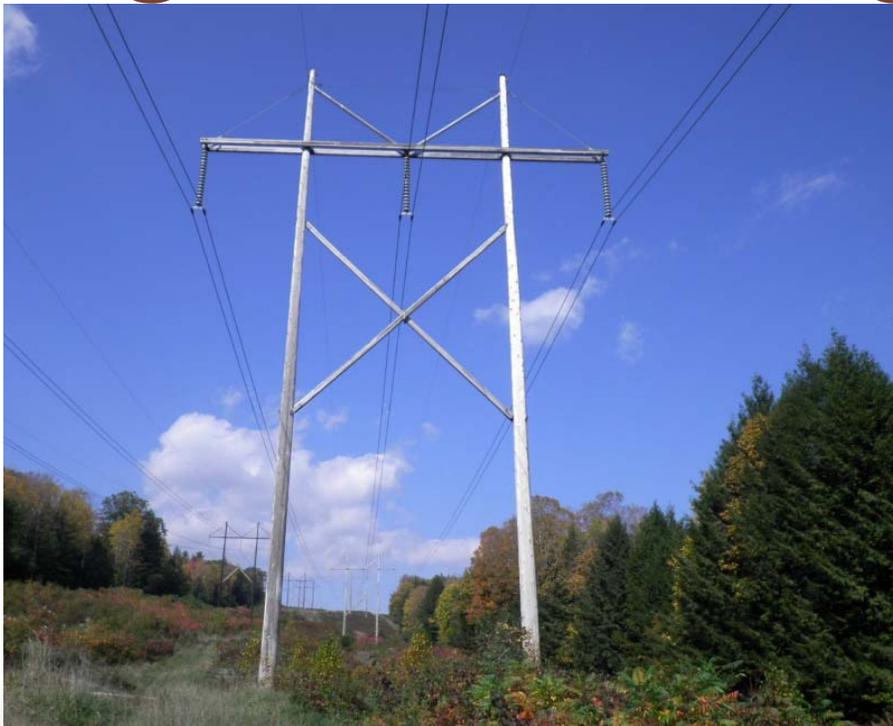


Using LiDAR to Improve a Vegetation Management Plan



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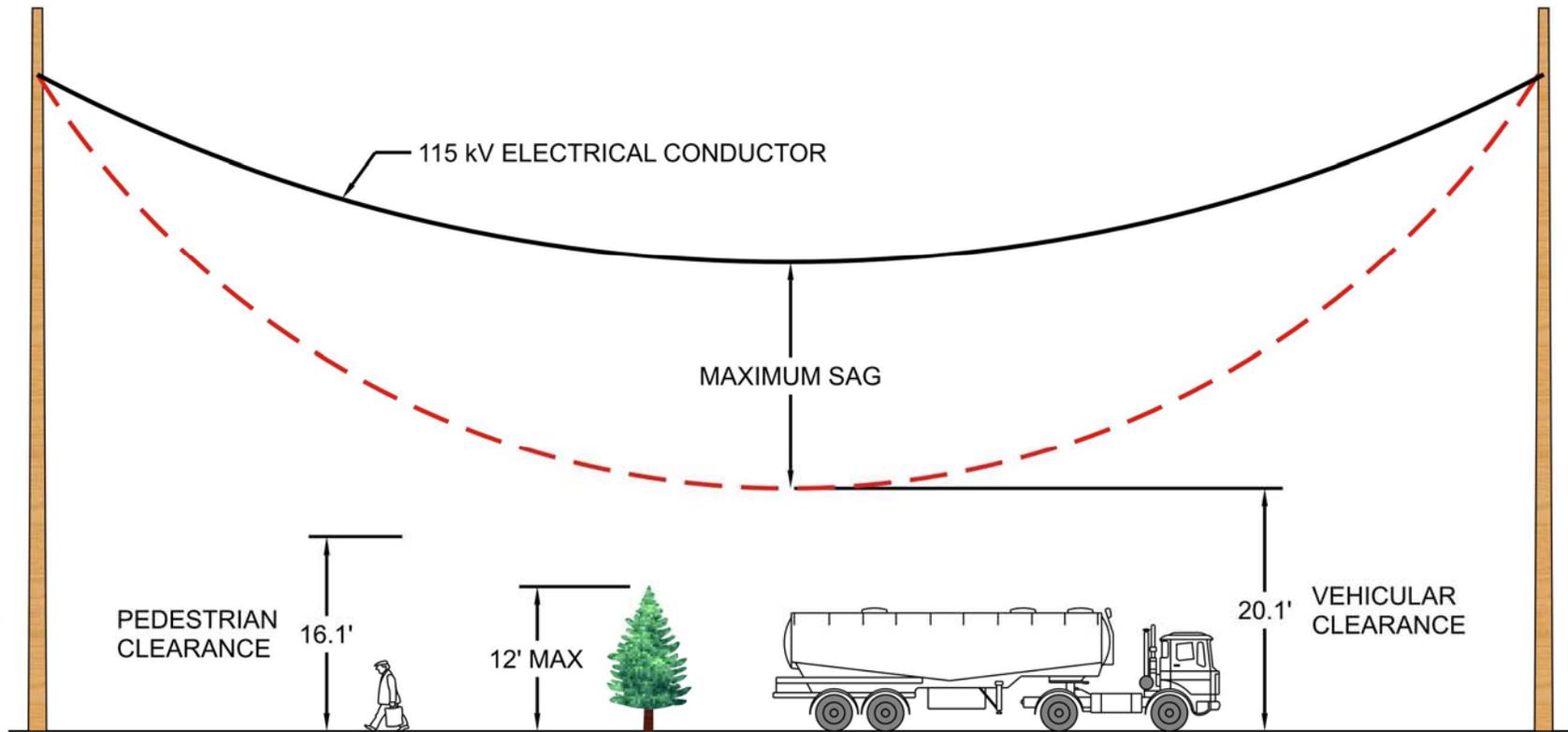
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FAC-003

To improve the reliability of the electric transmission systems by preventing outages from vegetation located on transmission rights-of-way (ROW) and minimizing outages from vegetation located adjacent to ROW, maintaining clearances between transmission lines and vegetation on and along transmission ROW, and reporting vegetation-related outages of the transmission systems to the respective Regional Reliability Organizations (RRO) and the North American Electric Reliability Council (NERC).

**Create a Vegetation Management Plan,
Execute the Plan, Document the Work and
No Vegetation Outages or Else!**

Electrical Clearances for a 115 kV Transmission Line



Electrical conductor clearances are required to keep the public safe and to prevent power interruptions.

This is what we are trying to prevent.



http://www.tva.com/power/rightofway/cost_single_tree.htm

Electrical conductor clearances are required to keep the public safe and to prevent power interruptions.

Pre 2010 Vegetation Management Plan

- Vegetation inventory was entered into ruggedized field computers via a custom GIS application
- All data entered was based on field observations
- Degreed foresters evaluated the condition of the vegetation and its proximity to transmission infrastructure
- Laser range finders were used to get more accurate vegetation heights and distances to conductors

Nothing has changed in the last two years, except...

- LiDAR is a new tool in the “toolbox”
- The LiDAR data helps the vegetation team to identify areas where extra time should be spent evaluating the vegetation
- Evaluating contractor use of mobile GIS to sign off on completed work

Difference between LiDAR flights

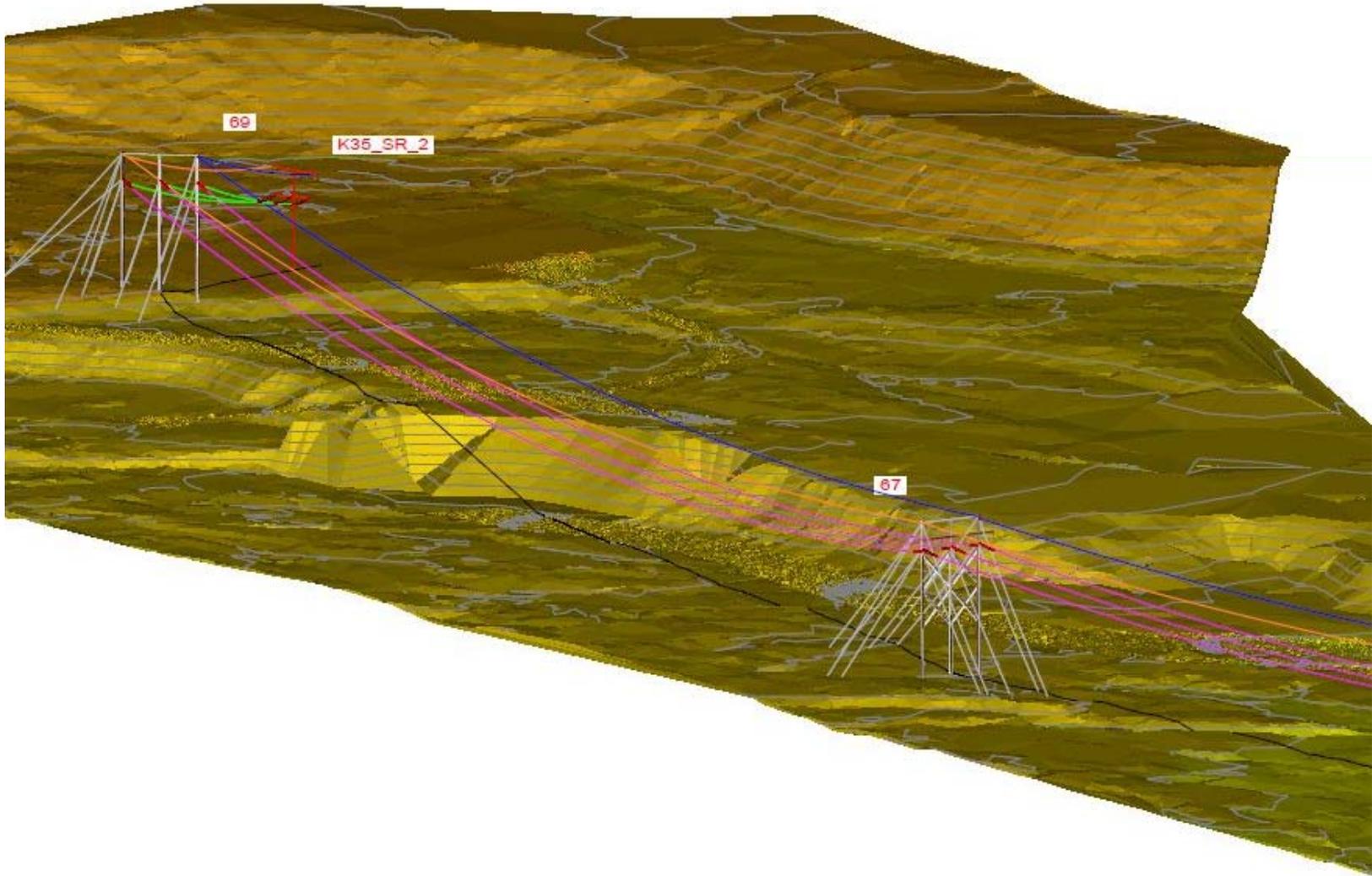
2010 Deliverables:

- [PLS-CADD Line Models](#)
- RGB Ortho-Rectified Imagery
- Vegetation Clearance Report
- Survey Point Clearance Reports
- GIS Data, including:
 - Infrastructure Geodatabase
 - Vegetation Polygons
 - Vegetation and Infrastructure Interactions

2012 Deliverables:

- PLS-CADD Line Models
- Vegetation Clearance Report
- GIS Data, including:
 - Vegetation Polygons
 - Vegetation and Infrastructure Interactions

PLS CAD Example



Difference between LiDAR flights

2010 Deliverables:

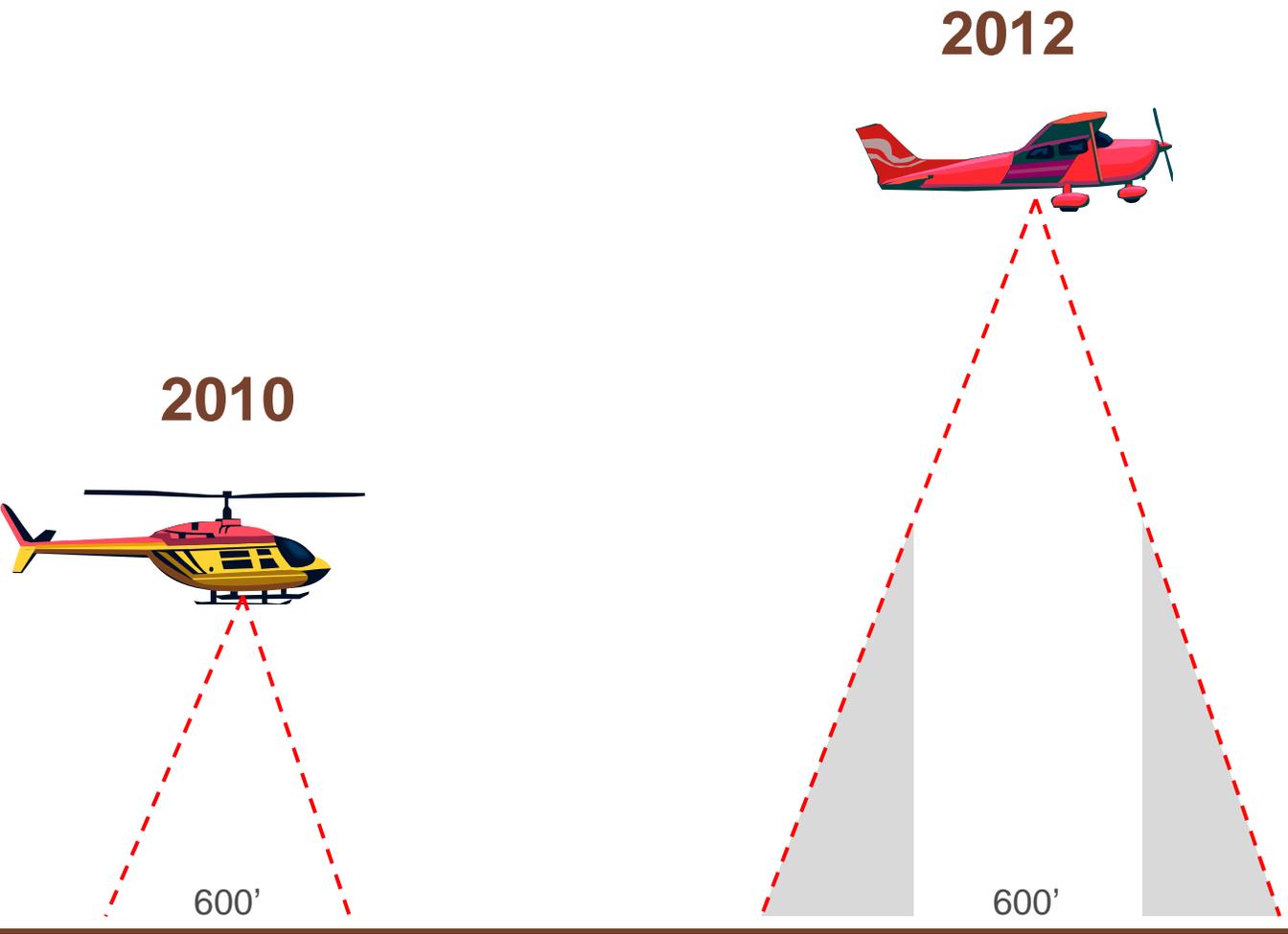
- 51 PLS CADD Models
- 794 Point Cloud Files
- 5,107,204 Vegetation Interaction Polygons
- 1,909 Color Ortho-Rectified Images
- 57.2 Gigabytes of data
- 585 Circuit Miles Flown
- \$974 per mile

2012 Deliverables:

- 2 PLS CADD Models
- 4,033,204 Vegetation Interaction Polygons
- 6.41 Gigabytes of data
- 322 Circuit Miles Flown
- \$390 per mile

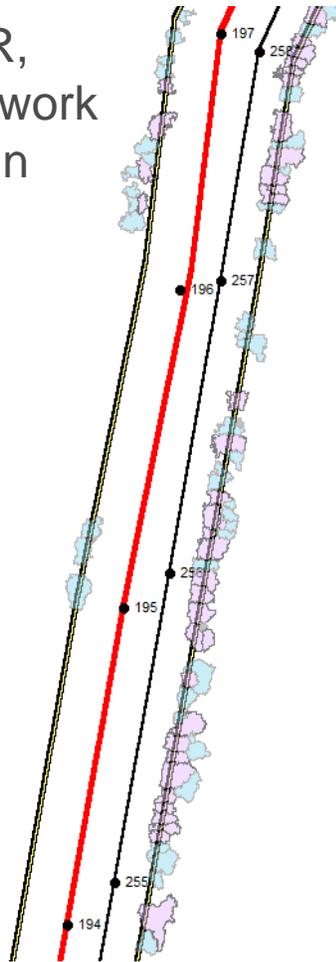
A custom ArcPad application was used to field verify and document their findings.

Difference between LiDAR flights



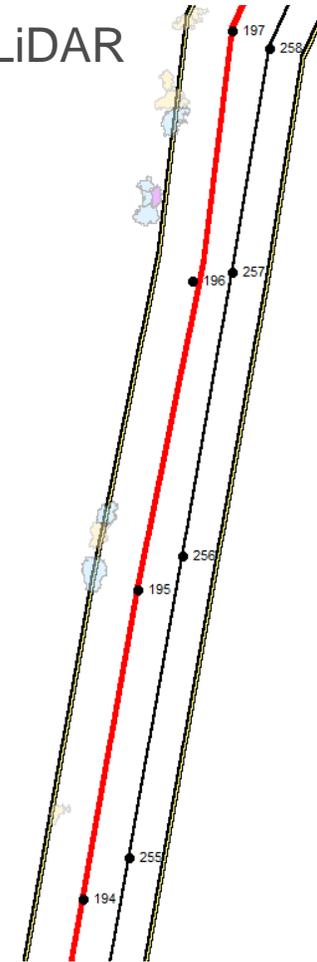
Difference between LiDAR flights

2010 LiDAR,
Vegetation work
completed in
2011

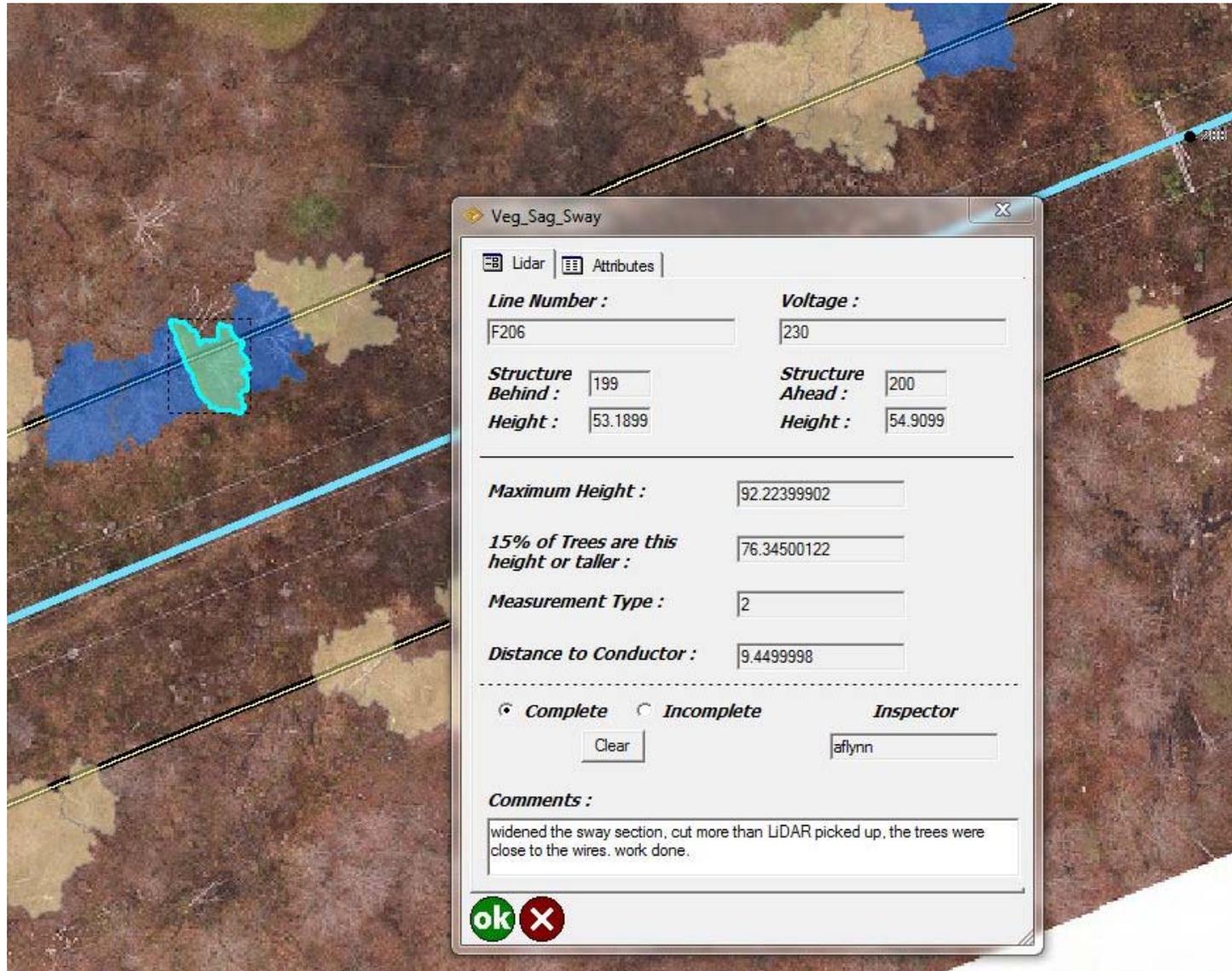


- Pink – Trees will contact the line if they fall
- Blue – Trees will fall within the minimum electrical clearance
- Tan – Future growth areas to inventory

2012 LiDAR



Vegetation Maintenance Work in 2011



Issues With Data : Danger Trees



Process to Remove a Danger Tree

Danger Trees

Danger Tree | VIP | Attributes | Geography

Diameter Class: 4 (25" to 30")

Tree Species: White Pine

Treatment Type: Remove

Marked: Painted

Threat Tree:

Comments: (Maximum 100 Characters)

Use Previous

Use values from last danger tree entered.

1

ok X

Danger Trees

Danger Tree | VIP | Contractor | Attributes | Geography

Initials: JCH

Date: 2013-05-07

Line Number: F206

Span: 130 | 131

Work Code: Danger Tree

Hours: 1.5

Feature ID #: D1-4/64

Comments

2

ok X

Danger Trees

Danger Tree | VIP | Attributes | Geography

Report ID: DT-169

Line Number: 370

Complete Incomplete Clear

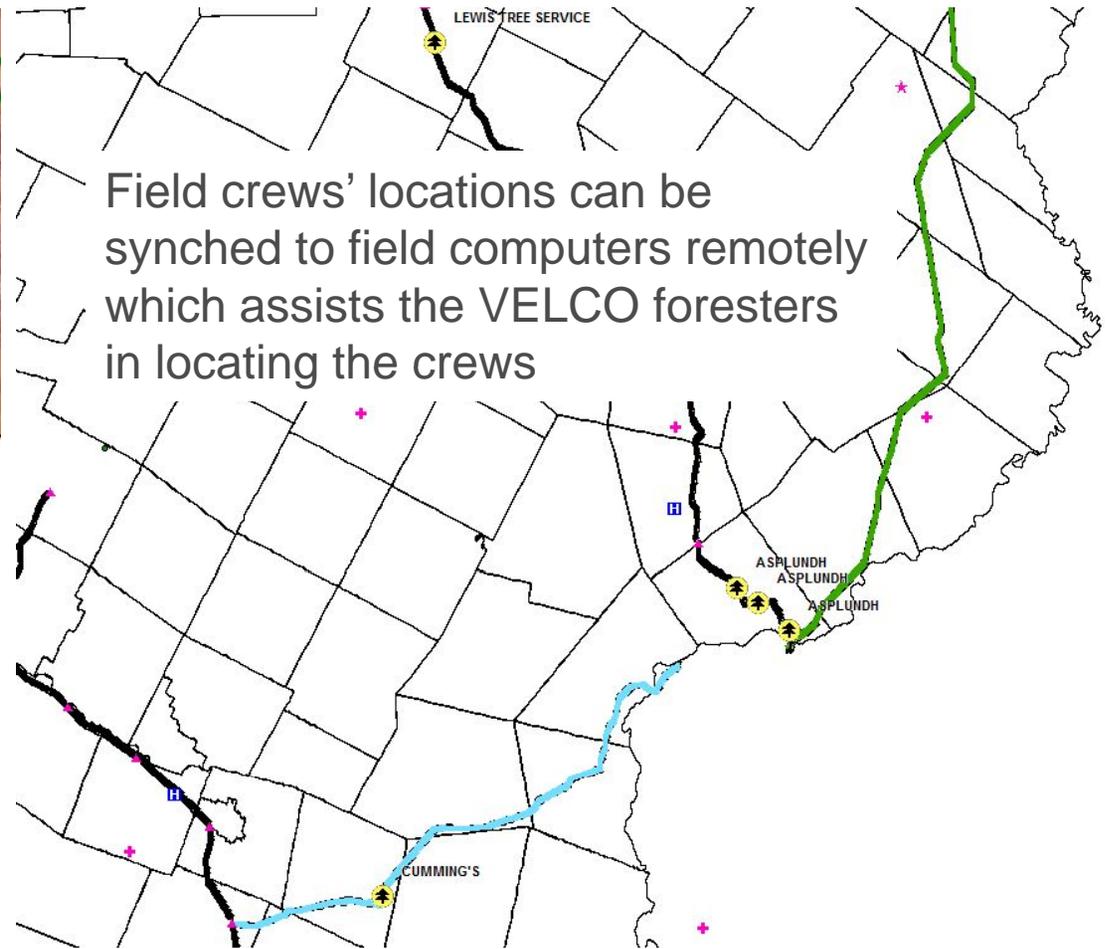
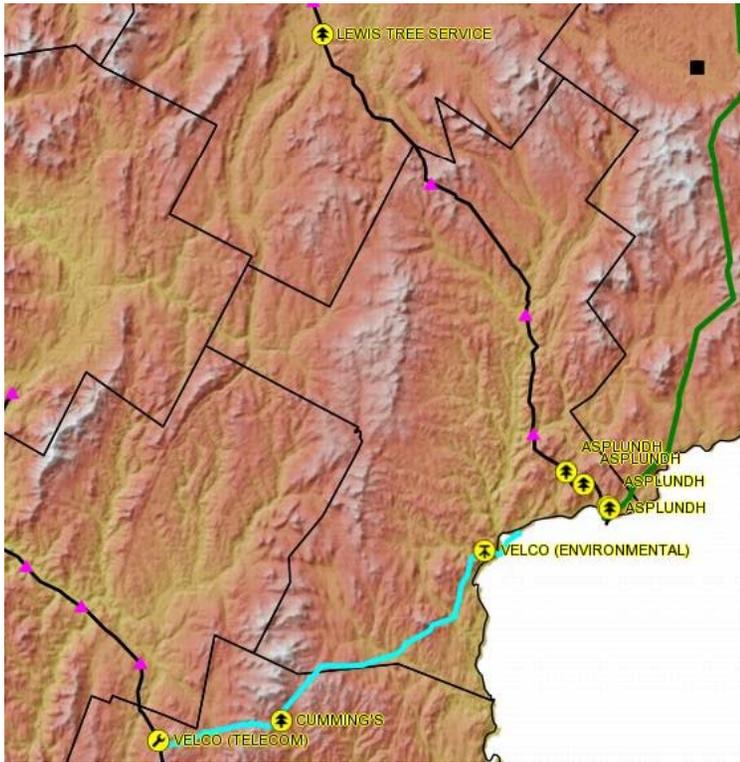
Comments

3

ok X

1. VELCO forester identifies a danger tree and enters it into the field computer
2. Contract tree crew removes the tree and enters it into the field computer
3. VELCO forester confirms that the tree has been removed

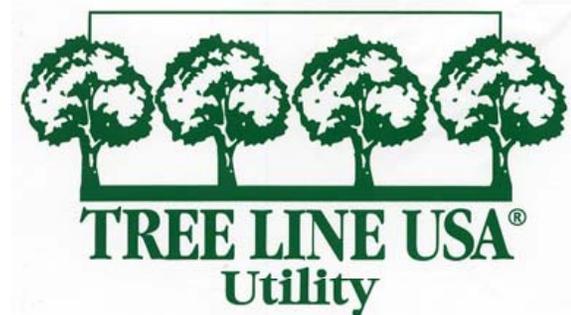
Locating Crews While Foresters are in the Field



Field crews' locations can be synced to field computers remotely which assists the VELCO foresters in locating the crews

Field crews' locations entered by VELCO system operators into a web mapping system

Please feel free to contact us



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