



Best Practices Identified at the **UAA Pennsylvania Safety Summit**

October 17 & 18, 2023



Thank you to our host utility!





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Welcome & Safety Message:

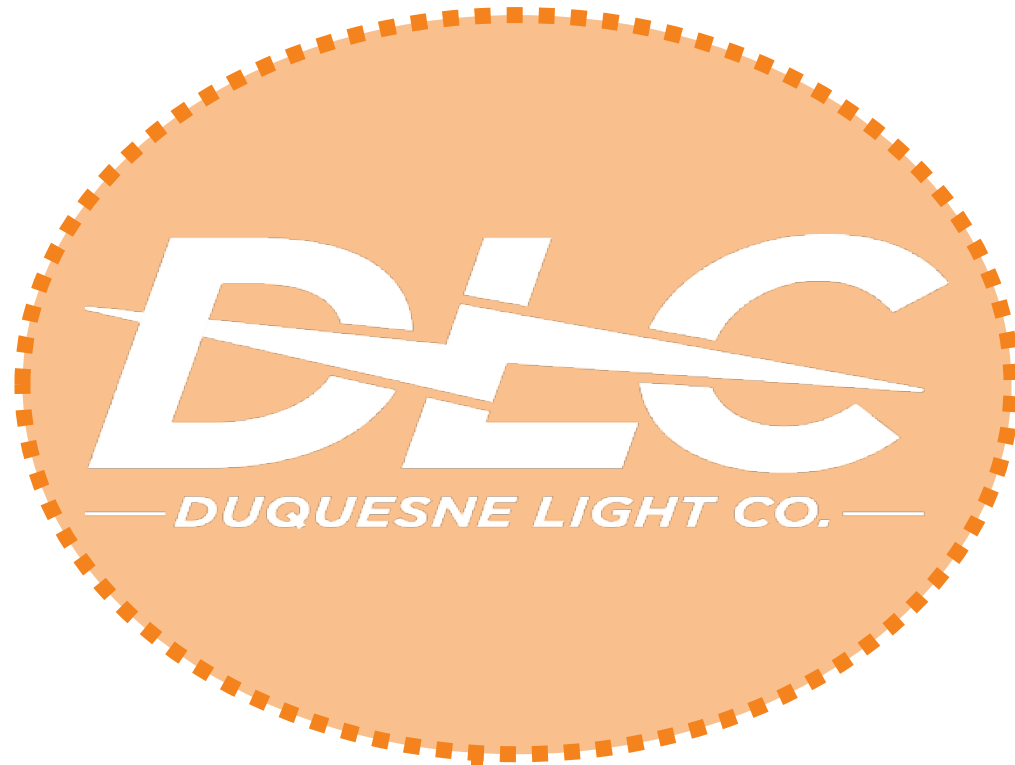
John Hilderbrand II, Duquesne Light Co.





DLC CM Program:

Tiffany Thomas; Duquesne Light Co.



DLC VM Program Overview

Tiffany Thomas

Safety Message

Summer provides a great opportunity to enjoy quality time with family and friends around a campfire. However, with every fire comes great responsibility. The following are some great tips from our good friend Smokey the Bear:

“Follow these steps when picking your campfire spot to help prevent wildfires.

- 1. DO NOT build a campfire if the campground, area or event rules prohibit them. Sometimes digging of pits may be prohibited due to archaeological or other concerns.*
- 2. DO NOT build a campfire in hazardous, dry conditions.*
- 3. FIND OUT if the campground has an existing fire ring or fire pit.*
- 4. If there is not an existing fire pit, and pits are allowed, choose a site at least 15 feet from tent walls, shrubs, trees or other flammable objects. Beware of low-hanging branches.*
- 5. Choose an open, level location away from heavy fuels such as logs, brush or decaying leaves.*
- 6. Take wind, and its direction, into account when choosing the site. Choose a spot that’s protected from gusts.*



Introduction of DLC

Mission/Values

Overview of DLC System

High Level Overview of VM Program

What Makes DLC Unique?

Distribution

Work Planning

Sched Maint 1300

reliability statistics

Transmission

Cap clearing/Aerial Saw

herbicide

Herbicide

Safety

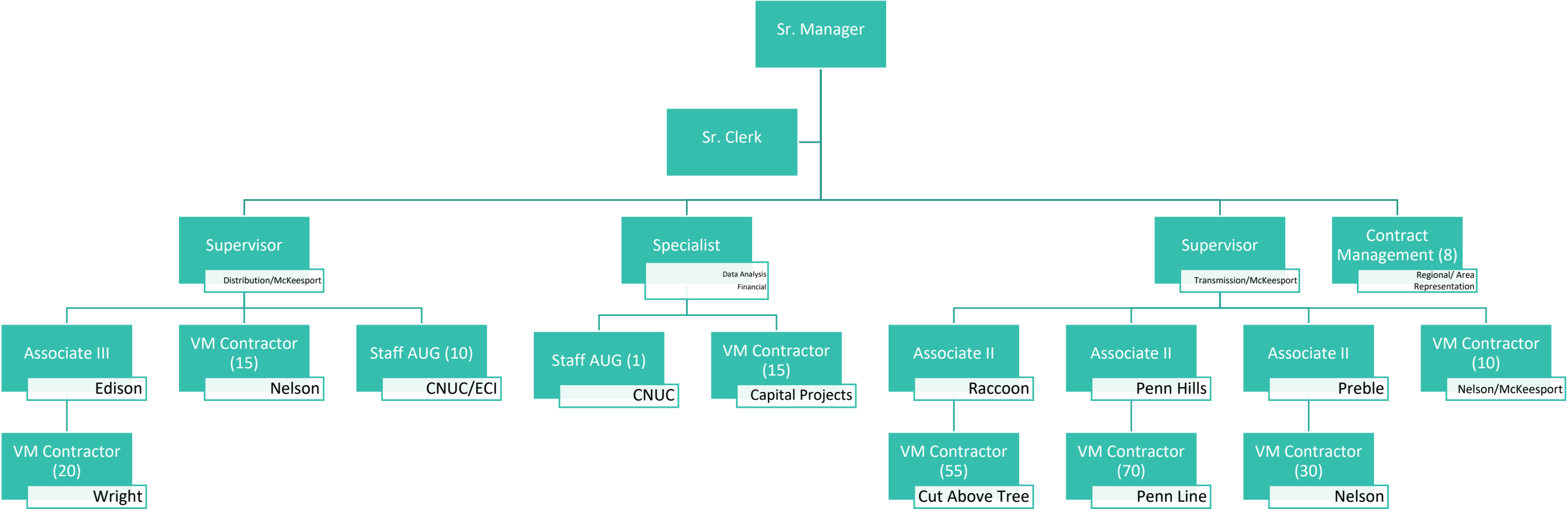
What Makes DLC Unique?



DLC Introduction

VM Department

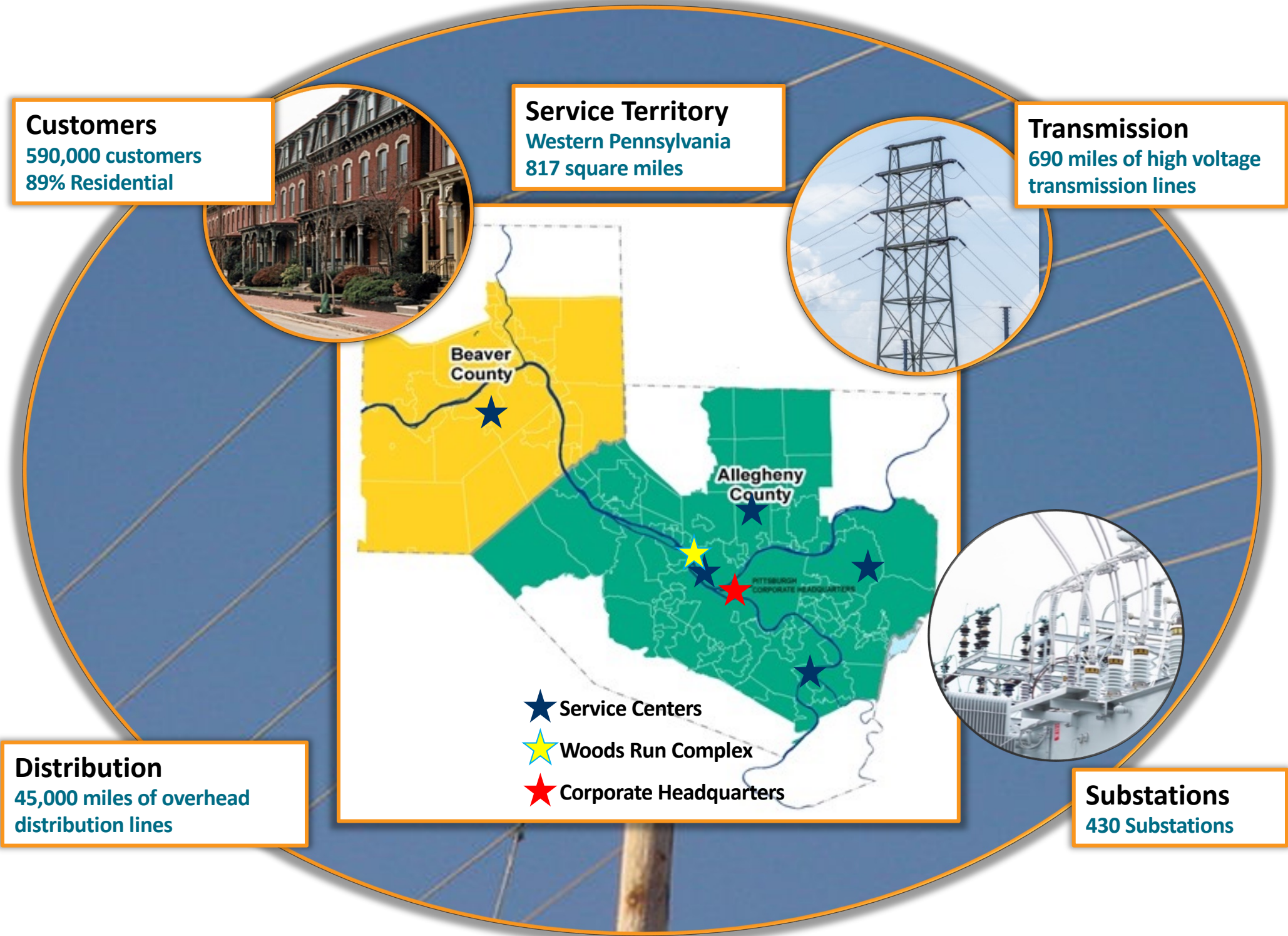
Staffing Levels



DLC By The Numbers



High Level Overview of DLC System



DLC Commitment and Volunteerism

As Your Trusted Energy Partner, We Are Committed To:

- Keeping our customers at the center of everything we do
- Ensuring the affordable supply of safe, reliable energy through efficient operations and value-added services
- Building a resilient culture focused on growing our positive impact and promoting diversity, equity and inclusion
- Modernizing our grid and advancing new technology to enable our region's clean energy future
- Maintaining the highest standard of compliance and business ethics

To learn more about DLC's commitment to our region's overall health and economic wellbeing, visit **DuquesneLight.com**.

Our Service Area



Charitable Giving & Employee Volunteerism

We believe when our customers and communities thrive, we thrive. We build strategic partnerships with organizations across our service territory, including through our Community Impact Grants Program. In 2021, our employees also donated over \$350,000 to nonprofit organizations across southwestern Pennsylvania through our annual Campaign for the Community, with eligible donations matched by the company.



145+
Trees planted in 2021



>\$2 Million
Donated annually



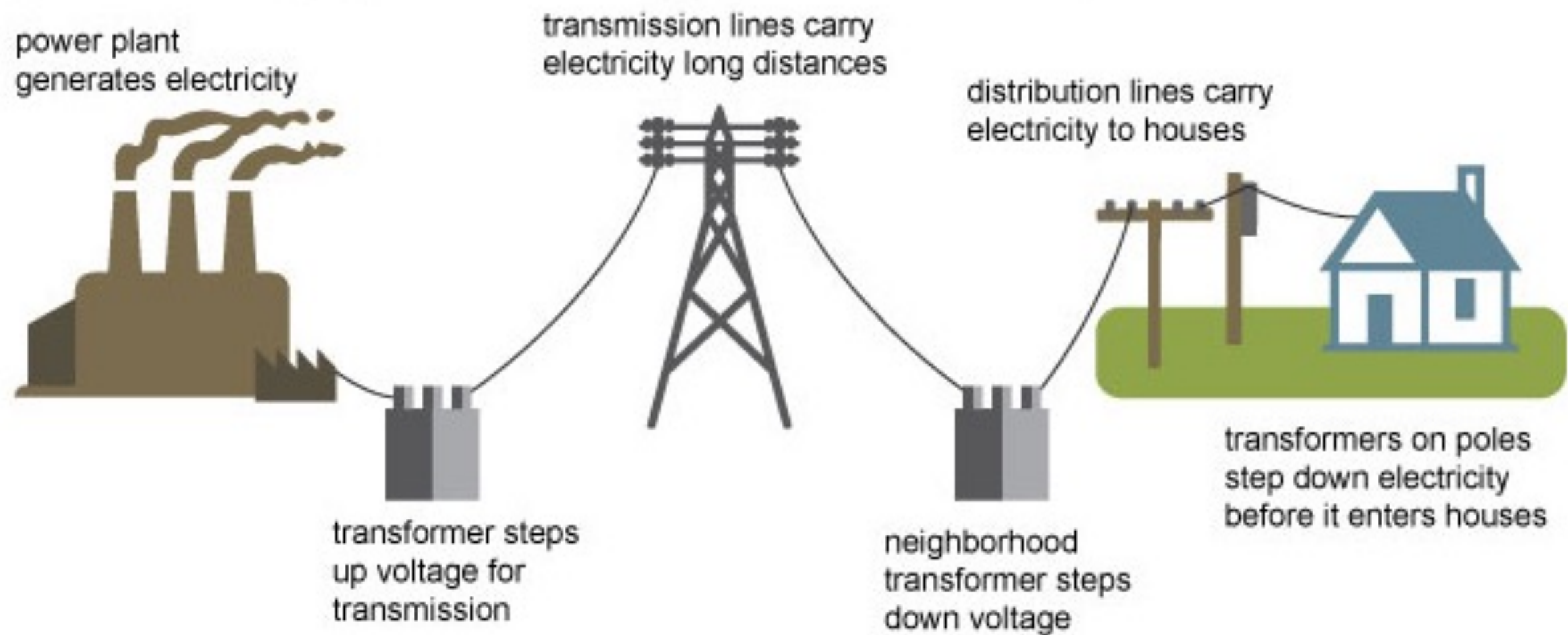
>3,200 Hours
Volunteered by employees in 2021



Electric Service

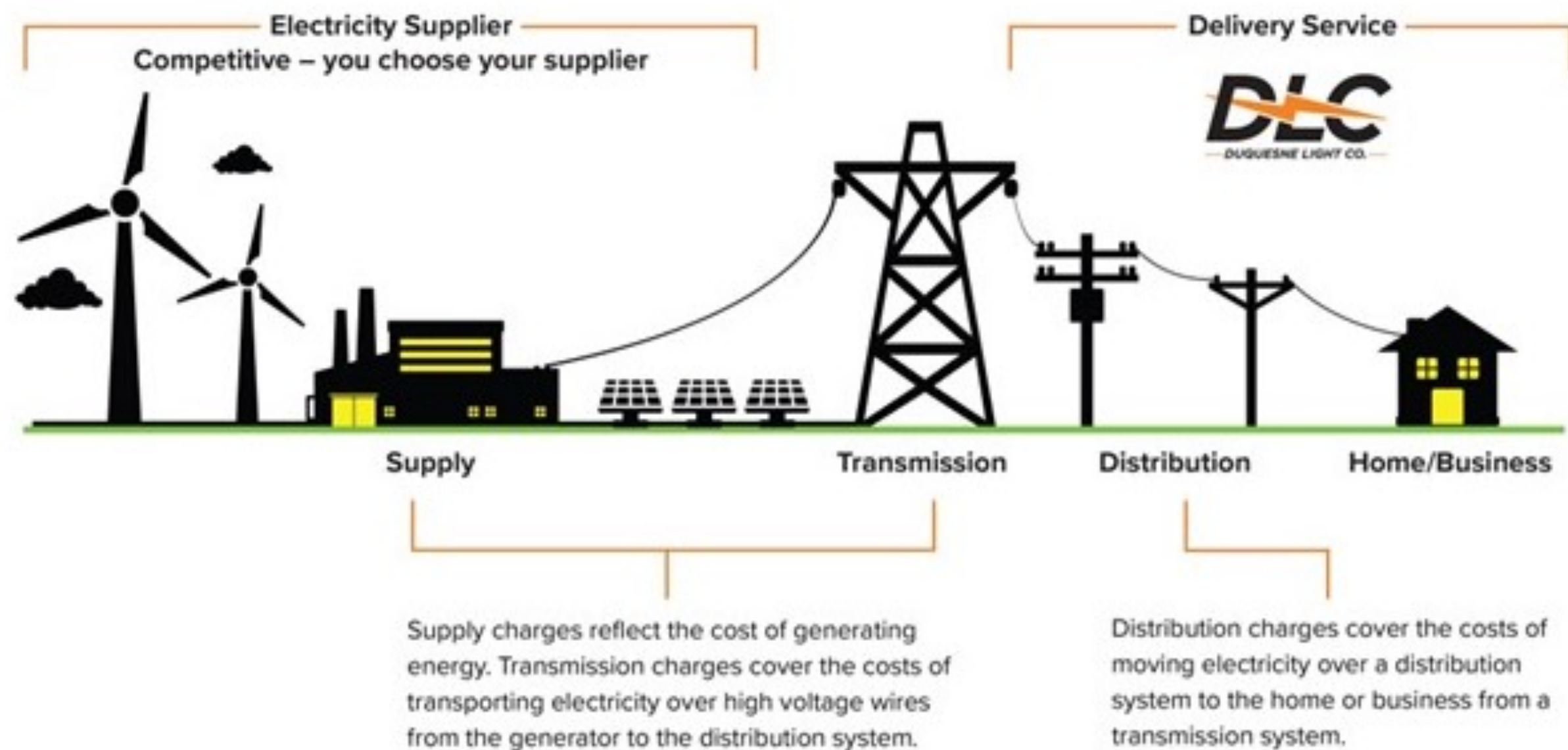
Electric Service Explained

Electricity generation, transmission, and distribution



Source: Adapted from National Energy Education Development Project (public domain)

Electric Service Explained





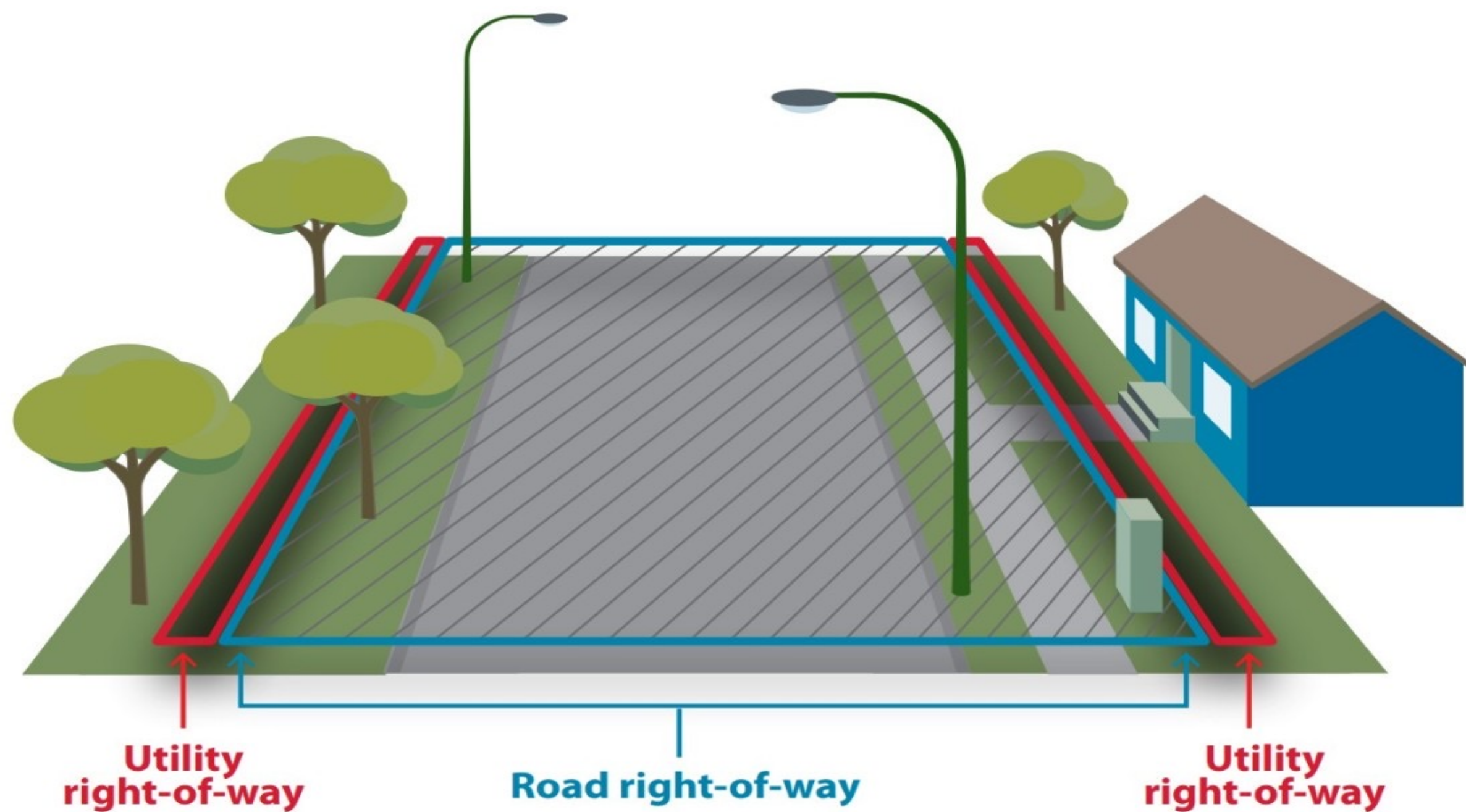
Line Clearance Operations

Distribution

Rights-of-Way (ROW), **Developed** - Electrical circuits geographically located, most frequently, in an urban residential environment and occasionally in a rural environment. For Work to qualify for this maintenance classification, trees in Developed sites shall have 360° of the area around their base maintained. Individual trees located in street lawns, yards, and parks typically fall under this maintenance classification.

Rights-of-Way (ROW), **Undeveloped** - Electrical circuits geographically located most frequently in a suburban or rural environment, and often urban environment, which generally consist of wooded areas that may be two-sided corridors or one-sided along an improved road. For Work to qualify for this maintenance classification, trees in Undeveloped sites shall have less than 360° of the area around their base maintained. Rear lot, cross country, and roadside easements typically fall under this maintenance classification.

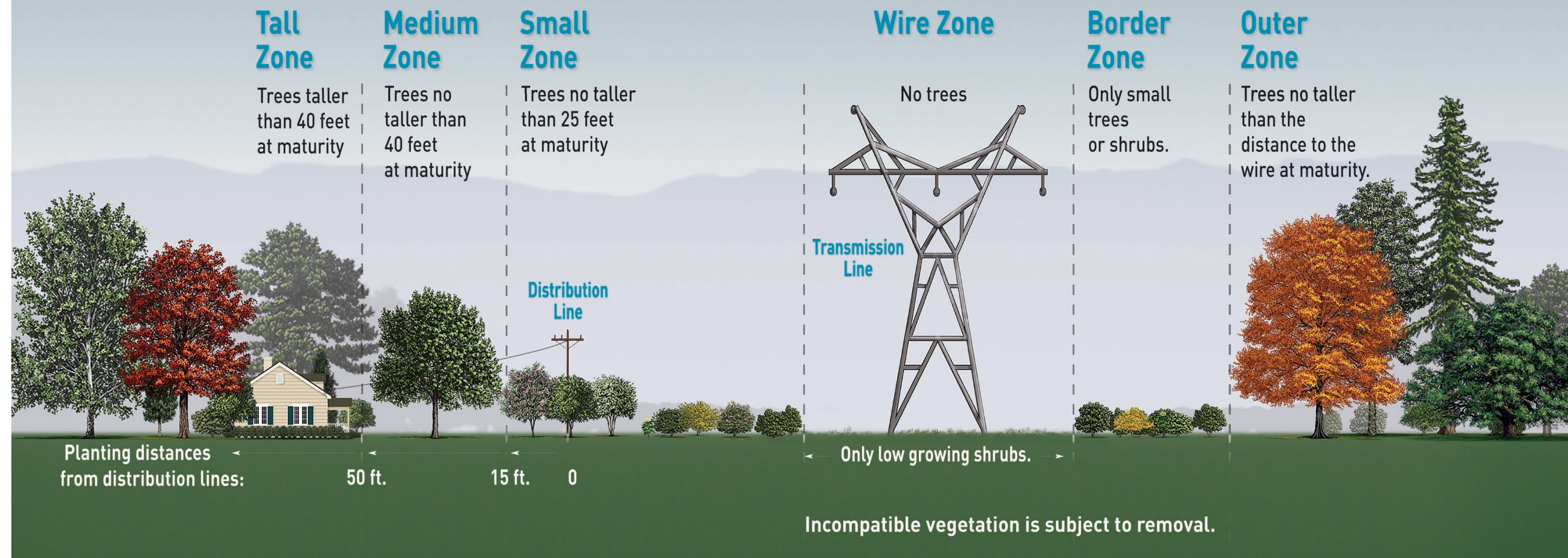
Developed Rights-Of-Way



Undeveloped Rights-Of-Way

Plant the Right Tree in the Right Place.

If you plan to plant a new tree near or under electric lines, follow these clearance guidelines.



Long Term Plan



Mileage is for illustrative purposes

Line Clearance Specifications

4kV & 23kV Distribution/Subtransmission

Prior Management Technique

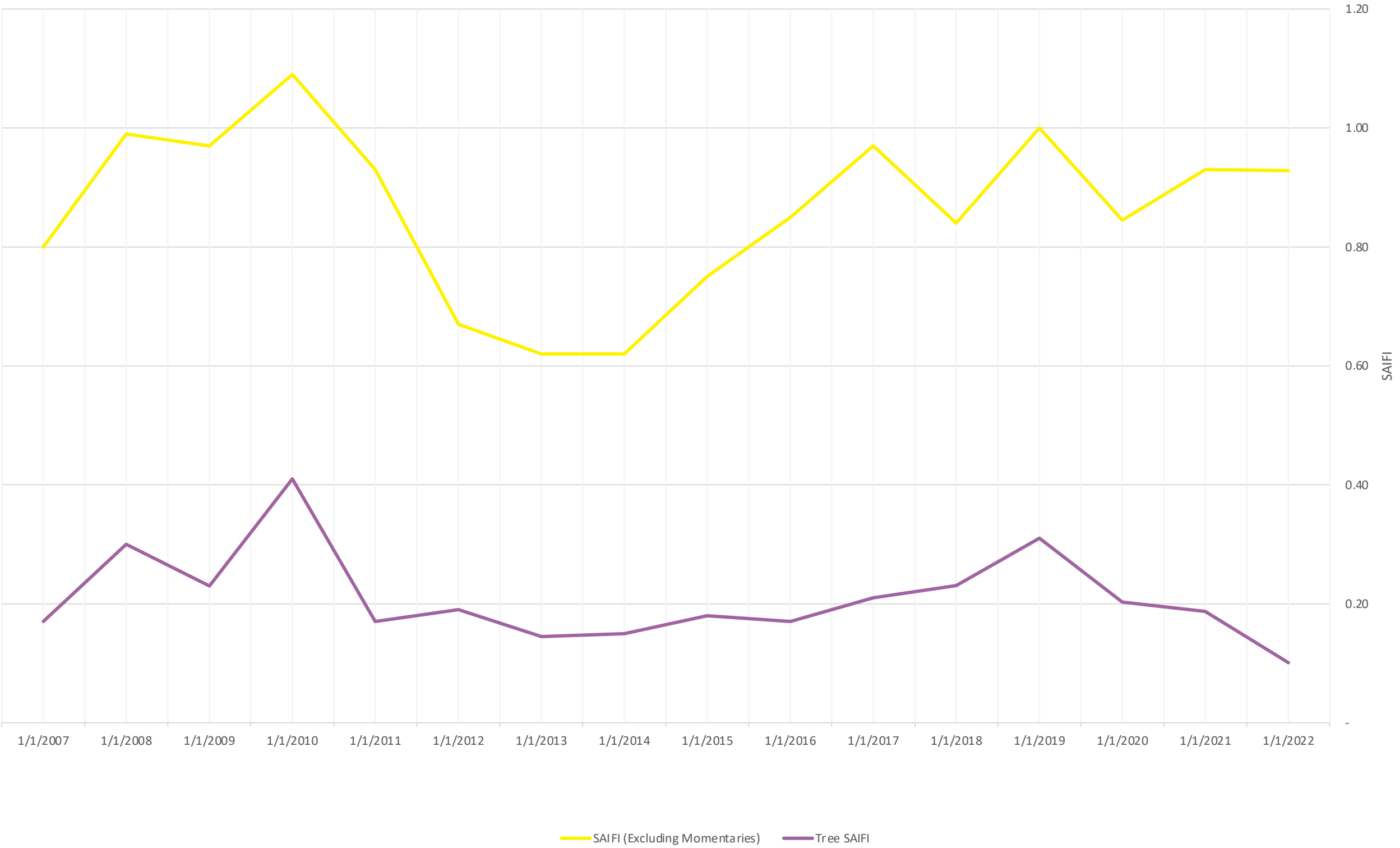
- Zone 2
 - Undeveloped multiphase lateral pruned 25' Ground to sky. *Capital*
- Zone 1 & Zone 3
 - Achieve clearances consistent with the cycle identified for the circuit for non-main feeder primary, all secondary, and aerial cable. *Expense*

2020-2030

- Zone 1
 - Approximately 1490 Circuit Miles
 - All Zone 1 capital clearing was completed Management Year 2019
 - Pre identified/planned work to be complete as needed. Notification to be completed by third party vendor. *Expense*
- Zone 2 (Current)
 - Approximately 1565 Circuit Miles
 - Capital to take place in identified years. Once complete all Zone 2 work will revert to Expense.
 - Developed
 - Prune trees to achieve 25' clearance horizontally and vertically
 - Undeveloped
 - Prune trees to achieve 25' Ground-To-Sky
- Zone 3 (2026-2030)
 - Approximately 2770 Circuit miles
 - Capital to take place in identified years. Work completed prior and after is expense
 - Prune trees to achieve 15' of clearance from the pole extending through the tree.

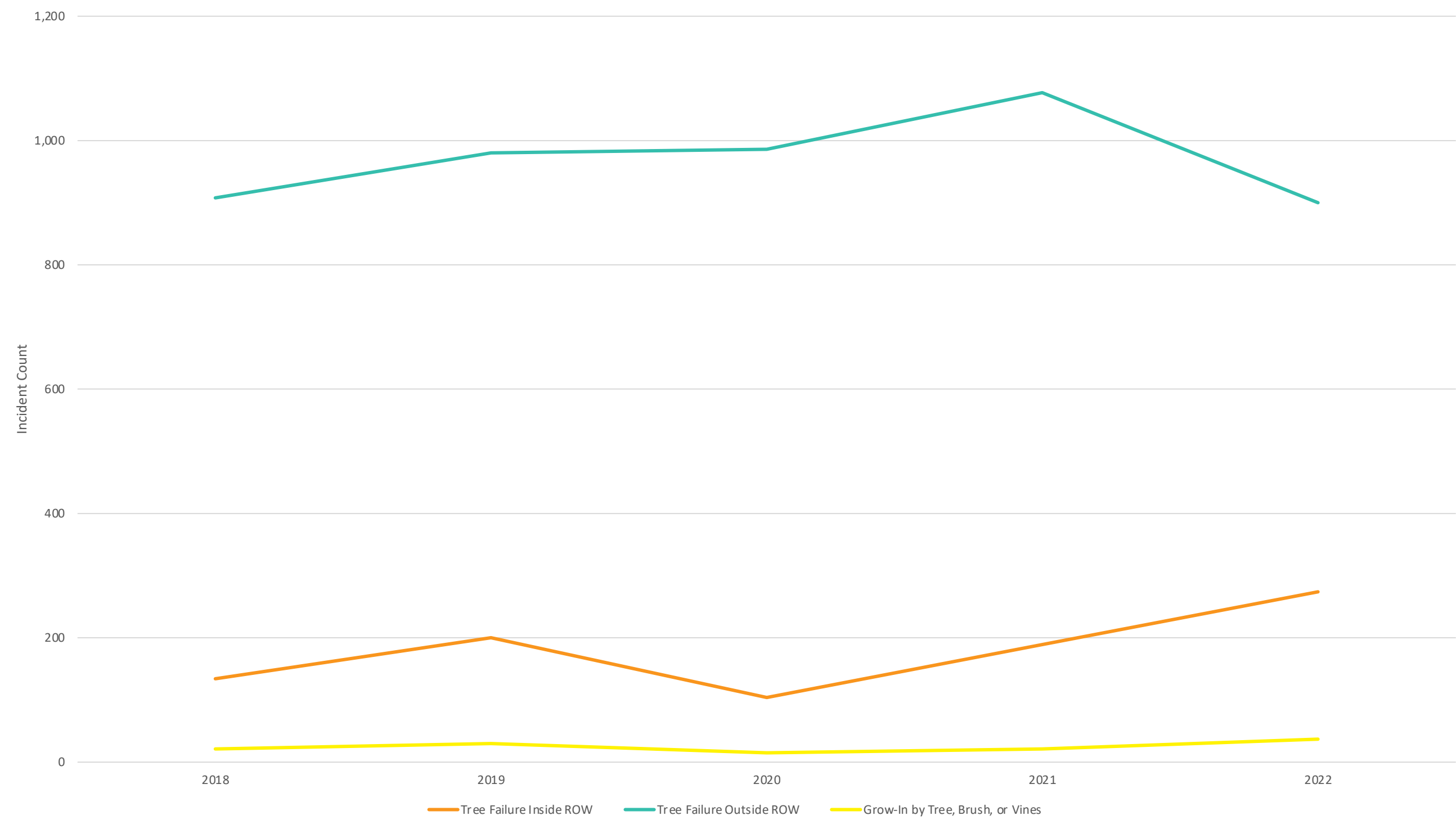
SAIFI Reliability

2007-2022



Incident Count By Year

2018-2023

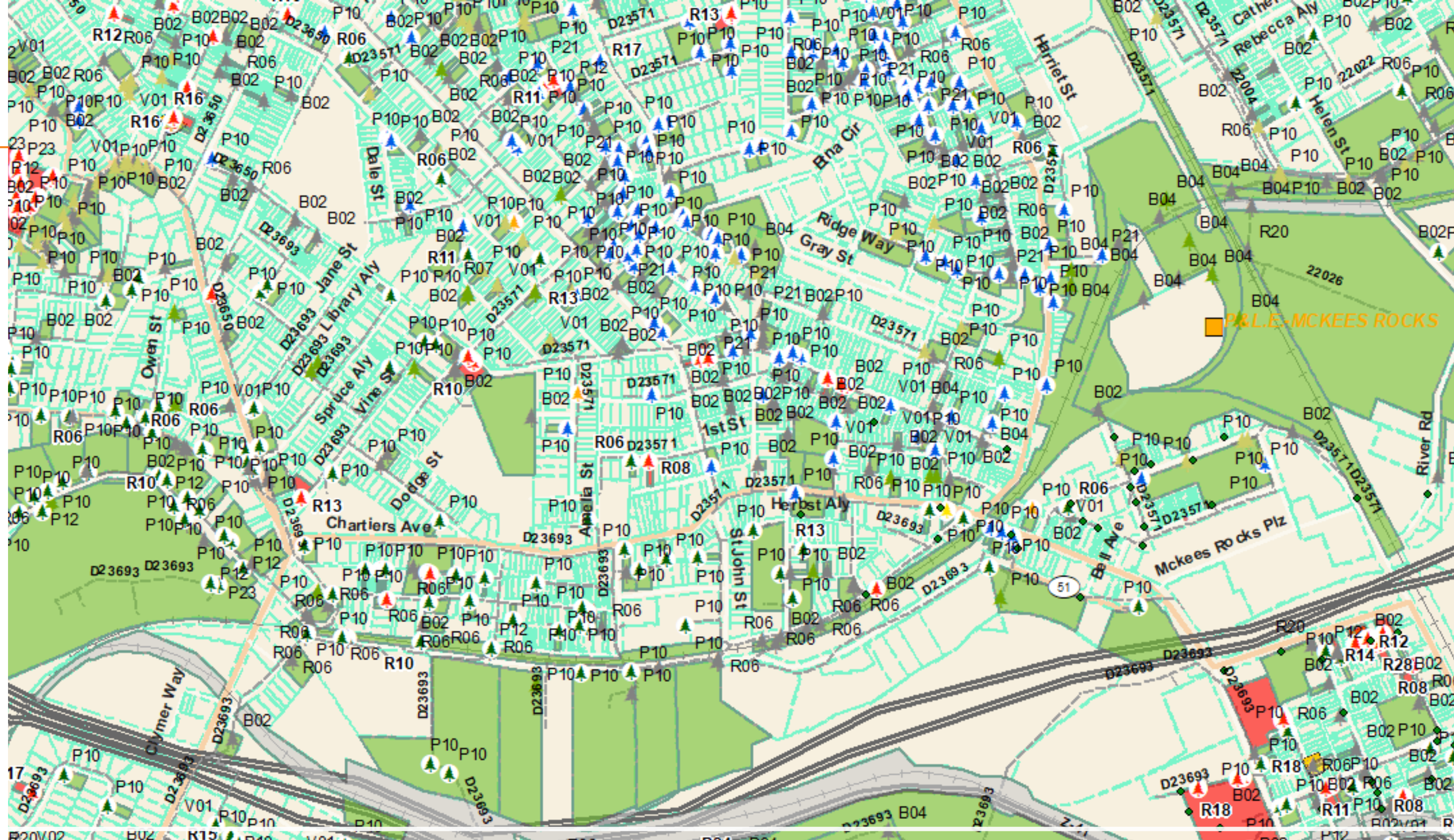


Vegetation Management Solutions

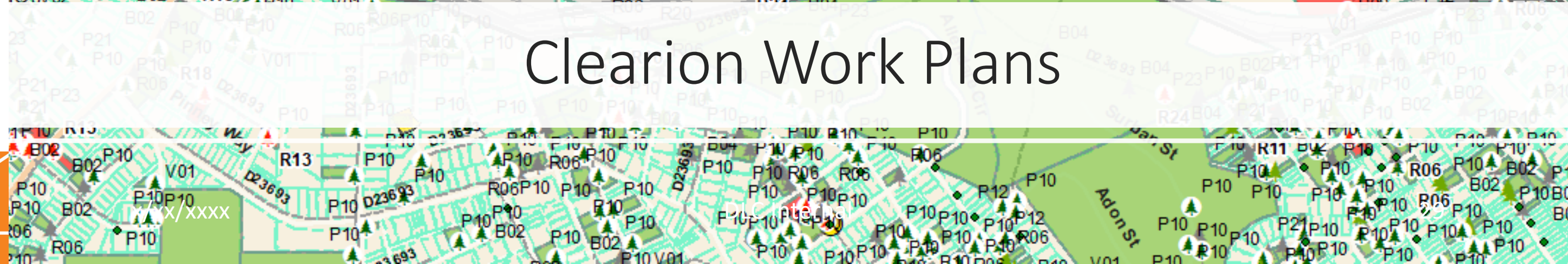
Create, Share, Plan, Schedule, Track, Audit, and Report

- **Work Manager**
 - Schedule
 - Detailed work plans
 - Calculate estimated and actual costs
 - Issue electronic work orders
- **Mobile**
 - Work Planning
 - Post-work inspections and rework
- **Crew**
 - Execution of work by qualified line clearance professionals





Clearion Work Plans



Pruning and Removal Applications



Pole Replacement Planned Vs Unplanned

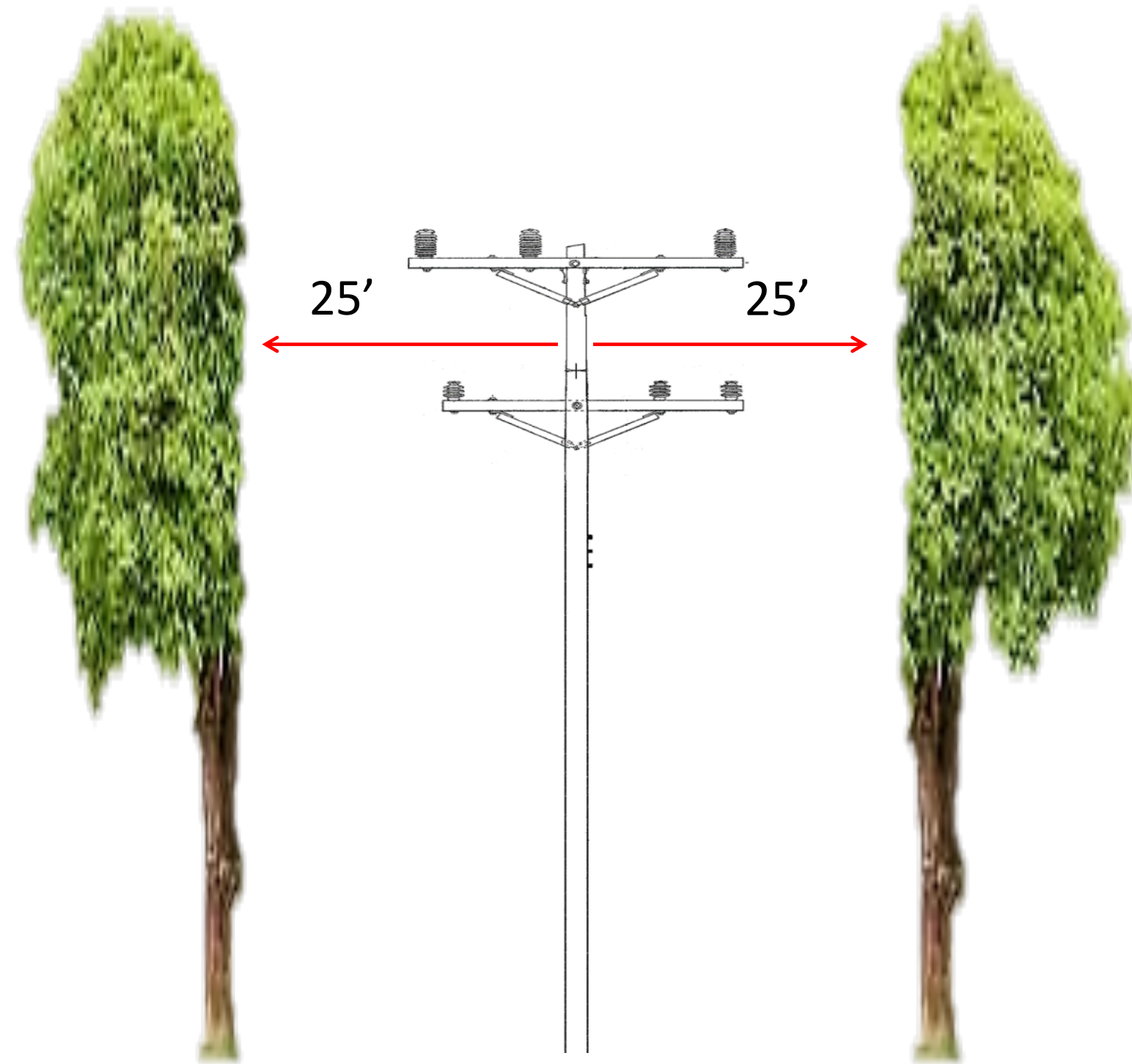


Capital Clearing Projects



Zone 1- Undeveloped Main Feeder (2013-2018)

23kV Distribution/Subtransmission ROW Management



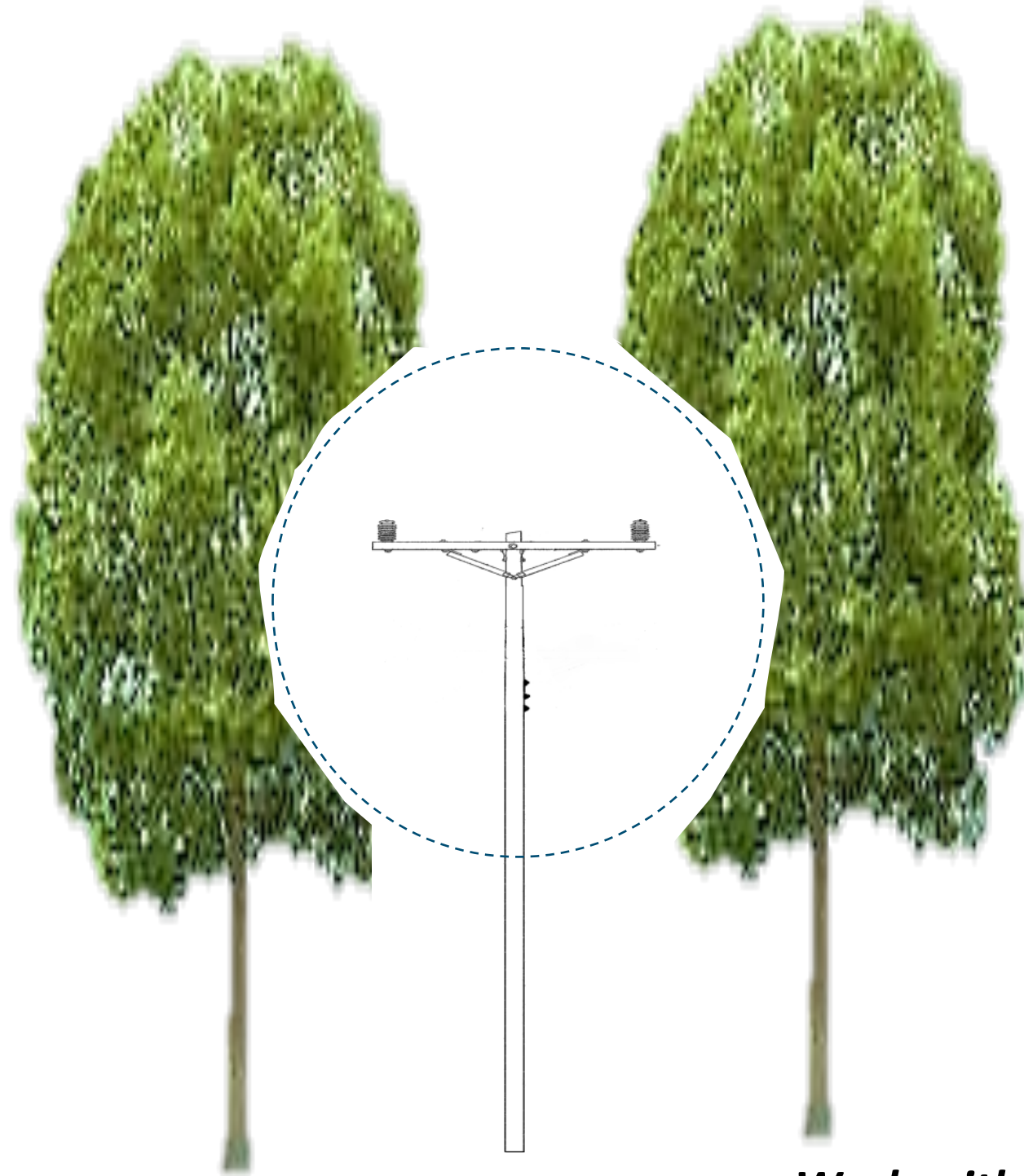
Ground-To-Sky

Zone 1

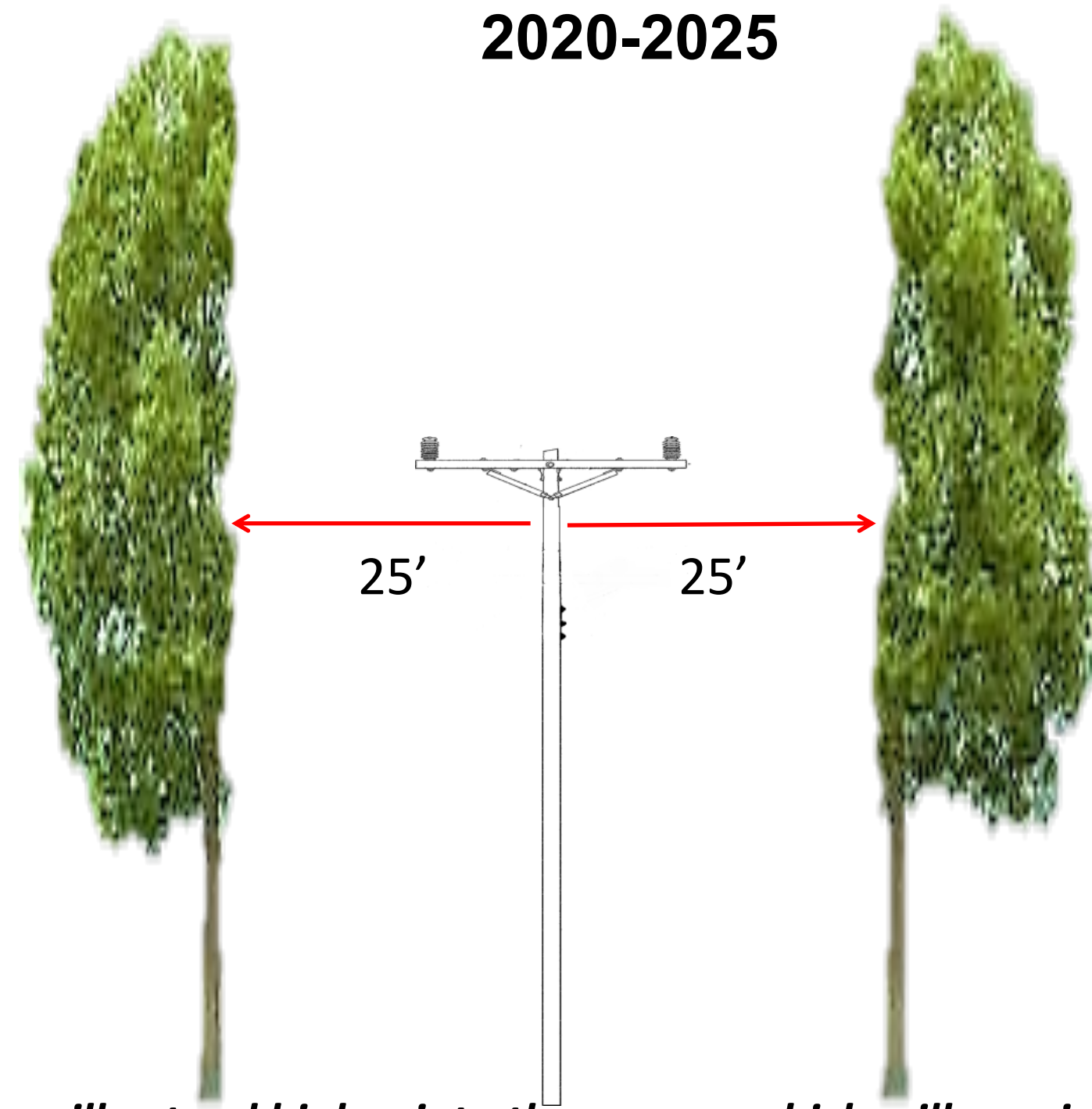


Zone 2- Multi-Phase Laterals Multiphase Non Mainfeeder

Previous



**Zone 2
2020-2025**



Work within trees will extend higher into the crowns which will require trees pruned under current practices to be ground-to-sky pruned or removed.

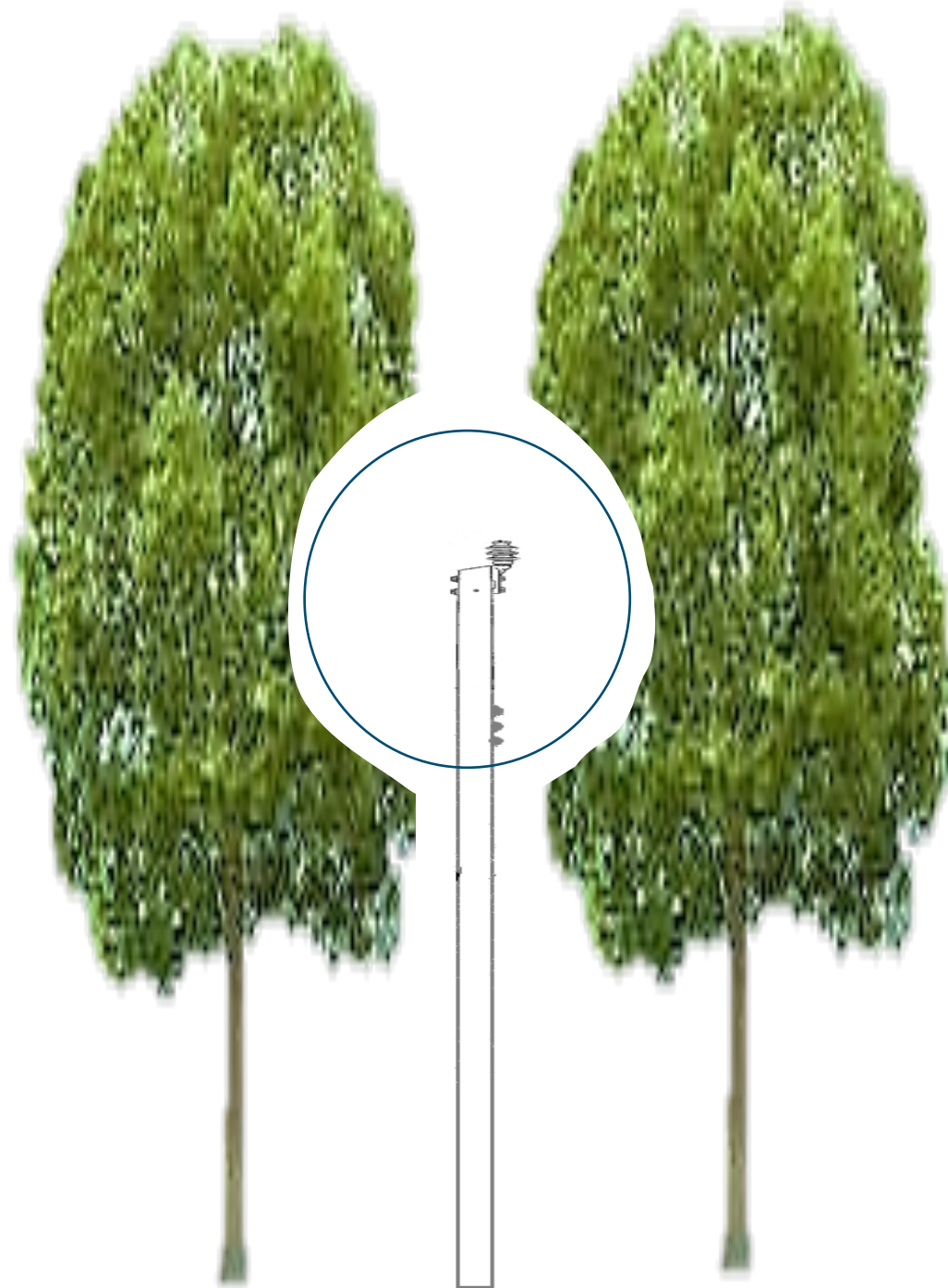
Ground-To-Sky Pruning

Zone 2

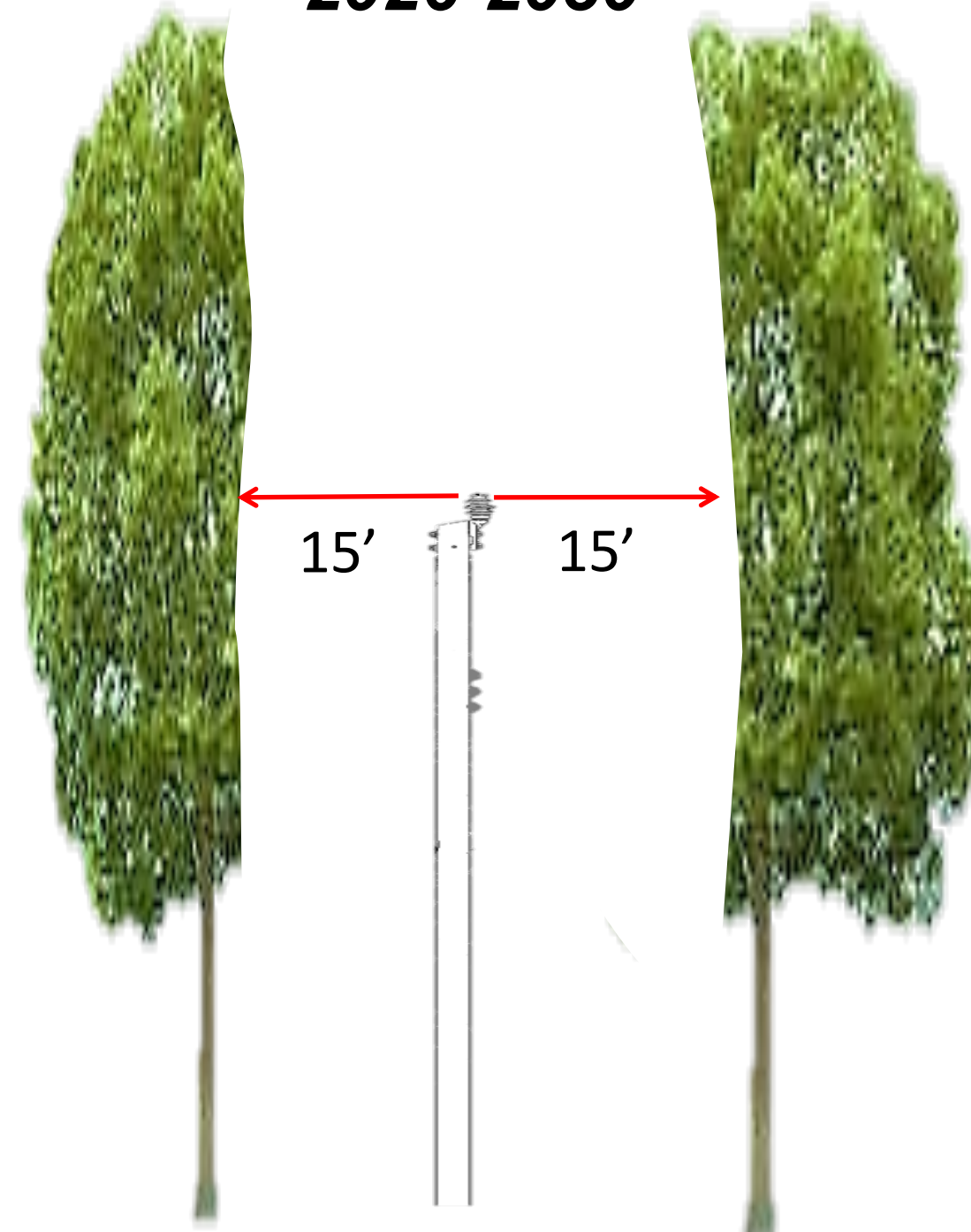


Zone 3- Developed & Undeveloped Single Phase Laterals

Current



**Zone 3
2026-2030**



O&M Pruning

“V” Cut

Before



After



Unplanned Response

Customer generated



Distribution Management Techniques

Capital Clearing

Enhanced Reliability

- Mature trees originating within or beyond the managed ROW but encroaching into the defined limits of the ROW are to be removed.
- Eliminate “on” ROW fall-ins
- Minimize the risk of grow-ins due to trees that must be monitored annually
- Reduce risk of “off” ROW fall-in outages

Best Practice

- Management vs Maintenance
- Clear ROW of incompatible vegetation to an industry standard

Financial

- Manage long term expense budget

Distribution Management Techniques

Capital Clearing

Planned

- First time clearing of incompatible trees
- Clearing Rights-Of-Way to full extent
- Typically, an industry best practice
 - 3 phase 25'CL or 50'
 - 1 phase 15' CL or 30'
- Significantly different pruning practice than past;
 - Removing large mature limbs either overhanging DLC facilities or breaking the limits of the managed easement
- Off-ROW Conflict tree removal

Unplanned

- Major Storm
 - Typically, an 85% Capital 15% Expense cost distribution
 - Major damage to facilities and customers interrupted

Contract Structure

Reducing Expenditure while promoting safe and reliable service

Fixed price contract structure (Historical)

- Vendors were provided work packages consisting of circuits in one geographical location
- Price was provided to manage trees to the desired specification

Unit Price contract structure (2020-2030)

- Pick list of tasks were provided to vendors to provide pricing per service region
 - 4 prune
 - 13 herbicide & brush cutting
 - 28 removal
- Third party utility VM vendor identifies tree work and notifies customer
 - Only trees requiring work are identified as part of the work plan
 - Trees are assigned a task and placed into work packages
- Line clearance qualified tree professional assigns tasks to crews and is tracked to close.

Transmission

- **345kV:** Typically managed to 150' or 75' from the centerline, however there are corridors that are of a lesser width.
- **69kV-138kV:** Typically managed to 100' or 50' from the centerline, however when defined ROW are typically defined as 85' (42.5' from centerline)-100' (50' from centerline)
- *ROW edge will be clearly marked with flagging that has been accurately measured with an electronic range finder.*
- *Trees that have branches extending into the ROW will be pruned to the trunk of the tree.*



Herbicide Applications

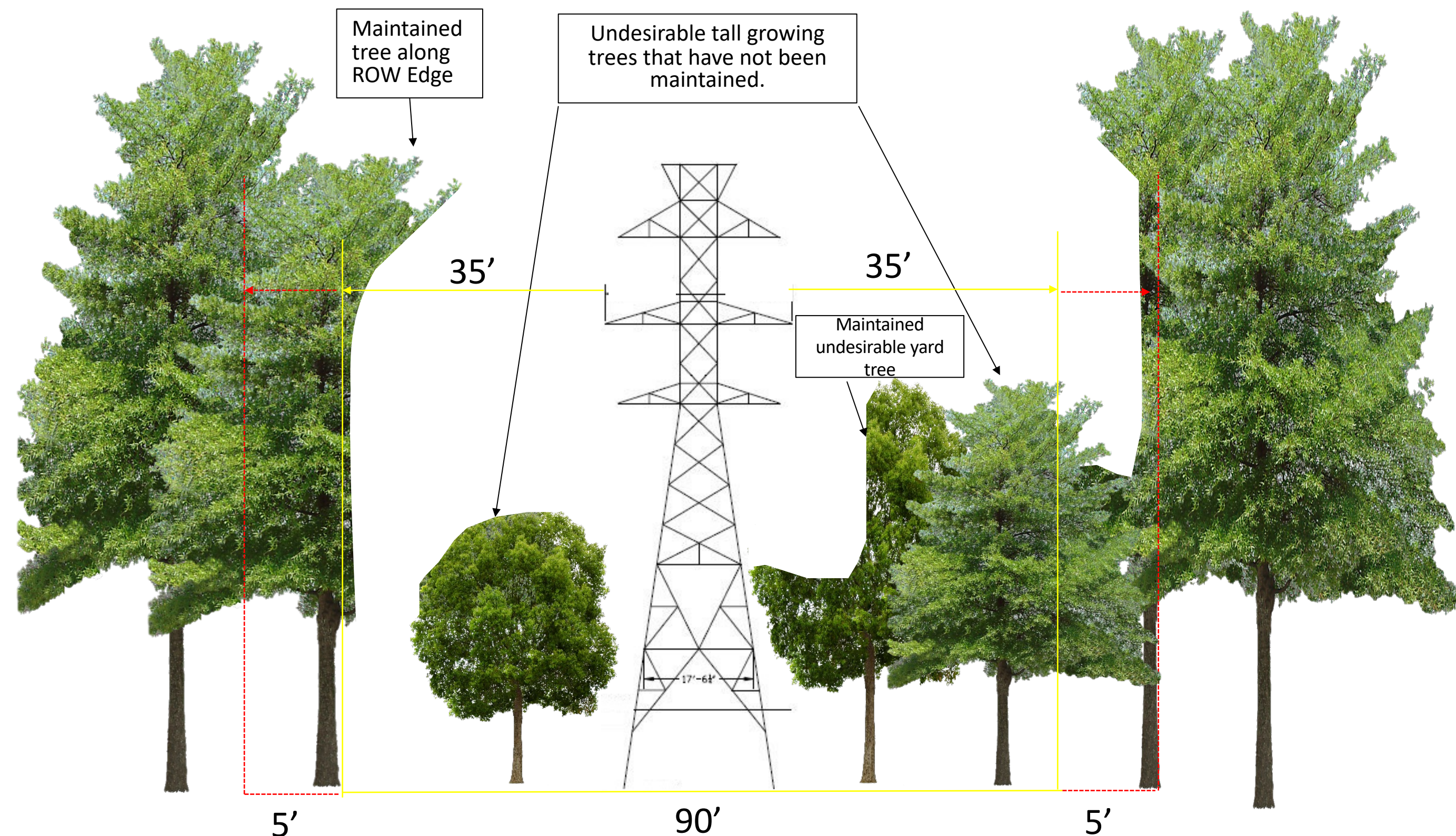


Bare Ground Test Plots



Capital Clearing

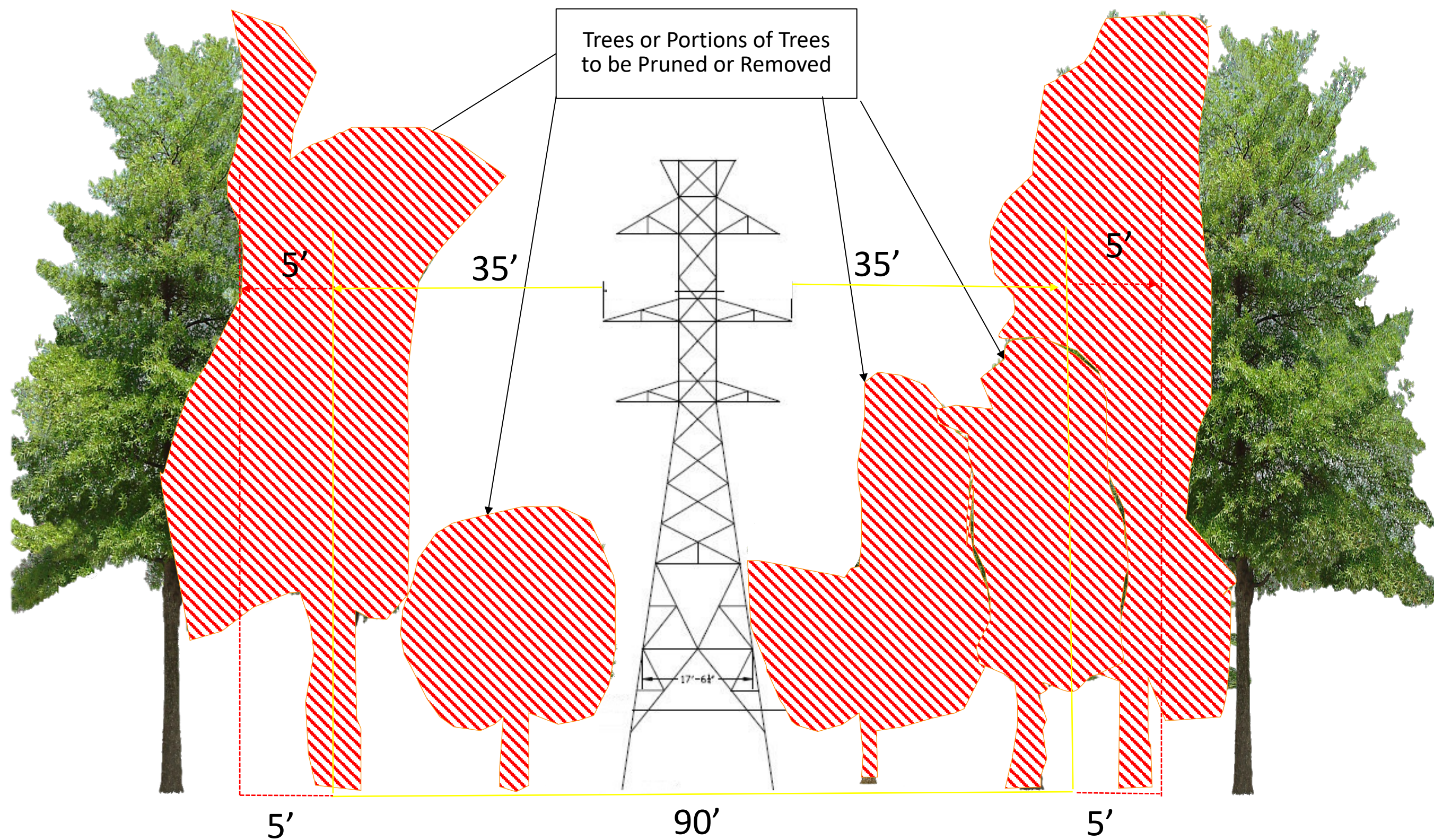
Transmission



-Maintained 35' from outside conductor (Yellow)
-Capital clearing 100' total width (Red)

Capital Clearing

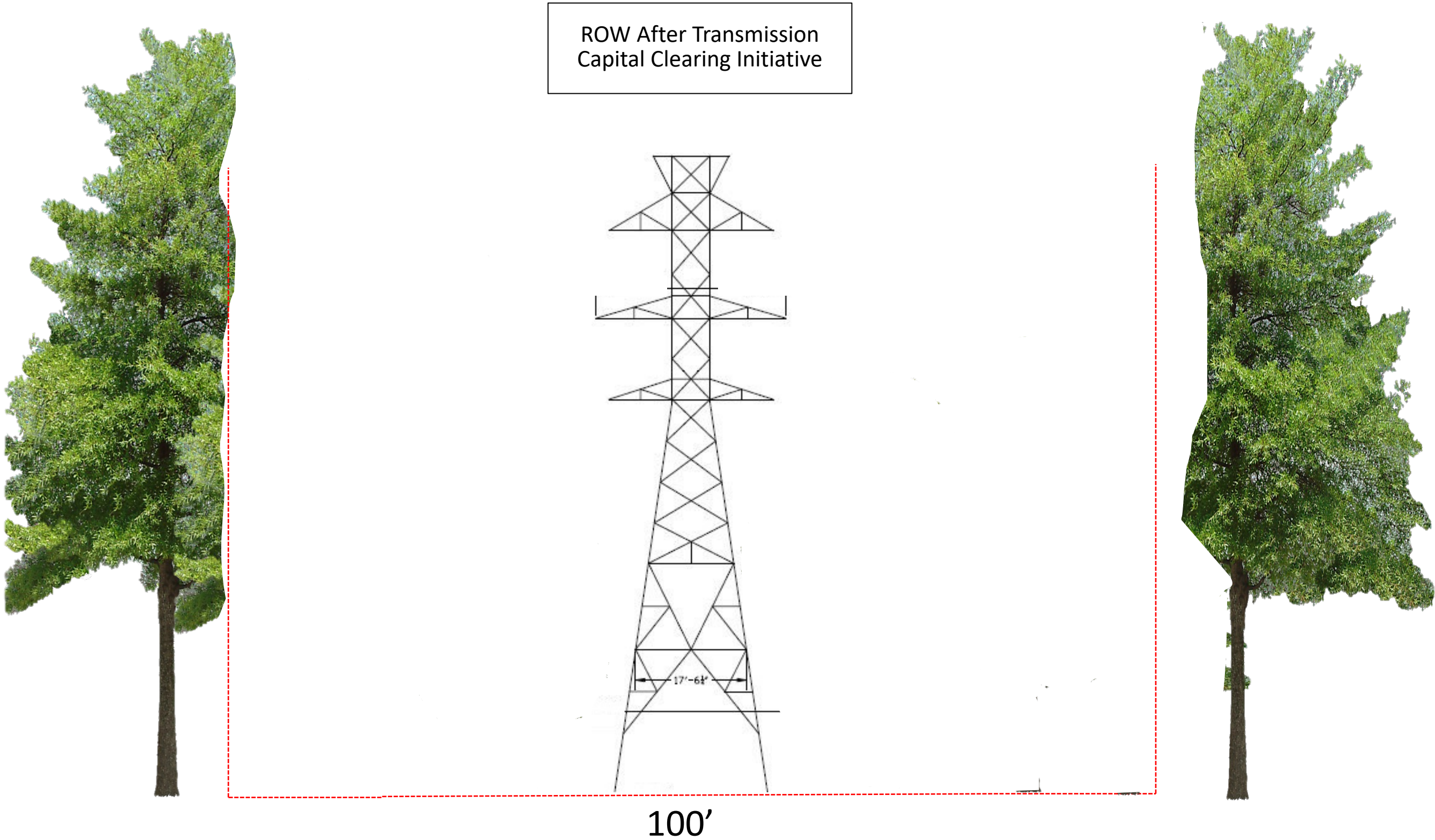
Transmission



- Maintained 35' from outside conductor (Yellow)
- Capital clearing 100' total width (Red)

Capital Clearing

Transmission



-Capital clearing 100 total width (Red)



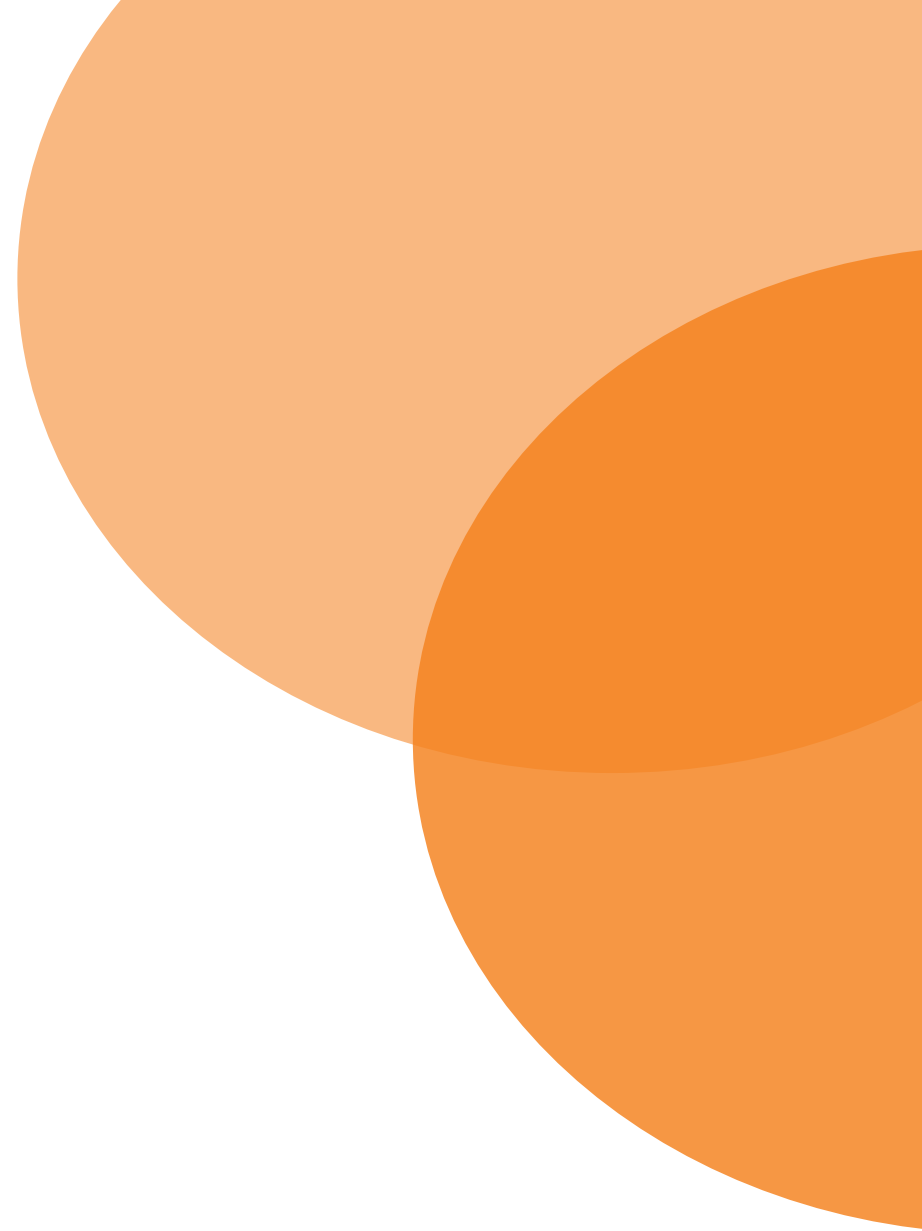
Transmission Outages

Success Story

Aerial View "Mohawk"

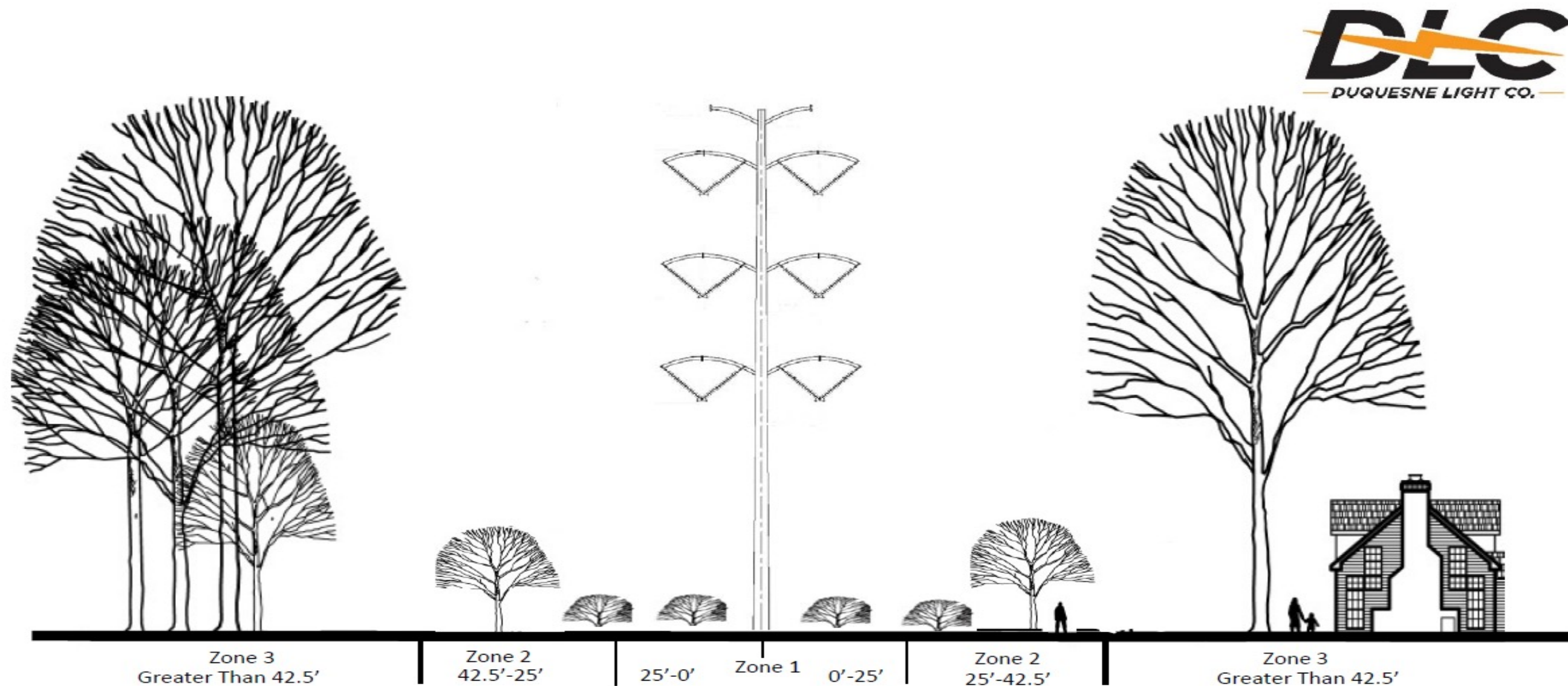
4 Circuits present with trees present between the structures







Tree Replacement Program



NOTE: Specific plant species have been identified as planting alternatives based on the maximum mature height each plant will attain. Matching the right tree or shrub with the right site ensures that future growth will be compatible with the safe and reliable operation of overhead power lines. Selecting the proper plant will minimize, and possibly eliminate, the need for utility pruning or removal of your landscape plants. Zones 1 through 3 are designated areas for the establishment of plants based on their maximum mature height and horizontal distances from the overhead lines. **Zone 1** is defined as the "Shrub Layer" and shall extend outward 25' from the center. **Zone 2** is defined as the "Understory Tree Layer" and shall extend from 25' – 42.5' from the center. **Zone 3** shall be defined as the "Shade Tree Layer" and shall extend distances of 42.5' and beyond from the center. Trees planted in Zone 3 will be planted at a distance so the crown will not encroach on the 42.5' at maturity.



Tree Planting Replacement Vouchers For Customers

Tree Voucher Program Numbers:

Year	Replacements
2022	493
2021	752
2020	829
2019	434
2018	662

Tree Plantings

Tree Vouchers & Tree Replacement

- **Tree Vouchers**
 - promote incompatible tree removal
 - Partnered nurseries
- **Tree Replacement**
 - Primarily used in capital clearing initiatives
 - Trees are selected from pre-approved list and DLCs qualified vendor installs trees and guarantees for up to 1 year.





Electrical Hazards



Fire/Electrical Hazards

Trees growing near power lines can cause a fire, as well as an electrical, hazard to anyone in contact with the tree at ground level.

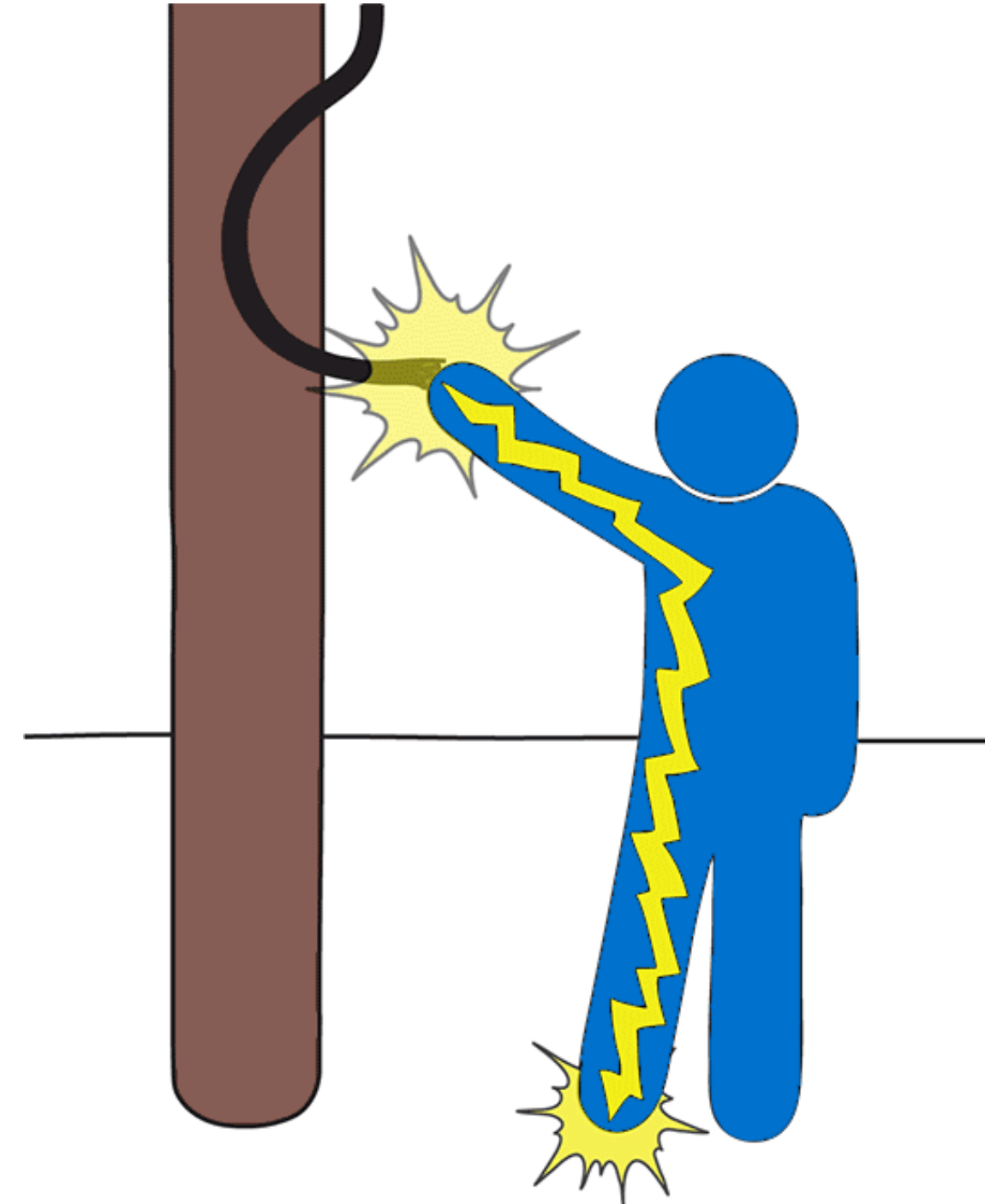
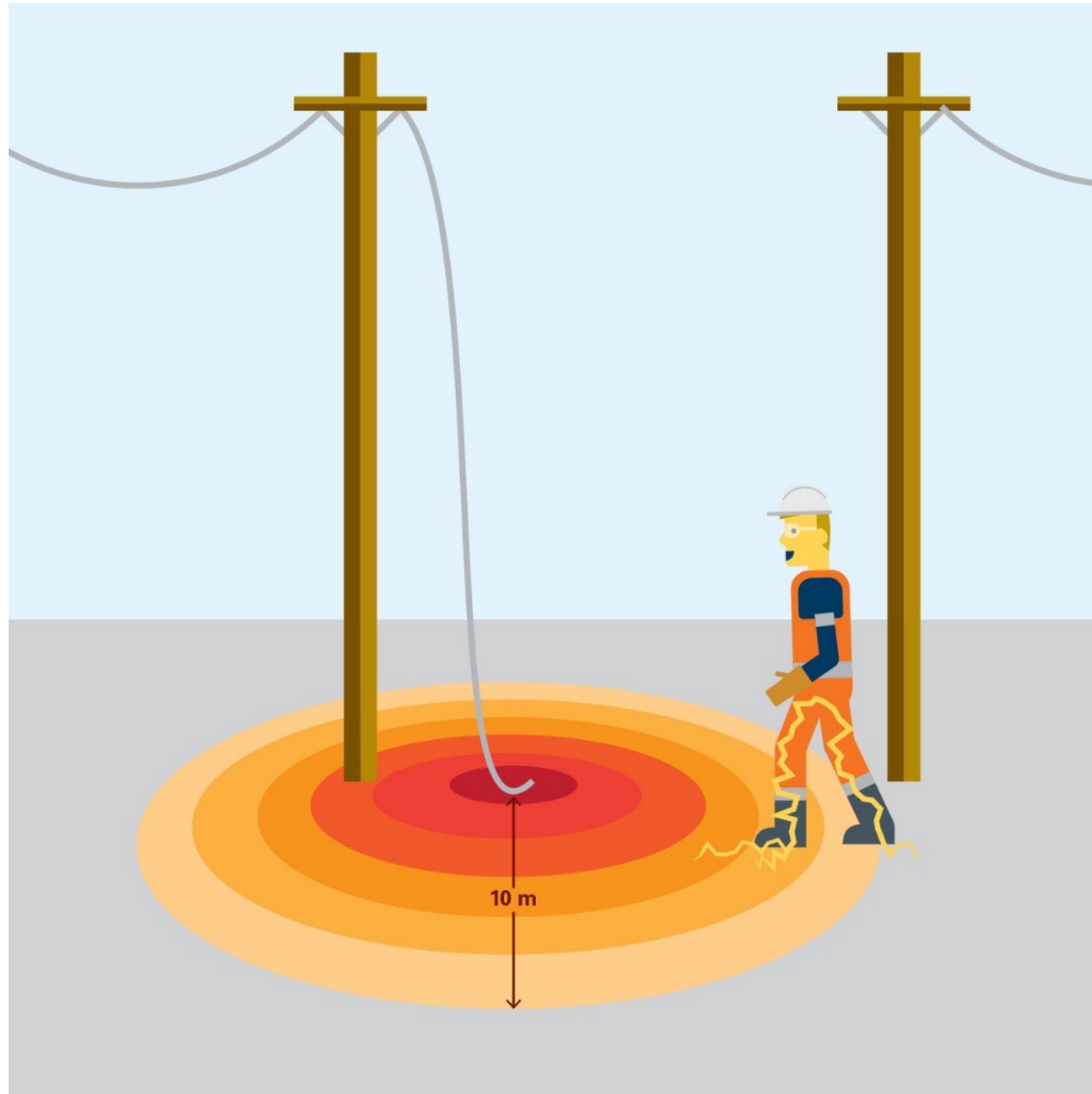
Trees don't have to contact an energized power line to be hazardous.

Electricity can arc from the power line to trees given the right conditions, such as a voltage surge on the line from a nearby lightning strike. This electric current can kill anyone caught near the tree and can cause a fire.

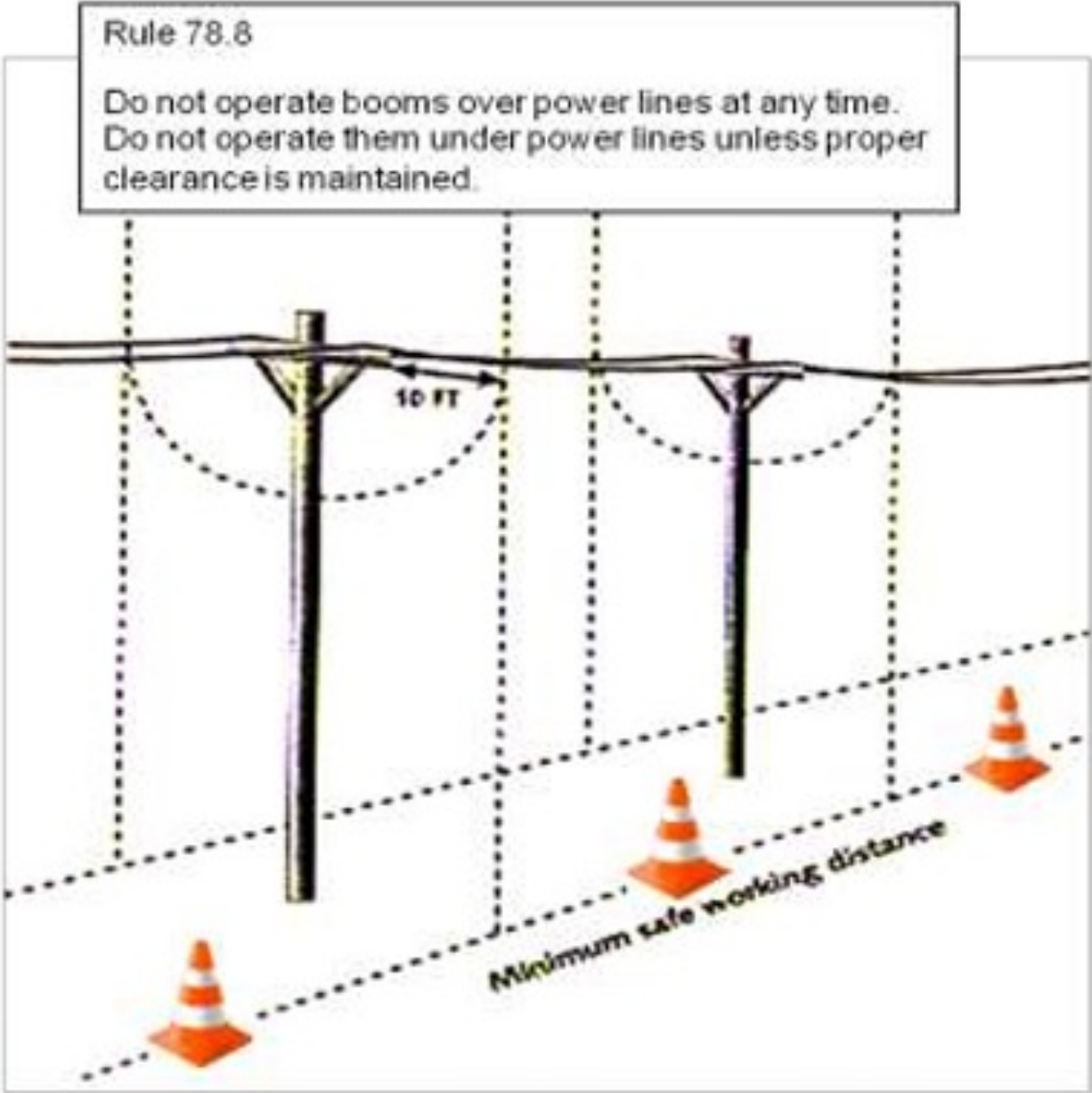
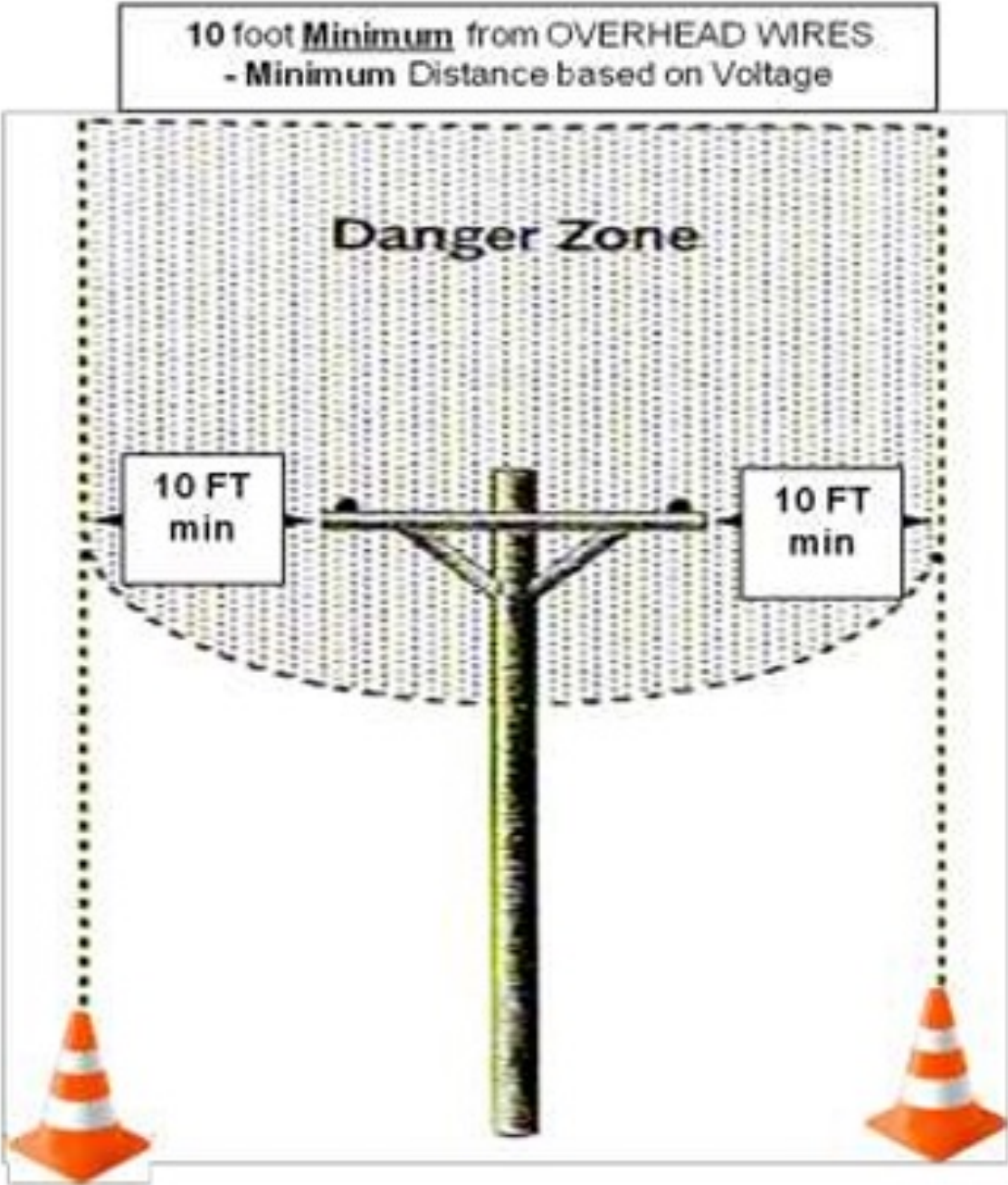
Arcing can also cause power outages by creating a path to ground.

The National Electric Safety Code specifies power lines be kept specific distances from nearby objects—including trees. The code requires greater clearances for higher voltage lines. For the same safety reasons, transmission line rights of way are wider than for local distribution lines

Step Potential and Touch Potential



Vegetation and Power Line Safety



Line Clearance Qualified Arborist



Questions?

- Contact Information:
- Tiffany Thomas
- tthomas2@duqlight.com
- 412-584-3442



Trees Under Tension:

Jeremy Lewis; The Davey Tree Expert Co.





UAA
UTILITY ARBORIST ASSOCIATION

**UAA Pittsburgh, P.A.
Safety Summit
October 17 & 18, 2023**

Wires Under Tension: or What Goes Down, Must Come Up



https://daveytreeexpert-my.sharepoint.com/:v:/g/personal/tim_walsh_davey_com/ETzyIYqK-IxAoSWqTYKF2sYBnq2gncWHSqZnDLObUlhJgg

Agenda

- **The Hazard**
- **Mitigation**
 - **Science**
 - **Training**
 - **Best Practices**



The Hazard

- Struck by
 - Wire
 - Wood
 - Saw
- Fall
- Electric Shock/Electrocution

Mitigation

An abstract graphic design featuring a white background. On the left side, there are two parallel diagonal stripes: a dark grey one and a light green one. These stripes extend from the top left towards the bottom right. The word "Mitigation" is written in a bold, black, sans-serif font, positioned to the left of the stripes, roughly in the middle of the image's vertical span.

Science

- **What do we know?**
- **What don't we know?**

Science

- **What do we know?**
 - **The approximate weight of the tree**
 - **Strength of rigging equipment**
 - **Displacement of wires**

8:10

85



Access the Wood Weight Esti...

Green Wood Weight Estimator

Choose a species..



0lbs

Diameter Large(inch) *

0in

Diameter Middle(inch) *

0in

Diameter Small(inch) *

0in

Length(ft) *

0ft

Estimated Weight(lbs)



Calculate

Clear



8:11

85

×

Access the Wood Weight Esti...

Select Species

Clear

Search

Maple, sugar

55

Mesquite spp.

59

Oak, black

64

Oak, Bur

63

Oak, California black

64

Oak, California white

63

Oak, canyon live

76

!

Cancelulate

Clear

...

8:12

85

×

Access the Wood Weight Esti...

Green Wood Weight Estimator

Maple, sugar

55

Diameter Large(inch) *

18

Diameter Middle(inch) *

14

Diameter Small(inch) *

10

Length(ft) *

21

Estimated Weight(lbs)

!

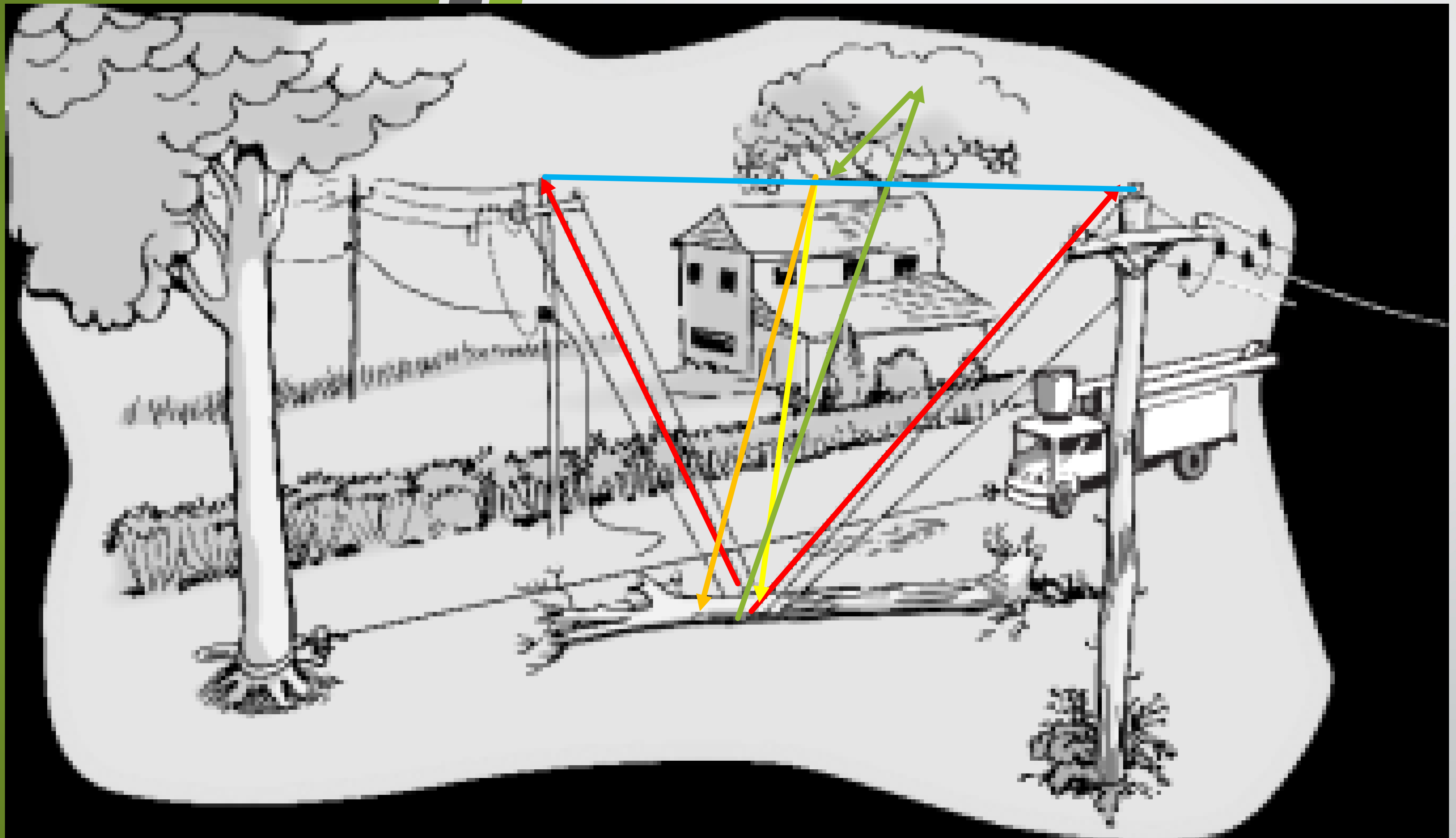
Calculate

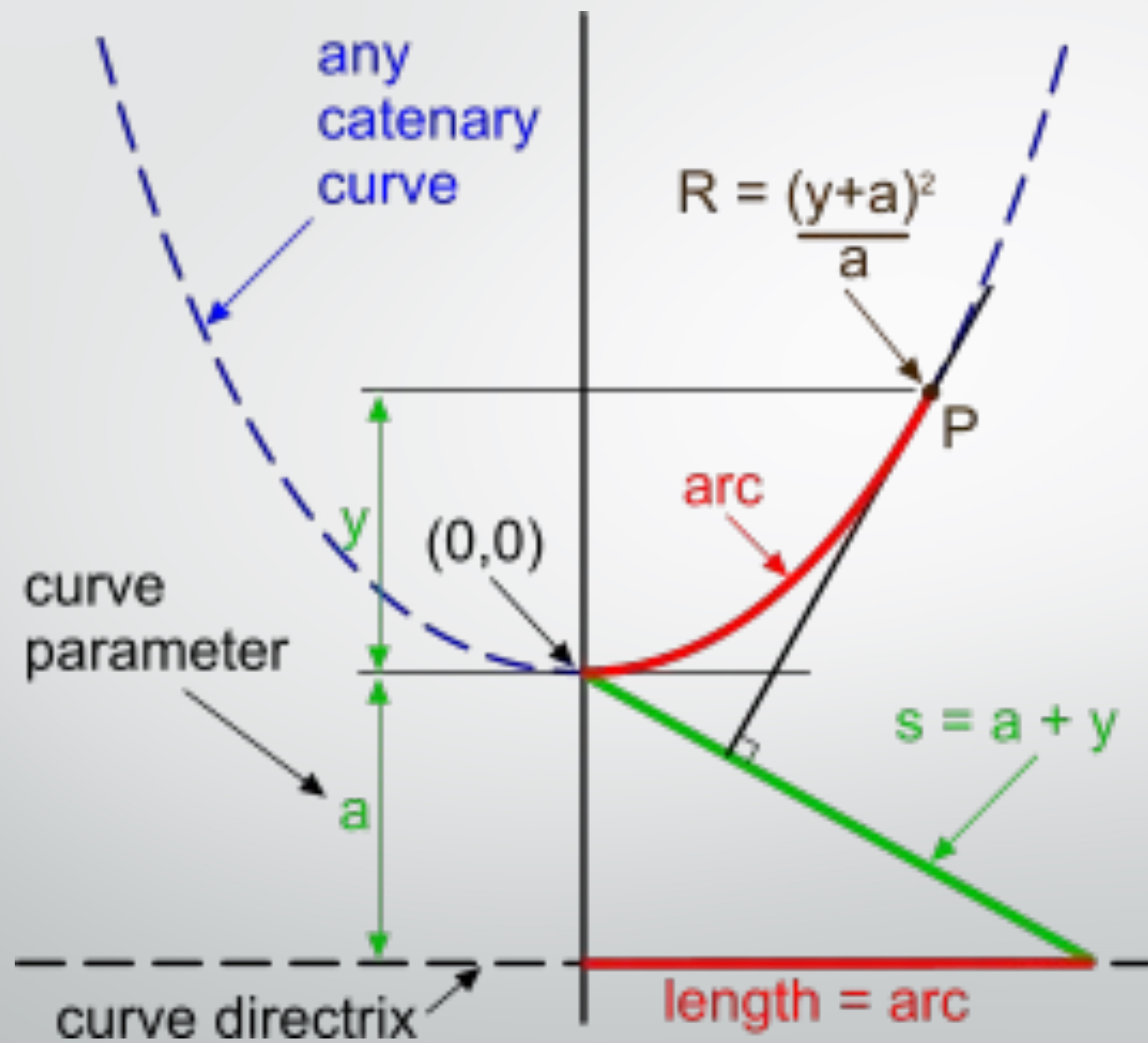
Clear

...

Science

- **What don't we know?**
 - **Actual load on wires, poles, hardware (Potential Energy)**
 - **Working with engineers to better understand loads, vectors, limitations, etc.**





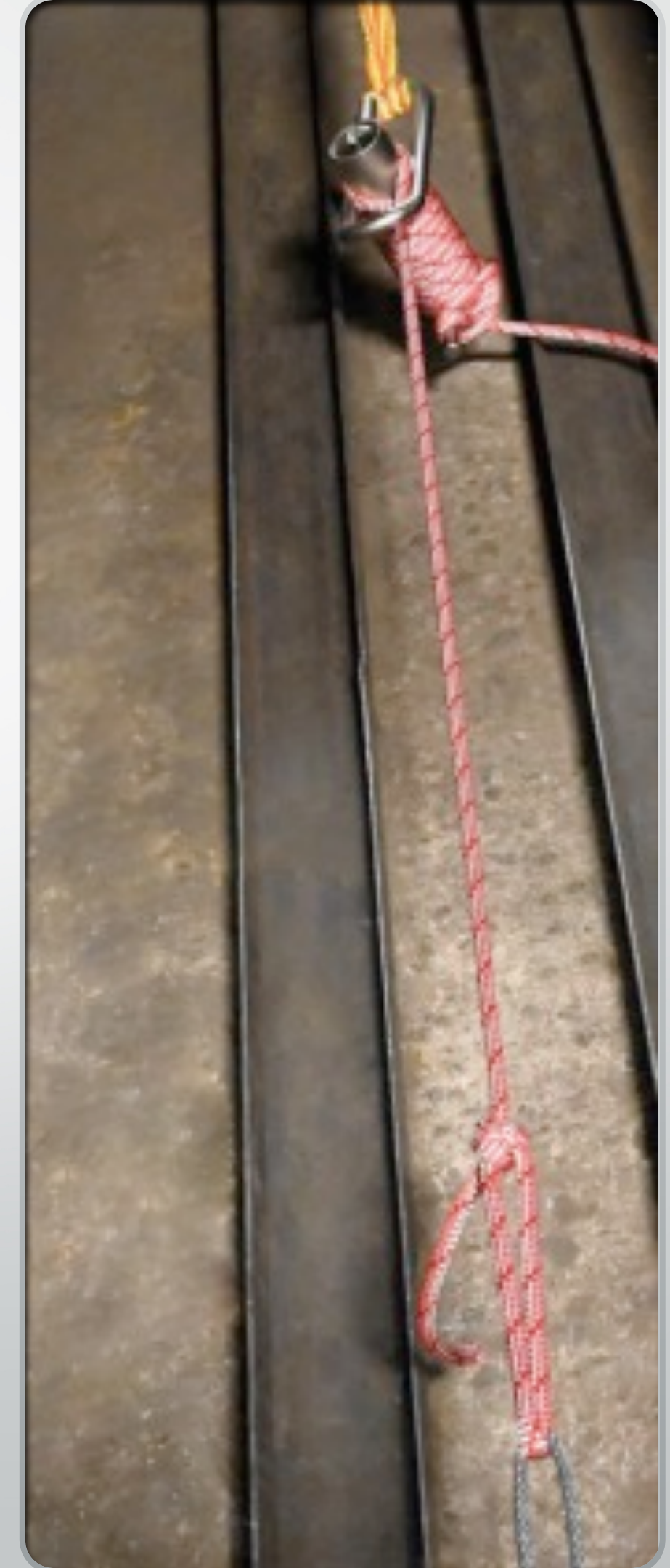
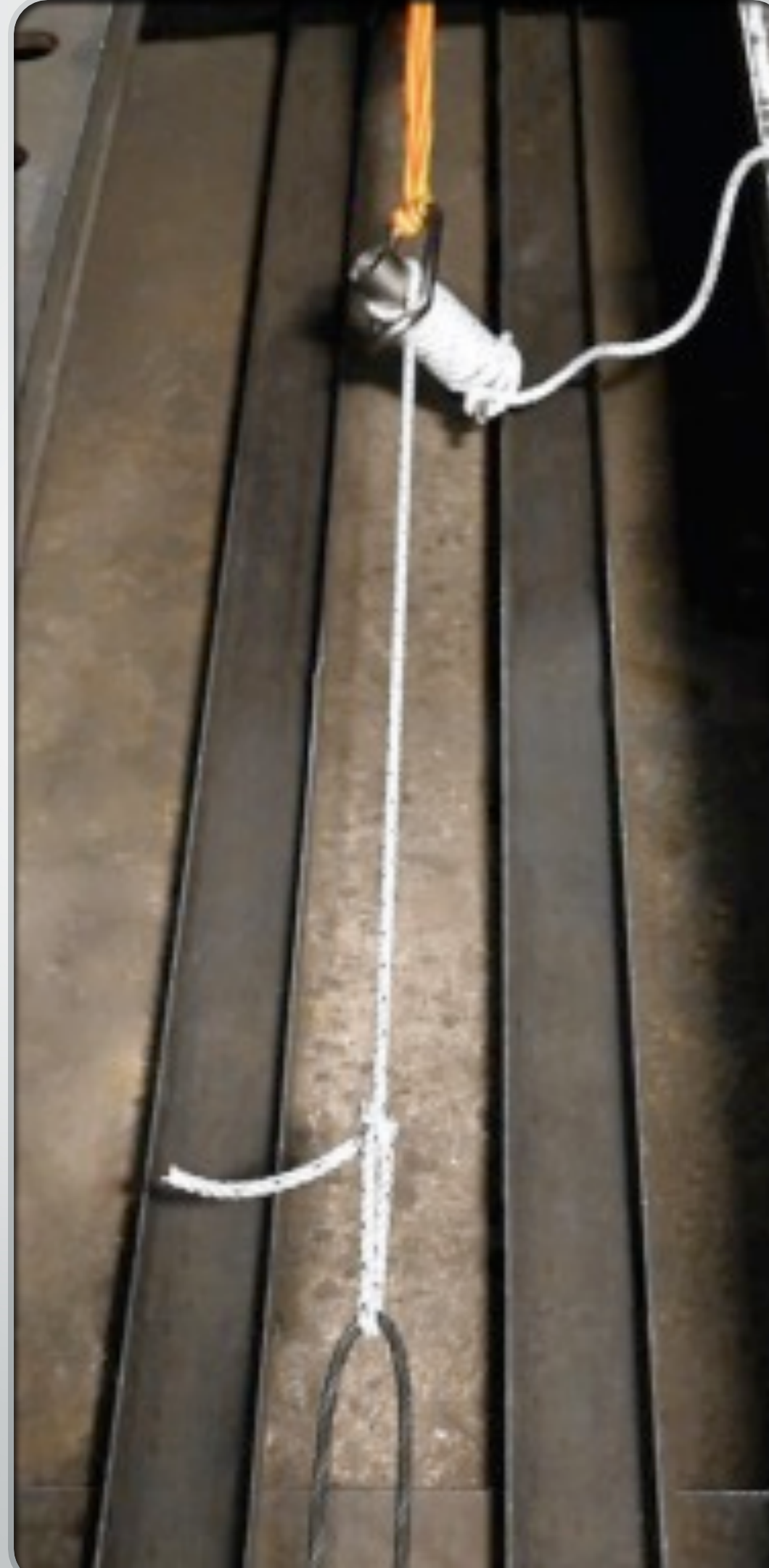
Science

- **What don't we know?**
 - **Likely failure points of rigging systems**
 - **Rigging line failure, where?**

Is the Rope/wire interface the weakest point?

- What about?
 - Bend ratio
 - Bend radius
 - D/d

Photographs courtesy of
Danae Jackson Redwing
Rigging Solutions



Nope!

- The knot is still the weakest point.

Photograph courtesy of Danae
Jackson Redwing Rigging
Solutions





Training

**Securing and Removing
Lodged Trees on Utility Lines
Checklist**

An abstract geometric design featuring a large green shape on the left and a grey shape on the right, separated by a diagonal line. The green shape has a white outline and a grey outline, and the grey shape has a white outline and a green outline. The text is positioned within these shapes.

Training

**Rigging Kit Training
Documentation of Proficiencies**



Training

**Required Knot Proficiency
Verification**



Training

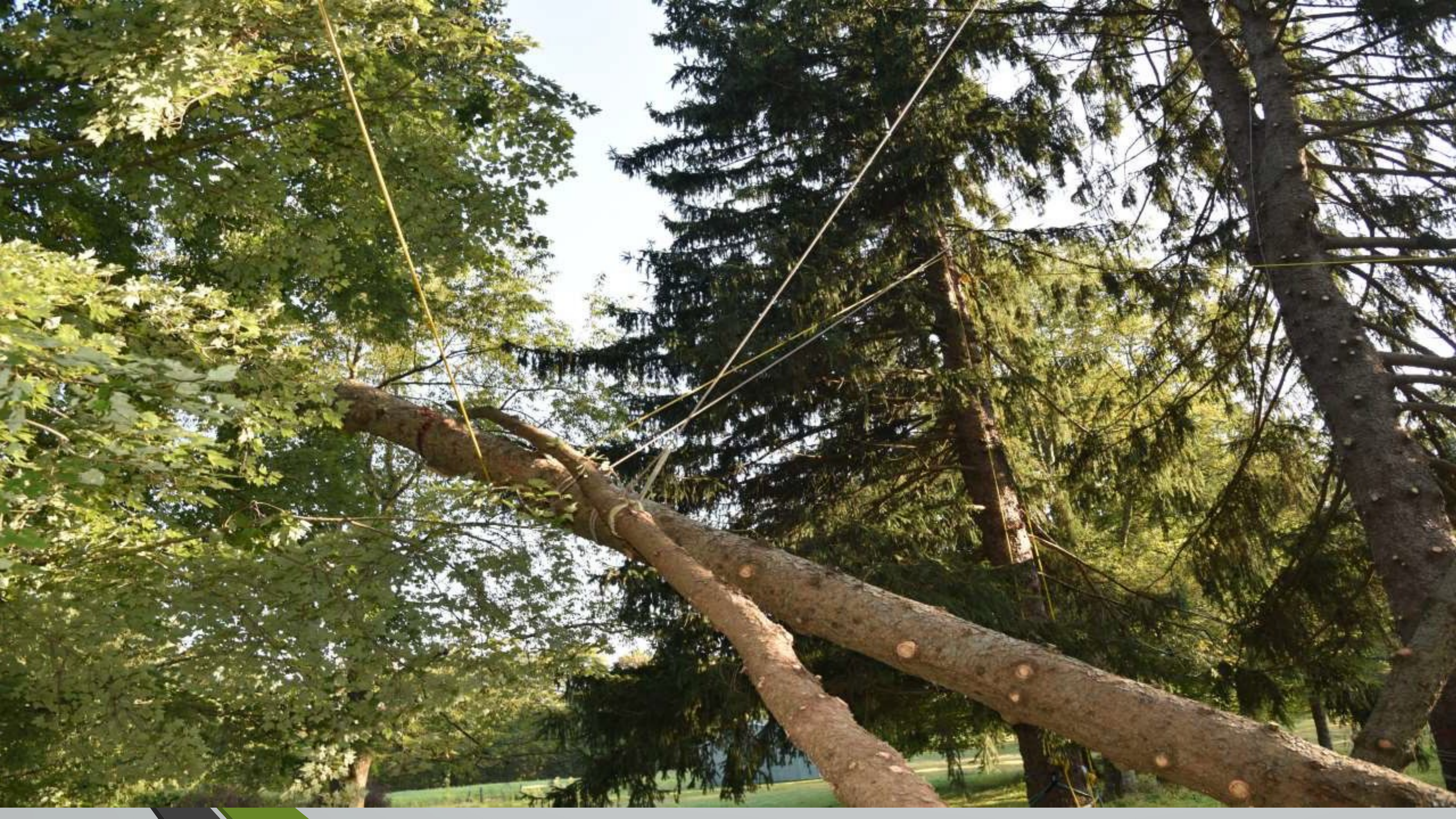
Rigging Equipment Proficiency Documentation

- GRCS
- Hobbs



Training

**Trees on Wire Documentation of
Training Proficiency Assessment**





























Science & Training

- **Putting it all together**
 - **Weight of tree**
 - **Load/capacity of poles and wires**
 - **Displacement/return**
 - **How to secure lines**
 - **Controlled release of lines**
 - **Cutting trees/limbs under tension**

Spring poles

Maximum point of
tension



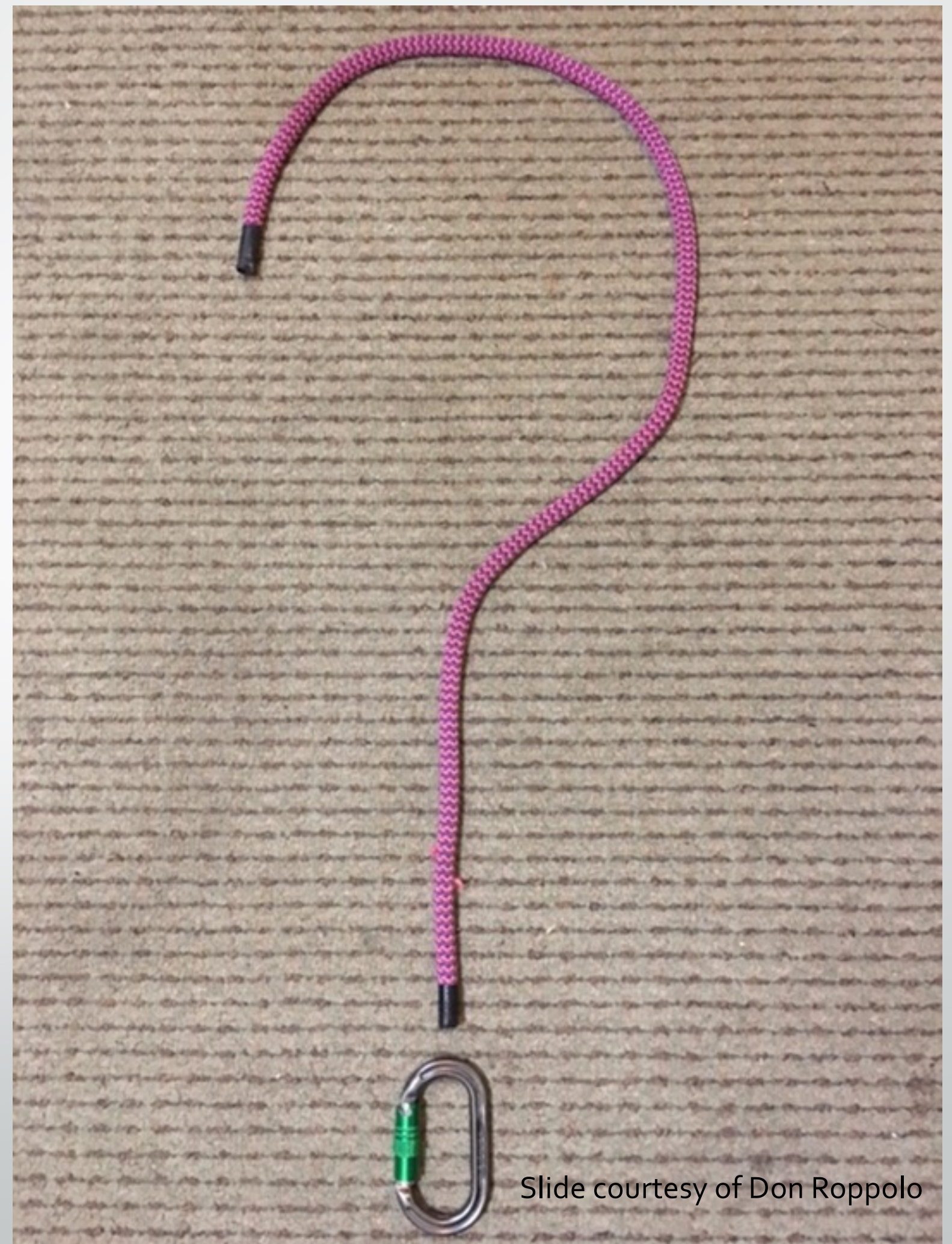
Best Practices

- ULCSP
- Prototype



Photograph courtesy of Danae
Jackson Redwing Rigging
Solutions

What Questions Do
You Have?



Slide courtesy of Don Roppolo



Best Practices Learned at the **UAA Pennsylvania Safety Summit**

October 17 & 18, 2023



Climbing Systems and Spar Work: Clint Pearsall, Penn Line





1. Proper Spar work:
 - The reason we review this is to continually progress to upgraded systems to meet all of the ANSI standards
 - The advantages of modern climbing systems will provide a return on investment through increases in safety, and productivity.
2. Know the updated terminology and best practices that is out there
 - DRT vs SRT
3. The pain of change is greater than loosing
 - Learn the new terms and products to keep improving
 - The easier you make the change the more successful you will be
4. Modern systems and the cost of them is worth the investment long term
5. Being tied-in and secured with a second climb line or lanyard while working aloft can mitigate the fall hazard from cutting a rope.
6. When working from a spar, the tie-in point must cinch to the stem. Lanyards or a climbing rope passed around the stem do not meet the requirements.
7. Aerial rescue must be considered in any task we perform aloft. Regardless of the climbing system you choose to use, take the time to become familiar with your co-worker's climbing systems. It may save a life!
8. Concerning your choice of climbing systems. To each their own, so long as a climber can use it effectively while complying with the applicable industry standards.
9. Remove as many barriers to entry for new climbers as possible. One approach is to start them out on a split tail system that they can tie and test low and slow while their Foreman is standing shoulder to shoulder with them. Overcoming a fear of heights in your first tree doesn't need to be coupled with the fear of tying a knot wrong when you finally reach your tie-in point.
10. To those in the crowd that manage traditional system holdouts in their organizations, ask for a demonstration of their spar work skills. It may become apparent that they do not possess the skills, equipment, or willingness to properly tie-in to a spar with a traditional system. This may be a safety concern that you can head off with some training before an incident occurs. This issue flew under the radar for some time at Penn Line. Spar work safety concerns were a primary driver that converted many of our holdouts from a traditional system to a split-tail system.
11. I leave you with this to consider. If you knew climbing spikes were to be banned next year, what would you do now to prepare for the inevitable upheaval in your work practices? Whether you're a Climber, Safety Pro, or Manager, being skilled with an eye-to-eye split tail system can only increase your odds of success while making the transition to a rope climbing system.
- 12. Always look forward, predict challenges, and strive to be proactive in your approach!**



Herbicide Chemistry and Safe Application Techniques: Jesse Peery, Envu



1. Notifications and what goes into them
2. You are an active customer service rep for whoever/whatever utility you are working for
3. Avoid trigger words like spray, kill or poison
4. If there are questions, answer them
5. Know your product
6. Proper PPE and equipment is important
 - Product is safe for the applicator, but you still need to protect yourself
7. The boom versus boomless / Drift pattern
 - Cannot spray over 10 mph winds
8. PA Hypersensitivity List
 - Vendors required to know
9. Restrictive language / Label Interpretation
 - For example; Should vs Shall



Tree Risk Assessment:

Scott Sjolander, Penn State Extension





1. Scott used an example of the Tree Risk Assessment Quiz to focus on which is great
2. Used to say “Hazard Tree/Danger Tree” is now more focused on words such as risk, failure and consequences
3. Defects & Site conditions that increase the likelihood of tree failure:
 - Standing dead trees and dead tree parts
 - Cracks
 - Weakly attached branches or codominant stems
 - Decayed, damaged or missing wood due to disease
4. Two types of consequences:
 - Direct : physical damage to facilities caused by the strike
 - Indirect :may occur as a result of damage due to the energy delivery system
5. Levels of tree risk assessment is done at different levels
 - Level 1 – Limited Visual
 - Level 2 – Basic
 - Level 3 – Advanced
6. Risk Rating
 - Four terms used to define levels of risk:
 - Extreme
 - High
 - Moderate
 - Low
 - Threshold / level of acceptable risk



Manual Aerial Rescue: William Allen, Penn Line





1. Never climb alone
 - Never presume the 2nd climber knows how to do an aerial rescue, so be sure to always validate they do
2. When calling 911
 - Give a physical address
 - Tell 911 if you are off trail and if so leave a trail of “breadcrumbs” such as cones into the location back to the site
 - Tell them AED and high angle rescue is needed
3. Always have 2 sets of equipment
4. Be aware of blood borne pathogens
 - Avoid the blood at all cost
- 5.
6. Always assess the area for risks
 - If there is an electrical hazard, stand down and secure the area. Call the utility and stand down until they arrive.
7. Do a second assessment if something happens BEFORE the rescuer goes up.
 - Sometimes it is safer to leave them in the tree
8. Medical alert information on the inside of a hardhat
 - This can include medicines, health condition etc
9. Don't discount the groundmen in that they too are critical in the saving process
10. Pre-job is critical
 - Look to see if there is cell service too
 - Who is doing what if something happens
11. The Best rescue is the one you never have do



Live Line Trailer Demo: Dan Feth, Duquesne Light Co.





1. Communication is the key to safety
2. Difference between voltage and current is important
 - Potential x current amperage
3. The neutral is the most dangerous wire
4. Having your PPE worn properly (tucked in/not loose) as that can be a hazard
5. Importance of PPE
 - Rating of the boots
 - Types of PPE
 - FR Clothing
 - Hard hats/glasses
1. Changes in policy / procedures
2. Difference between voltages determines minimum approach distances
3. More awareness of the safety culture
 - The shift of the crews as a whole
4. Situational awareness with homeowners/businesses running generators
 - Going to a homeowner and making sure it is turned off to protect crews
5. Equip Potential
6. Step Potential
7. Repeat Command Confirm