



# **DIAR Overhead Transmission Data Capture Manual**

**August 29<sup>th</sup>, 2020**

**Revision\_0**



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## **1.0 Document Purpose**

The purpose of this document is to provide SDG&E's minimum requirements for data capture for the following structure types:

- Wood structures (Poles & H-Structures)
- Tubular steel poles (Direct Buried, Engineered Foundation Poles, H-structures Etc.)
- Lattice Towers

Every possible structure/material configuration will not be shown in this manual. For any questions or if in doubt of the proper data to capture, please contact your SDG&E QA/QC representative for any clarifications prior to proceeding.

## **2.0 General Notes**

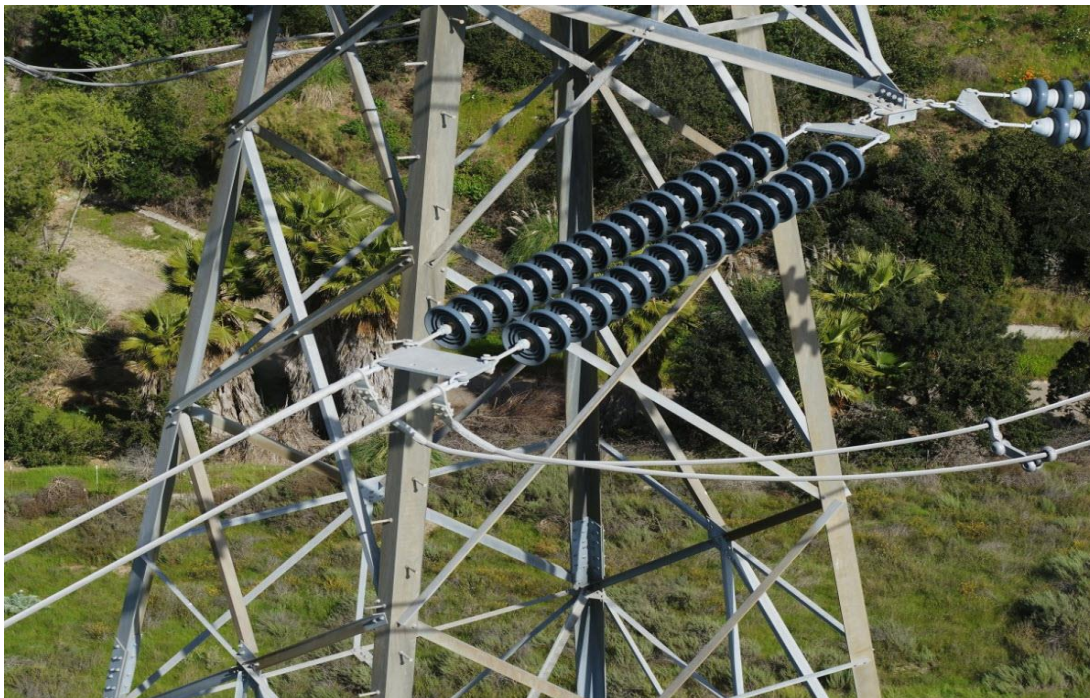
The correct UAS and camera combination shall be used to capture the required data to allow SDG&E to properly assess the photos from the office, utilizing zoom, and determine if remediation is needed. A X7 Camera with a 50mm lens is required. The UAS used for this camera will be at the discretion of ASD and the drone pilots. All safety standards and other requirements from SDG&E's Aviation Services Department, SDG&E's Land Management, Local, State, and Federal agencies must always be followed. Reference SDG&E's unmanned aircraft system (UAS) Aviation Operations Manual Revision 7 (1/24/20).

## **3.0 Data Quality**

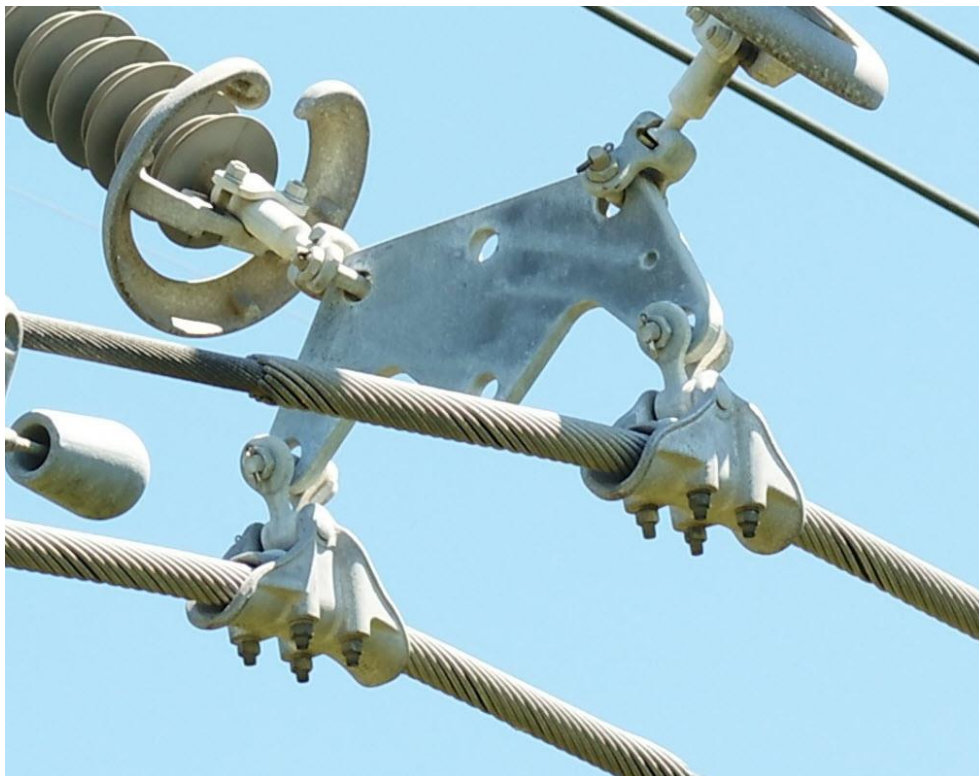
The photos provided shall be of high quality to allow SDG&E to assess, in fine detail, the condition of the pole and all its components, attachments, equipment, etc. SDG&E reserves the right to adjust the photo capture methods, quality, amounts, and angles at any time via an update to this manual. Any imagery deemed insufficient or blurry by SDG&E QA/QC shall be recaptured in the field at no additional cost to the company. The following images illustrate the level of detail, quality, and zoom clarity required for each photo captured in the field:

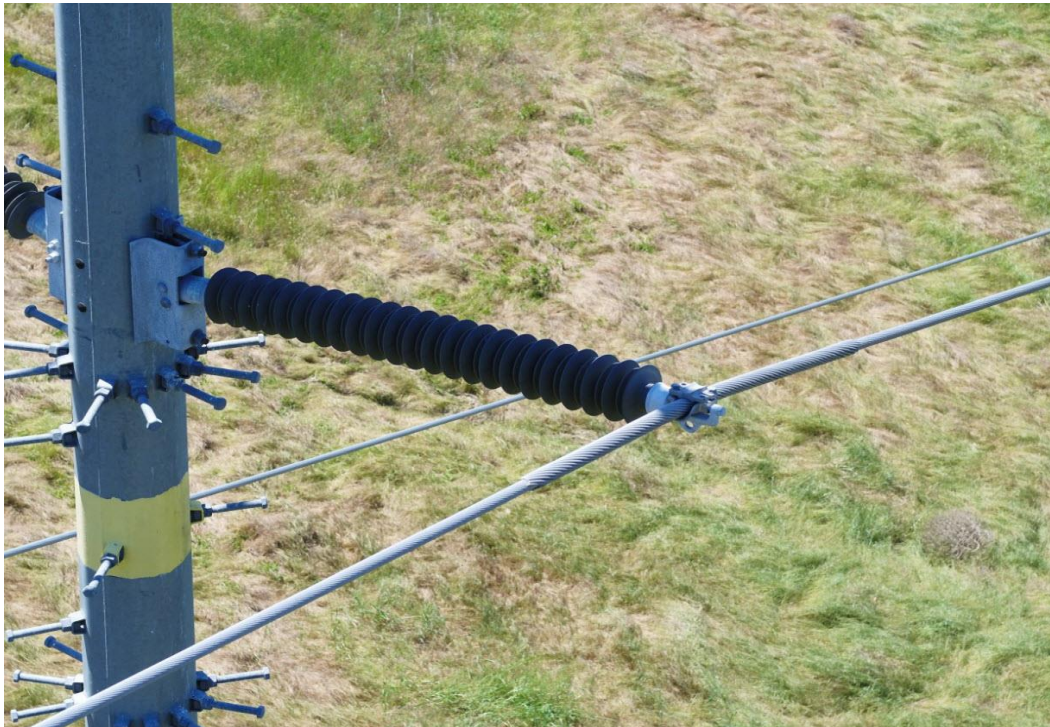
















## **4.0 Photo Capture Requirements**

The photo capture requirements include all structure types listed in section 1.0 of this manual. The Transmission Shot Sheets must be followed for each structure/structure type.

Any structures encountered in the field that differ from those shown in the shot sheets, will require a joint meet with SDG&E QA/QC in the field (i.e. Cable Poles, Figure 4's, Switch Poles, Custom structures). SDG&E QA/QC is to be notified a minimum of 5 business days prior to flights for structures requiring a joint meet.

Photos captured will need to be from both above and below the conductors. ASD safety requirements must be followed during both types of flight operations (Above & Below).

Drone crews are required to check each span for any sleeves in the transmission conductors and static wires. This will require the use of high-power binoculars. All sleeves will require photos per the Miscellaneous page of the Shot Sheets. The cut off in the ahead and back spans from a structure will be mid-point. This means that from mid-point of the spans, whichever structure to which a sleeve is closest to, will be the structure that the photos of that sleeve are uploaded to in the CORE program. Drone crews are also required to check each span of communication cables (in our transmission tie line alignment) for any broken lashing.

Any photos taken from the ground with a hand camera (i.e. anchor photos), are required to be shot with a camera that meets or exceeds the capabilities/specifications of a Nikon P900.

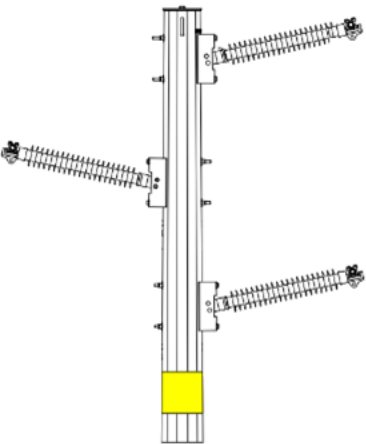
Any hazards/emergency conditions found in the field shall be immediately reported to an SDG&E QA/QC representative via process defined by SDG&E.

## **5.0 Submissions and Data Organization**

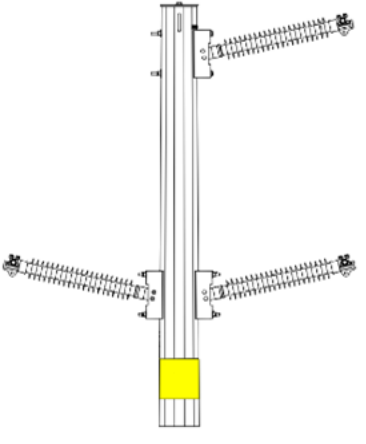
Contractors shall submit all data to SDG&E through the CORE program per process defined by SDG&E. All images must be in JPG format. SDG&E reserves the right to change data methods/processes at any time. All data captured is the sole property of SDG&E and at no time should any data captured by contractor be retained by the contractor or shared outside the SDG&E DIAR Project unless otherwise approved in writing by SDG&E.

## **6.0 Shots Sheets (See next pages)**

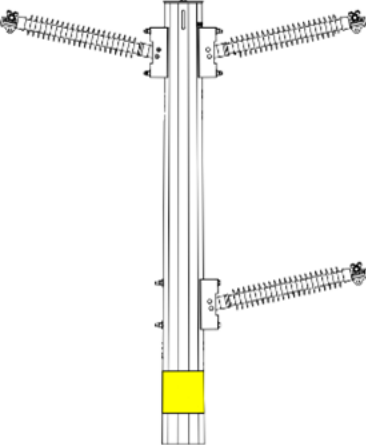
Configurations encountered in the field



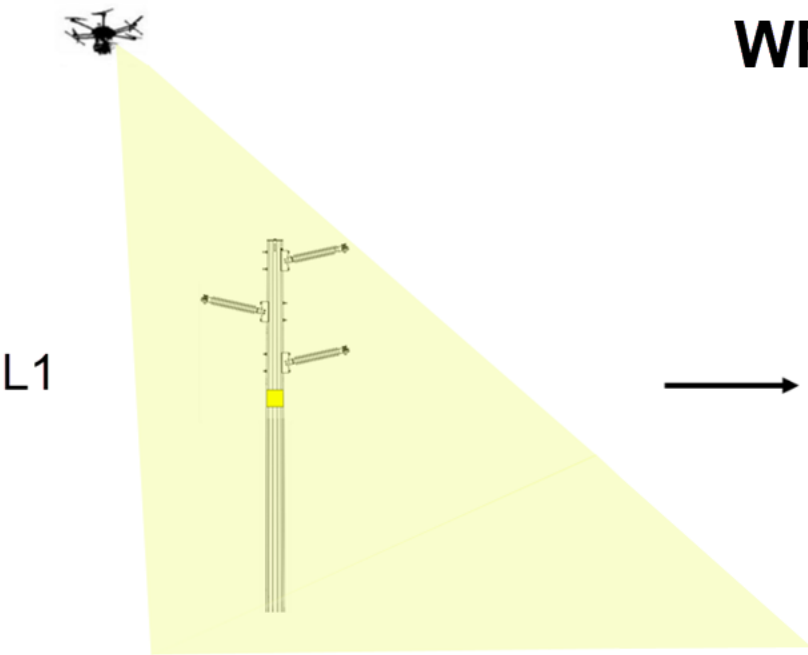
WPI



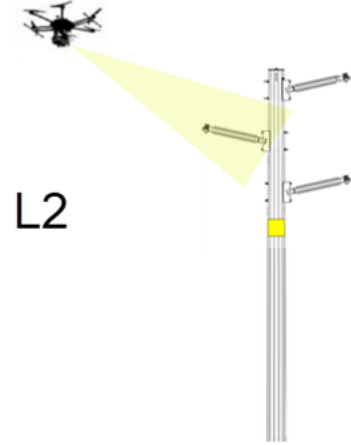
1/2 WPI



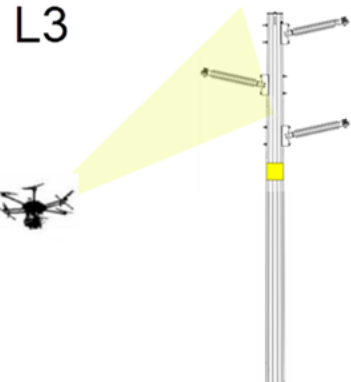
2/1 WPI



L1

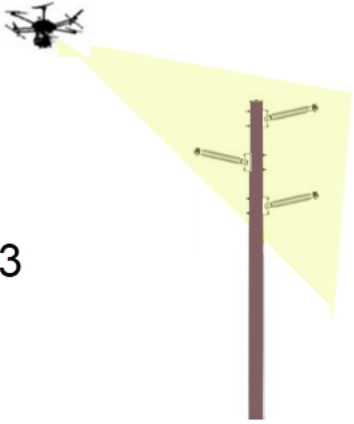
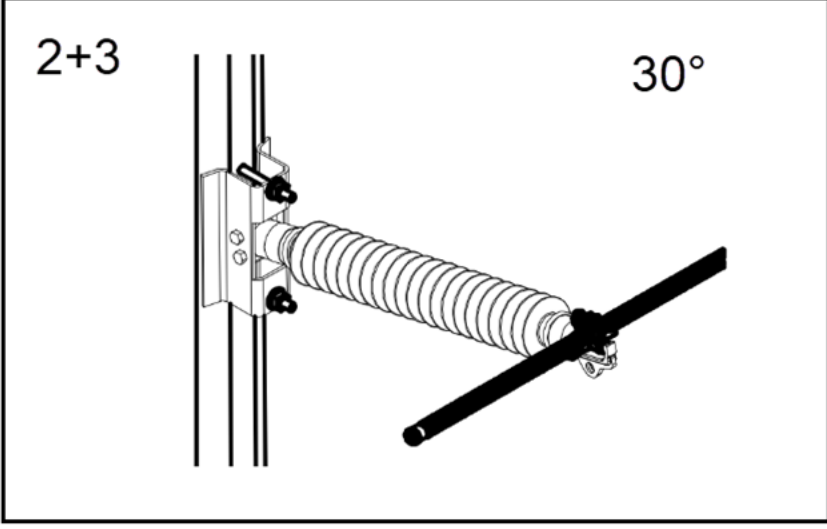
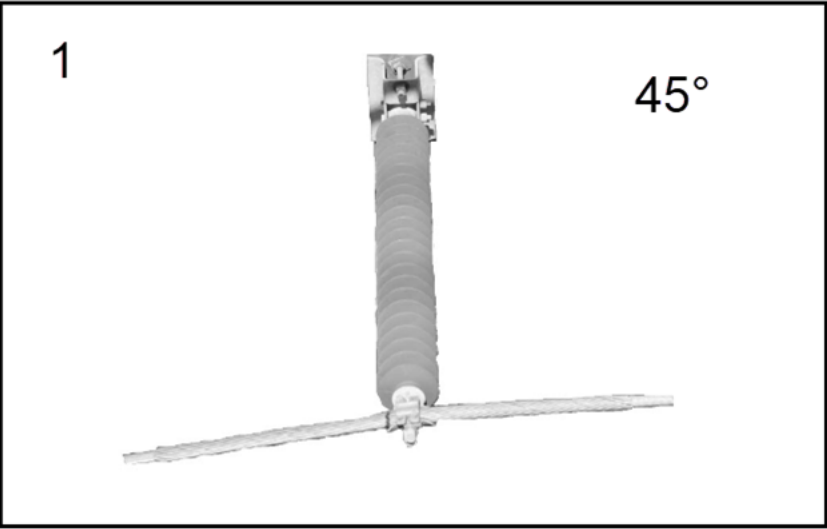
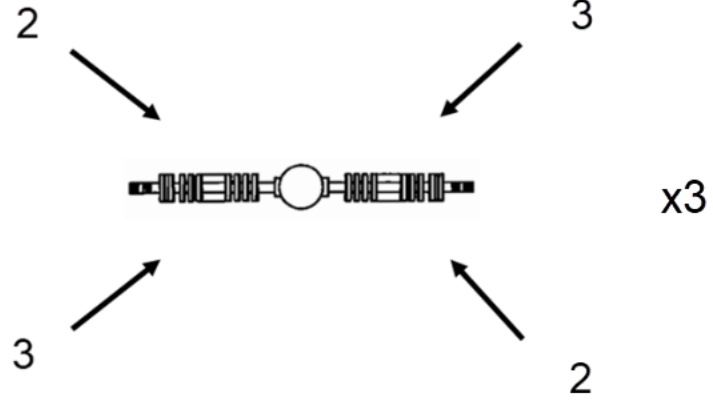
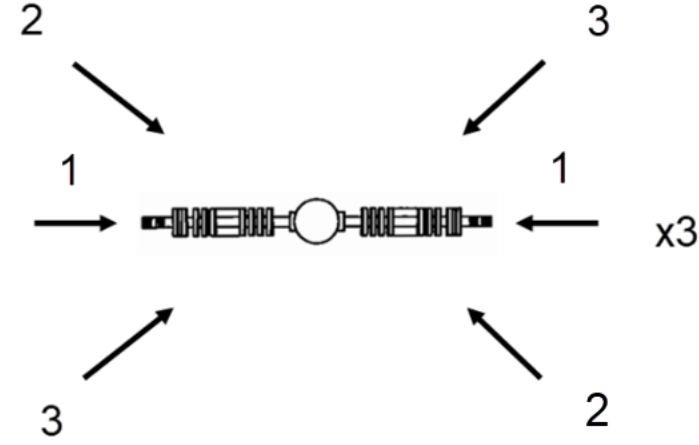
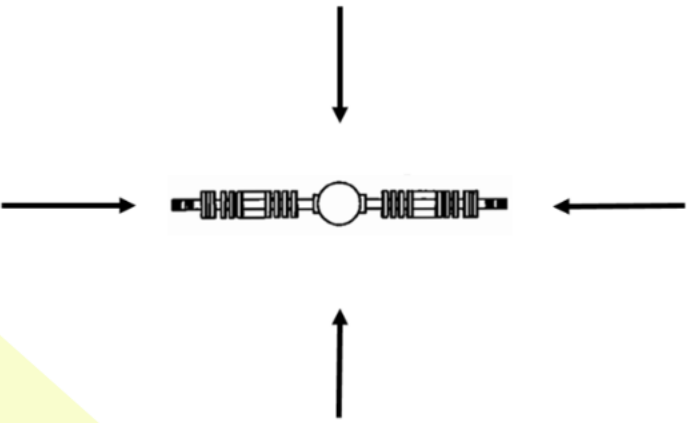


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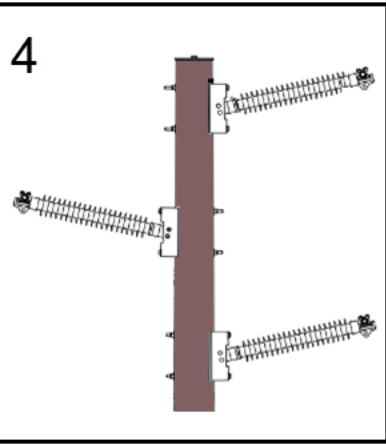
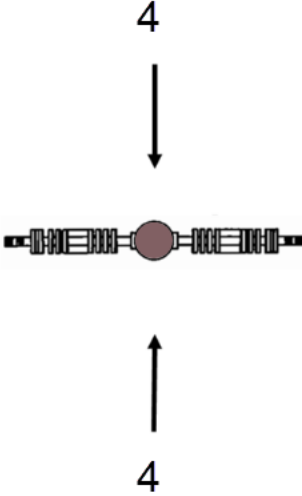


L3

WPI Structure

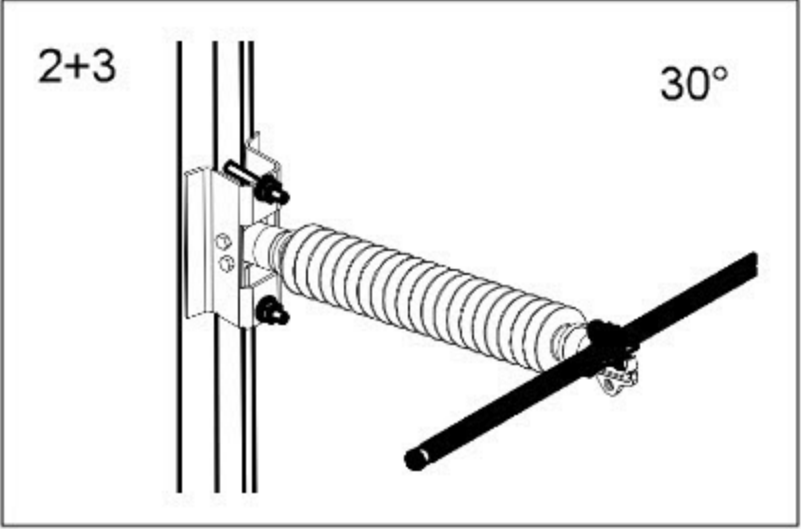
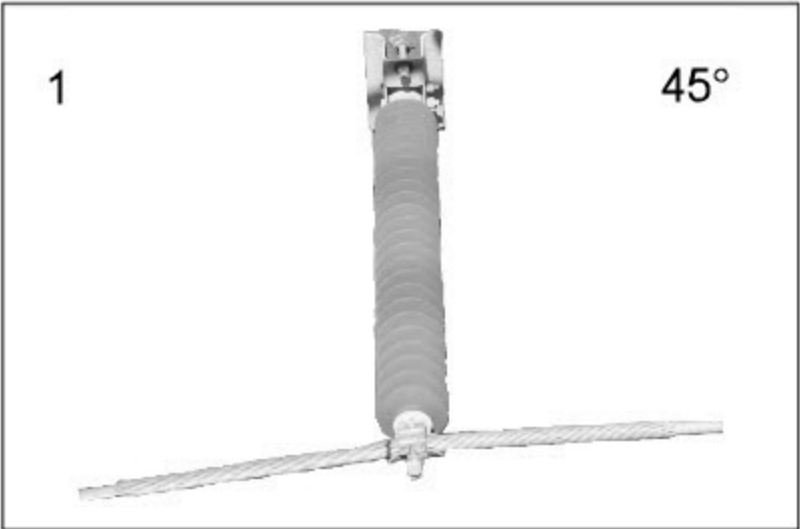
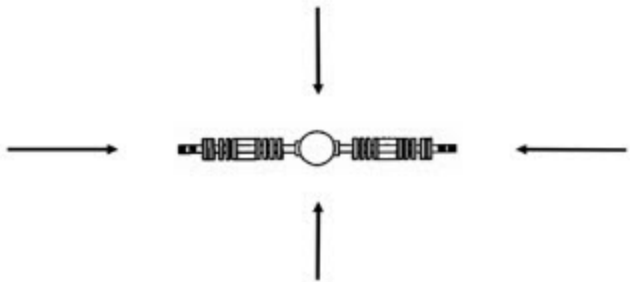
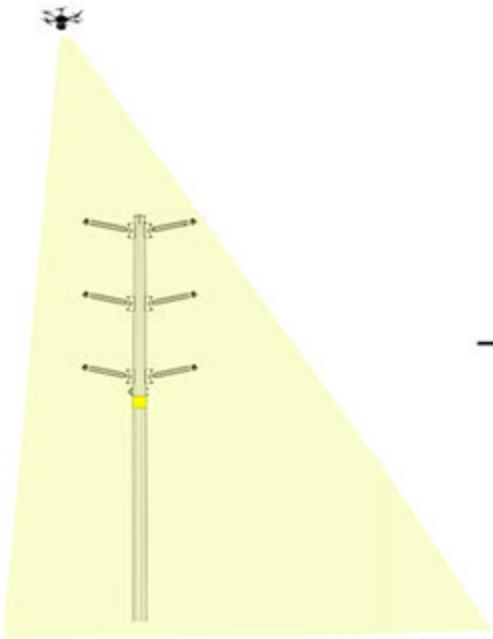


Wood Pole Only

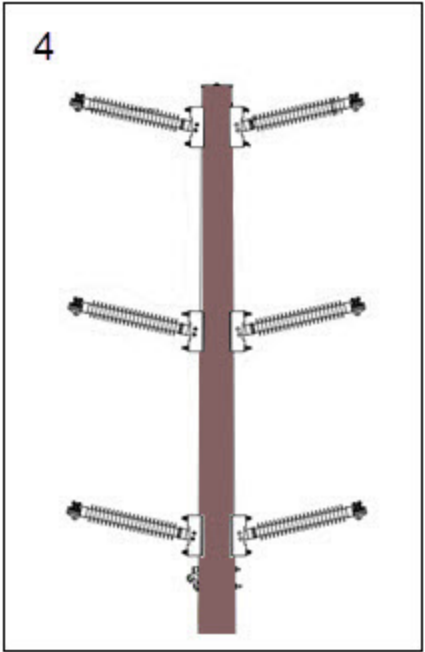
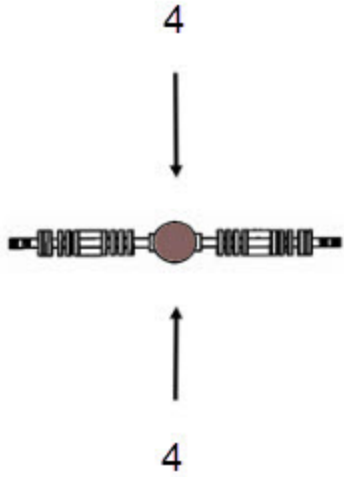
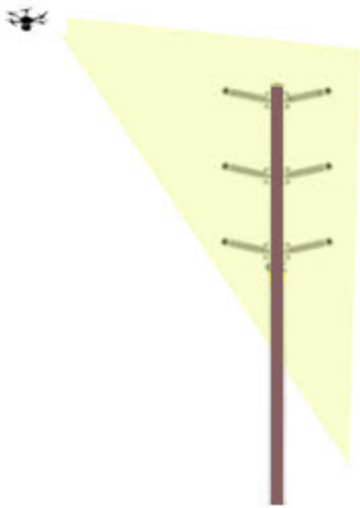
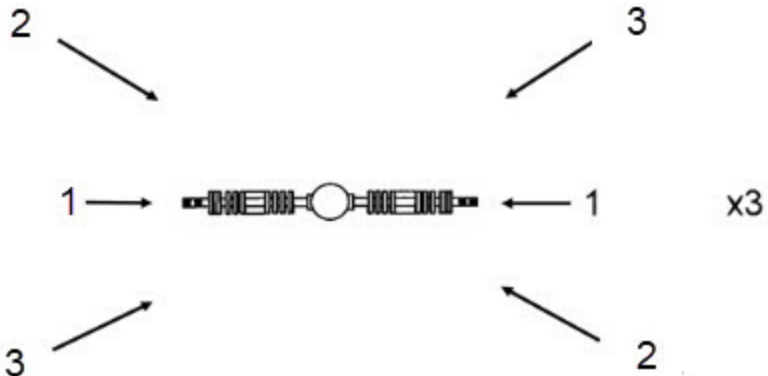
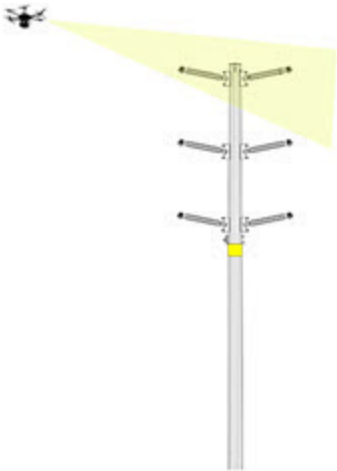


DC WPI Structure

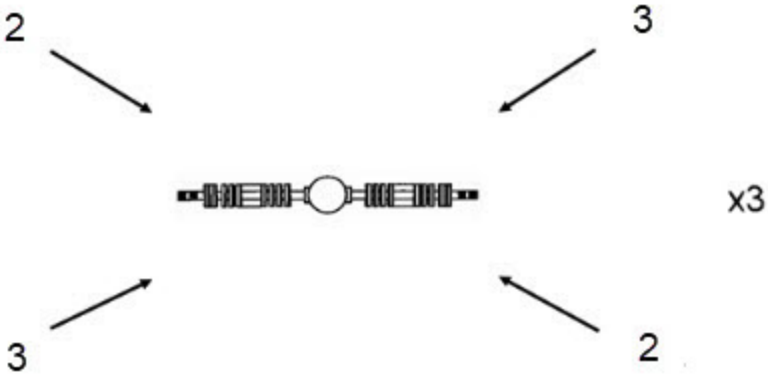
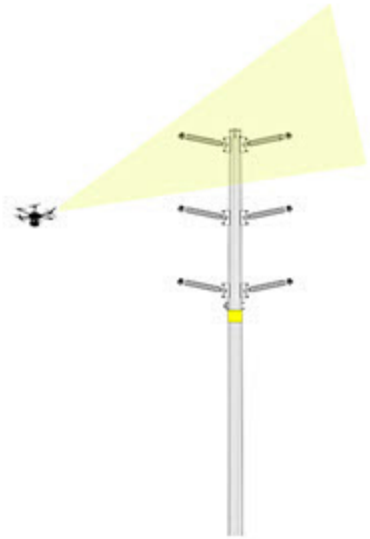
L1



L2

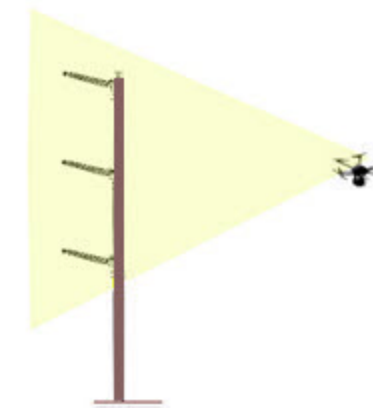
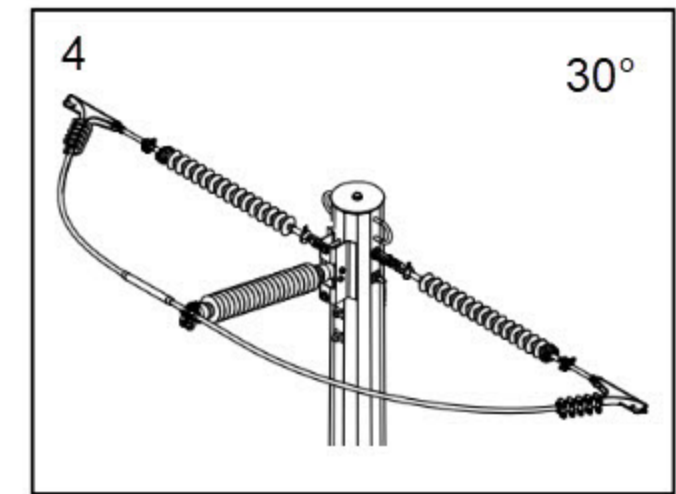
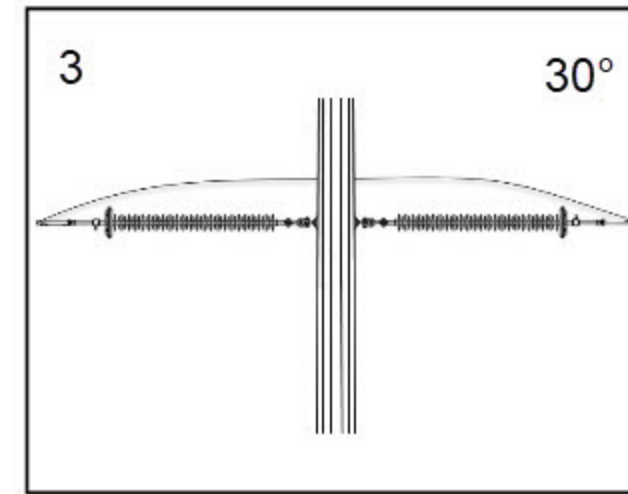
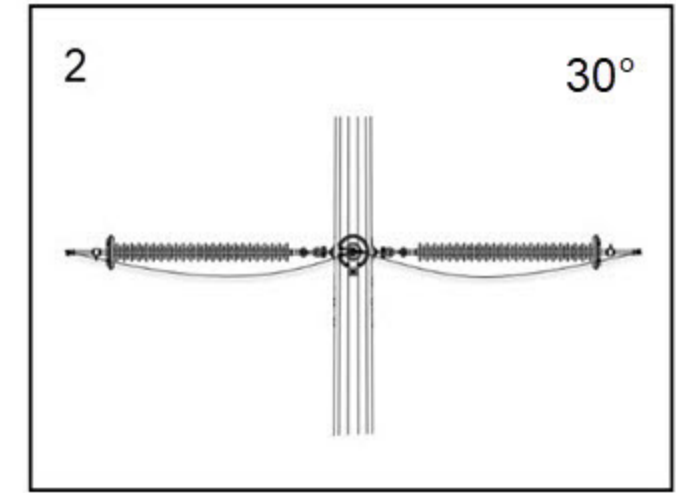
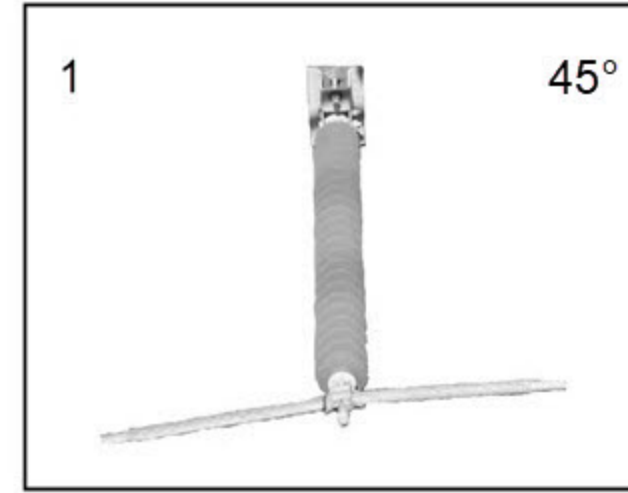
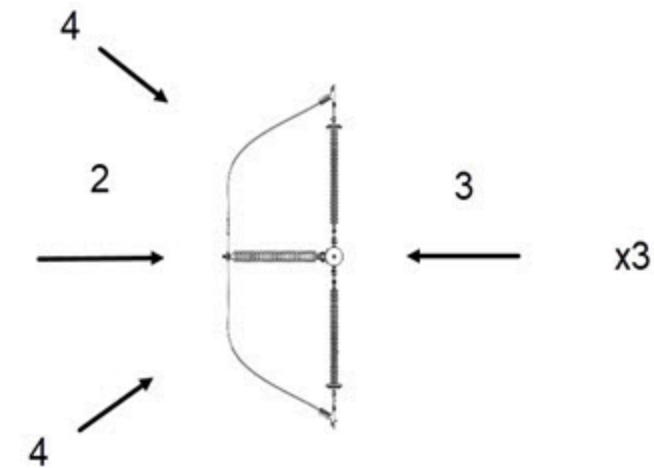
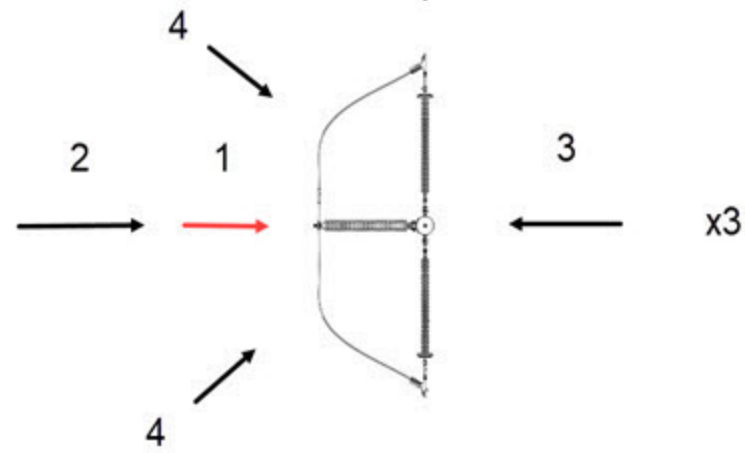
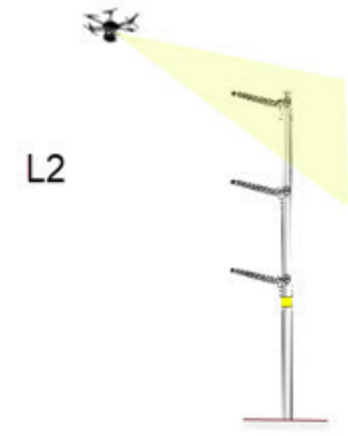
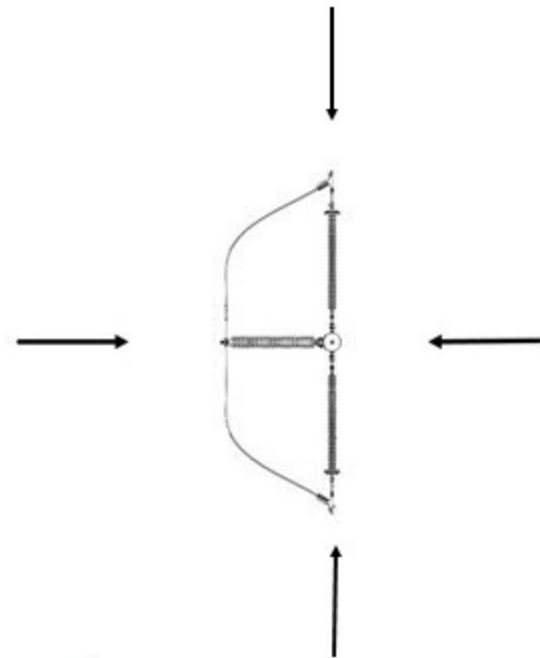
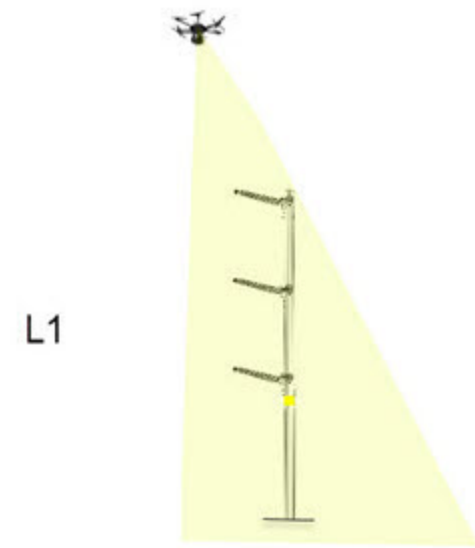


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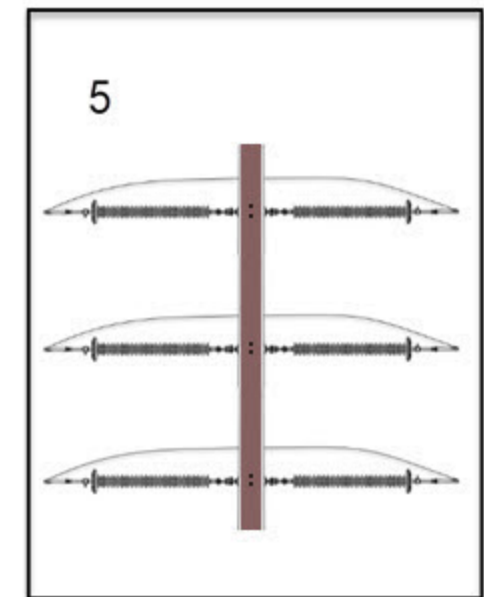


Wood Pole Only

# YPI Structure



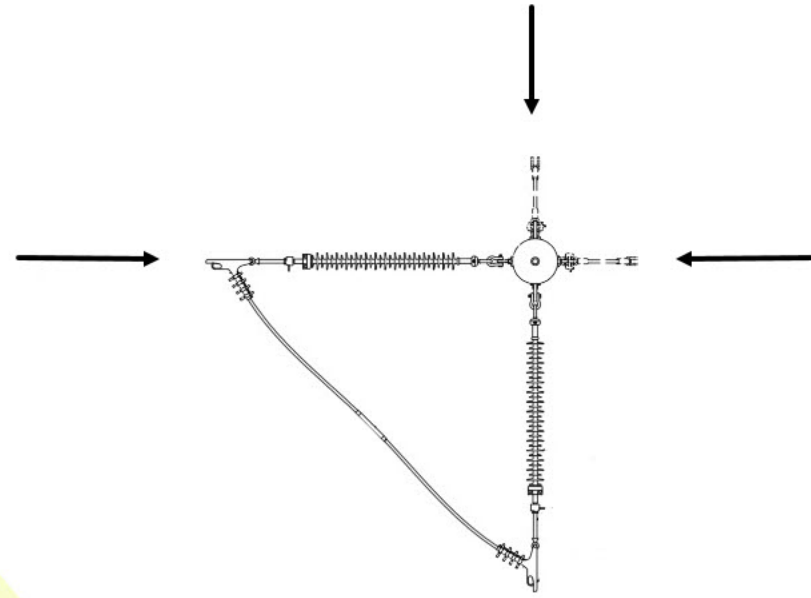
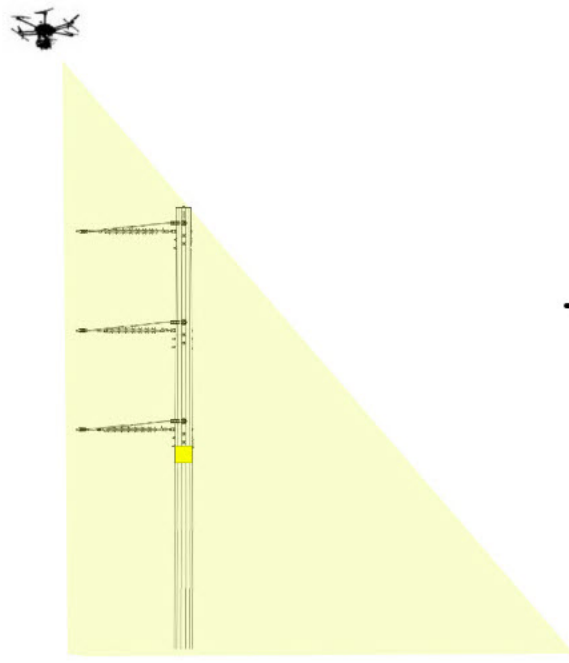
Wood Pole  
Only





# Y Structure

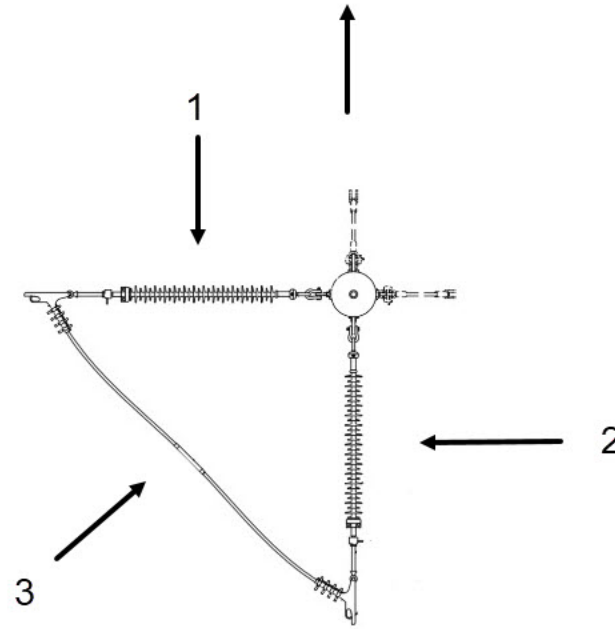
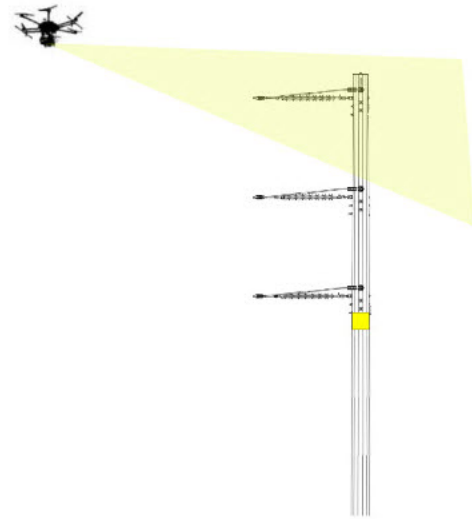
L1



1 + 2

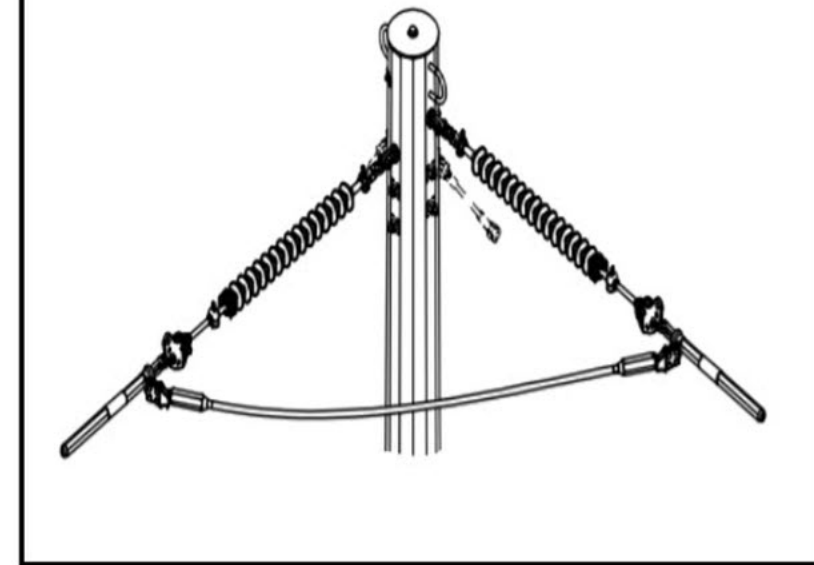


L2

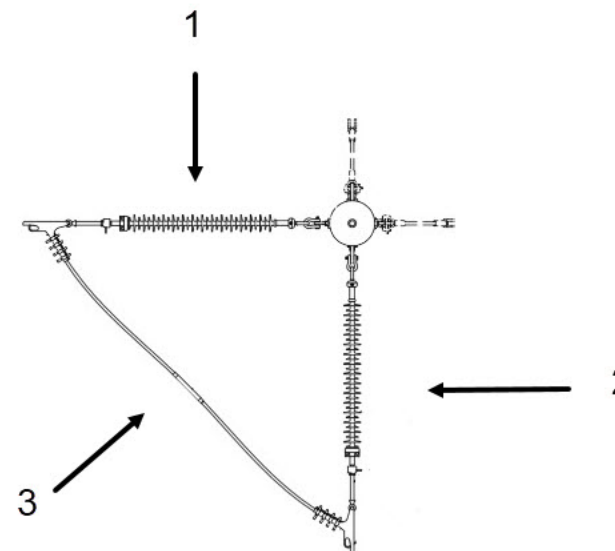
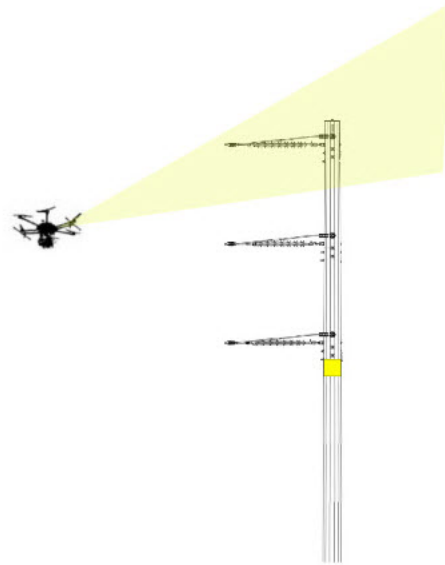


x3

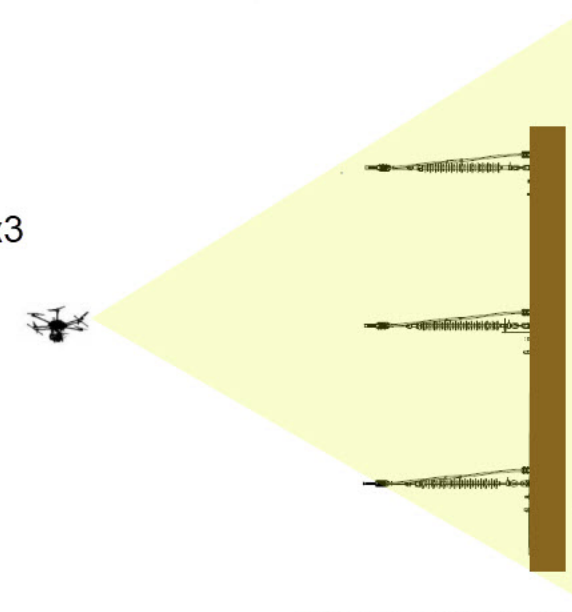
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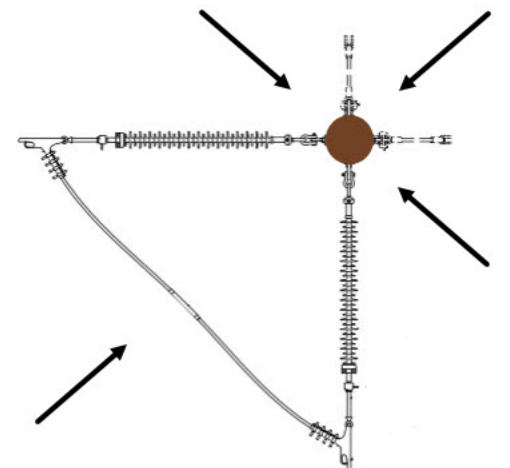
L3



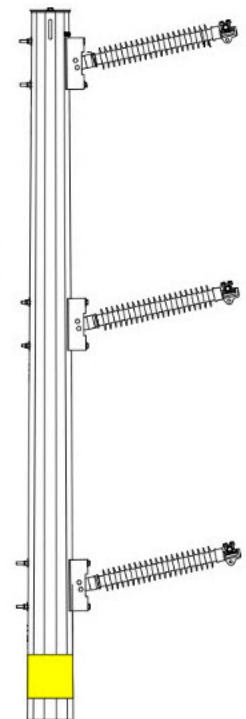
x3



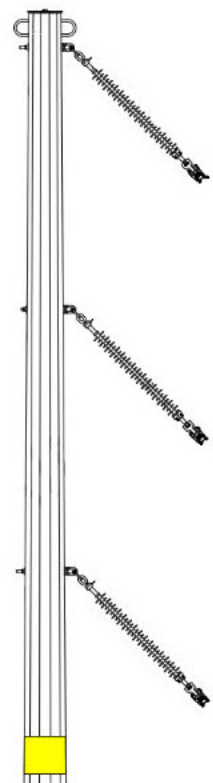
Wood Pole Only



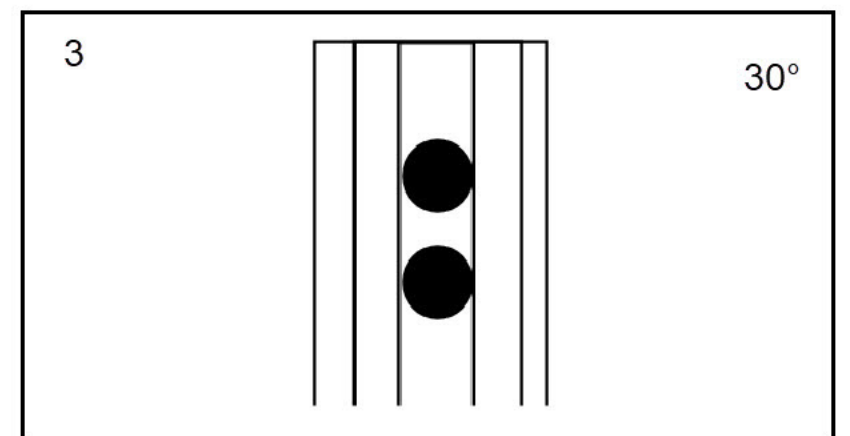
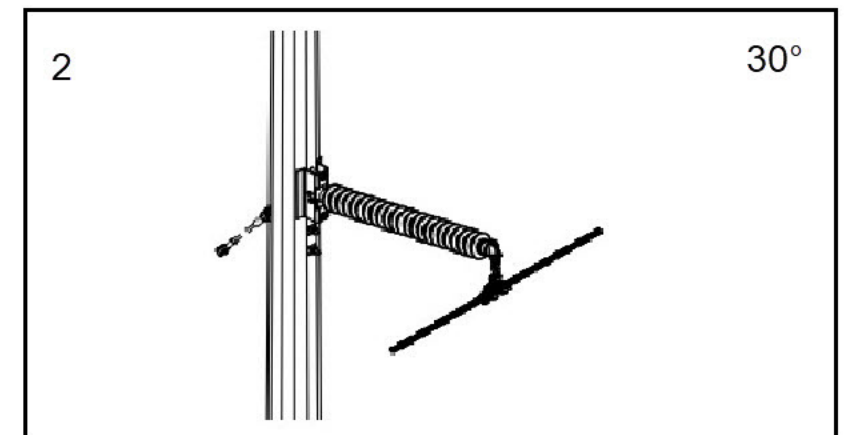
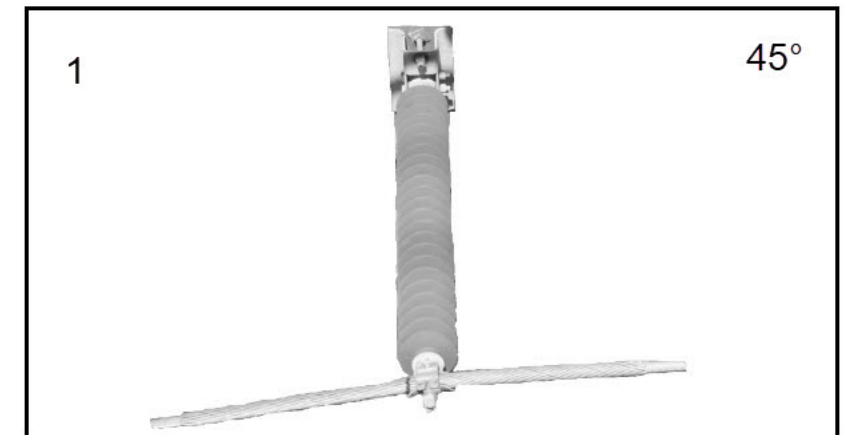
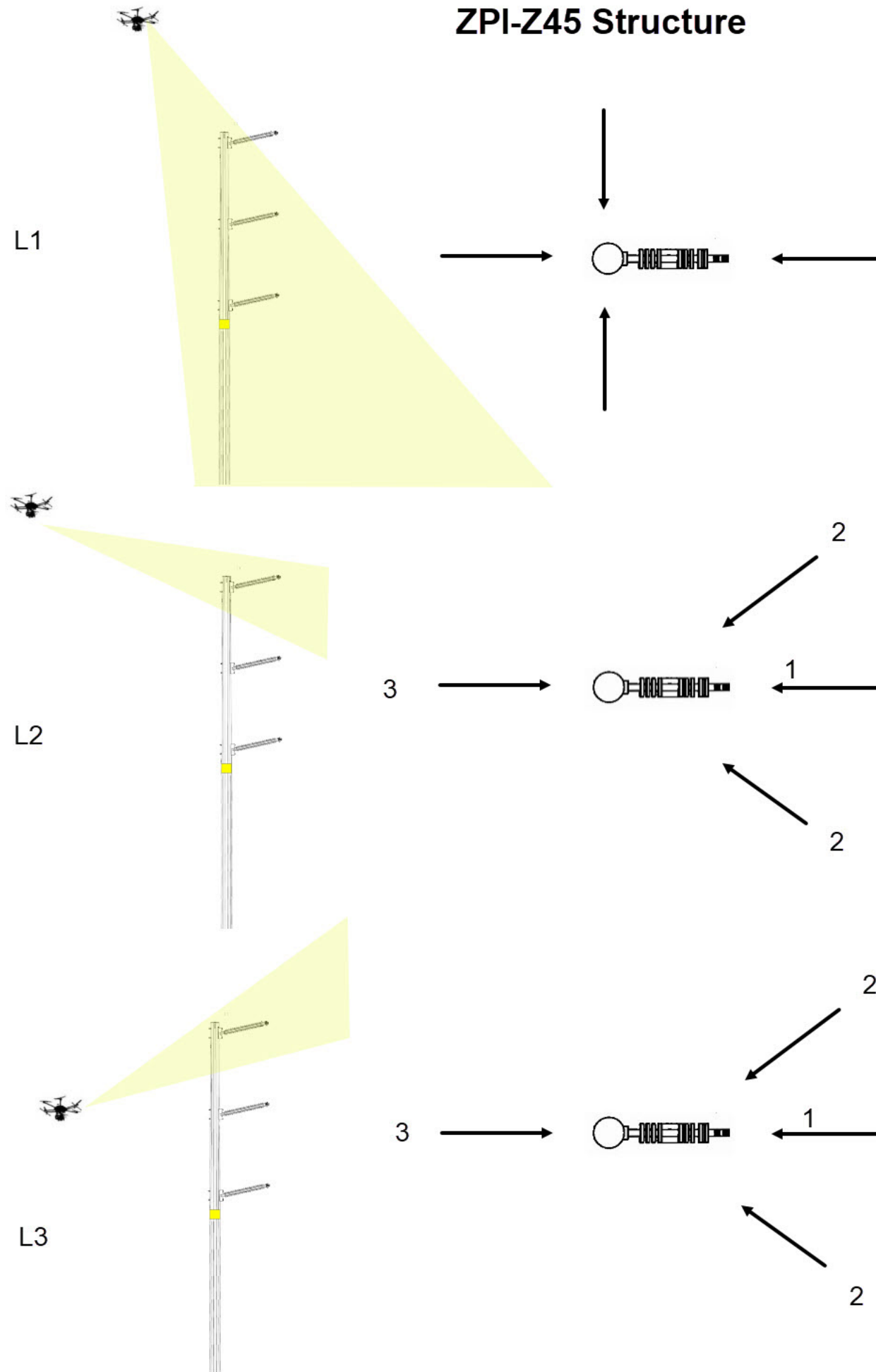
# Configurations encountered in the field



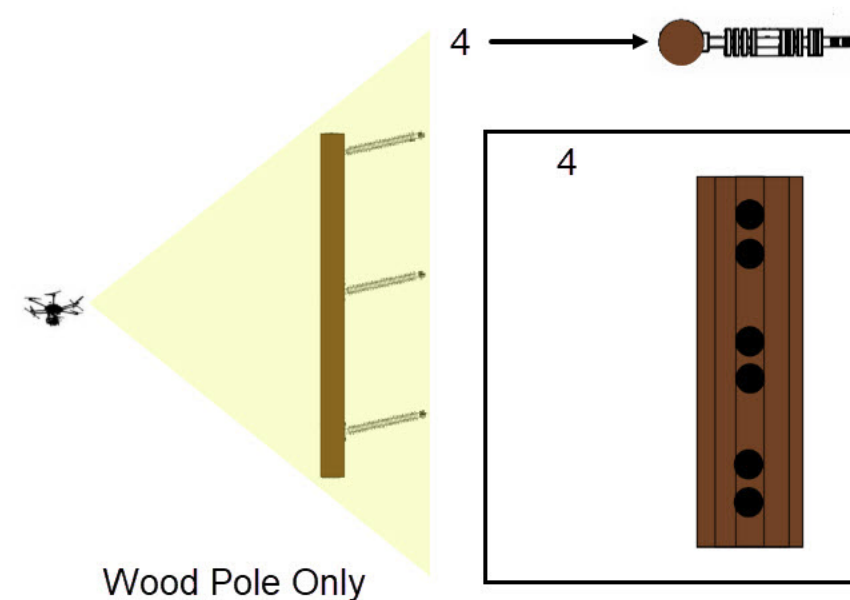
ZPI



Z45



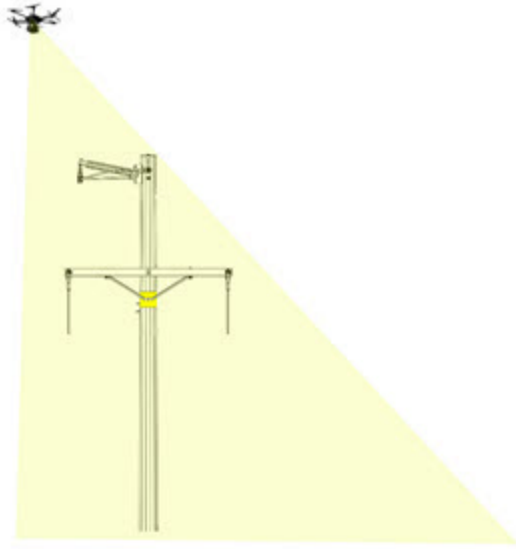
x3



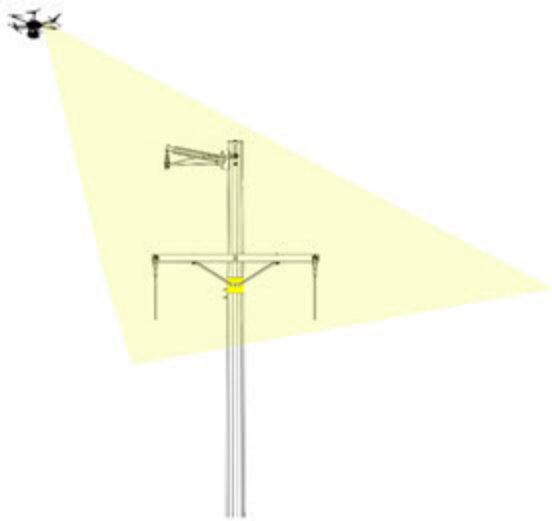
Wood Pole Only

# X-Delta Structure

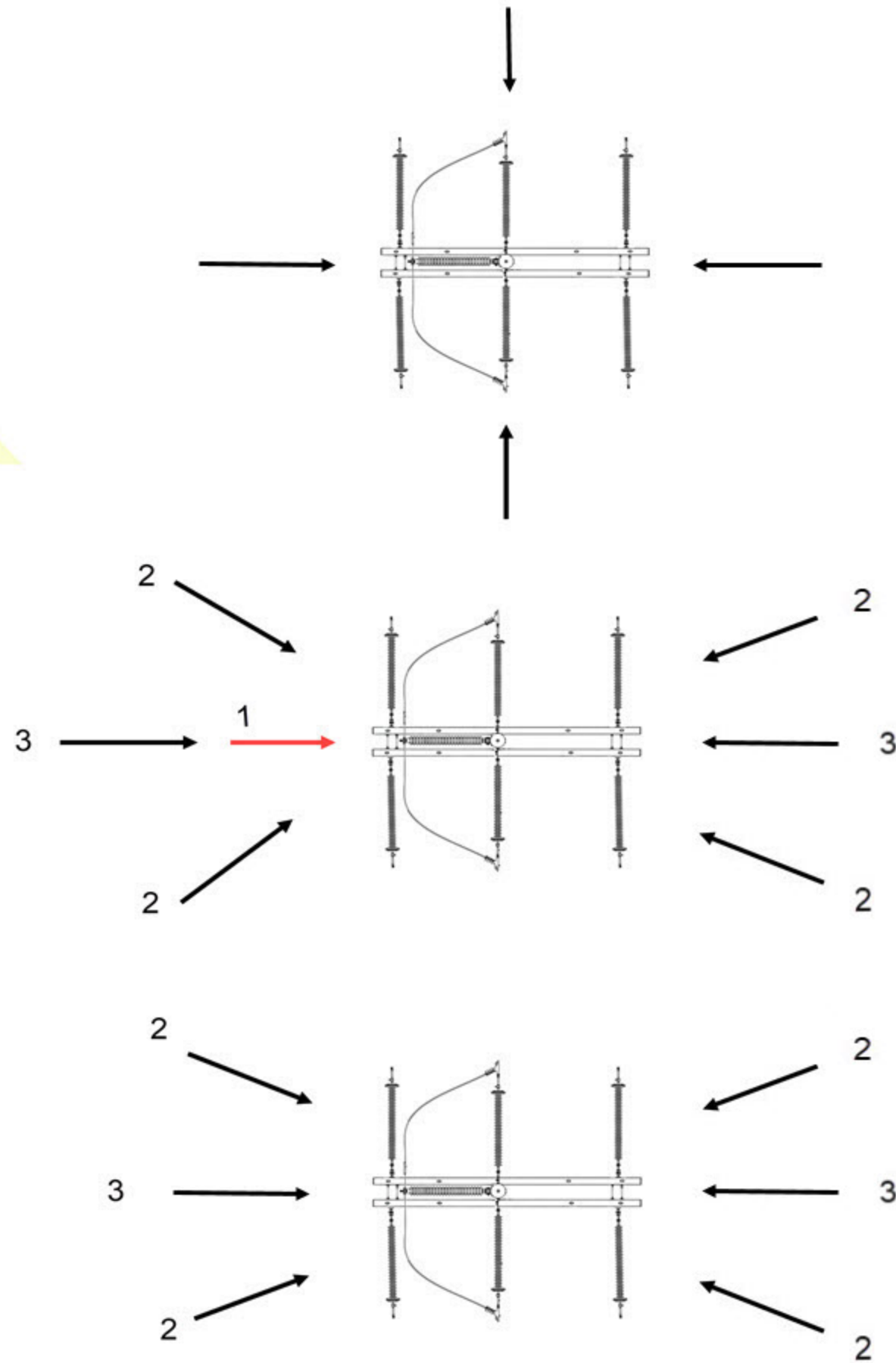
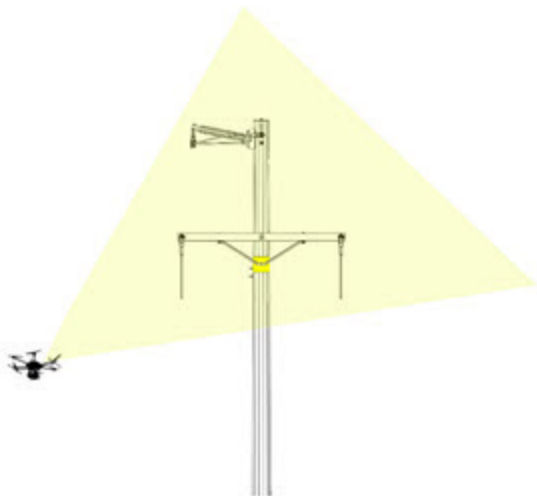
L1



L2



L3



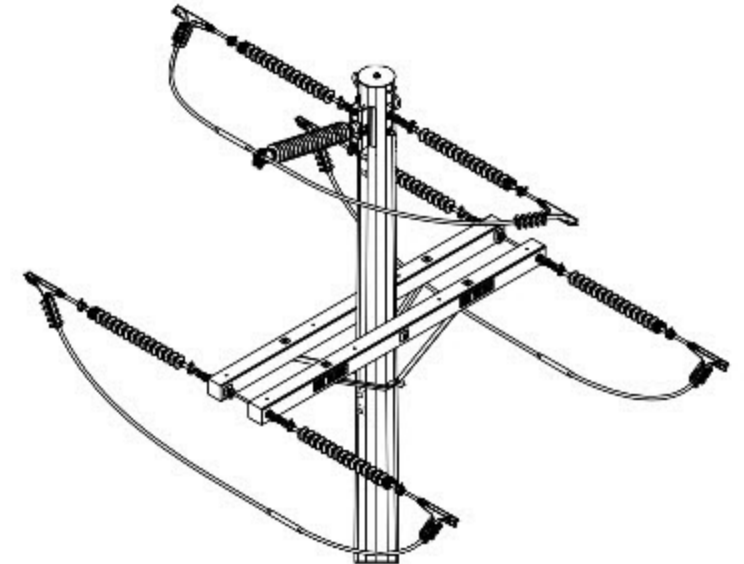
1

45°



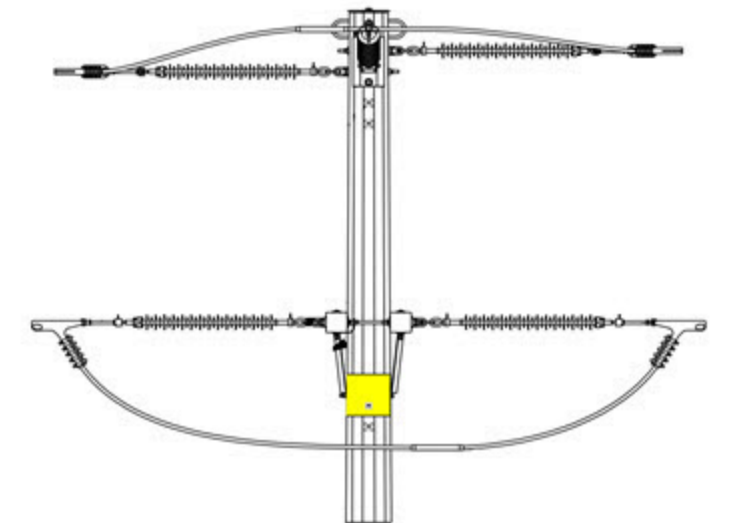
2

30°



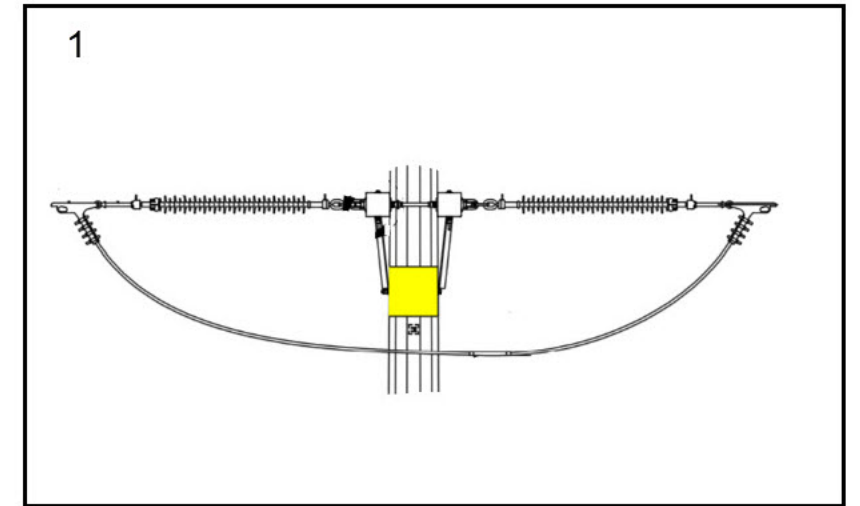
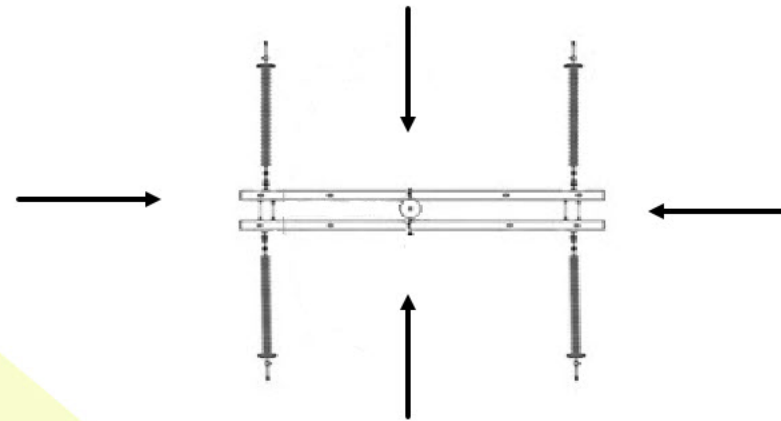
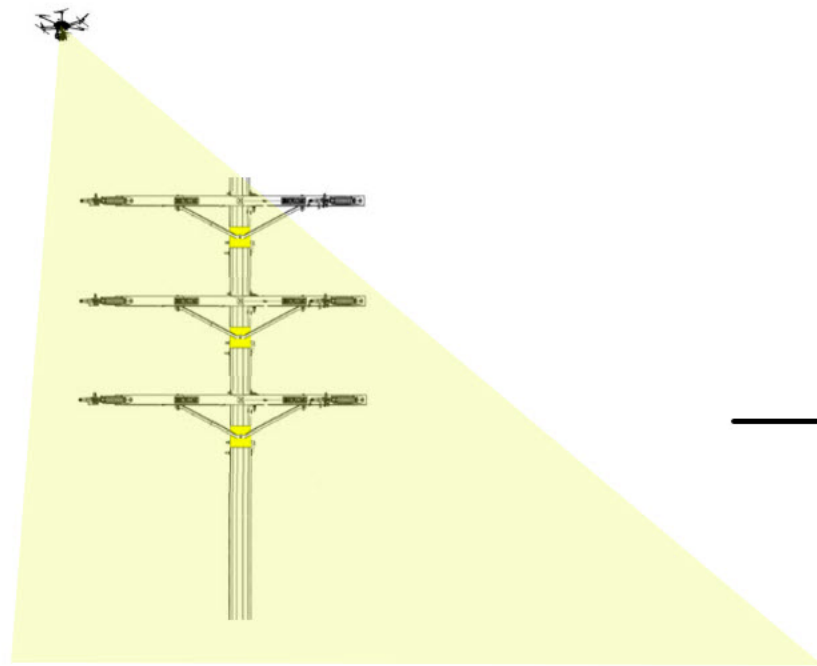
3

30°

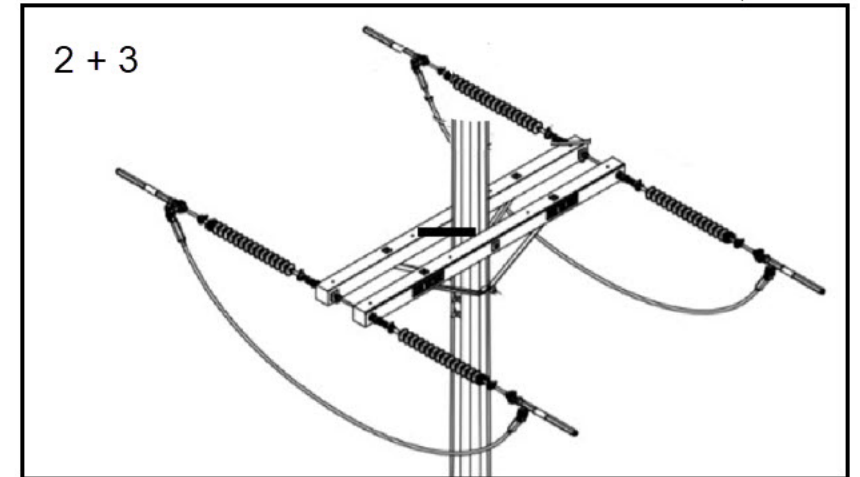


# DCX Structure

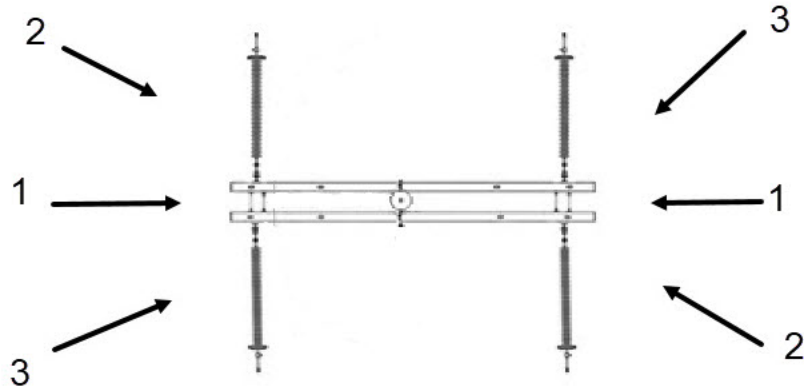
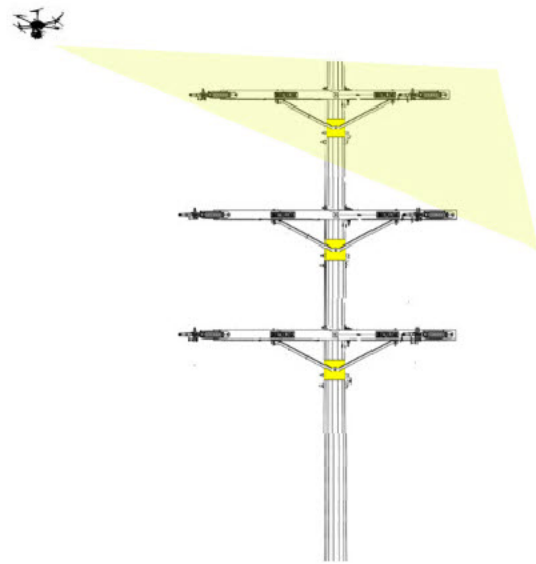
L1



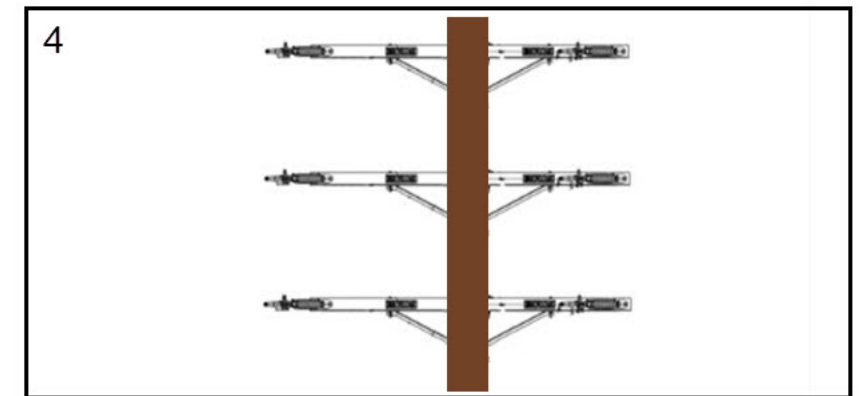
2 + 3



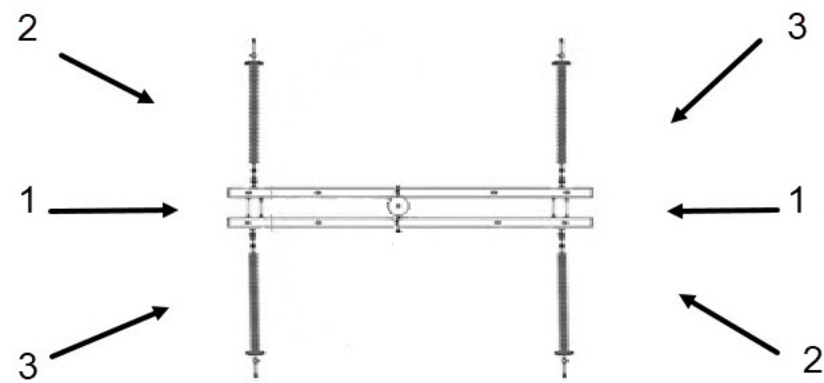
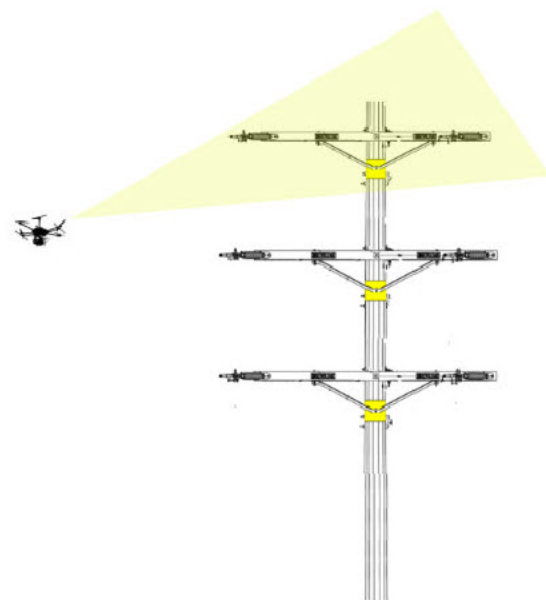
L2



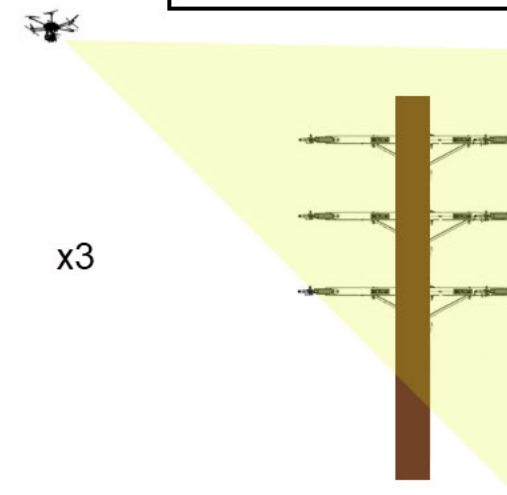
x3



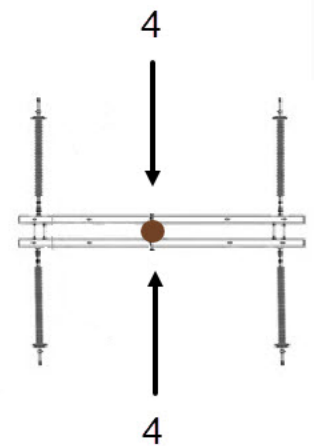
L3



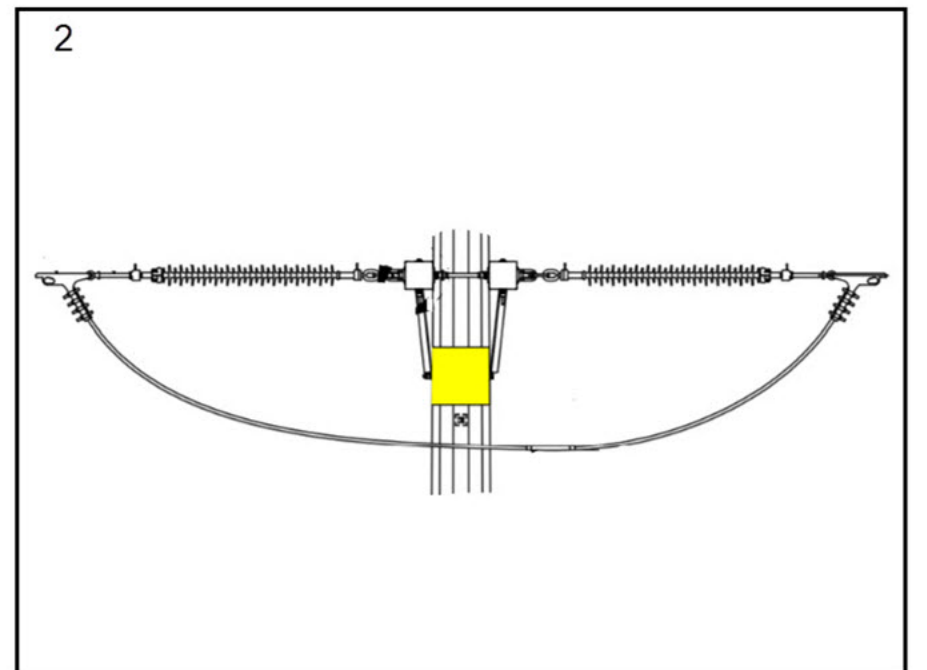
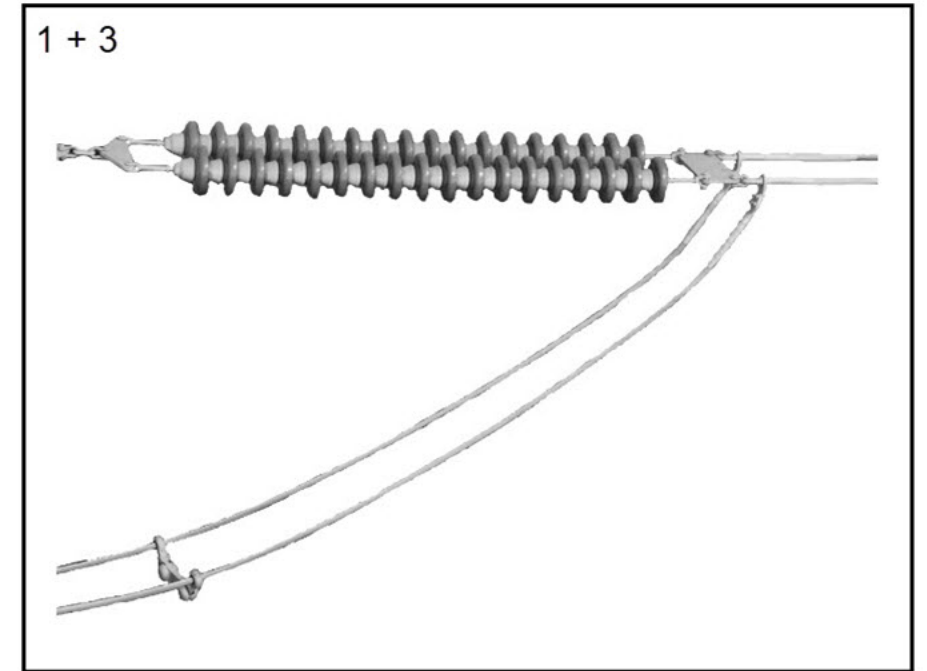
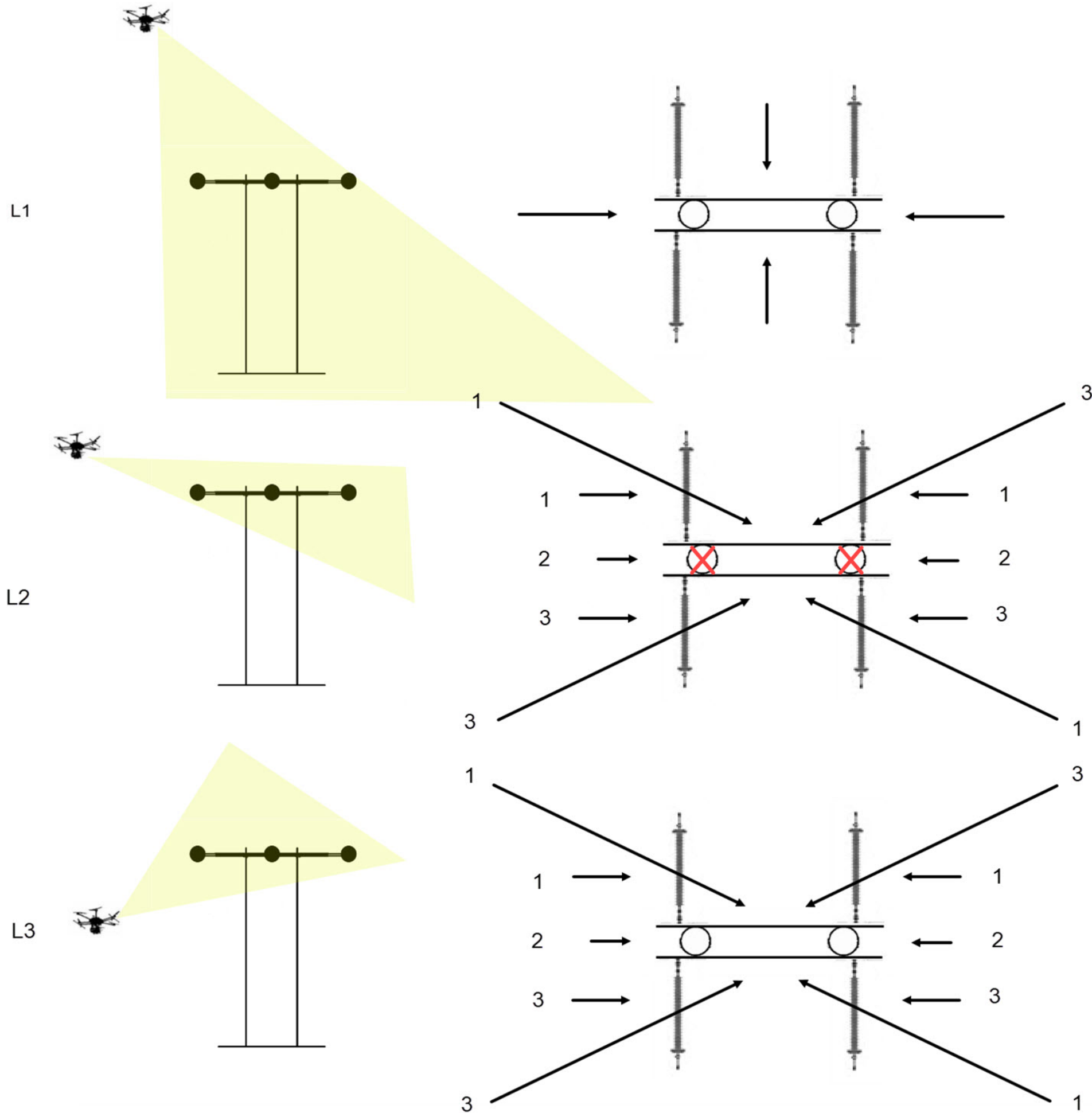
x3



Wood Pole Only



## H Structure Dead-Ends

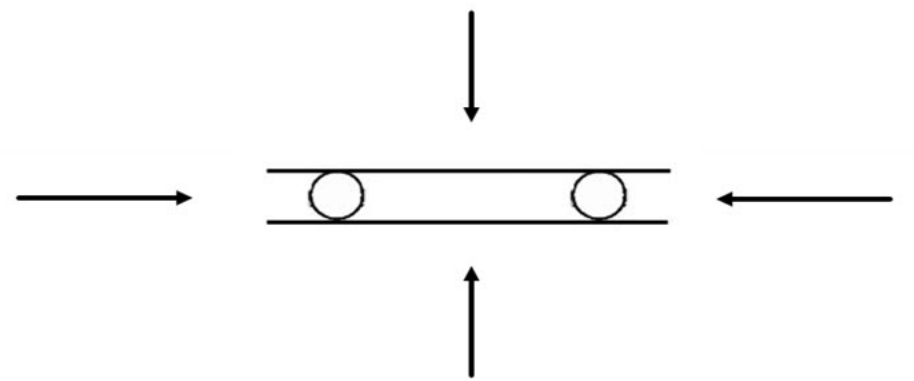
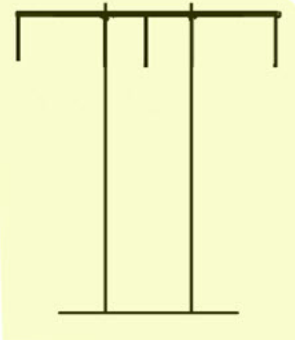


✗ Wood Pole Only - Top down close up Nadir of Pole Top

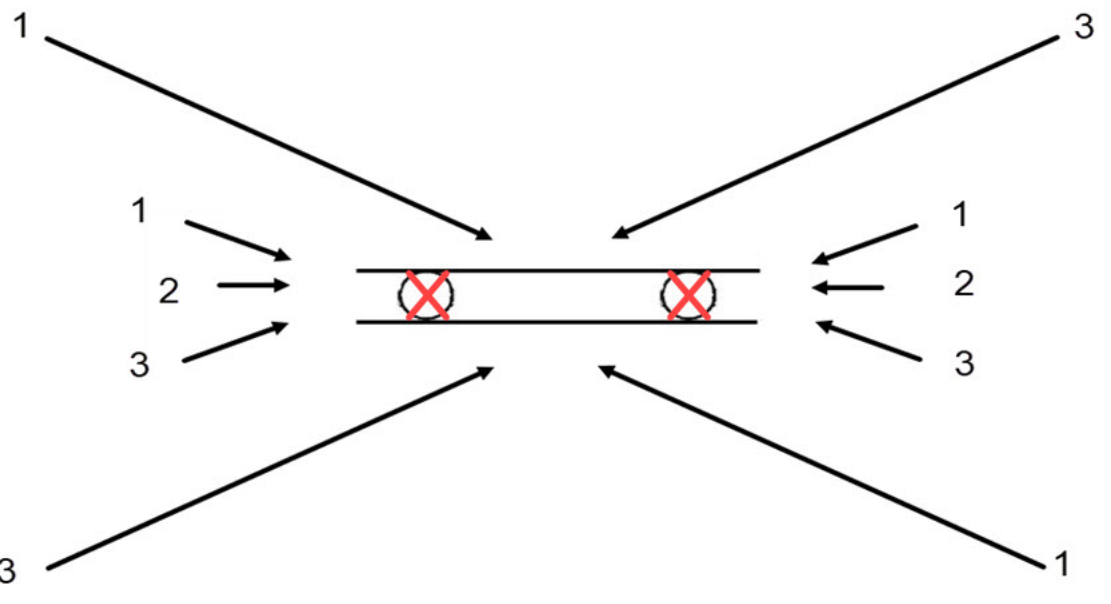
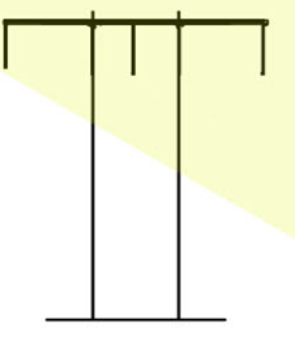


H Structure I-Strings

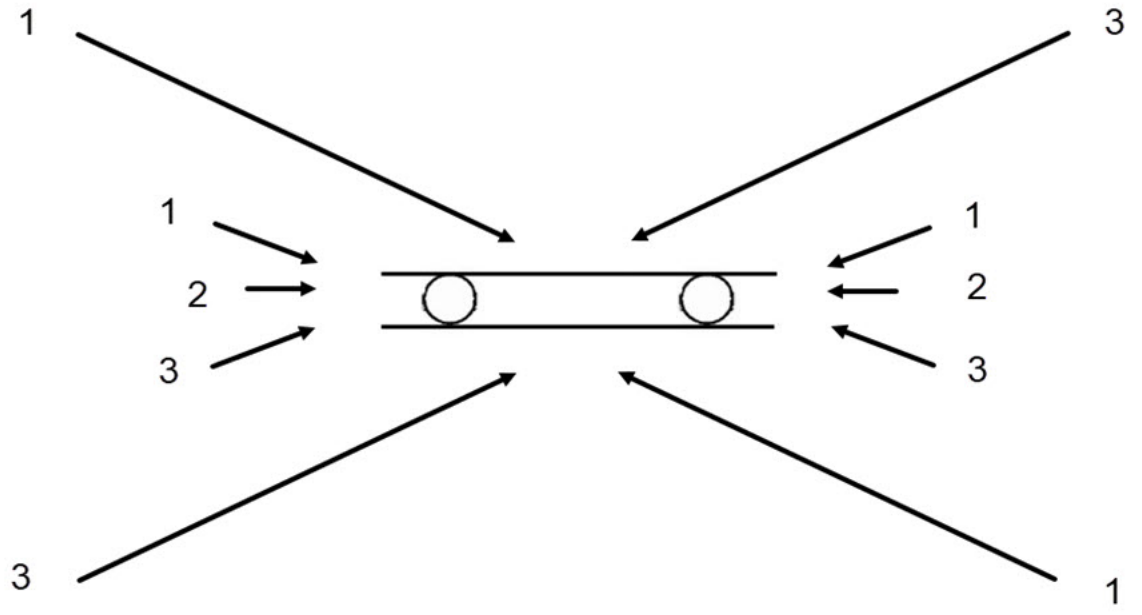
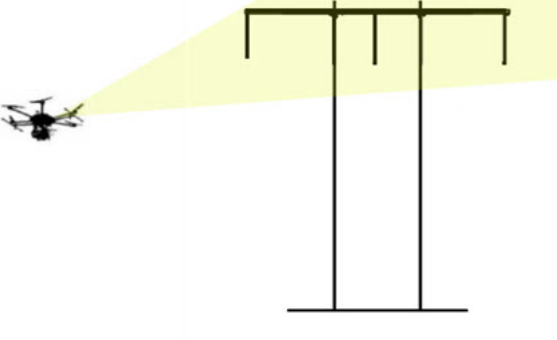
L1



L2



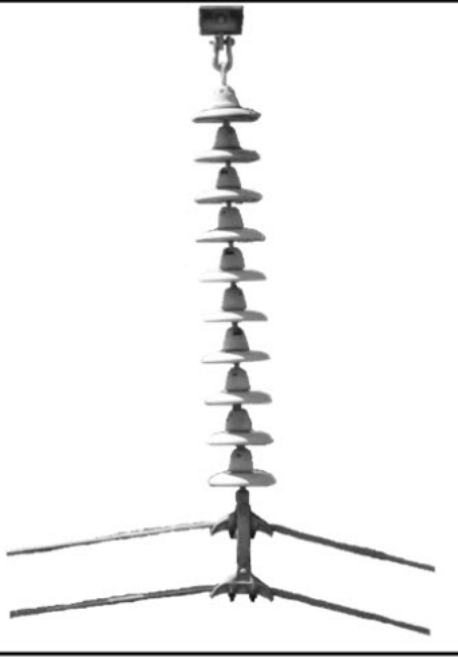
L3



1+3

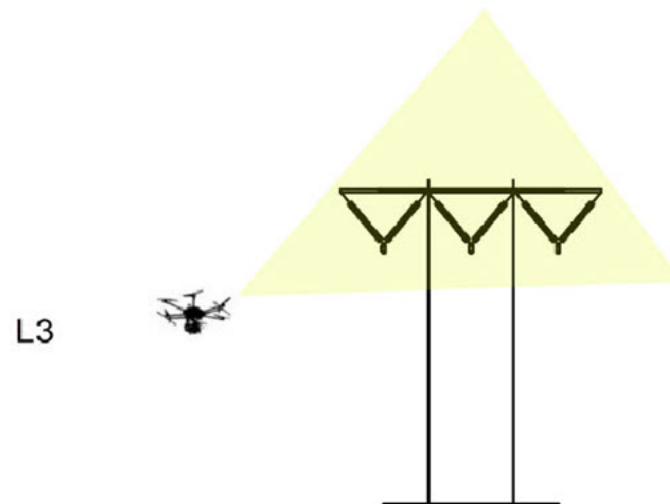
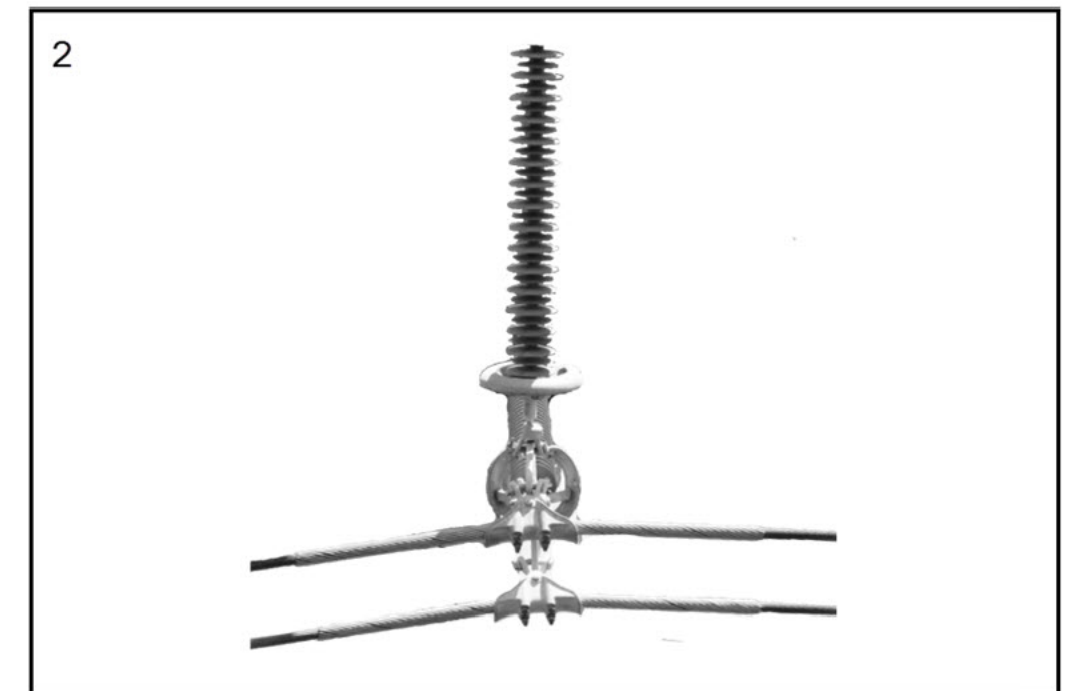
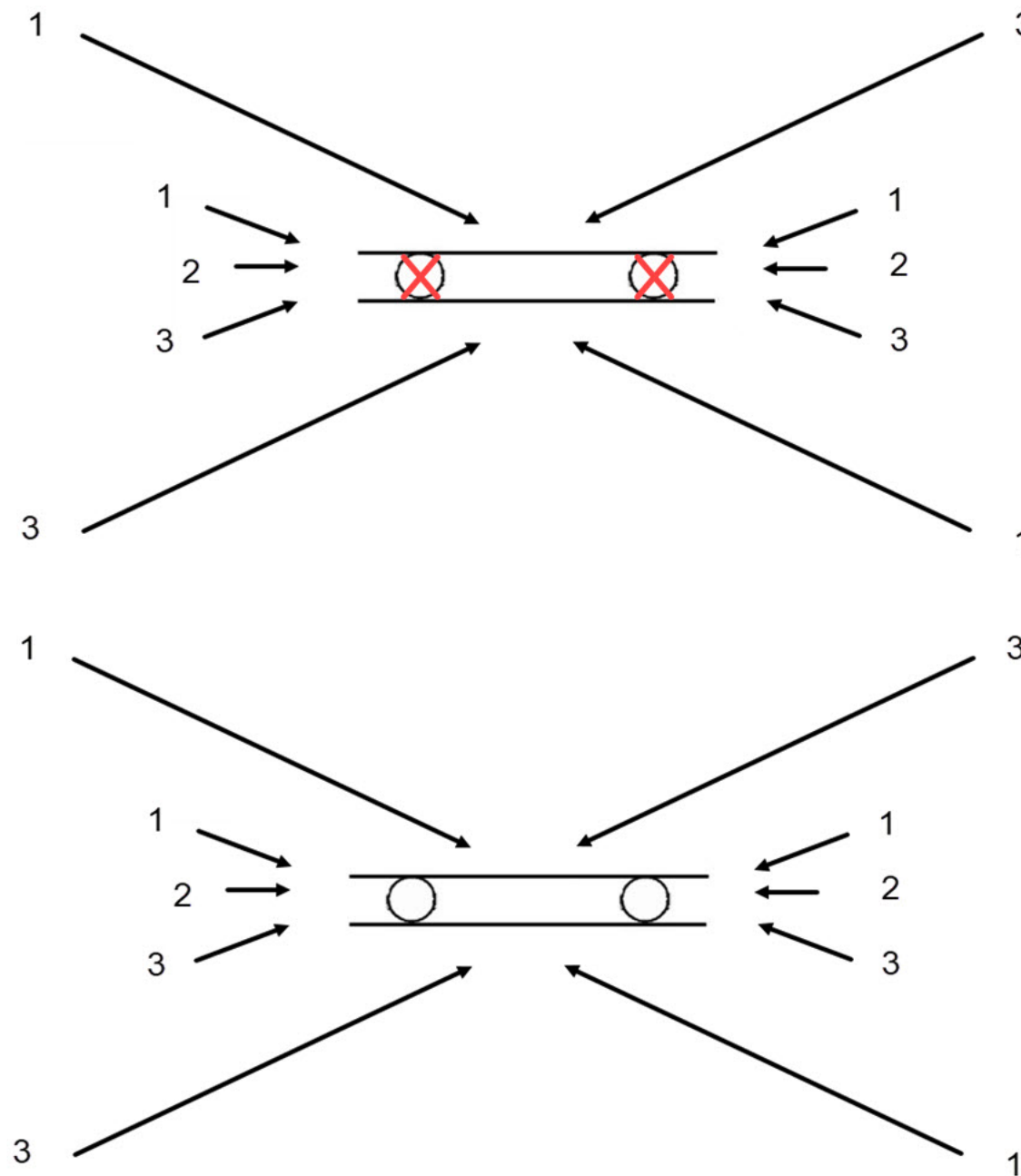
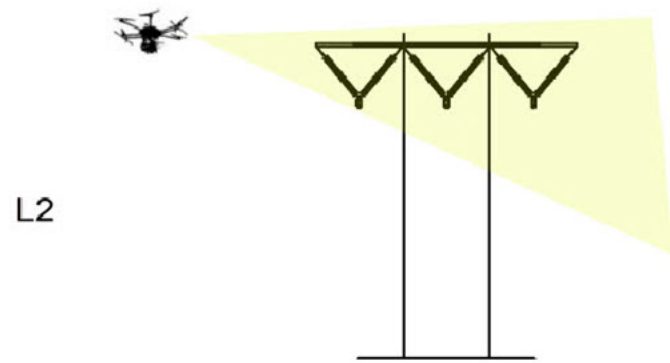
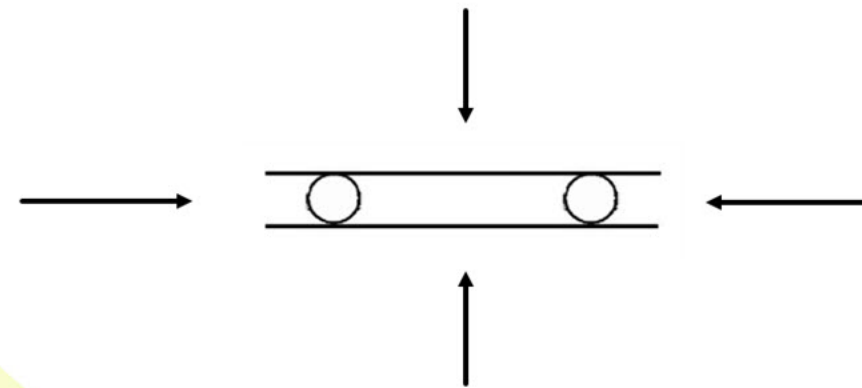
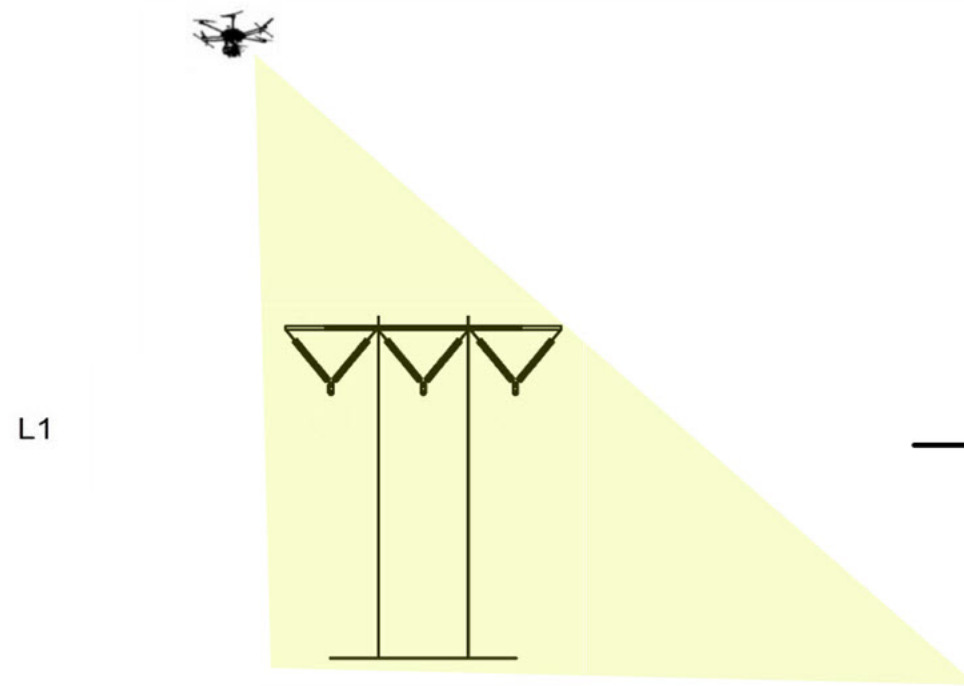


2



❌ Wood Pole Only - Top down close up Nadir of Pole Top

# H Structure V-Strings

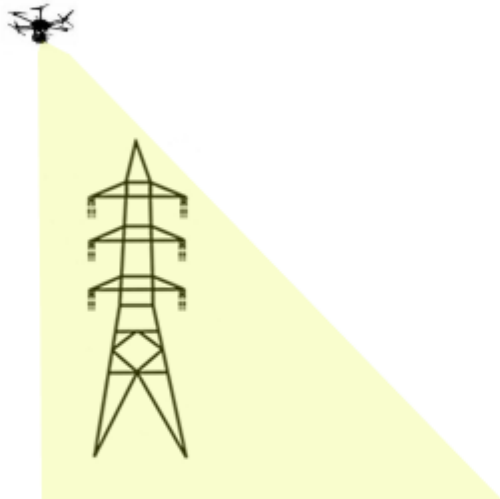


✗ Wood Pole Only - Top down close up Nadir of Pole Top



138/230kV Single Circuit/Double Circuit  
Deadend  
(Tower or Pole)

L1



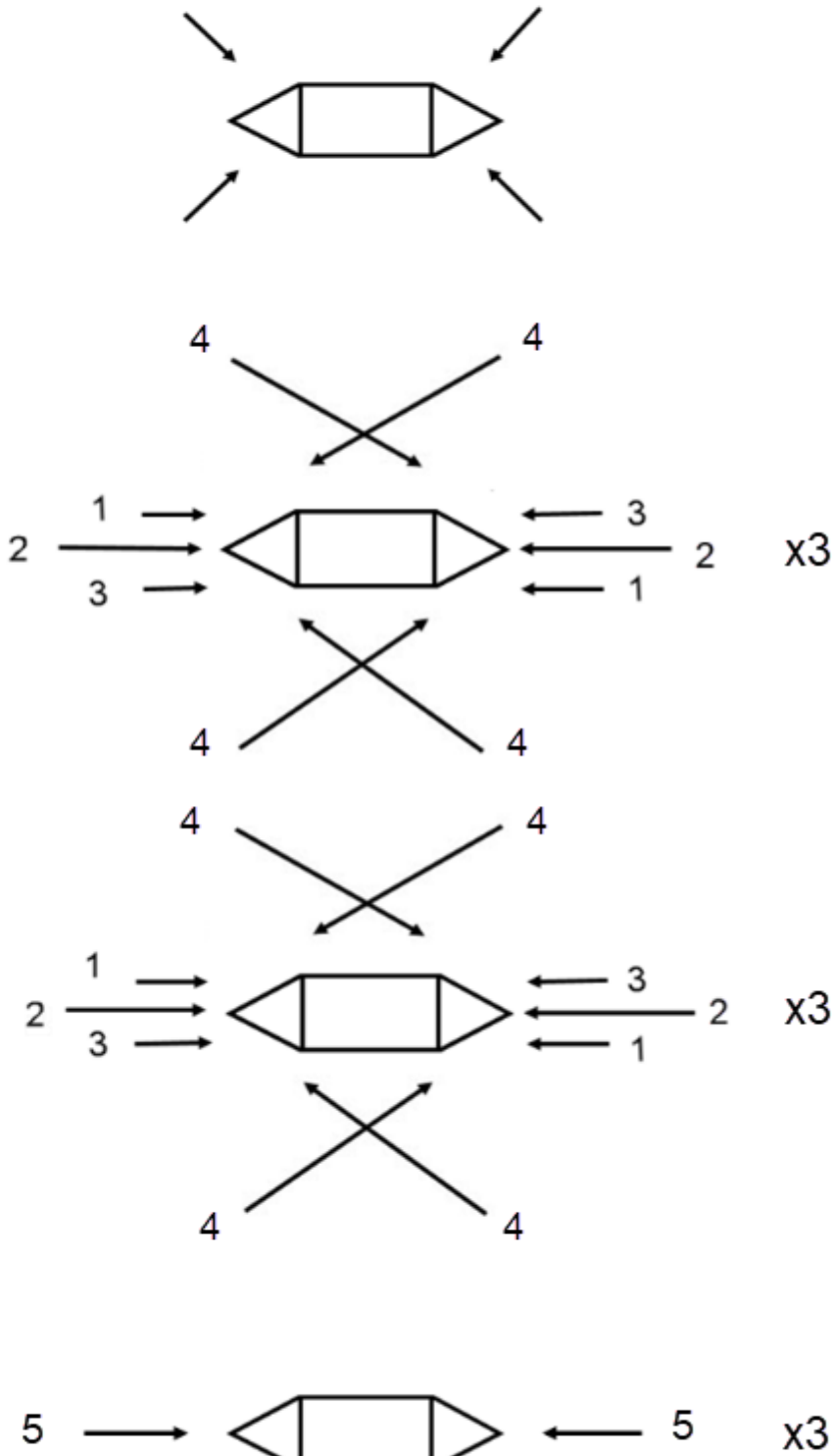
L2



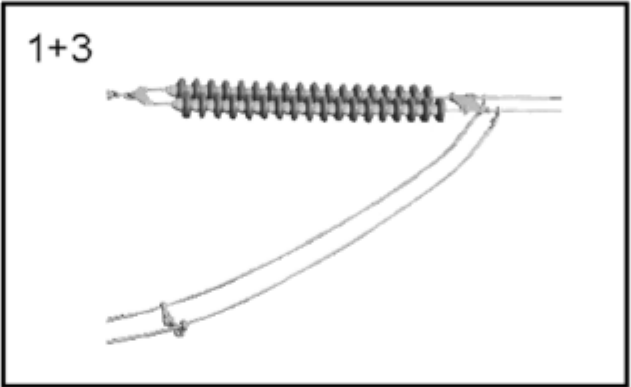
L3



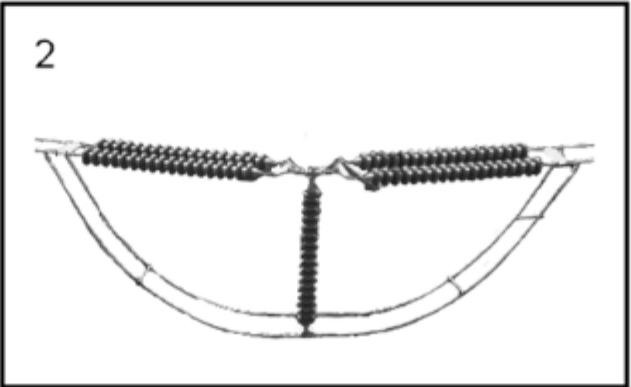
L4



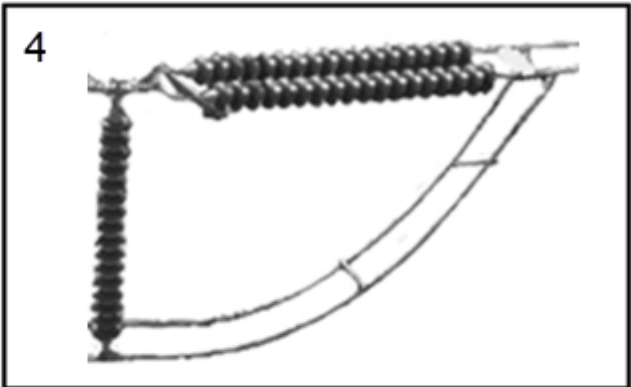
1+3



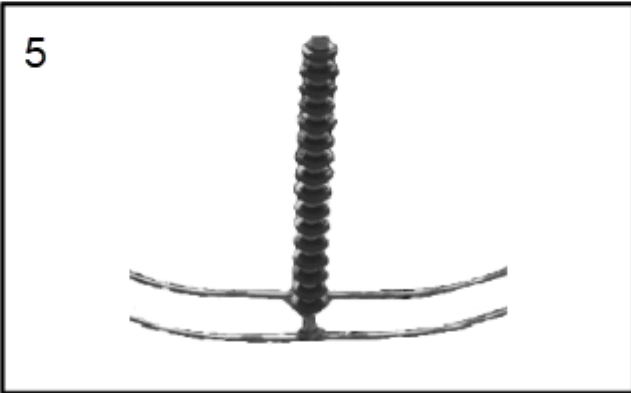
2



4



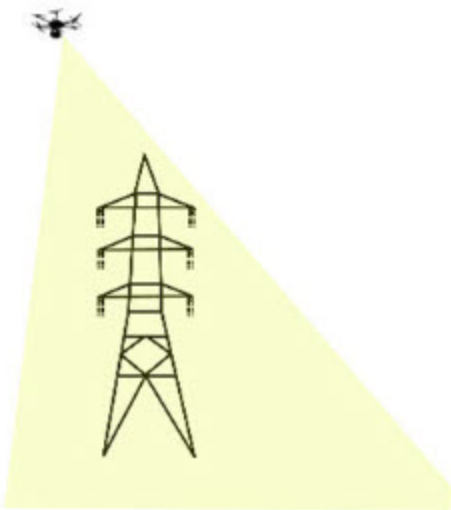
5



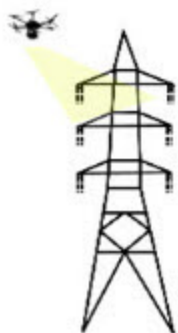
138/230kV Single Circuit/Double Circuit  
Tangent - I String

(Tower or Pole)

L1



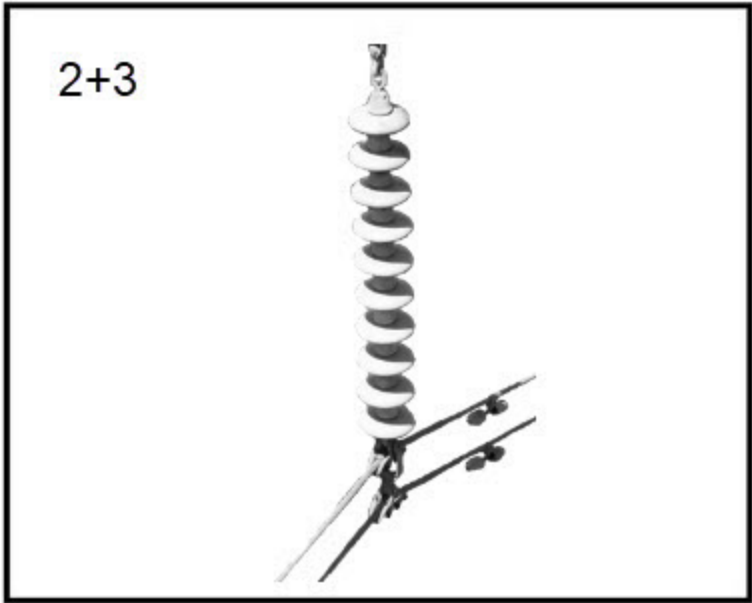
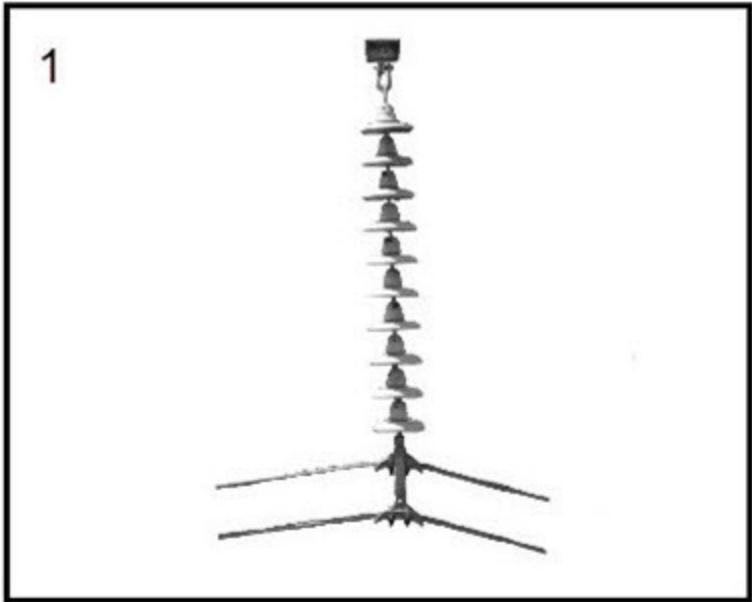
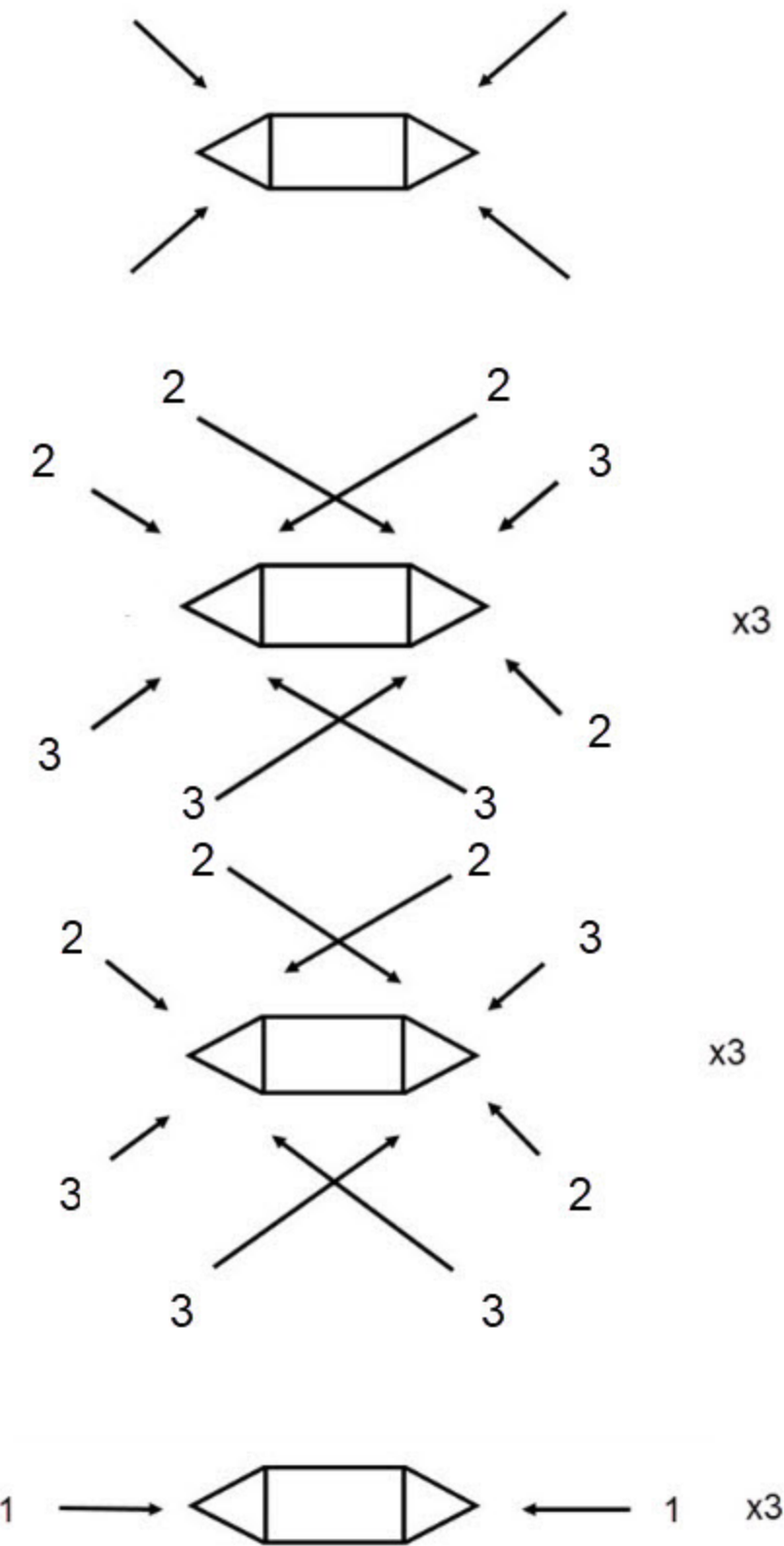
L2



L3

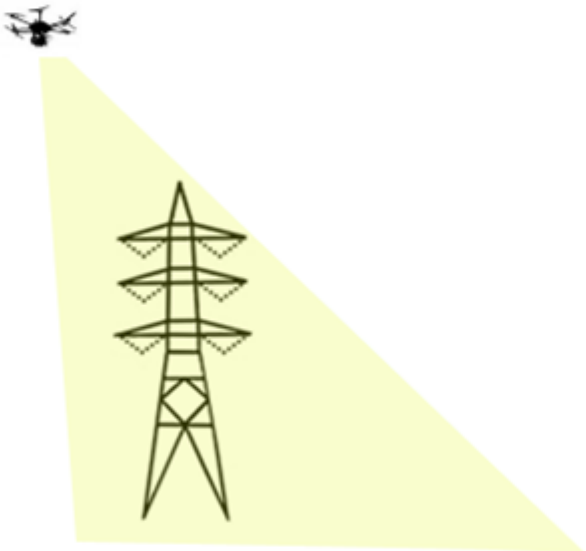


L4

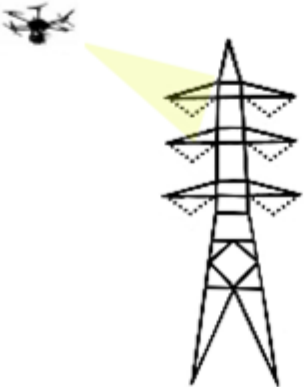


138/230kV Single Circuit/Double Circuit  
Tangent - V String  
(Tower or Pole)

L1



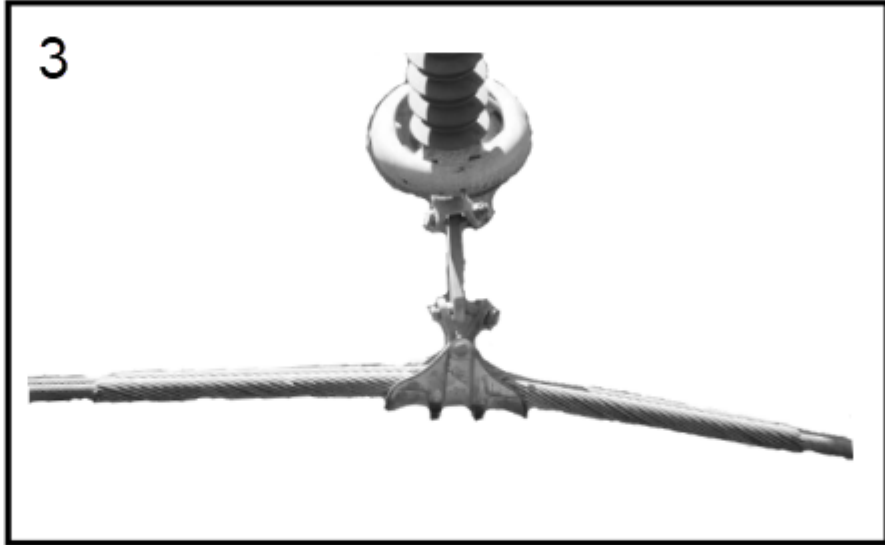
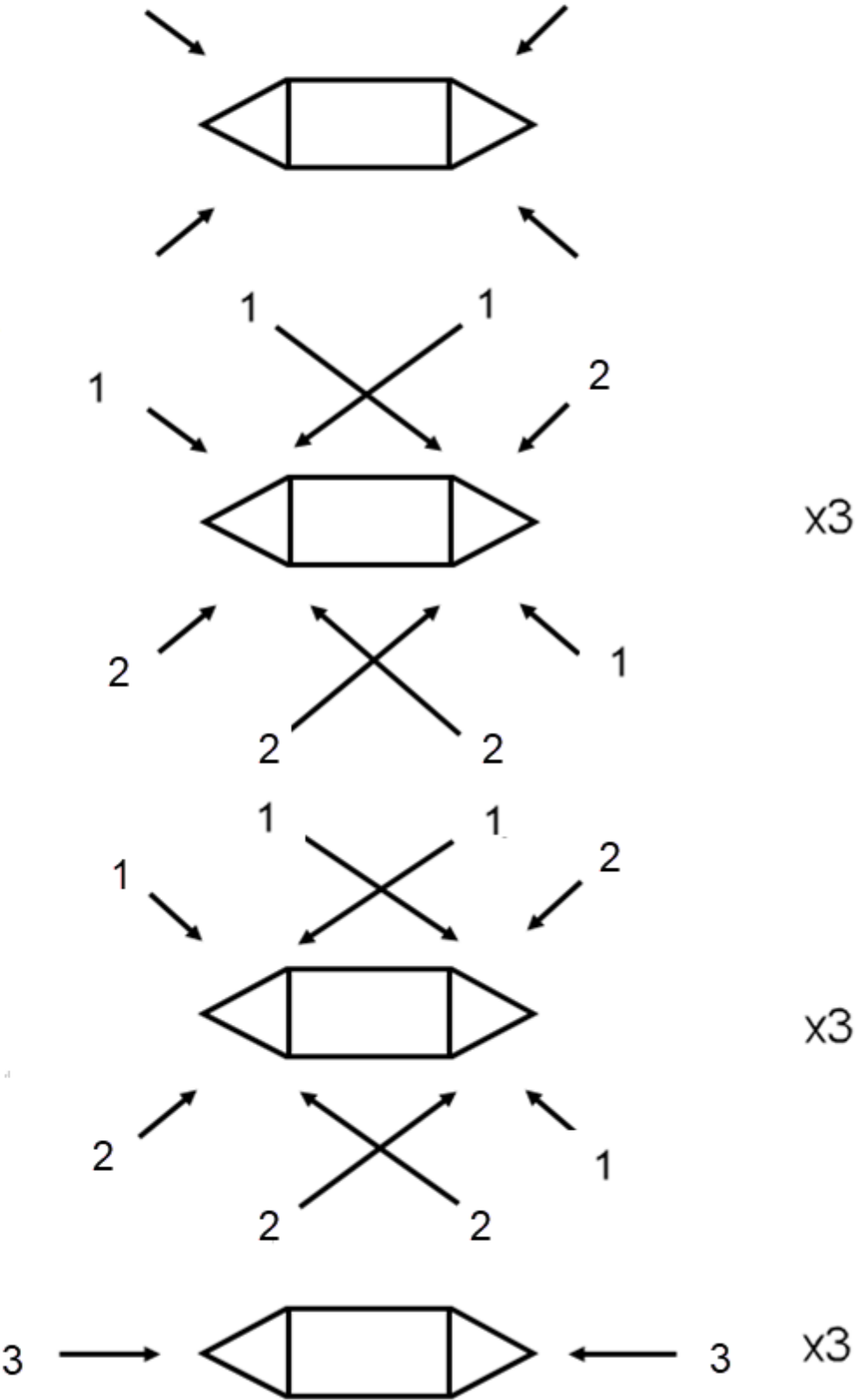
L2



L3



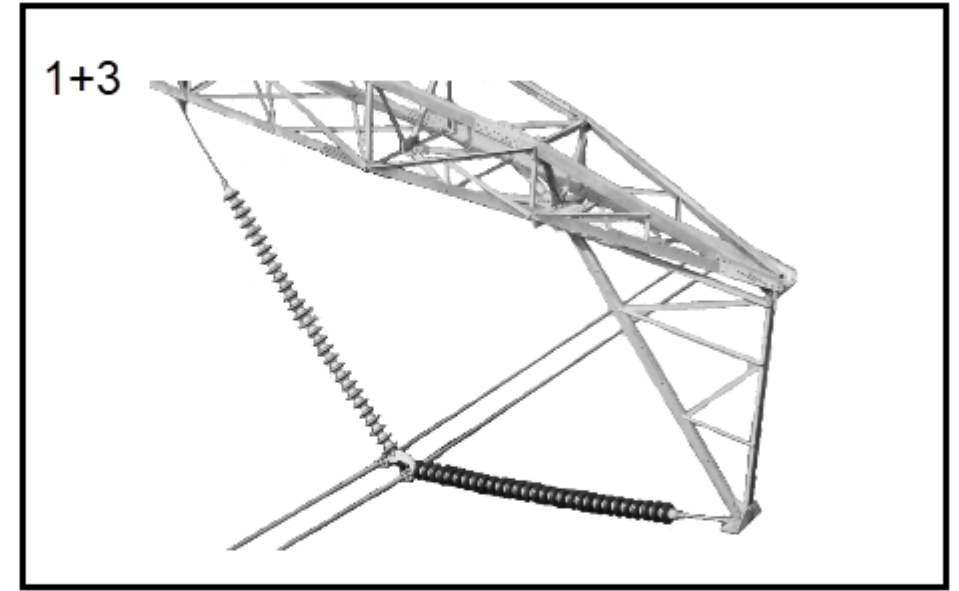
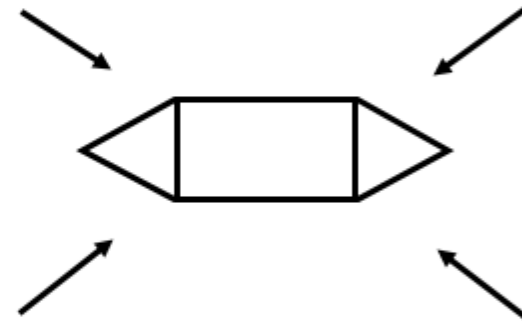
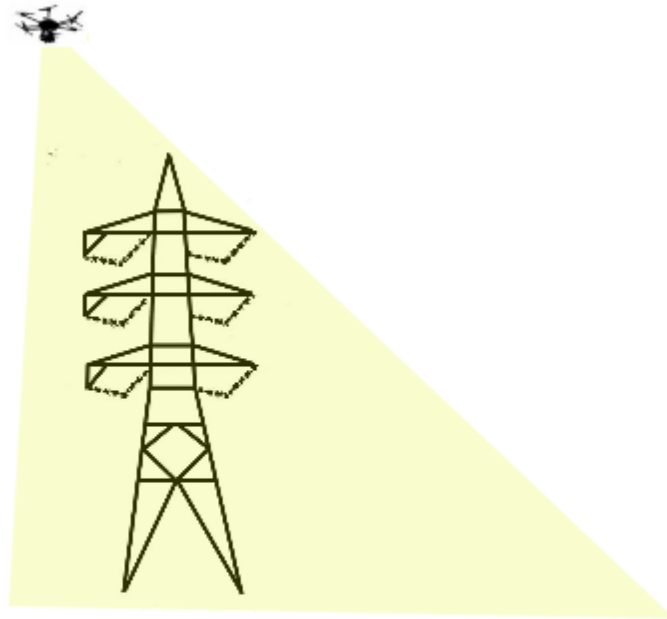
L4



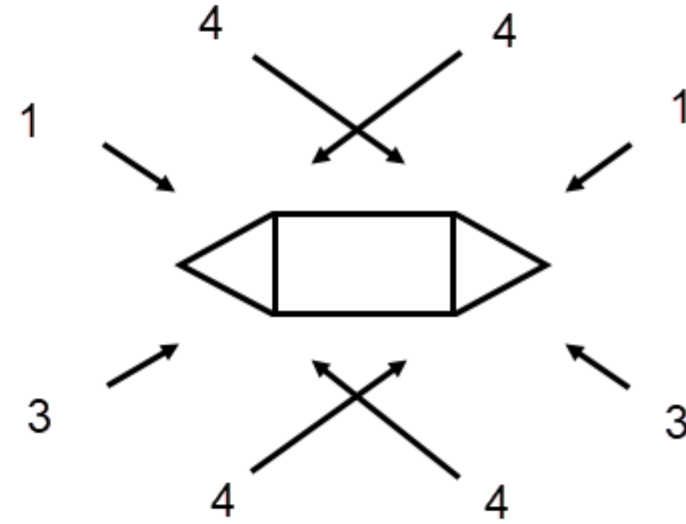
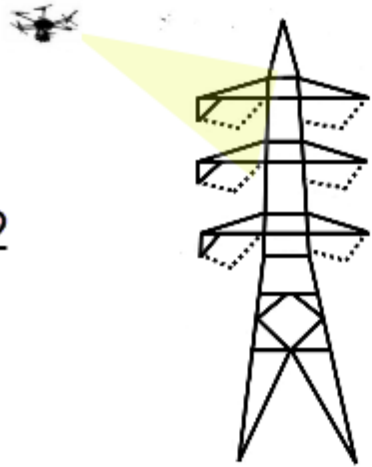
# 138/230kV Single Circuit/Double Circuit Light Angle V String

(Tower or Pole)

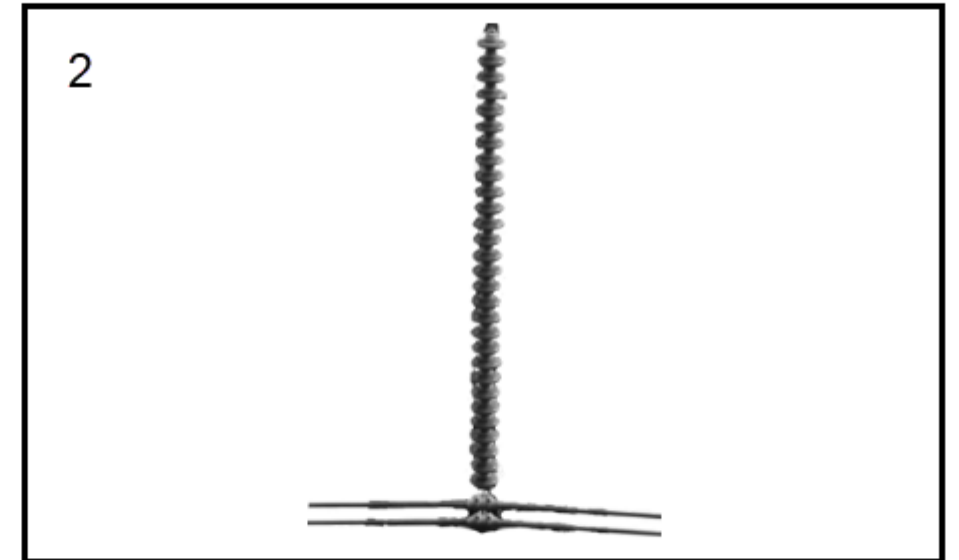
L1



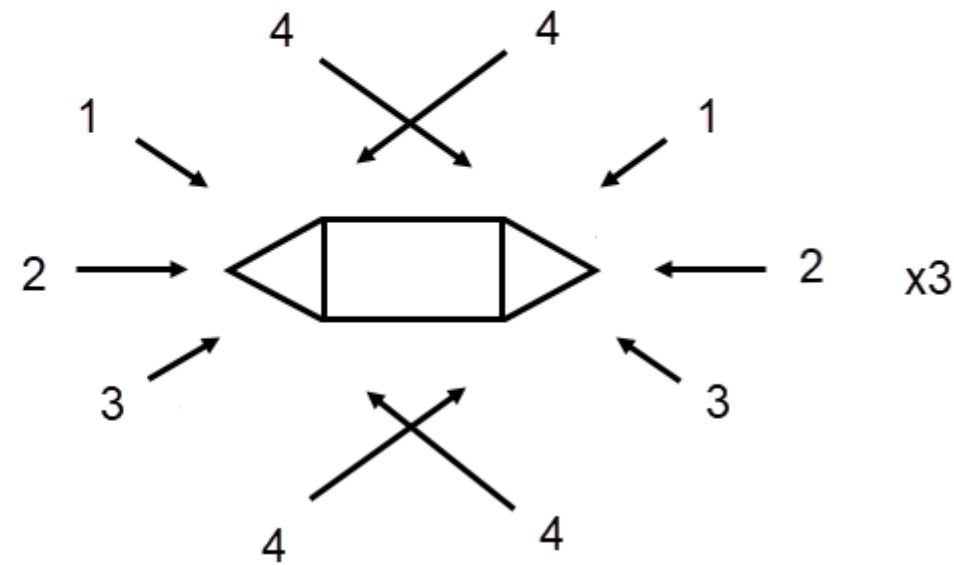
L2



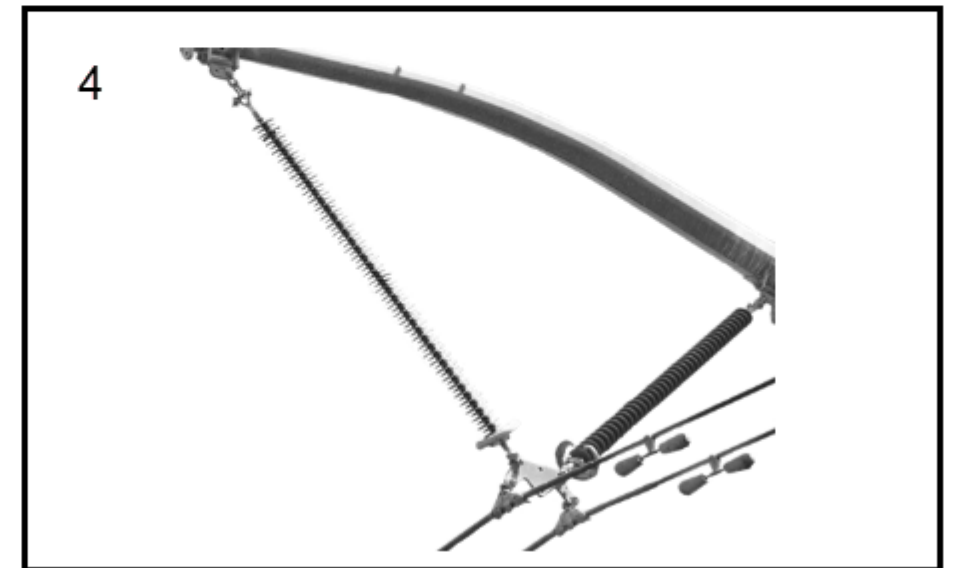
x3



L3

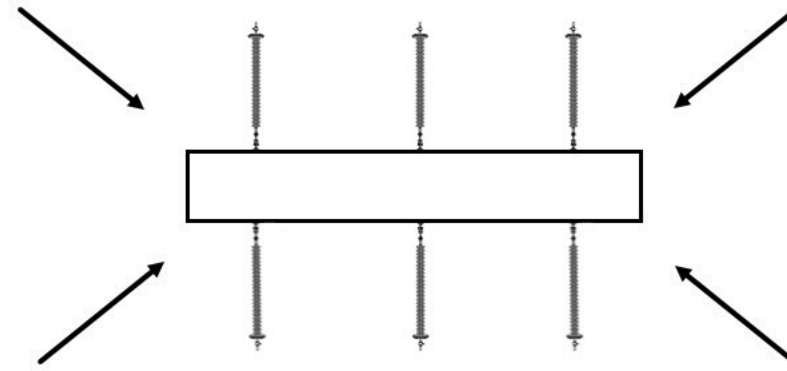
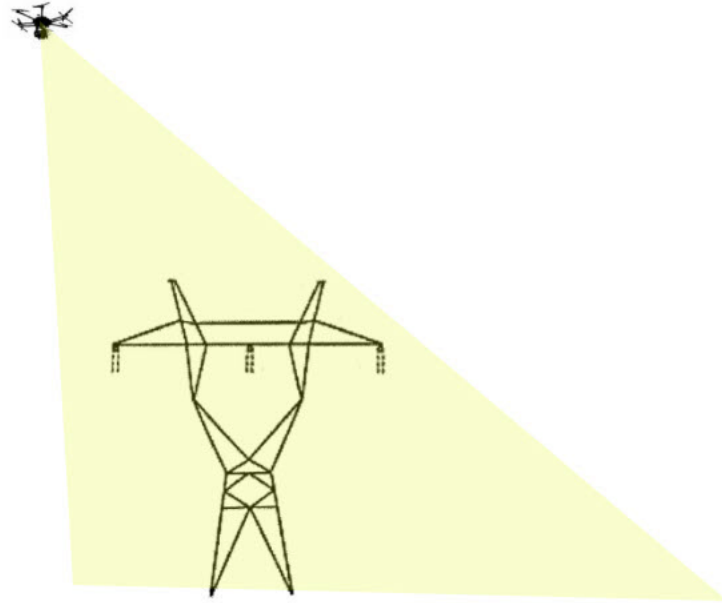


x3

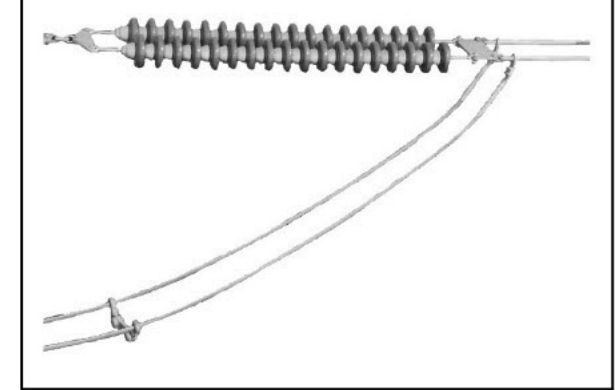


# 500kV Dead End

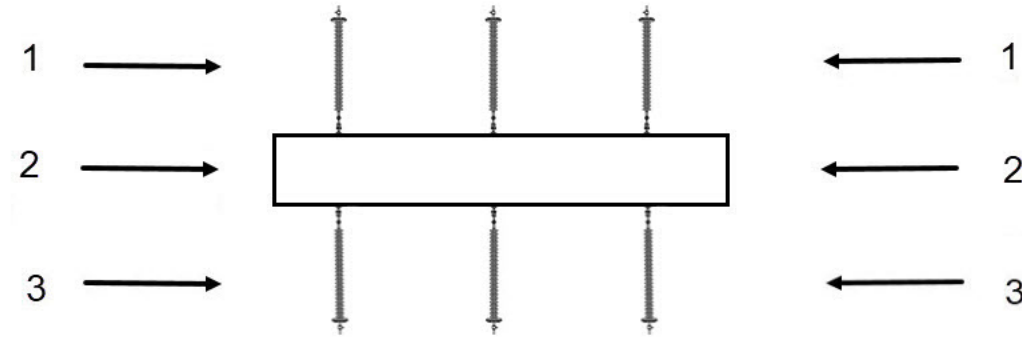
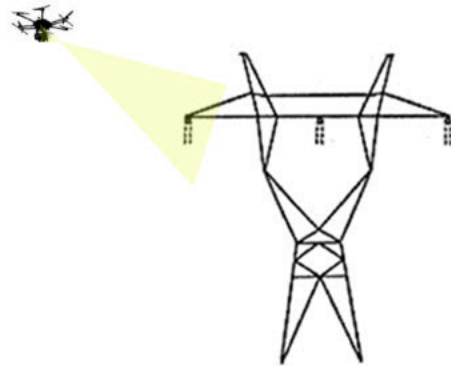
L1



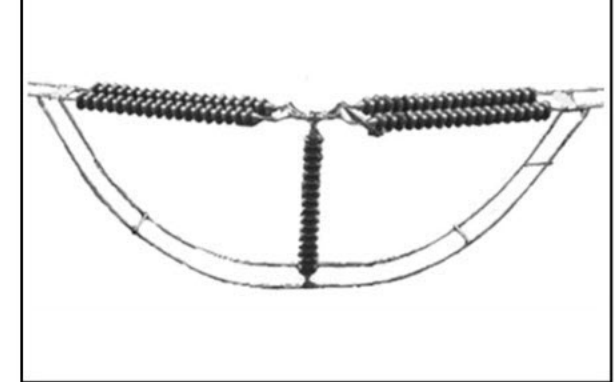
1+3



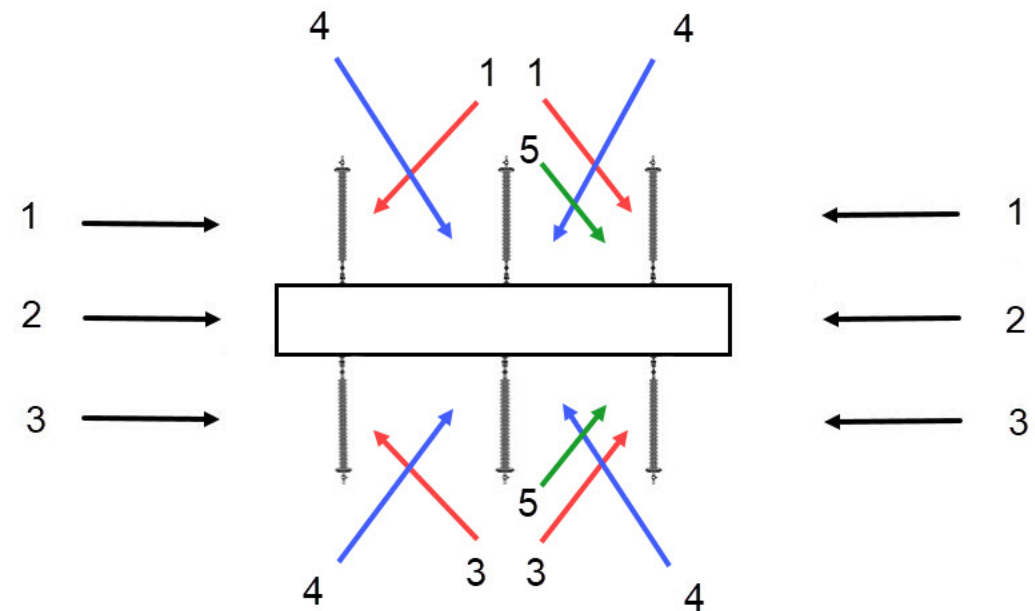
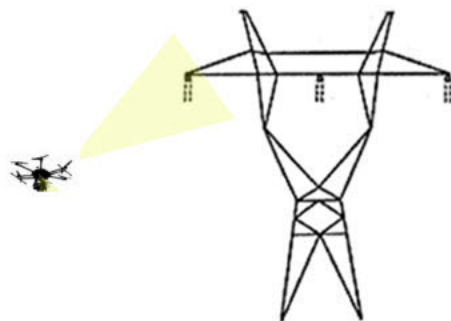
L2



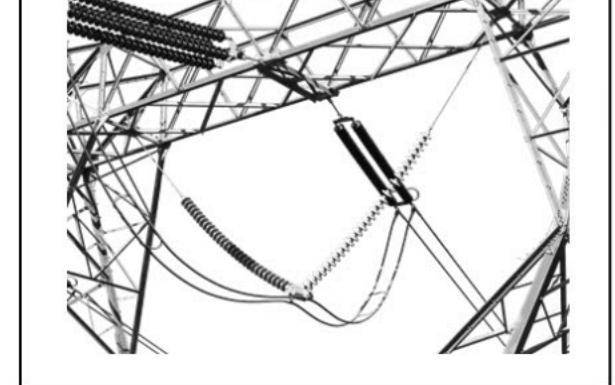
2



L3



4



5\*



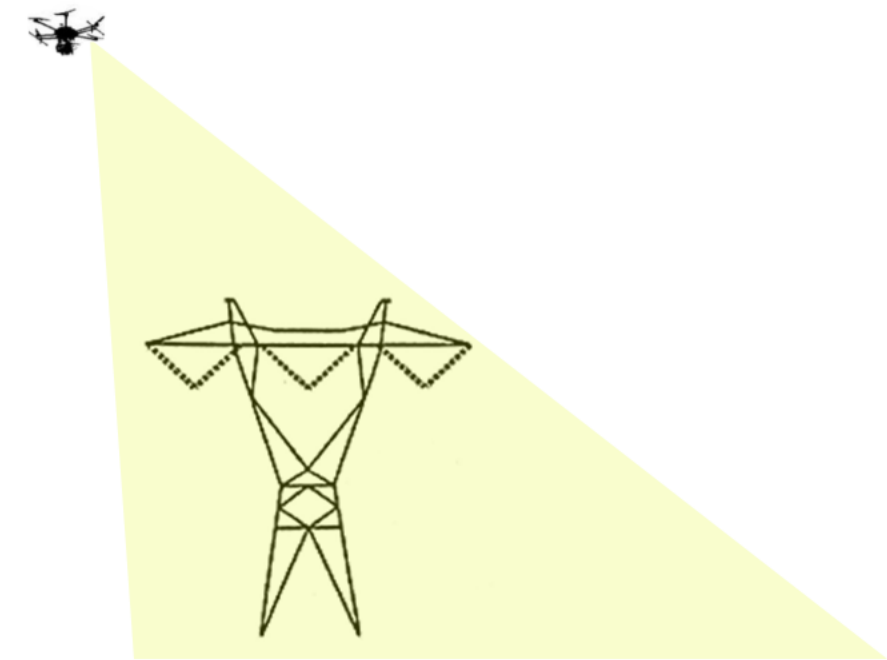
\*Colored arrow shots must be taken from under the conductors

\*Only if the idler exists

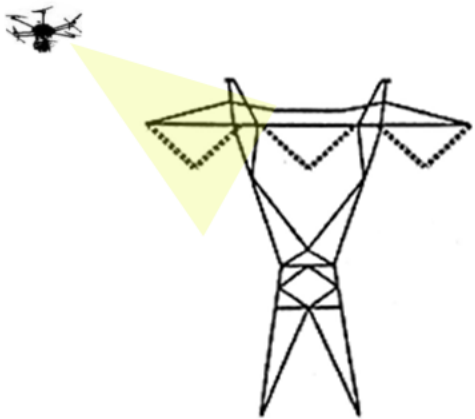


500kV V-String Tangent

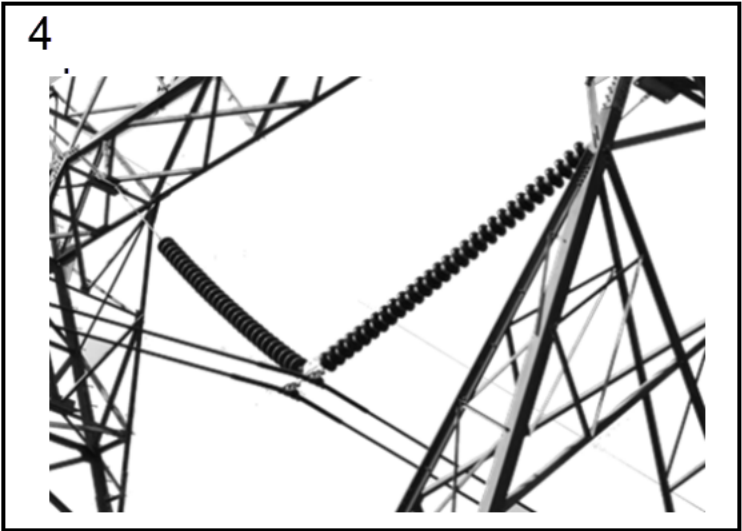
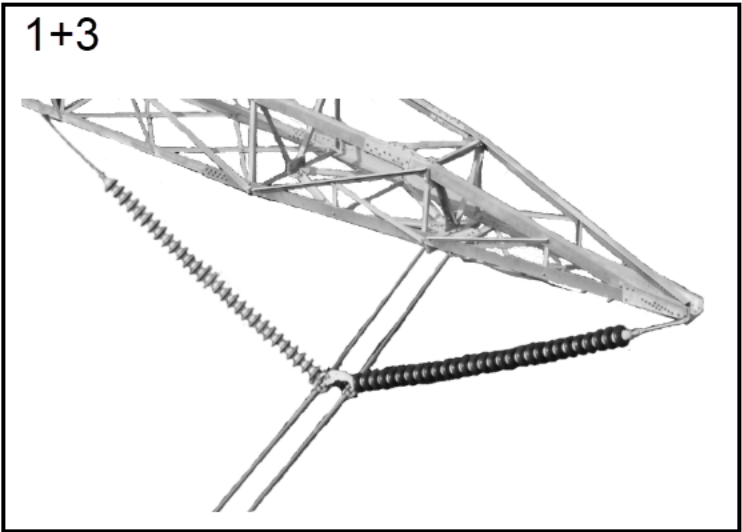
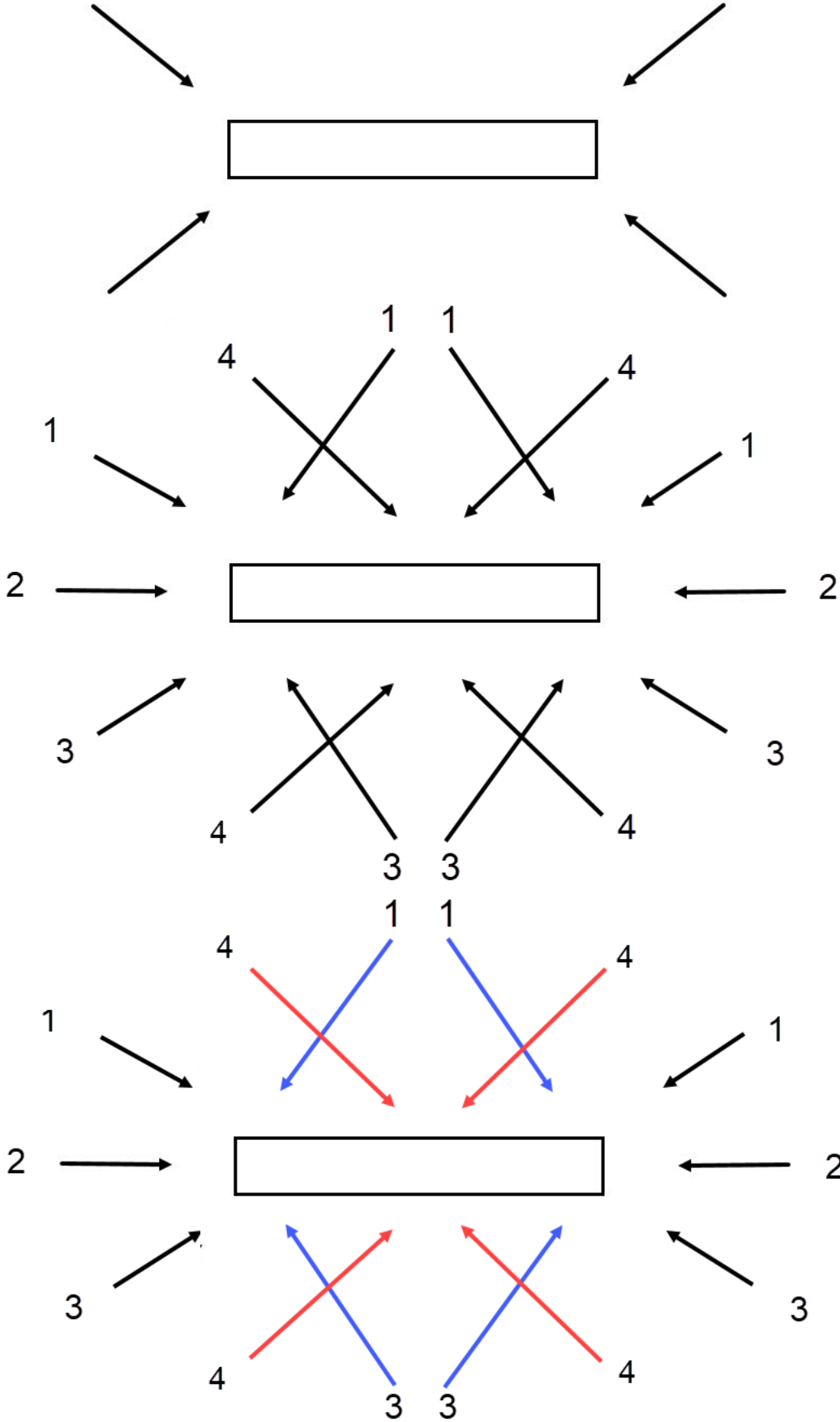
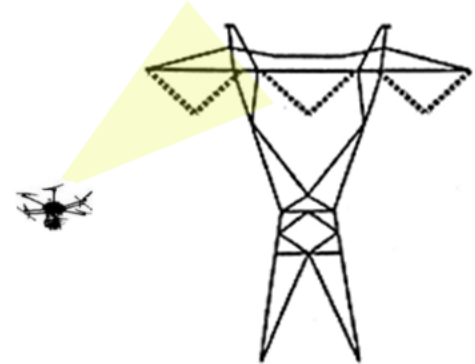
L1



L2



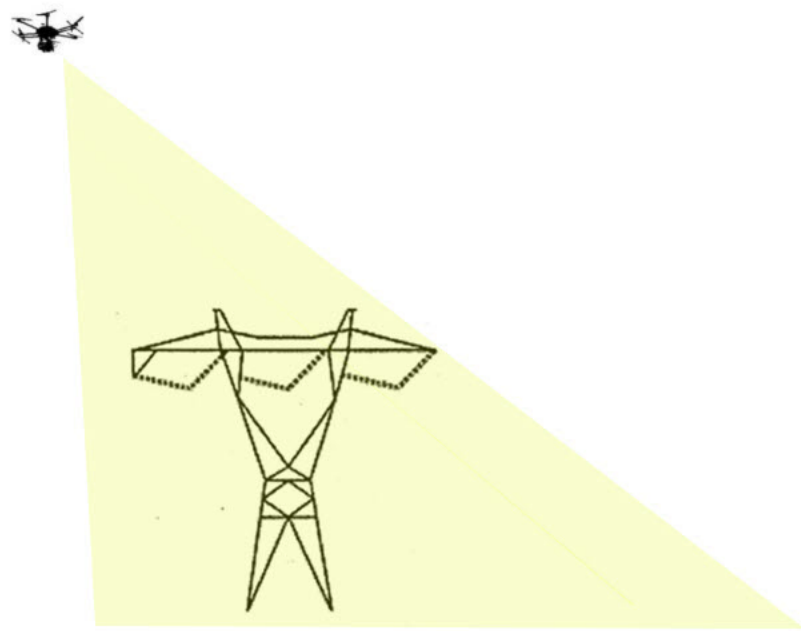
L3



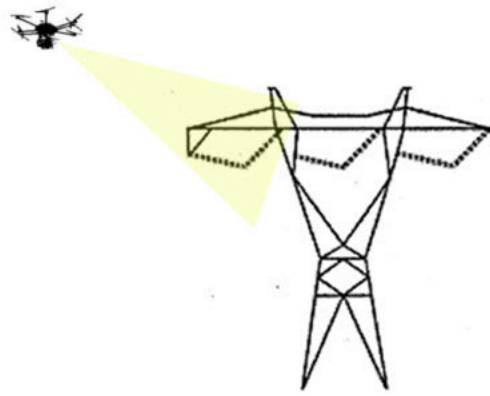
\*Colored arrow shots must be take from under the conductors

# 500kV Light Angle Tangent

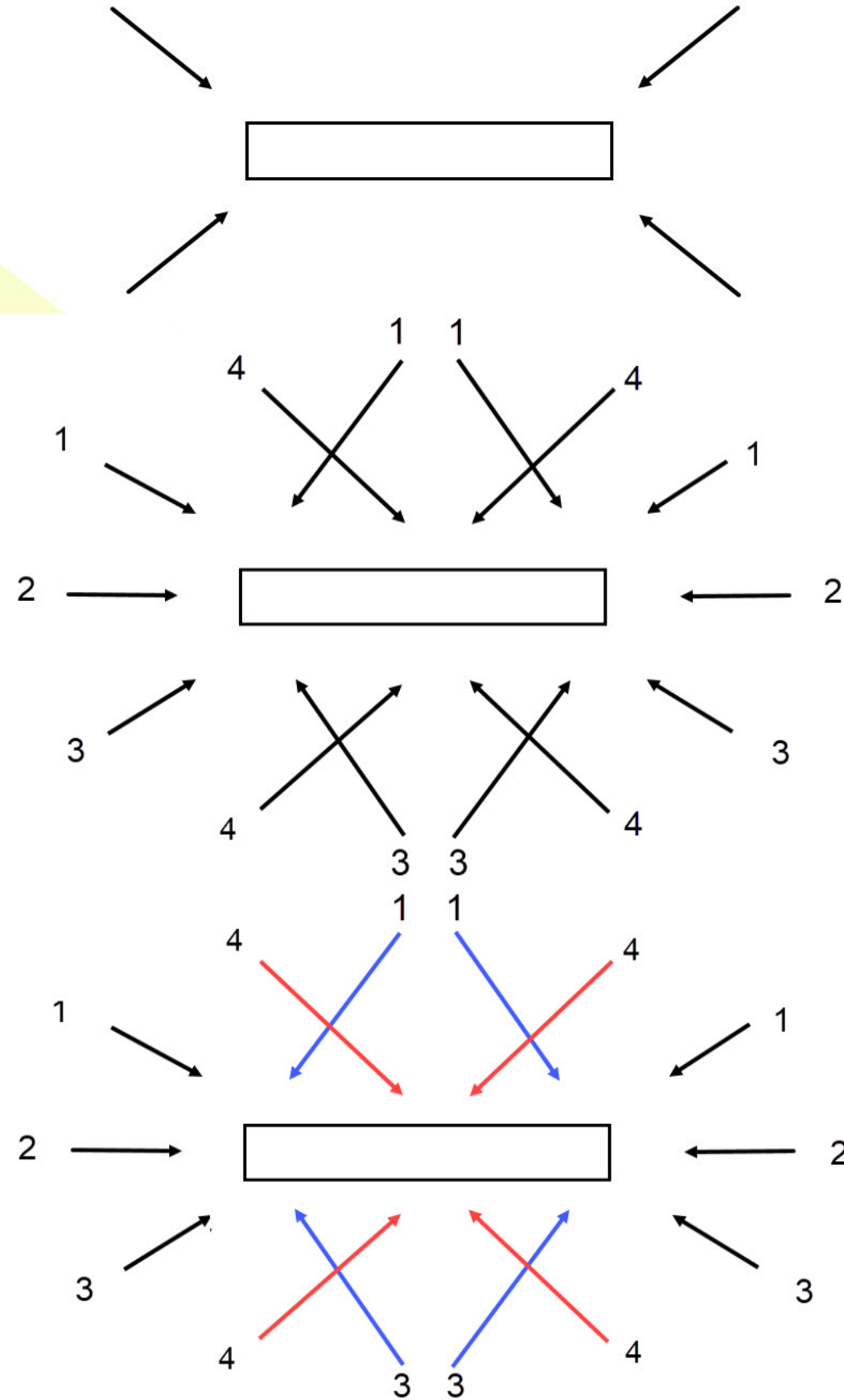
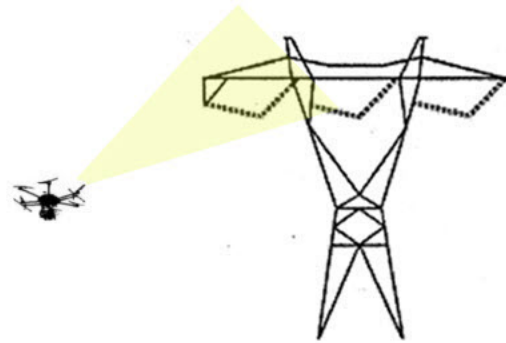
L1



L2

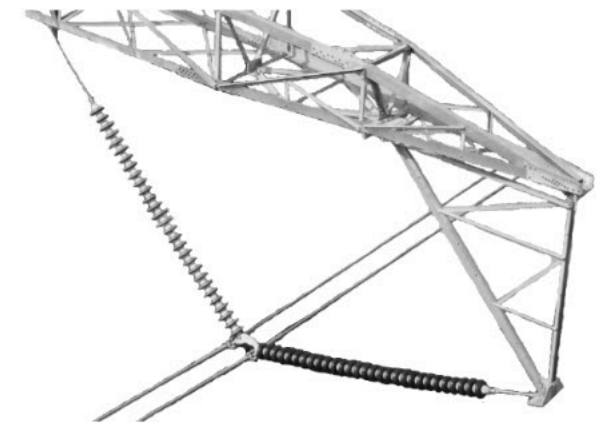


L3



\*Colored arrow shots must be taken from under the conductors

1+3



2



4

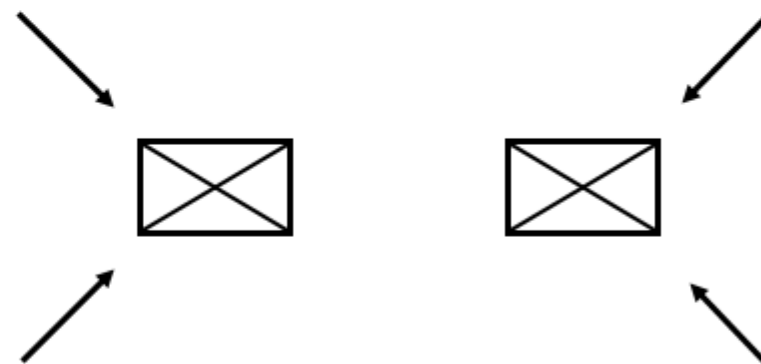
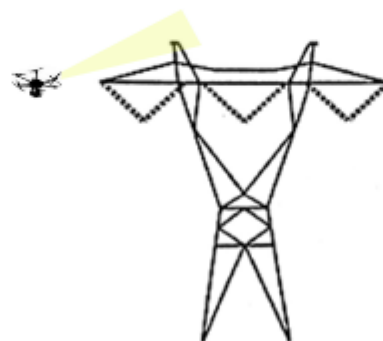
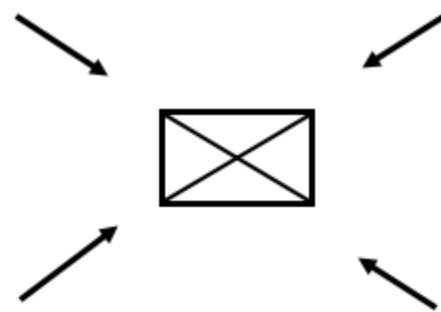
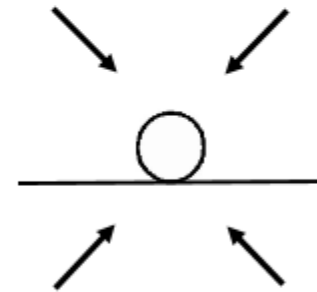
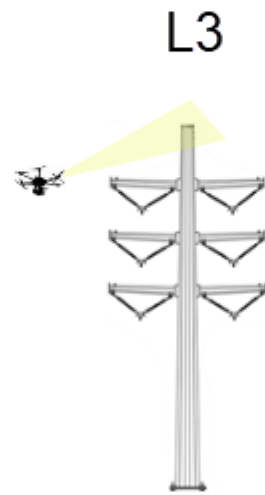
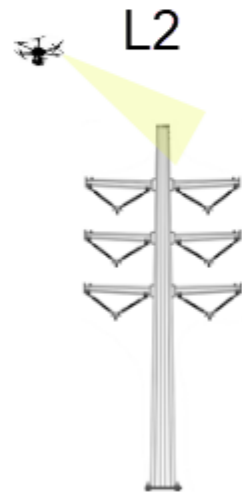




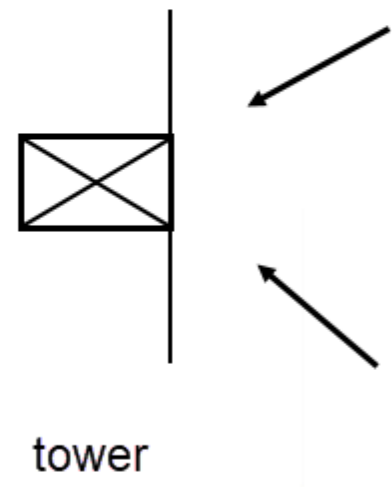
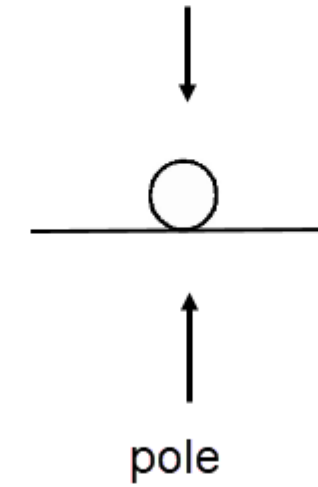
# Miscellaneous

(If any of these items exist, these shots are required)

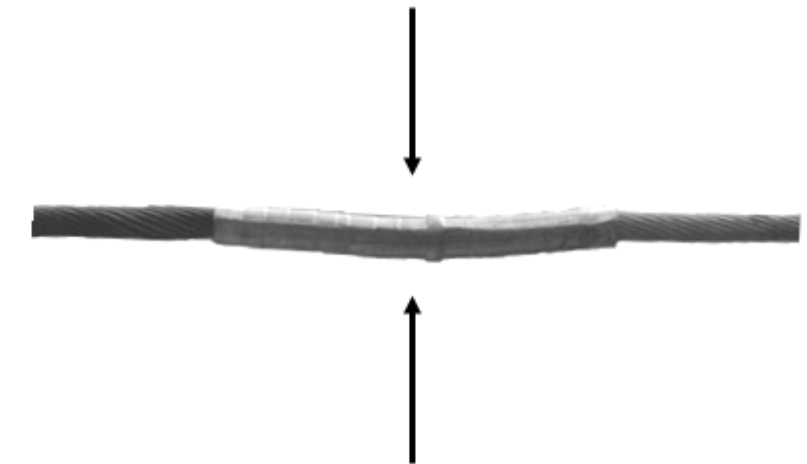
## Static Wire



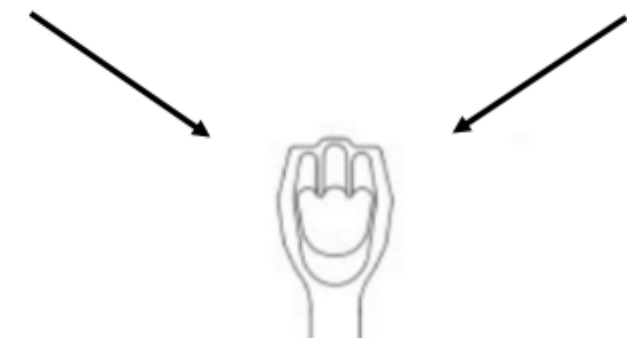
## Communication Wire



## Sleeves (Each)



## anchors (Each)





## 7.0 Additional Photo Requirements

While out in the field, if any obvious severe condition is found, additional photos of that condition will need to be taken. Multiple photos from multiple angles are required to properly showcase the condition for SDG&E QA/QC review. The following are examples of possible severe conditions:

- Poles (Hit by vehicle, broken)
- Crossarms (Broken, damaged)
- Guying (Damaged, Loose)
- Insulators (Broken, damaged)
- Shoes (Loose, damaged)
- Conductors/Static (Broken strands, damaged)
- Connections (Loose, damaged)
- Equipment (Broken, damaged)
- Foreign objects (Balloons on structure or conductors)
- CIPs (Broken lashing, damaged)
- Vegetation (Guy bent around tree, tree limb on conductor)

Nests – Any raptor nests on a structure require a minimum of 4 photos, all from different angles. Please consult with ASD regarding protocol for flying a structure with a nest.





## 8.0 Example Photos for Anchors





