

# Safe Work Practices

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	1 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	



# VERSANT POWER

Installing New Conductor  
**Equipment**  
Module 1

# Safe Work Practices



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	2 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Purpose

This training will help to familiarize you with the set-up and operation of the rope and wire trailer in preparation to go to the field to work with a line crew.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	3 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Versant Power Wire Trailers

### SOR

HERE ARE EXAMPLES OF WIRE TRAILERS USED IN THE SOR



### NOR

HERE ARE EXAMPLES OF WIRE TRAILERS USED IN THE NOR



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	4 of 112
	<b>Date:</b>	3/21/2019
	<b>Revised:</b>	

## Versant Power Rope Trailers

### SOR

HERE ARE EXAMPLES OF ROPE TRAILERS USED IN THE SOR



### NOR

HERE ARE EXAMPLES OF ROPE TRAILERS USED IN THE NOR



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	5 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## 1 Communication

One of the most important parts of a safe and smooth running wire job is good communication. The first step is a thorough risk assessment that includes all crew members at one location, either at the shop or on the jobsite, so that all crew members understand their roles for the day.

---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	6 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Communication

When arriving at the jobsite, crews will be spread out. Having good radio communication is of the utmost importance. It is important that each group of crew members has a portable radio and that all truck radios are tuned to the appropriate channel. Ensure that outside speakers are on.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	7 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Communication



It is also important to ask questions of the lead worker and discuss changes over the radio so that all crew members are aware of what is going on.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	8 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Wire Pulling Basics

As a basic overview, the Rope trailer, wire trailer, and P-Line are all used in unison to install new conductor. The P-Line is used to pull in the bull rope on the Rope Trailer.





<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	9 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Wire Pulling Basics

The bull rope is used to pull in new conductor from the Wire Trailer.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	10 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Positioning



Positioning of both types of trailers is very important. Distance from the pole is an important consideration. It is recommended that the trailer be set back from the first pole a distance equal to 3 times the height of the pole.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	11 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Positioning

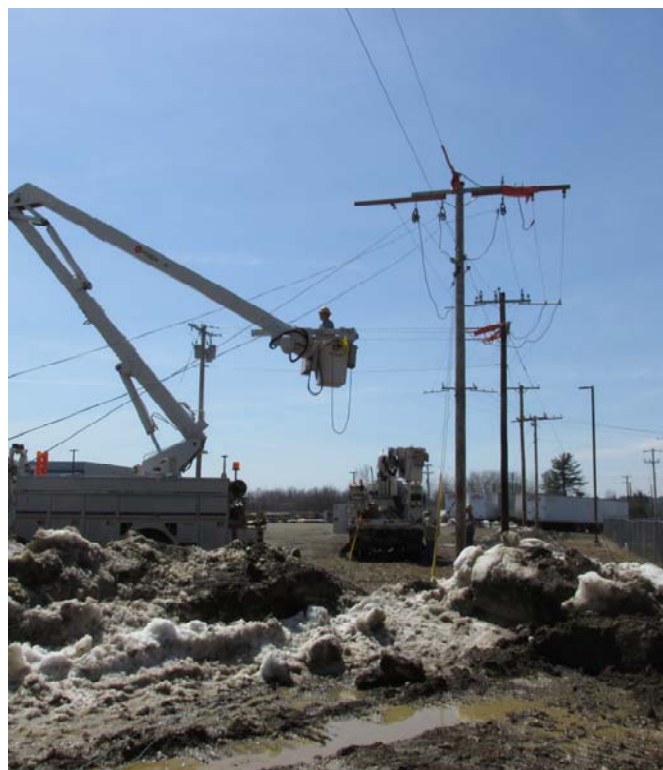
Geography, traffic and pole height all go into the decision on where to set-up your trailer. Being too close to the pole can put too much pressure on arms, poles and running blocks.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	12 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Positioning

Setting your trailer up, out of line with the pole, can put side pressure on the pole. Installing temporary anchors can help with this problem.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	13 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Proper Grounding

It is very important to use proper grounding techniques when setting up your trailers. Both trailers need to be solidly bonded to the system neutral where available.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	14 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Proper Grounding

The wire trailer needs to have equal potential mats installed.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	15 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Proper Grounding



Also, a running ground and/or arbor ground needs to be installed to ground the conductor.

---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	16 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Proper Grounding

The mats, trailer, arbor, and running grounds need to be bonded together with grounds and connected to the system neutral.





<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	17 of 112
	<b>Date:</b>	3/21/2019
	<b>Revised:</b>	

## Rope Trailer

There are several different types of Rope Trailers at Versant Power, but they all are similar in the way that they operate. They all are hydraulically driven with either a Gas or Diesel engine. The hydraulic motor drives a drum that can be run in forward or reverse (pay-in or pay-out).



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	18 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Rope Trailer

Some can be payed out using a brake system that is useful in some situations.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	19 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Rope Trailer

In general, a steel drum is loaded with Bull Rope. It can vary in size with various trailers. They also can be outfitted with an empty reel to wind up old conductor that is on the ground or used to pull in new conductor.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	20 of 112
	<b>Date:</b>	3/21/2019
	<b>Revised:</b>	

## Rope Trailer

All of these trailers are equipped with a hydraulic cutout. It can be set so the drum will stop automatically to minimize damage to poles and equipment if something gets hung up while running the conductor.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	21 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Wire Trailer

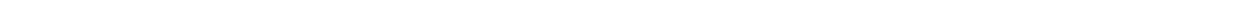
As with the Rope Trailer, we have many different variations of Wire Trailers here at Versant Power. They all have their uses, but they all have the same basic operation.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	22 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Wire Trailer

They are designed to hold a reel of wire on an arbor and hold it under adjustable tension with some sort of braking device.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	23 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Wire Trailer



Some are equipped with one brake just on the reel while others have brakes on the reel plus a Schematic (Bull Wheels) with brakes.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	24 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Wire Trailer

The size of the wire to be installed, length of run and whether energized or not are some considerations when choosing the proper wire trailer for the job.





<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	25 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Wire Trailer

The size of the wire to be installed, length of run and whether energized or not are some considerations when choosing the proper wire trailer for the job.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	26 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Wire Trailer Brakes

Adjusting Wire Trailer brakes can take some practice. The goal is to set the brakes so that the wire is tight enough to run smoothly but without too much tension for running blocks, arms, poles, etc.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	27 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Wire Trailer Brakes



Concerning a trailer with only brakes on the reel, pulling wire smoothly is harder to achieve as the wire size gets larger. The trailers with Schematics (Bull Wheels) and multiple brakes can help with this problem.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	28 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Wire Trailer Brakes

With multiple brakes, it becomes easier to control a heavier reel of wire. The key is learning how to set these multiple brakes to work together and make the wire run smoothly. This takes some hands on practice and instruction to master.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	29 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Kellem Grip and Swivels

Another important piece of equipment when using a the Rope and Wire Trailers is a Kellem Grip (Snake). This is the device that goes on the end of the conductor that connects it to the Bull Rope.



<b>Title:</b> <b>Conductor Installation/Removal</b>  <b>Module 1</b>  <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	30 of 112
	<b>Date:</b>	3/21/2019
	<b>Revised:</b>	

## Kellem Grip and Swivels



These come in various sizes and styles. It is very important to choose the proper size for the wire to be pulled. Too small and it will not fit on the wire properly and may not be strong enough. Too large and it may slip off.

---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	31 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Kellem Grip Sizing

To size a Kellem grip properly you need to know the wire diameter. This can be measured with a wire mic. Then a Kellem grip should be marked with a range that it will accept. You need to find a grip that the diameter falls into.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	32 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Installing a Kellem

Once you have chosen the proper size Kellem, you need to install it on the wire. The end of the wire should be cut squarely and taped with a small amount of tape to keep the strands of the wire from spreading apart. Then slide the Kellem down over the wire until the end of the wire is all the way through the mesh part of the grip and half way through the crimped ends of the mesh.

---



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	33 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Installing a Kellem



The end of the Kellem should be taped, or on larger conductor and Hendrix cable, the end should be secured with two Punch-Lok bands.

---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	34 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Installing a Kellem



Next, the Kellem on the wire should be attached to the Kellem on the Bull rope using the appropriate size swivel. The Swivel is very important, as when the wire and rope are under tension, they will spin at different rates.

---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	35 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Installing a Kellem

The best practice when pulling the conductor is to pull past the deadend pole far enough so that you can cut the wire and let the wire to the ground with the Kellem still installed. It can be removed on the ground much easier than in the air.



---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 1</b> <b>Equipment</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	36 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Know Your Equipment

As with any equipment that we use on a daily basis it is important to know all you can about it before using. It is important to read safety labels and manuals. More importantly, ask questions of your coworkers that have experience with the equipment.

Take advantage of their knowledge and make it your own.

---

# Safe Work Practices

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	37 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	



# VERSANT POWER

Installing New Conductor  
**Layout and Framing**  
Module 2

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	38 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Purpose

This training will help to familiarize you with laying out and framing for an energized reconductor job.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	39 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Job Layout and Plan

The very important first step in any reconductor job is riding over the whole job and figuring out how it will be laid out.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	40 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Job Layout and Plan

The lead worker generally will take care of this step but input and involvement from the whole crew is also important, and necessary, so that everybody knows the plan and why you are doing it that way.

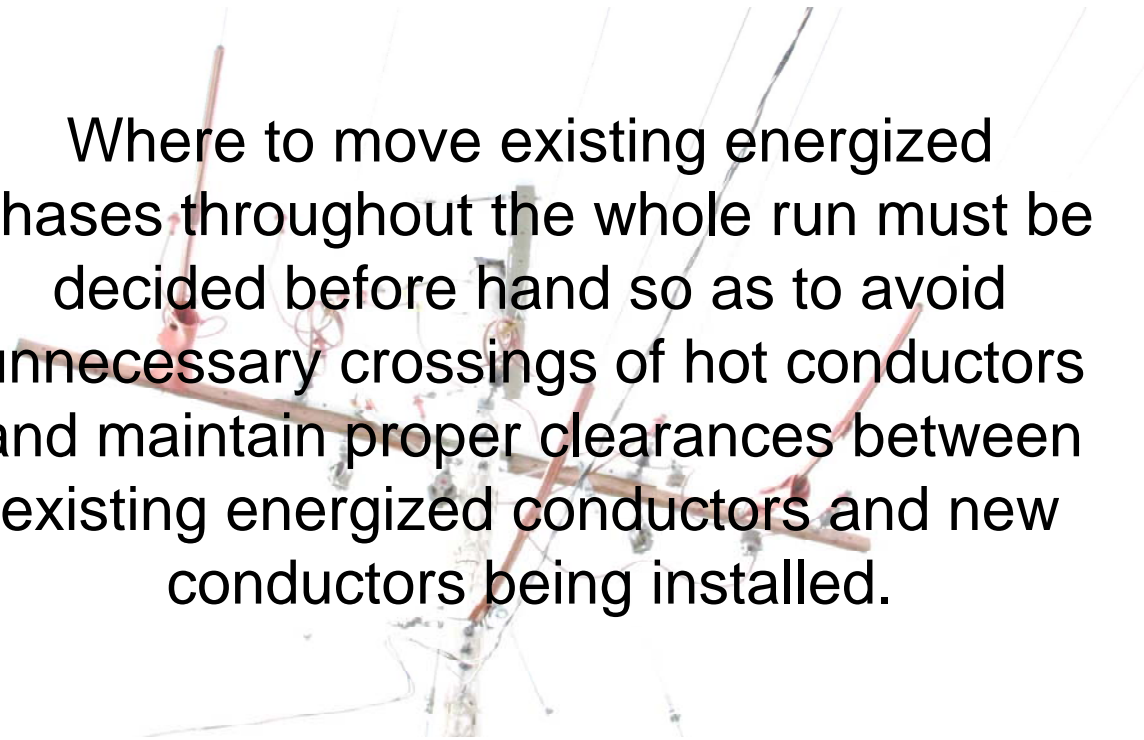
---





<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	41 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Job Layout and Plan



Where to move existing energized phases throughout the whole run must be decided before hand so as to avoid unnecessary crossings of hot conductors and maintain proper clearances between existing energized conductors and new conductors being installed.

---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	42 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Job Layout and Plan



Deciding the length of the run, placement of temporary anchors, and where wire and rope trailers will be set-up, must be decided before the start of framing.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	43 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Job Layout and Plan

As a general rule when replacing wire in place on new poles, it is best to frame new poles and move old conductor onto hot arms on the new poles.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	44 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Job Layout and Plan



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	45 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Job Layout and Plan

Also, it moves the old conductor up and out of the way so to avoid running over the top of energized conductor and with transformers in their permanent locations, you can run new neutral conductors in place.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	46 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Job Layout and Plan



Now, this is not always sensible if the new poles are moved back from the old poles and running new conductor would not be over the old poles. This is why looking at the whole job and planning ahead is so important.

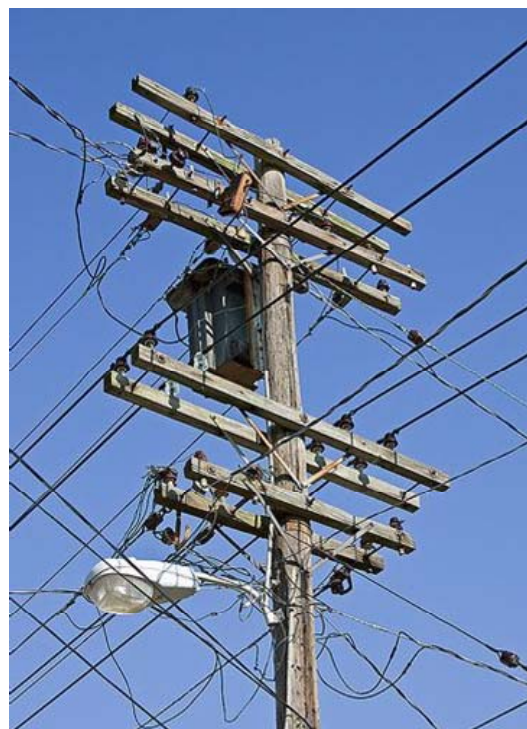
---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	47 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Equipment Needed

There are many variables that go into planning a wire pull.

The size and condition of old wire, poles and arms are all things to take into account.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	48 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Equipment Needed

On most jobs, the old wire must be moved out of the way to set up for the new wire to be installed. The use of “Hot Arms” can make this much easier.





<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	49 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Equipment Needed



Running Blocks are also needed to run the new wire in.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	50 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Equipment Needed



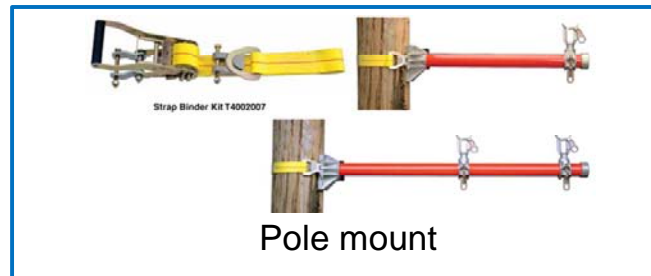
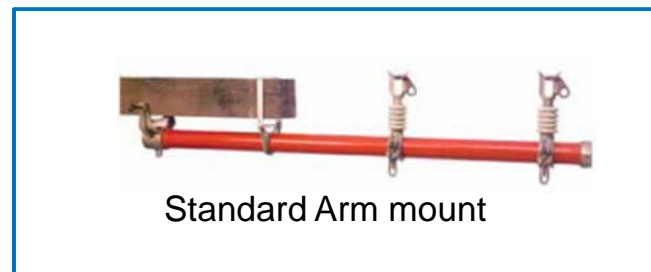
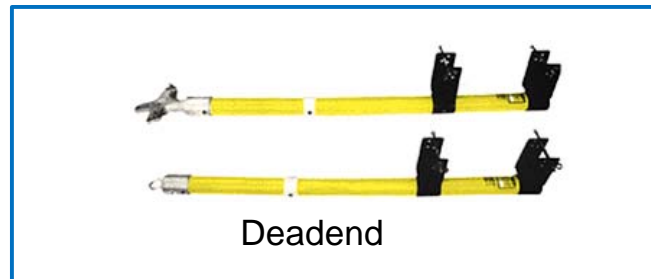
Grounding Blocks, P-Line, and Cover Up are some other important tools.

---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	51 of 112
	<b>Date:</b>	3/21/2019
	<b>Revised:</b>	

## Hot Arms

There are several different variations of hot arms available.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	52 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Hot arms

Wooden arms are bolted to poles or other arms in situations where needed, such as hard corner poles where a hot arm is not strong enough, or as a temporary dead-end when dead-end hot arms aren't available.

---



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	53 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Hot arms



Another good practice is to tie in each phase as you move it to the hot arm. This helps to keep wire in place if a tree came down during the duration of the job and helps keep things in place in the future step of wire removal.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	54 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Running Blocks

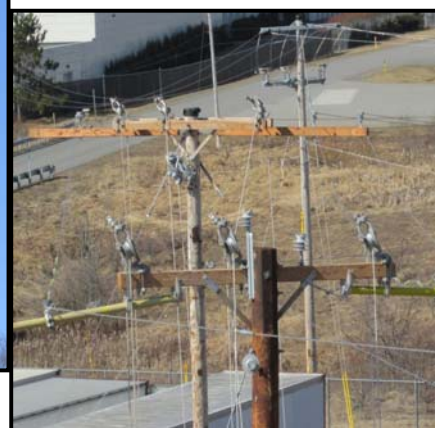
There are many different size and types of running blocks, but the most used for distribution installations is a Sherman Reilly XS-100-B. This is a very versatile block that can be set up in many configurations, hang from a clevis, or mounted to an arm at multiple different angles.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	55 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

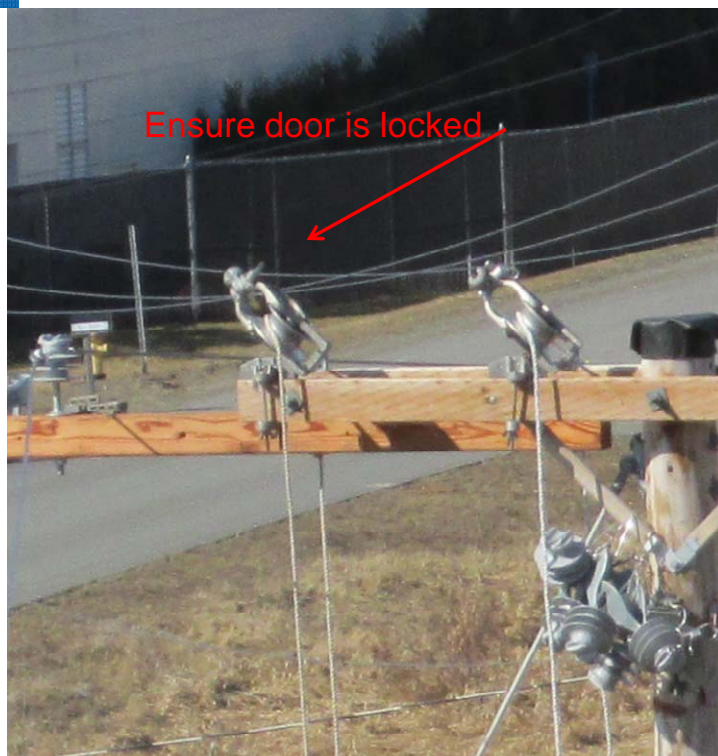
## Mounting Blocks

Blocks can be mounted in many different configurations.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	56 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Mounting Blocks



Getting the right set up is very important especially when framing a corner pole. When framing a corner it is important to mount the block in place, where the insulator will be mounted, so as not to change the sag of the wire when it is tied (clipped) into its permanent location.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	57 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Grounding Blocks

Grounding blocks must be installed the first pole out from the wire trailer, at least every mile of run, and on both sides of every energized crossing.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	58 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## P-Line

The P-Line or Pilot line is a small 5/16" rope that is pulled in by hand through the running blocks and then used to pull in the Bull Rope when the wire is ready to be installed. There are a couple different size reels that these come on, but the most common has approximately 3000 feet per reel.

---



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	59 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## P-Line Installation

P-Line is installed using a brake that is mounted to the pole, or the wire trailer, and then pulled pole to pole by hand.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	60 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## P-Line Installation

Depending on the job, this may be pulled in as the poles are framed. It may also be left until after all the poles are framed and pulled in just before the wire pull. If the latter technique is used, hand lines should be placed in each block as the last step when framing.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	61 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Handlines



As with any work around hot wire, contact between energized conductors and hand lines, p-lines or bull rope is not allowed. For instances where incidental contact may occur, a barrier needs to be in place. The use of rubber cover up and/or the use of rubber gloves for a worker on the ground must be used.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 2</b> <b>Layout and Framing</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	62 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Cover up

There are instances where protective cover up will need to be left in place. Sometimes transformer taps, cutouts, etc, that are left on poles are too close to running blocks, p-lines or conductor as it is being installed. In these situations cover up should be securely installed so as not to come out of place from wind or other means.



# Safe Work Practices

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	63 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	



## **VERSANT** **POWER**

Installing New Conductor  
**Pulling, Sagging, Tying In**  
Module 3

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	64 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Purpose

This training will familiarize you with the steps of pulling wire, sagging wire and clipping in.



# Safe Work Practices



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	65 of 112
	<b>Date:</b>	3/21/2019
	<b>Revised:</b>	

## Communication

One of the most important parts of a safe and smooth running wire job is good communication. The first step is a thorough risk assessment that includes all crew members at one location, either at the shop or on the jobsite, so that all crew members understand their roles for the day.

Risk Assessment/Tailboard Conference Plan				
Work Address:		Circuit ID:		
Job being performed:		Circuit Voltage:		
Energy Source Control:		Offline Protection:		
<input type="checkbox"/> Check box if One Line/System Diagram Reviewed				
List Red Tag Zone of Protection:				
List Yellow Tag Zone or Clearance:				
Blue Tag:				
Local:				
Date	Person Leading Tailboard	Crew & Others Present (Initials)		
Emergency: Call 911 or use Radio Channel/Tower _____ Declares A Code 99 ERD (Emergency Response Device): Push either button 3 times in succession to issue an alert to Central Dispatch/System Operations for emergency requiring Police and/or Ambulance Services.				
What Are The Hazards Associated with the Job?				
<b>Gravity</b> Falling from a height Falling objects Falling structures Combining obstructions Dangerous trees Ladders	<b>Electrical</b> Electrical contact Induced voltage Backfeed Step potential Static charge Boom/insulator contact Arc flash	<b>Mechanical</b> Equipment failure Conductor tension Cable tension Loaded springs Moving parts Malicious rigger/wire	<b>Kinetic</b> Traffic Driving condition Moving/lifting loads Rotating machinery Vehicle stability Chainaw	<b>Other</b> Adhesives Chemicals Confined space Hot surfaces Heat/cold Pressurized fluids
<b>Work Steps, Hazards &amp; What's Different</b>		<b>Barriers &amp; Controls To Protect Crews</b>		<b>Control Barriers:</b> 1. Eliminate hazard 2. Minimize energy 3. Install physical barriers <b>Safety Barriers:</b> 4. Shear PPE 5. Install warning devices 6. Minimize error potential <b>Support Barriers:</b> 7. Written procedures 8. Provide training 9. Provide supervision
Have We Also Considered The Following?				
<b>Work Procedures</b> Isolation of apparatus Check for potential Adequate grounding Minimum approach Vehicle grounds	<b>People</b> Worker fatigue Other work groups Public safety Protection control Other utilities	<b>PPE</b> Safety glasses Hard hat / footwear FR clothing Rubber gloves Traffic vest Inspection of PPE Fall protection	<b>Tools/Equip</b> Adequate coverage Live line tools Fall arrest Inspection of tools Special tools/equip	<b>Special Precautions</b> Adjacent structures Condition of structures Weather conditions Lighting conditions Terrain Water bodies Sails and flags
<b>!!! ALWAYS REVIEW, DISCUSS, RE-EVALUATE THE JOB PLAN IF ANYTHING CHANGES !!!</b> Rev 3/1/16				

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	66 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Communication

When arriving at the jobsite, crews will be spread out. Having good radio communication is of the utmost importance. It is important that each group of crew members has a portable radio and that all truck radios are tuned to the appropriate channel. Ensure that outside speakers are on.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	67 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Communication



It is also important to ask questions of the lead worker and discuss changes over the radio so that all crew members are aware of what is going on.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	68 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Pulling Bull Rope with P-Line

Once the job is framed and P-Line has been pulled, it's time to pull conductor. The first step is pulling the Bull Rope in with the P-Line. The P-Line drum is attached to a hydraulic capstan, either on a truck or wire trailer, using a P-Line adapter.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	69 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Pulling Bull Rope with P-Line



Then, the P-Line needs to be attached to the Bull Rope with a swivel. The P-line will then need to be payed in and the Bull rope payed out either hydraulically or with the brake.

---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	70 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Pulling Bull Rope with P-Line



Swivel on End of Bull Rope

Designated "Chaser"  
with Portable Radio

An important job doing this task is chasing the swivel. One easy problem to have is the swivel getting caught in a block and twisting a pole or arm. Someone with a radio needs to chase the swivel, either in a vehicle, or on foot.

---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	71 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Pulling Bull Rope with P-Line



When the rope is moving it is very important to keep the radio traffic to a minimum so that the trailers and the chaser can stay in constant communication.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	72 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Pulling Conductor with Bull Rope

Once the Bull Rope arrives at the Wire Trailer, it needs to be caught off with a hoist (strap jack) and a grip.





<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	73 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Pulling Conductor with Bull Rope

The P-Line is disconnected from the swivel and the Kellem Grip on the conductor is attached. Then the conductor needs to be cranked, or turned back, to put tension on the bull rope, brakes tightened up, and the hoist removed.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	74 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Pulling Conductor with Bull Rope



All grounds should be checked and running grounds, if used, should be installed. Once this is complete, the brakes should be released until the wire just starts to roll. The Rope Trailer can then be contacted and they can start to pay in slowly and start pulling the wire.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	75 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Pulling Conductor with Bull Rope



At this time, the brakes on the Wire Trailer can be adjusted as the wire slowly moves towards the first block.



The Rope Trailer can be adjusted for cutout pressure.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	76 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Pulling Conductor with Bull Rope

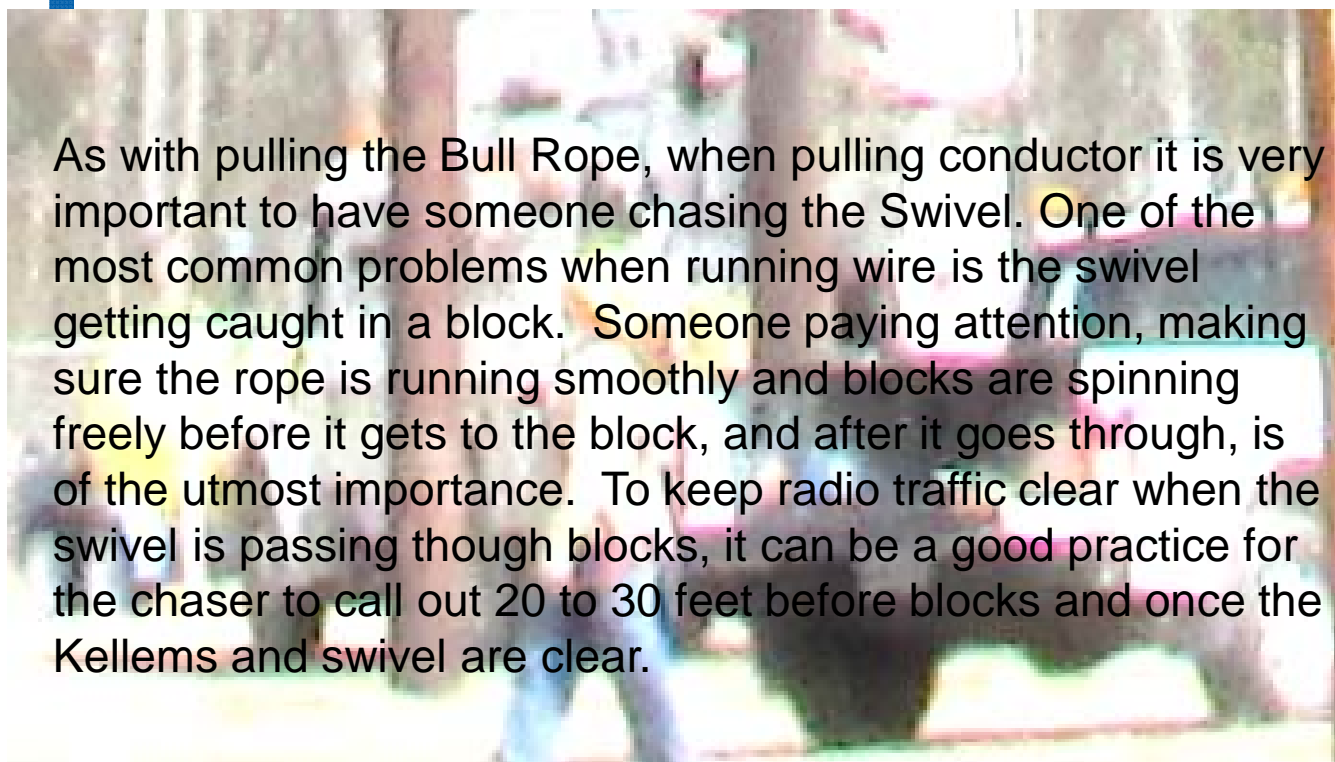
Once the brakes have been adjusted and the swivel is at least through the first block, the Rope Trailer can be contacted and slowly build on speed, until a pace is reached that the wire runs smoothly. It is important at this time for the Wire and Rope Trailers to communicate with each other and get the pull going smoothly.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	77 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Chasing the Swivel

As with pulling the Bull Rope, when pulling conductor it is very important to have someone chasing the Swivel. One of the most common problems when running wire is the swivel getting caught in a block. Someone paying attention, making sure the rope is running smoothly and blocks are spinning freely before it gets to the block, and after it goes through, is of the utmost importance. To keep radio traffic clear when the swivel is passing through blocks, it can be a good practice for the chaser to call out 20 to 30 feet before blocks and once the Kellems and swivel are clear.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	78 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Dead-Ending Conductor

Once the conductor has arrived at the rope trailer end, it is time to dead-end the wire. There are several different ways to dead-end and sag wire depending on the situation. We will go over one technique here but the lead worker and crew on site will need to determine what the best way is for the particular jobsite.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	79 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Dead-Ending Conductor

On a three phase run, it is often easiest to run the two outside phases first, run the middle phase next and run the neutral last. When the first outside phase arrives at the bull rope end, it is best to pull through the last block with enough tail outside the kellem to make any taps needed to deadend the wire safely and have enough tail to connect a tap later.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	80 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Dead-Ending Conductor



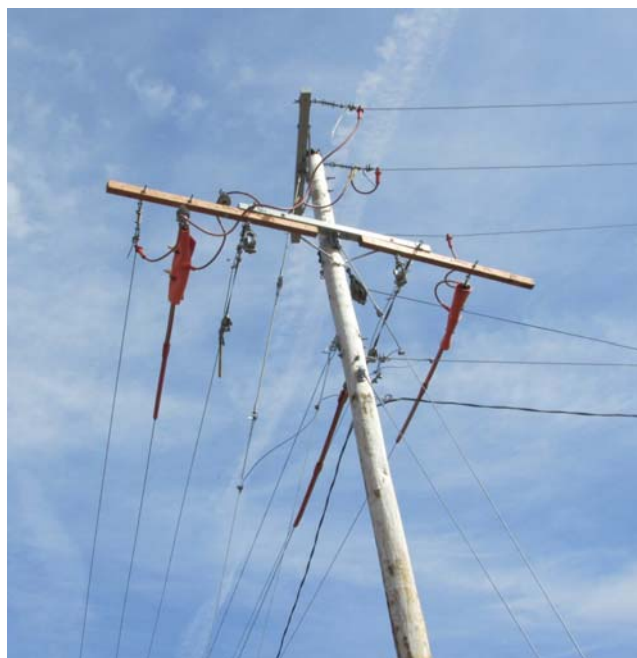
The first step is to get the wire in the shoe on the Wire Trailer end and rigged to the middle of the pole if necessary as to not twist the new arm. Then slack can be let into the wire by releasing the brakes on the Wire Trailer and the conductor can be cut to the ground. Then the Rope Trailer can be called and with the wire still hooked to the rope trailer pay in and get the wire to approximate sag.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	81 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Dead-Ending Conductor

Then the wire can be put on a hoist (strap jack) rigged to the middle of the pole as to not twist the new arm. The wire can be cut outside the Kellem and the rope let down to the ground, leaving the wire in the Kellem to be taken off on the ground.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	82 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Deadending Conductor

The previous steps of pulling the wire are repeated to pull in the other outside phase. Once that is done, the wire can again be dead-ended on the Wire Trailer end in place and the rigging of the first phase to the middle of the pole can be removed.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	83 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Deadending Conductor

Then, as before, the Wire Trailer end needs to communicate with the Rope Trailer and the wire can be pulled up to

approximate sag with the Rope and then put on a hoist and the rigging to the pole of the first



phase can be removed. So you will be left the two outside phases are at approximate sag in place.

---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	84 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Deadending Conductor

All the same steps need to be repeated to run in the middle phase. Once the middle phase is in and dead-ended on the Wire Trailer end, then the Rope Trailer can match it to the other two phases at an approximate sag.




Title: <b>Conductor Installation/Removal</b>  <b>Module 3</b>  <b>Pulling, Sagging, Tying In</b>	Reference:	SWP-6.03	Revision:
	Page:	85 of 112	
	Date:	3/21/2019	
	Revised:		

## Sagging Wire

There are different methods to properly sag new wire. With smaller wire it is not as critical that the sag is an exact number, but it is important to get it close. Sag Charts in the Standards Book, Section 1700, give the sag in inches.

		Stringing Sag - inches				
		Span Length - ft				
		125	150	175	200	225
Ambient	-20	2	3	4	5	7
Temp (F)	0	3	4	5	6	8
	30	3	5	6	8	10
	60	4	6	8	10	13
	90	6	9	11	15	19
		Final Sag - inches				
		Span Length - ft				
		125	150	175	200	225
Conductor	-20	3	3	4	6	7
Temp (F)	0	3	4	5	7	8
	30	4	5	7	9	12
	60	6	9	11	15	19
	90	10	15	20	25	32
	120	15	22	29	38	48
	167	22	31	43	56	70

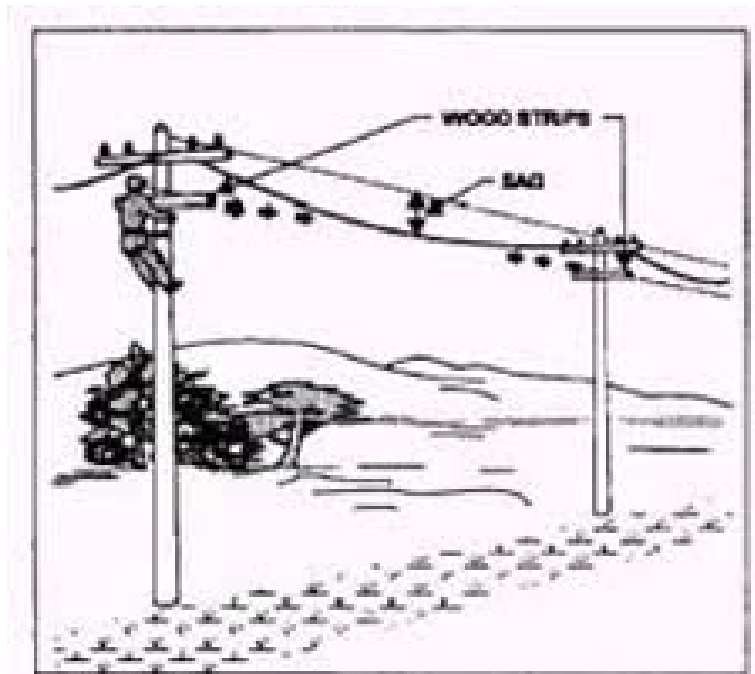
CONDUCTOR: AZUZA  
 AREA = .0968 SQ. IN.  
 DATA FROM CHART #1-106B  
 123.3 KCMIL  
 7 STRANDS

 GERARD CHAVES No. 8714 LICENSED PROFESSIONAL ENGINEER	DISTRIBUTION CONSTRUCTION STANDARDS	ALCOA HEAVY LOADING SAG CHART 1/0 AAAC - 2000# TENSION 175' RULING SPAN
	BANGOR HYDRO ELECTRIC Co.	DRAWING 1702

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	86 of 112
	<b>Date:</b>	3/21/2019
	<b>Revised:</b>	

## Sagging Wire

The use of Sag boards can be used or can be done with a practiced eye.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	87 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Sagging Wire



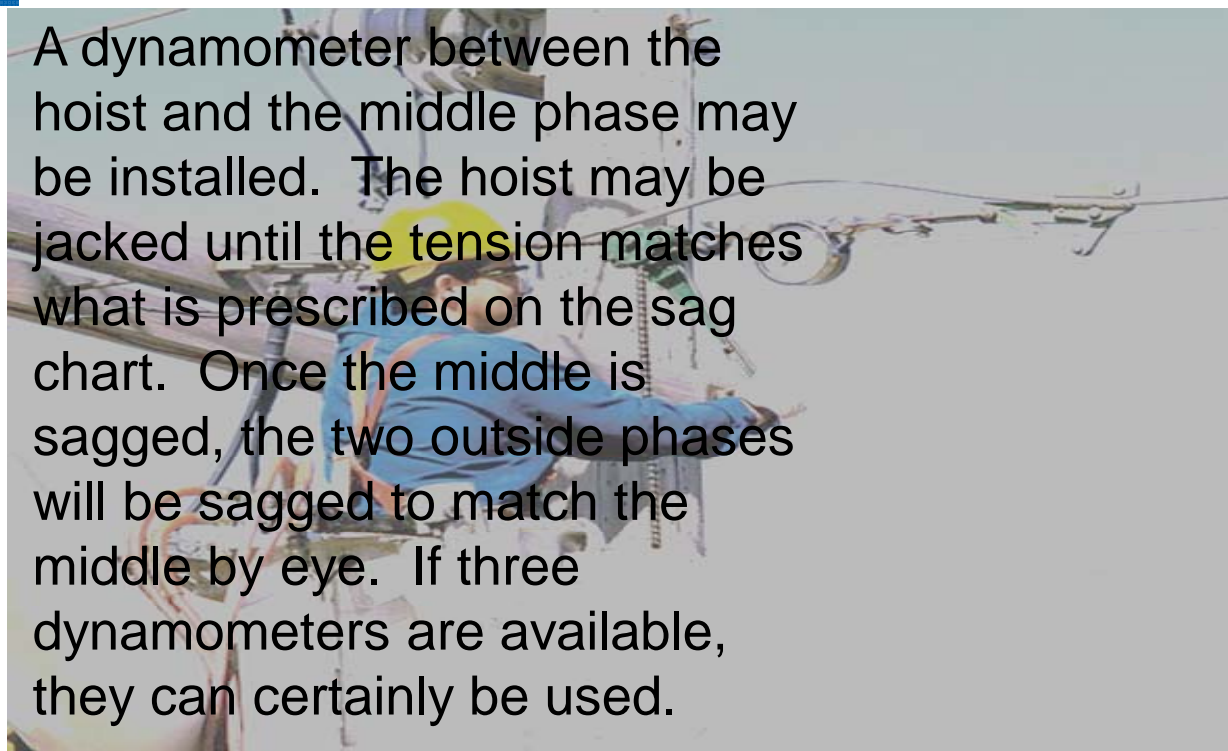
When the wire gets larger, it is more important to follow the sag charts closely. A more detailed sag chart can be provided by engineering that will have sag in inches, pounds and wave time. One of the easiest ways to sag larger conductor is to use the pounds of tension provided and a dynamometer.

---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	88 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Sagging Wire

A dynamometer between the hoist and the middle phase may be installed. The hoist may be jacked until the tension matches what is prescribed on the sag chart. Once the middle is sagged, the two outside phases will be sagged to match the middle by eye. If three dynamometers are available, they can certainly be used.





<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	89 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Sagging Wire

Now all three new phases can be installed in the shoes and hoists removed. It is important to have all three phase in hoists when sagging wire. If you remove your hoist and try to match the next phase by eye, the weight of the hoist will make this difficult to accomplish.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	90 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Clipping In / Tying in Wire

The next step after the conductors have been installed, sagged and dead-ended, is to tie it in on the permanent insulators. It is really as simple as it sounds, but there are a few things to keep in mind.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	91 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Clipping In / Tying in Wire

It is common practice to go through the run and tie in the hard corners first. Then, go back to one end and work down through the job. Hard corners are often easier to have two trucks work together. It is important to not pull the wire too far when moving from the block to the insulator. Also, make sure most of the tension has been released from the jib onto the insulator before tying in the phase to the insulator as not to mess up the sag.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 3</b> <b>Pulling, Sagging, Tying In</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	92 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Clipping In / Tying in Wire

As you are clipping in, you will be removing all running blocks. It is important to treat them well. Throwing them to the ground from the pole is not an acceptable practice. Always make sure doors are locked as you remove the block.



# Safe Work Practices

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	93 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	



# VERSANT POWER

Installing New Conductor  
**Energize and Wreck Out**  
Module 4

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	94 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Purpose

This training will help to familiarize you with phasing new wire with old, swapping load and removal of old wire.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	95 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Phasing and Energization

Now, we have installed new conductor along side existing energized conductor, it is time to energize and phase in the new conductor.



---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	96 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Phasing and Energization



This is often done a day or more after the wire has been installed and clipped in. For this reason, it is very important to look the line over closely before energizing.

---



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	97 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Phasing and Energization

In some cases this can be very straight forward and in other situations it can be a bit complex and confusing.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	98 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Phasing and Energization

If you are working on a straight re-conductor in place, it is as easy as energizing the phases in the same order as the old; road is road, middle is middle and field is field.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	99 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Phasing and Energization

There are other situations where your new wire may dead-end on a different pole than the old wire. You may need to energize from one end and use phasing sticks to phase together on the other end. This can get confusing and should be dealt with accordingly.



---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	100 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Phasing and Energization

A thorough risk assessment with all crew members is very important, along with very good communication throughout the energization and phasing process.

---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	101 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Phasing and Energization

When there are many steps, it is good practice to have a written procedure that all crew members have reviewed, understand, and follow closely.

---

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	102 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Swapping Load

Once the new wire is energized and carrying the main line current, it is time to swap the load located on the jobsite. This can be as easy as taking single transformers offline and swapping them to an energized phase.

---



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	103 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Swapping Load



This also could be as complex as phasing in a three phase side break and jumpering onto the new and then removing jumpers from the old.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	104 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## De-Energizing Old Wire

Once all load has been swapped to the new wire, it is time to de-energize the old wire. It is a good practice to ride the whole job out prior to de-energization as to make sure no transformers or side breaks have been missed. Now the jumpers or taps can be removed and the old wire can be de-energized.





<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	105 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Wrecking Out - Wire removal

The final step is to remove the old wire. The wire being removed isn't grounded due to clearance issues. In some situations, it is a good idea to remove sections of wire that cross over side breaks as a first step.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	106 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Wrecking Out - Wire removal



You want to make sure the wire end that is staying up is securely held with a hoist, hand line or other means before cutting down the conductor. Also, the workers on the next pole know you are cutting the wire down to them.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	107 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

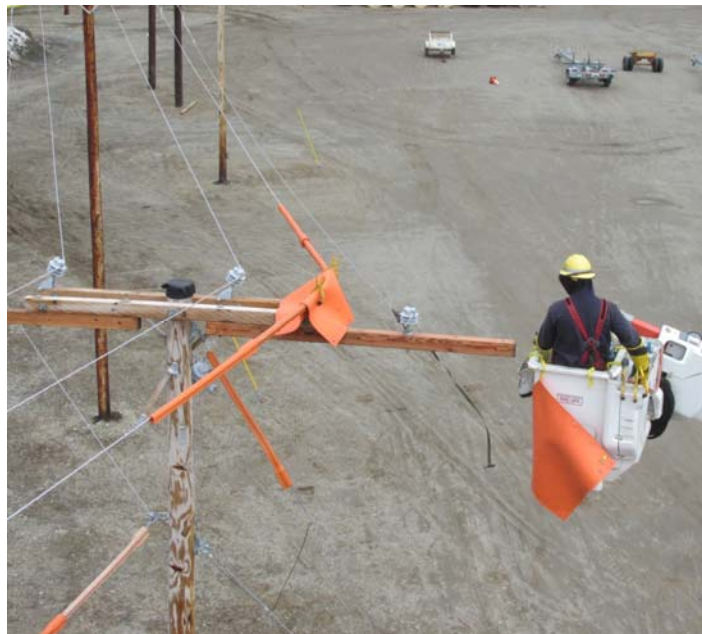
## Wrecking Out - Wire removal

It should be further noted that the conductor being removed is considered energized (it is not grounded and is within a yellow-tagged “MAD” zone). Therefore, the conductor can not be cut to the ground from one end and left in the air on the other. In other words, careful coordination for the removal of the conductor must be considered so that the span is dropped to the ground simultaneously from each end of the span. The conductor may also be removed under tension.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	108 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Wrecking Out - Wire removal

It is also important that the workers on the ground do not handle the wire until it has been cut to the ground on both ends.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	109 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

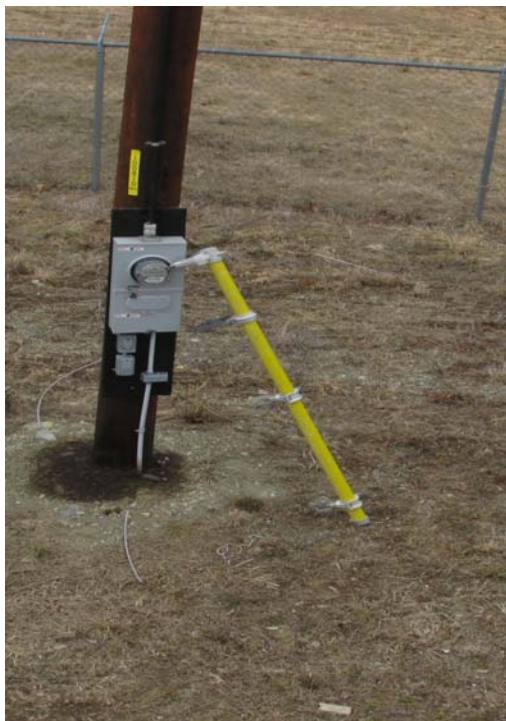
## Wrecking Out - Wire removal

Depending on wire size and length of spans, wire can be done up into hand coils as you go. You can also come back later with a take up reel on a truck's capstan. An empty reel on a rope or hydraulic equipped wire trailer can also be used to pick up the wire.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	110 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Hot Arm Removal



As you move along cutting down wire, you will be removing Hot Arms. As with the blocks, it is important to treat these with respect. They are a hot line tool and should be treated as such.

<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	111 of 112
	<b>Date</b>	3/21/2019
	<b>Revised:</b>	

## Hot Arm Removal

Hot arms should never be thrown roughly into the back of the truck. Often times leaving them at the base of the pole and picking them up with a pick up truck can be a good idea.



<b>Title:</b> <b>Conductor Installation/Removal</b> <b>Module 4</b> <b>Energize and Wreck Out</b>	<b>Reference:</b> SWP-6.03	<b>Revision:</b>
	<b>Page:</b>	112 of 112
	<b>Date:</b>	3/15/2019
	<b>Revised:</b>	

## Finishing Up

As you move along cutting wire and removing hot arms, inspect your pole. Make sure there are no loose ends, such as un-bonded guys, down grounds, cover up, etc.... Make it so your crew will not have to go back to the pole if possible.

---

<b>Developed by:</b> Line Leadership Team, Travel Line, Brian Gould	<b>Approved by:</b> SWP Committee
------------------------------------------------------------------------	-----------------------------------