges

- Pole workload varies greatly from year to year and by area
  - Difficult to design and/or construction to react
  - Difficult to maintain consistent practices
- Difficult to understand progress replacing poles across NSPM
  - Often the decision to bring in contractors was made late in the year and greatly increased the CPU
- Impossible to develop comprehensive pole by pole view
  - Areas reported monthly progress as gross counts
  - Which poles were replaced?
- Budget and forecasting
- Design challenges
  - Difficult to group poles geographically
  - Design and construction made separate trips to the pole
Process Change

- Management decided to have C&US centrally manage the replacement program
  - C&US to design the pole replacements
  - C&US to manage contractors replacing the poles
  - Local areas have the option to complete some of this work
    - The “default switch position” is C&US replacing the poles
  - C&US implemented a new pricing structure – bid units
- We needed pole replacement tracking system!
GIS Solution
The Solution

- Centralized GIS database with web and mobile access
  - Real time data
  - Intuitive
  - Collaborative Environment
  - Cost effective
  - More powerful than using KML/KMZ files
What is GIS?

- Layers
- Database Driven
- Spatial Relationships
- Analysis

- Roads
- Land use
- Boundaries
- Hydrography
- Elevation
- Image base
End user access

- Web Map
- Web Table
- Mobile Mapping Application
#1 Change Attributes to Filter Table

#2 Load Records to see filtered results

Export to Excel Spreadsheet

Click to Edit

Click to View Pictures
Edit Record

Construction Notes
Need mini lineman, primary, 3 wire buss, 2 three wire services,

Designer Notes
P3-34828651 (J451) – REPLACE 30’ POLE – 7945 SCOTT BLVD – ONE PHASE PRIMARY, SECONDARY, 2 OH SERVICES, MINI LINEMAN ACCESS. CGR072 7970

Responsible Party
C&US

Assigned Designer
Joel Felk

Assigned Contractor
MJ Electric

Status
Install complete- Old pole removed

Design Number
0000496448

Work Order Number
12201905

Cancel   Save
### NSPM Pole Replacements as of 10/7/2015

**Year Complete**  
**Current Work Load**

<table>
<thead>
<tr>
<th>Area Responsible for Const</th>
<th>Service Area</th>
<th>Assigned to Design</th>
<th>Design Complete</th>
<th>Sent to Construction</th>
<th>Install complete 3rd party transfer left</th>
<th>Install complete Old pole removed</th>
<th>Already completed by others</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contracting &amp; Util Srvcs</td>
<td>Metro East</td>
<td>3</td>
<td>28</td>
<td>87</td>
<td>24</td>
<td>594</td>
<td>50</td>
<td>786</td>
</tr>
<tr>
<td></td>
<td>Metro West</td>
<td>7</td>
<td>36</td>
<td>249</td>
<td>53</td>
<td>445</td>
<td>62</td>
<td>852</td>
</tr>
<tr>
<td></td>
<td>South Dakota</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>74</td>
<td>5</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>Southeast</td>
<td>258</td>
<td>45</td>
<td>1</td>
<td>3</td>
<td>170</td>
<td>11</td>
<td>484</td>
</tr>
<tr>
<td></td>
<td>(Blank)</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>15</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Contracting &amp; Util Srvcs Total</td>
<td></td>
<td>270</td>
<td>65</td>
<td>382</td>
<td>80</td>
<td>1298</td>
<td>128</td>
<td>2223</td>
</tr>
<tr>
<td>Local Area</td>
<td>Metro West</td>
<td>35</td>
<td>2</td>
<td>14</td>
<td>66</td>
<td>13</td>
<td>10</td>
<td>140</td>
</tr>
<tr>
<td></td>
<td>North Dakota</td>
<td>26</td>
<td>16</td>
<td>1</td>
<td>5</td>
<td>40</td>
<td>1</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>Northwest</td>
<td>102</td>
<td>7</td>
<td>28</td>
<td>225</td>
<td>7</td>
<td>365</td>
<td></td>
</tr>
<tr>
<td></td>
<td>South Dakota</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Southeast</td>
<td>6</td>
<td>9</td>
<td>78</td>
<td>71</td>
<td>406</td>
<td>56</td>
<td>803</td>
</tr>
<tr>
<td>Local Area Total</td>
<td></td>
<td>183</td>
<td>9</td>
<td>78</td>
<td>71</td>
<td>406</td>
<td>56</td>
<td>803</td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td>453</td>
<td>74</td>
<td>460</td>
<td>151</td>
<td>1704</td>
<td>184</td>
<td>3026</td>
</tr>
</tbody>
</table>

**Sub total - poles replaced by contractors:** 1506 (68%)

**Sub total - poles replaced by local areas:** 533 (66%)

**Total Poles Replaced:** 2039 (67%)
## Status of Pole Replacements in St Cloud Service center

**Responsible Party:** Northwest  
**Year Complete:** Current Work Load  

<table>
<thead>
<tr>
<th>Count of Status</th>
<th>ServiceCenter</th>
<th>INSPECTLOCATION</th>
<th>Assigned to design</th>
<th>Design complete</th>
<th>Sent to construction</th>
<th>Install complete-Old pole removed</th>
<th>Already completed by others</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td>Saint Cloud</td>
<td>MN- Northwest- Saint Cloud- Kimball</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MN- Northwest- Saint Cloud- Kingston</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MN- Northwest- Saint Cloud- Le Sauk township</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MN- Northwest- Saint Cloud- Munson township</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MN- Northwest- Saint Cloud- Saint Cloud</td>
<td>26</td>
<td>2</td>
<td>19</td>
<td>119</td>
<td></td>
<td>156</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MN- Northwest- Saint Cloud- Sartell</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MN- Northwest- Saint Cloud- Waite Park</td>
<td>1</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>Saint Cloud Total</td>
<td></td>
<td></td>
<td>26</td>
<td>2</td>
<td>23</td>
<td>143</td>
<td>1</td>
<td>135</td>
</tr>
<tr>
<td>Local Total</td>
<td></td>
<td></td>
<td>26</td>
<td>2</td>
<td>23</td>
<td>143</td>
<td>1</td>
<td>135</td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td></td>
<td>26</td>
<td>2</td>
<td>23</td>
<td>143</td>
<td>1</td>
<td>135</td>
</tr>
</tbody>
</table>
EDITING
1. Click Pole
2. Click Button
3. Select Edit
4. Attach Picture
5. Make Attribute Changes
Demonstration
The Process Started in 2014

- **Overview**
  - Process follows the same testing process
  - Test results sent only to C&US and then uploaded into the system
    - Then work is distributed across work groups
    - Records tracked at individual pole level
  - Local area use the system
    - Provided training and support
The Process Started in 2014

**Contractor Perspective**
- Contractors adapted to the system very quickly
- Contractors visit all poles and…
  - Collect info for design
  - Upload pictures
  - Identify need for…
    - Tree trimming
    - Switching
    - Special equipment, etc.
- See all poles on a map view to identify laydown yards
- Contractors update the tracker on a pole by pole basis
The Process Started in 2014

Design Perspective

- Designers can easily design from the office using information collected by contractors
  - increased productivity and consistency
  - Design progress and assignments can be tracked and revised
  - Allows designers to manage their workload
- Poles can be grouped geographically on work orders
  - Geographically grouped poles is one of the keys to our bid units contracts
  - We have seen an approximately 28% CPU decrease comparing poles replaced in 2013 vs 2015 YTD
The Process Started in 2014

- **C&US Back Office Perspective**
  - Easily and accurately…
    - Report on design productivity and progress
    - Report on construction progress
      - Including local area progress
      - Allows for more accurate forecasting
    - Manage workload between contractors and local areas
    - Keep track of poles requiring 3rd party transfers
Results & Analysis
Pros

- Clear map of all poles with status
- Easy for multiple work groups to utilize simultaneously
- Provides users two ways to access the same data
  - Table viewer or GIS Map Viewer
- Can be accessed with PC, smart phone or tablet
- Searchable
- Easily generates reporting
- Reduced CPU
- Is an additional tool for WO closing
  - Provides back office another view of what happened in the field
Cons

- Stand alone system
  - Not tied in to our GIS system
  - Not tied into our system of record (PassPort)
  - Not tied into scheduling or dispatch systems
Additional Opportunities

- Other operating companies
- Incorporate the testing process
  - Identification of test areas and poles
  - Test crews collect pictures
  - Improved turn around
- Tracking interactions with vegetation management
- Tracking other segments of work
  - Tap level cable replacement
  - Joint trench projects
  - Storm restoration rosters and crew tracking
  - Etc..
Contact Information

- Scott Hafner- Xcel Energy
  - Scott.A.Hafner@xcelenergy.com  651-229-5537

- Sean Walker- Xcel Energy-
  - Sean.D.Walker@xcelenergy.com  651-229-2360

- Dan Haglund- Ulteig-
  - Dan.Haglund@ulteig.com  651-415-3843
Questions?