

# STRUCTURE BULLETIN

## NCDOT Construction Unit

[Website](#) [email](#)

### Current Issues: Form Blowout

Placing and vibrating concrete seem like a simple task but must be done with care. Even well designed and constructed forms can fail due to improper placement and vibration. Specifically, we will be discussing deep wood forms, such as CFL diaphragms and walls. Concrete in its plastic form acts somewhat like a thick liquid. Just like the pressure on your ears increases as you dive deeper in a pool, the pressure on the forms increases as the depth of concrete increases. The physical properties of concrete allow it to partially hold itself up, but the vibrator liquifies the concrete around it. This can increase the form pressure by 20%. The deeper you vibrate, the more the pressure on the forms increases. ACI recommends vibrating no more than 4' deep, but our specifications limit this to 12". The specification calls for any member over 12" thick with more than one layer of horizontal reinforcement to be placed in lifts no thicker than 12". A 4' diaphragm would require 4 layers. The vibrator should fully penetrate the layer being placed and into the previous layer as well, so at most you should see the contractor vibrating 2-3 feet deep.

Other factors that affect the pressure on the forms are slump, rate of pour and height of drop. Higher slump mixes act more like a liquid and increase form pressure. Pouring too fast on a large member may mean the impact force is greater on the forms, and the previously placed concrete has not had a chance to begin setting before higher layers are placed. The greater the height concrete is dropped from, the greater the impact, and therefore, the greater the form pressure. **While there are other factors that effect the form pressure, the ones listed above are the easiest to control (Cont.)**



1. Current Issues
2. Odds and Ends
3. Specification Questions
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### Odds and Ends:

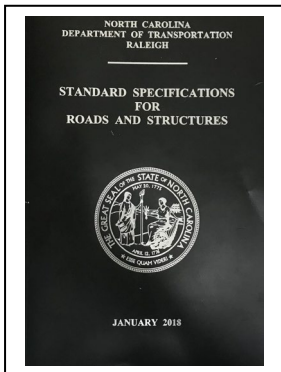
**Power Lines:** Structure Bulletin Volume 2, Issue 5 covered the subject of overhead power lines. Attached at the end of this Bulletin is a brochure from Duke Power concerning the subject. There is some additional good information contained in it.

**Shoring:** Structure Bulletin Volume 1, Issue 2 covered shoring. These rules apply to any road carrying public traffic, even driveways. Periodic review of the sketch is a good idea and use for tailgate safety meetings is encouraged.

**(Cont.) by the placement crew, and therefore inspectors should be**

**familiar with the factors.** If you think a contractor is vibrating too deep, placing layers too thick or dropping the concrete too far, discuss your concerns with them and apply the specification.

Keeping the mix within the prescribed slump is also beneficial. If you have any questions about this or any other topic send us an email.



## Standard Specification Questions:

**Question:** Is use of a straightedge required on PPC overlays?

**Answer:** Yes. The special provision states: *“Immediately following the paving machine, and while the material is still workable, test the overlay*

*surface for irregularities with a 10 foot straightedge. Test by holding the straightedge in successive positions parallel to the centerline of bridge and in contact with the floor surface. Test the surface approximately 18 inches from the curb line, at the centerline of each lane and at the centerline of 2 lane bridges. Advance along the bridge in stages of not more than half the length of straightedge.”*

The quantity of hand work necessary for installing a PPC overlay makes this requirement especially important. If the contractor is resistant to using the tool you should elevate the issue to the Resident Engineer.

## Area Construction Engineers:

Div	Contact	Phone
1&2	<a href="#">Randy Hall</a>	282-402-9957
3&4	<a href="#">David Candela</a>	910-524-4931
5	<a href="#">Troy Brooks</a>	336-972-4627
6&8	<a href="#">John Partin</a>	336-847-1226
7	<a href="#">Aaron Griffith</a>	336-215-9170
9	<a href="#">Vickie Davis</a>	704-202-0945
10	<a href="#">Darin Waller</a>	980-521-5176
11&12	<a href="#">Doug Eller</a>	336-877-7048
13&14	<a href="#">Aaron Powell</a>	828-694-7971

## Videos:

Inspection training videos can be found on the [Construction Unit YouTube playlist](#).

## Training:

PDF copies of the Winter Inspector Training presentations can be found at the following link:

[2018 Structure Inspector Training](#)

**Structure Bulletins** are now archived on the [Construction Unit](#) website under [Construction Resources](#).

If you have a topic you would like to see addressed in a future edition of the Structure Bulletin please [email](#) us at either [acochran@ncdot.gov](mailto:acochran@ncdot.gov) or [aeawood@ncdot.gov](mailto:aeawood@ncdot.gov)



## Your safety is our priority

We have a goal at Duke Energy – to eliminate injury and death from needless power line contacts. We want to provide you with the information you need to stay safe at work.

## Important OSHA minimum approach regulation

The following table is from OSHA 1910.333 and applies to nonqualified persons working in proximity to energized power lines. The minimum approach distance is to be maintained for nonqualified workers. When using equipment classified as a crane or derrick, OSHA 29 CFR 1926.1407-1411 must be followed.

OSHA - 1910.333 Applies to NonQualified Persons Minimum Approach Distance	
Up to 50 kV	10 Feet
50 kV up to 200 kV	15 Feet
200 kV up to 350	20 Feet
350 to 500 kV	25 Feet
500 kV to 750 kV	35 Feet

## Important OSHA crane regulation

Cranes and derricks near transmission power lines – OSHA 29 CFR 1926.1407-1411

This regulation applies to power-operated equipment used in construction that can hoist, lower and horizontally move a suspended load. Such equipment includes, but is not limited to:

If any part of equipment, load line or load could get closer than 20 feet to less than 350 kV power lines or 50 feet for greater than 350 kV power lines, you must speak with a Duke Energy representative before beginning work.

Such equipment includes, but is not limited to:

- Articulating cranes (such as knuckle boom cranes)
- Floating cranes
- Locomotive cranes
- Multipurpose machines when configured to hoist and lower (by means of a winch or hook) and horizontally move a suspended load
- Industrial cranes (such as carry deck cranes)
- Pedestal cranes
- Straddle cranes
- Derricks
- Overhead bridge and gantry cranes NOT permanently installed
- Crawler cranes
- Cranes on barges
- Side boom tractors
- Base-mounted drum hoists only when used with derricks
- Tower cranes
- Portal cranes
- Service/mechanic trucks with a hoisting device
- Dedicated pile drivers
- Mobile cranes (such as wheel-mounted, rough-terrain, all-terrain, commercial truck-mounted and boom truck cranes)
- Variations of these types of equipment



## Look up and live.

Working around high-voltage transmission lines



Know how to protect yourself, your crew and the public when working around transmission lines.

## Contact us

For more information, please visit [duke-energy.com/safety](http://duke-energy.com/safety) or call:

Duke Energy Carolinas  
800.777.9898 or 800.POWERON

Duke Energy Indiana  
800.521.2232

Duke Energy Kentucky or Ohio  
800.544.6900

Duke Energy Progress  
800.452.2777

Duke Energy Florida  
800.700.8744

Duke Energy cares about your safety. This brochure contains important information for:

- Anyone working around power lines
- Grading contractors
- Forklift operators
- Crane operators
- Developers (residential, commercial, industrial)
- Architects and engineers
- Dump truck operators

550 South Tryon Street  
Charlotte, NC 28202



[www.duke-energy.com](http://www.duke-energy.com)

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## Know your voltage, know your clearance

Federal law requires that all contractors maintain at least a 10-foot clearance from overhead power lines up to 50 kV. Greater clearance is required for higher-voltage power lines and cranes and derricks in construction.

Contact Duke Energy at least three working days before you start working near overhead power lines and equipment so that safety recommendations can be made.

Treat all transmission lines, regardless of their operating voltage, with caution:

- 44 kV and 100 kV lines look similar.
- Never assume a voltage based on the illustration.
- Minimum clearance includes maximum sag, which must be calculated for each instance.
- Injury or death can occur without touching power lines.
- Assume all overhead power lines are energized.
- Contact Duke Energy if you are in doubt about safe operating distances.

### Fact 1.

Power lines that serve your homes and businesses are not insulated like home appliance cords.

### Fact 2.

Power lines carry 4,000 to 500,000 volts of electricity that can seriously injure or kill on contact.

### Fact 3.

The simplest way to stay safe is to know where your power lines are located and stay away.

## A planned project is a safe project

Check the job site for hazards and know the location of all overhead power lines and electric equipment, including poles and guy wires.

Consider all overhead lines as energized. Mark the work site boundaries to keep workers, vehicles, tools and equipment a safe distance from electric lines and equipment.

Hold a pre-work safety meeting, pointing out areas where overhead lines and electric equipment are located.

### We can help you:

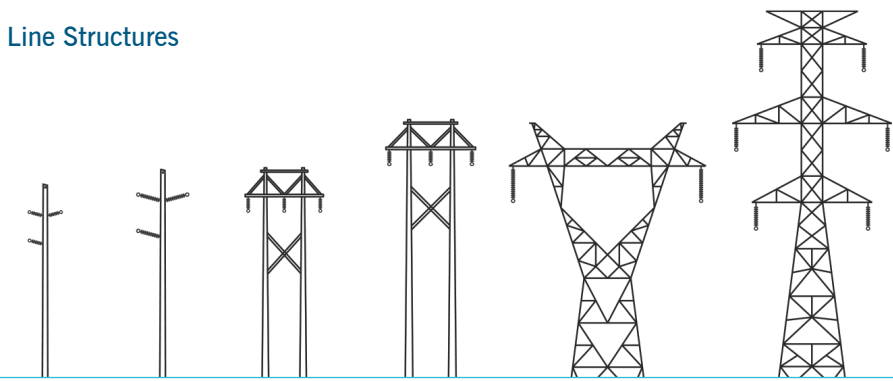
- Confirm voltage
- Confirm clearance
- Confirm wire height under peak conditions
- Provide safety guidance around power lines
- Review and approve drawings for:
  - Compliance with right-of-way restrictions
  - Compliance to National Electric Safety Code
- Identify the best, safe solution

### Emergency situations

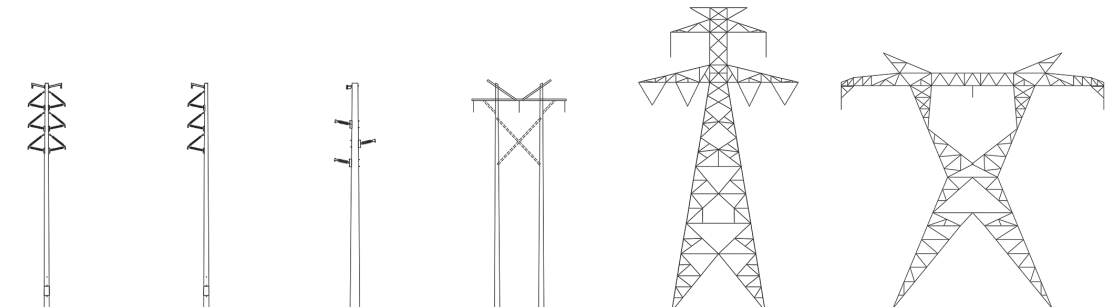
If your equipment makes contact with an overhead power line, notify Duke Energy immediately and take these precautions:

- Have someone call 911.
- Do not attempt to turn off engines or generators.
- Move equipment away from the line only if it is safe to do so.
- Remain on equipment until utility workers arrive and de-energize the line.
- Warn others to stay away. Those on the ground can be injured or killed if they make contact with the equipment.
- If you must leave the equipment because of fire or other dangers, jump off with your feet together. Never touch the ground and equipment at the same time. Keeping your feet together, shuffle or hop away until you are clear of the area.

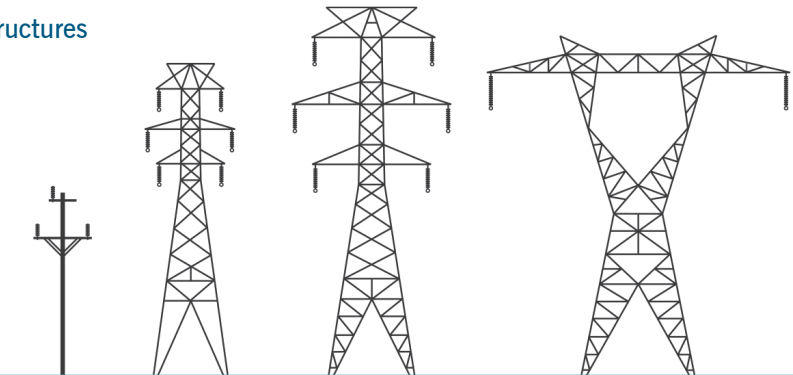
### Duke Energy Midwest Transmission Line Structures



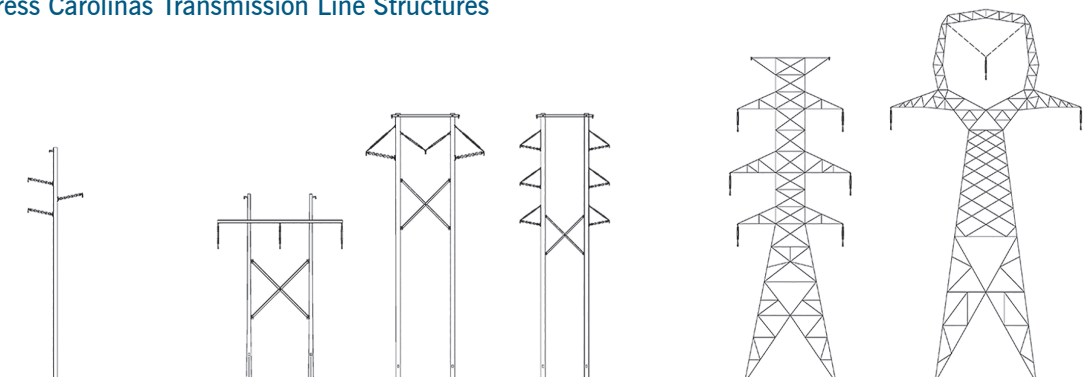
### Duke Energy Florida Transmission Line Structures



### Duke Energy Carolinas Transmission Line Structures



### Duke Energy Progress Carolinas Transmission Line Structures



For more information, visit [duke-energy.com/safety](https://duke-energy.com/safety).