

**Tri-County Electric Cooperative, Inc.
Standards of Construction Report to the Florida Public Service
Commission Pursuant to Rule 25-6.0343, F.A.C.
Calendar Year 2017**

1. Introduction:

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2. Number of meters served in calendar year

Tri-County Electric Cooperative provided electric service to 18,212 for the reporting period ending December 31, 2017. The meters were located within Tri-County Electric Cooperative’s service territory, which consists of Madison, Jefferson and Taylor Counties and the northern portion of Dixie County in the State of Florida.

3. Standards of Construction

Since the Cooperative was organized in the early 1940’s, the standards, policies, guidelines, practices and procedures set forth by the Rural Utilities Service (RUS), previously known as the Rural Electrification Administration (REA) have been followed. Tri-County Electric Cooperative’s main construction standards are those set forth in the following bulletins: (1) RUS Bulletin 1728F-803 “Specifications and Drawings for 24.9/14.4 kV Line Construction”, (2) RUS Bulletin 1728F-804 “Specifications and Drawings for 12.47/7.2 kV Line Construction”, (3) RUS Bulletin 1728F-806 “Specifications and Drawings for Underground Electric Distribution”, (4) RUS Bulletin 1728F-810 “Electric Transmission Specifications and Drawings 34.5 kV through 69 kV”, (5) RUS Bulletin 1728F-811 “Electric Transmission Specifications and Drawings 115 kV through 230 kV.” Tri-County Electric utilizes the USDA Bulletin “Informational Publication 202-1: List of Materials Acceptable for Use on Systems of USDA Rural Development Electrification Borrowers” for any constructional material used in compliance with the above listed RUS construction bulletins.

a) National Electric Safety Code Compliance

The RUS construction bulletins are updated as required to stay in compliance with the National Electric Safety Code (IEEE/ANSI C-2) (NESC). However, Tri-County Electric Cooperative considers the standard in the NESC and the National Electric Code (NEC) to be the minimum safety standards and Tri-County Electric Cooperative has worked to exceed these minimum standards. Maintenance of proper clearance levels and the safety of the general public as well as the safety of our own workforce remains the main focal point for Tri-County Electric Cooperative’s compliance with National Electric Safety Codes.

1. Tri-County Electric Cooperative’s construction crew leaders inspect each newly built job as well as two (2) adjacent spans in each

direction before leaving the job site for any NESC or NEC code violations. If any code violations are found, they are corrected at that time. The Cooperative Foreman inspects all primary voltage construction completed by Tri-County Electric's construction personnel. Tri-County Electric's Contract Supervisor inspects all work completed by outside contracting personnel at the time of completion. All Cooperative distribution lines are inspected annually as well as during normal work assignments by Cooperative personnel.

2. After construction jobs are completed, Tri-County Electric Cooperative employs a third party engineering firm to inspect and verify that new construction jobs are built to RUS standards and free of code violations. Inspections are completed as per the RUS Bulletin with inspections completed quarterly. If NESC or NEC code violations are noted, Tri-County Electric Cooperative corrects these violations prior to a Professional Engineer certification of the work order report (RUS Form 219). Upon certification, the RUS Form 219 work order reports are then sent to Washington, D.C.
3. Tri-County Electric Cooperative sends a quarterly report of completed construction jobs (RUS Form 219) to the Florida Public Service Commission (FPSC). The FPSC selects jobs to be inspected by FPSC inspectors and provides Tri-County Electric Cooperative with a list of these jobs. If the FPSC inspector notes any code violations, Tri-County Electric Cooperative is notified via Certified Mail and these violations are then corrected by the Cooperative.
4. Of all RUS Form 219 jobs inspected, less than 5% required action by the Cooperative to correct minor code violations. These violations were minor infractions such as backfill and tamping of underground primary installations, guy marker installation or installation of insulated guy rods to maximize clearances. The Cooperative is committed to safety during distribution line extension and regular maintenance and remains vigilant of NESC, NEC or RUS code violations. The Cooperative attempts to address any potential code violations before leaving new construction sites and frequently revisits underground installation in an attempt to head off any potential erosion or code violation issues prior to inspection.

b) Extreme Wind Loading Standards

1. Tri-County Electric Cooperative utilizes Class B construction when crossing railroads, limited access highways and interstate highways. However, Tri-County Electric Cooperative has begun to institute Class B construction in certain highly congested areas to promote safety and maximize clearances. As specified in the NESC loading tables, Class B construction will withstand heavier wind and ice loading and will help to storm harden critical infrastructure facilities. These areas of high load demand and a desire to increase overall load capacity for Tri-County Electric Cooperative’s consumers will determine the future course and utilization of Class B construction standards for the Cooperative in normal construction. The Cooperative will continue to evaluate the feasibility of Class B construction on an ongoing basis as is justified by load, congestion and cost constraints.

c) Flooding and Storm Surges

1. Tri-County Electric Cooperative has reviewed its standards, policies and procedures relating to the effects of flooding and storm surges on underground facilities and supporting overhead structures. Currently the Cooperative’s standard practice is to restrict electrification of flood prone areas, which includes areas immediately adjacent to river banks within Madison and Jefferson counties, in the immediate threat of a flood. In coastal areas of Taylor and Dixie Counties served by Tri-County Electric Cooperative storm surge threats are minimal due to the natural protection afforded by the cove like land structure of the panhandle of Florida and the shallow depth of the coastal seaboard area. In an effort to minimize the effects of salt spray and storm surge on the electrical service provided to these coastal areas, Tri-County Electric Cooperative has maintained a larger kV construction standard in the past. Tri-County Electric will continue to evaluate this practice in the future to determine its effectiveness in minimizing service interruptions in coastal areas. Due to the abundance of natural drainage pathways and the rural landscape within Tri-County Electric Cooperative’s service territory, flooding and storm surge issues are minimal and at this time it is the opinion of the Cooperative that current practices and procedures are

sufficient to minimize the effects of flooding and storm surge on the electrical distribution facilities of the Cooperative.

d) Safe and Efficient Access of New and Replacement Distribution Facilities

1. All construction standards, policies and procedures provide for the installation of new facilities and the replacement and maintenance of existing distribution facilities. In addition, the same standards, policies and procedures provide for efficient access by Tri-County Electric Cooperative's personnel and vehicles for installation and maintenance as safely and quickly as possible. It is the standard practice of Tri-County Electric Cooperative's staking personnel to acquire easements for all new construction jobs in order to ensure safe and efficient access by Cooperative personnel during both initial construction and routine maintenance of all Cooperative distribution facilities. In the case of existing line relocation, Tri-County Electric Cooperative decides on a case-by-case basis if the relocation of such facilities is warranted based on both ease of access and cost feasibility. If Tri-County Electric Cooperative determines that existing facilities need to be relocated, then the new route for these facilities is chosen based on the most accessible and safest area available at the time of relocation.

e) Attachments by Others

1. Tri-County Electric Cooperative utilizes Joint Pole Use Attachment Agreements, which includes language specific to Tri-County Electric Cooperative's construction, policies, guidelines, practices and procedures. This language also addresses the issues of safety, pole reliability as well as engineering safety guidelines and maintenance procedures.
2. In 2011, Tri-County Electric Cooperative renewed its existing joint use pole agreements with all of the utilities attached to our facilities. The agreement has language and procedures which require each utility to contact the Cooperative before making additional attachments in an effort to insure any new or additional attachment would not overload the existing pole lines. The Agreement maximizes safety standards and ensures all necessary clearances

are met in accordance with NESC, NEC and RUS requirements.

4. Facility Inspections

a) **Description of policies, guidelines, practices and procedures for inspection transmission and distribution lines, poles and structures including pole inspection cycles and pole selection process.**

1. Distribution poles are inspected on an eight-year inspection cycle by a third party contractor that performs both ground line and visual inspections. Poles for inspection are selected based on the distribution substation on which they reside. Substations are chosen based on the date of the last pole inspection cycle which most closely adheres to the eight-year inspection cycle of the Cooperative's pole inspection program. The pole inspection cycle is in addition to those performed by FPSC personnel on selected RUS Form 219 construction jobs as well as the quarterly job inspections performed by Tri-County Electric Cooperative's third-party engineering firm for new construction jobs.
2. Affected poles are treated with either a formulation of preservative paste for decay control or a fumigant which is applied to protect against strength loss due to internal decay and/or insect strikes. These chemical applications treat the existing conditions affecting the inspected poles and help prevent any further decay that may compromise the structural integrity of the distribution system. Tri-County Electric Cooperative's pole inspection program is managed by the Cooperative's Contract Supervisor. All rejected poles are reported to the Contract Supervisor who coordinates their replacement through the Staking Technicians within the Engineering Department of Tri-County Electric Cooperative.
3. Tri-County Electric Cooperative visually inspects two 69 kV transmission lines, owned by Seminole Electric Cooperative, Inc., located in Dixie and Taylor County, Florida, and a 115 kV transmission line owned by Tri-County Electric Cooperative located in Madison County, Florida, each year. We utilize an outside pole inspection contractor to perform both ground line and visual inspections on these transmission lines on a five (5) year cycle. Affected poles are treated with the same chemical applications as the distribution poles, which is either a fumigant which protects against strength loss due to internal decay and/or insect strikes or a

preservative paste which treats existing conditions and prevents further decay problems. Affected transmission poles are reported to the Cooperative's Contract Supervisor who coordinates their replacement through the Staking Technicians within the Engineering Department of the Cooperative.

b) Transmission and distribution inspections planned and completed.

1. There are three transmission systems maintained. The Steinhatchee transmission line, which is 69 KV and is 17.7 miles in length, located in Dixie County, Florida, and the Scanlon transmission line, which is 69 kV and 16.4 miles in length, located in Taylor County, Florida. These transmission lines are owned by Seminole Electric Cooperative, Inc., but are maintained by Tri-County Electric Cooperative. Twelve wooden poles were replaced with steel poles on the Steinhatchee Transmission line in 2017. Tri-County Electric Cooperative also owns and maintains a 115 kV Sonnie transmission line located in Madison County, Florida which is 13.77 miles in length. 1.77 miles of the line are concrete structures. The remaining 12 miles of line were H-frame wooden structures. In 2017, this line underwent a complete rebuild with all new infrastructure. The line was replaced with steel mono-pole structures with new wire and insulators. This transmission project completes the storm hardening requirement for the Sonnie transmission line.
2. In addition to our ground line pole inspection, we conduct an annual visual inspection of our transmission facilities. The visual inspection each year looks for pole, insulator, conductor damage, wood pecker damage on each wooden structure and possible right-of-way encroachment. We also inspect for any tree growth which could possibly cause an outage.
3. The first iteration of an eight-year inspection cycle of our distribution poles is currently underway. Of the 55,964 poles on our system, 51,947 poles have been inspected within this cycle.

c) Number and percentage of transmission poles and structures and distribution poles failing inspection and the reason for the failure.

1. During 2017, 6,169 distribution poles were inspected. Of the poles inspected, 146 were rejected for a rejection rate of 2.4%. In addition to checking and treating poles, the inspection crew changed out and/or replaced missing down guy guards and repaired broken ground wires. They repaired 78 broken ground wires.

d) Number and percentage of transmission poles and structures and distribution and class of structure, replaced or for which remediation was taken after inspection, including a description of remediation taken.

1. The 148 rejected distribution poles found during the 2017 inspection which required replacement are in the process of being changed out.
2. After the annual visual inspections are performed, any items noted on the inspection are corrected, which usually consists of a large number of woodpecker hole repairs along with any other maintenance items.

5. Vegetation Management

a) Utility's policies, guidelines, practices, and procedures for vegetation management, including programs addressing appropriate planting, landscaping, and problem tree removal practices for vegetation management outside of road right-of-ways or easements, and an explanation as to why the utility believes its vegetation practices are sufficient.

1. A listing of pre-construction guidelines are maintained which is provided to members prior to distribution line extensions. Members are also advised by Staking Technicians of the right-of-way procedures and practices performed by the Cooperative during line extension construction. This includes information about the maintenance of and access to right-of-way easement granted by the land owner to Tri-County Electric Cooperative for distribution line extensions. Members are advised to avoid planting any type of vegetation, other than grass, directly under the planned distribution lines or within the scope of the

easement granted to Tri-County Electric Cooperative. The Cooperative will continue to evaluate this process on an ongoing basis and will continue to formulate new and more comprehensive right-of-way planning and maintenance materials which will be made available to current and prospective members.

2. The vegetation management and right-of-way practices of the Cooperative are sufficient at this time based upon our outage records per annual consumer hours off. Our reliability statistics meet and exceed RUS guidelines for SAIDI, SAIFI and CAIDI Indices. The Cooperative will continue to maintain an active right-of-way management program to minimize distribution line exposure and outage times for members. The Cooperative will continue to trim so called “hot spots” consisting of dangerous tree overhangs and vegetation overgrowth as these areas are reported to the Cooperative by members and Cooperative personnel during distribution line inspections and regular maintenance procedures.

b) Quantity, level and scope of vegetation management planned and completed for transmission and distribution facilities.

Tri-County Electric Cooperative’s operation procedures and practices for right-of-way and vegetation management are as follows:

1. Acquiring right-of-way easements 30-foot wide when constructing three-phase facilities is the ideal standard. If only a 20-foot wide right-of-way easement can be obtained, then narrow profile construction is considered. The entire width of the obtained right-of-way easement is cleared from ground level to a maximum height of sixty (60) feet in order to minimize vegetation and right-of-way interference with the distribution facilities of the Cooperative.
2. On new single-phase construction, a 20-foot wide easement is desired with a 10-foot wide easement as the minimum standard. If a 10-foot easement cannot be obtained then an alternate route is required. The entire width of the obtained right-of-way easement is cleared from ground level to a maximum height of sixty (60) feet in order to minimize vegetation and right-of-way interference with the distribution facilities of the Cooperative.

3. There are approximately 2,781 miles of overhead distribution line in Madison, Jefferson, Taylor and Dixie counties. During 2017, the Cooperative's right-of-way contractors trimmed approximately 600 miles of right-of-way. The right-of-way removal procedure concentrated on areas with the heaviest tree coverage with targeted goals of widening the tree overhang in order to minimize power interruptions due to tree coverage and vegetation growth. The right-of-way maintenance schedule includes a three-year trim cycle for the least reliable circuits. There is also a four and five-year cycle based on more reliable feeders.
4. An herbicide-spraying program began in July 2009 to control vegetation growth and supplement current right-of-way trimming practices. Since the inception of the herbicide spraying program in 2009, the Cooperative has treated over 3,682 miles of right-of-way following our cutting and trimming program with a total of 600 miles being sprayed in 2017. The program has produced positive results in minimizing vegetation and tree growth within the Cooperative's right-of-way easements. The Cooperative will continue to monitor and evaluate the successfulness of all tree and vegetation management programs on a proactive rather than a reactive basis in order to maximize efficiency and minimize distribution line exposure.
5. Replacement trees are offered to consumers as a way of negotiating with landowners in the right-of-way removal process. It is the practice of the Cooperative to attempt to build new distribution lines in the most accessible and safest available areas. This includes minimizing distribution line exposure to tree overhang and vegetation growth by planning and staking line extensions in areas with the least amount of right-of-way as is most feasible and cost effective at the time of construction.

Report on Collaborative Research for Hurricane Hardening

Provided by

The Public Utility Research Center
University of Florida

To the

Utility Sponsor Steering Committee

Final Report dated February 2018

I. Introduction

The Florida Public Service Commission (FPSC) issued Order No. PSC-06-00351-PAA-EI on April 25, 2006 (Order 06-0351) directing each investor-owned electric utility (IOU) to establish a plan that increases collaborative research to further the development of storm resilient electric utility infrastructure and technologies that reduce storm restoration costs and outages to customers. This order directed IOUs to solicit participation from municipal electric utilities and rural electric cooperatives in addition to available educational and research organizations. As a means of accomplishing this task, the IOUs joined with the municipal electric utilities and rural electric cooperatives in the state (collectively referred to as the Project Sponsors) to form a Steering Committee of representatives from each utility and entered into a Memorandum of Understanding (MOU) with the University of Florida’s Public Utility Research Center (PURC). The third extension of this MOU was approved last year by the Research Collaboration Partners and now extends through December 31, 2018.

PURC manages the work flow and communications, develops work plans, serves as a subject matter expert, conducts research, facilitates the hiring of experts, coordinates with research vendors, advises the Project Sponsors, and provides reports for Project activities. The collaborative research has focused on undergrounding, vegetation management, hurricane-wind speeds at granular levels, and improved materials for distribution facilities.

This report provides an update on the activities of the Steering Committee since the previous report dated February 2017.

II. Steering Committee Workshop

On December 5, the Steering Committee organized a web-based workshop for over 40 participants from the Project Sponsors hosted by the University of Florida. The workshop was held to orient new members on the model of the costs and benefits of storm hardening strategies and to discuss the integration of data from recent storm activities.

The presenter for the workshop was Ted Kury. He first described the model and the overall flow of the simulation element. He then described the 115 different inputs to the model and demonstrated where to find them. Next, he demonstrated a test run of 50 hurricane years for the state and demonstrated how the model illustrates the shift in the probability distribution of the outcome variables. Finally, he demonstrated the model’s ability to simulate single hurricanes, both historical and hypothetical.

Following the demonstration, the members discussed strategies for adding data from recent storm experiences to the model.

III. Undergrounding

The collaborative research on undergrounding has been focused on understanding the existing research on the economics and effects of hardening strategies, including undergrounding, so that informed decisions can be made about undergrounding policies and specific undergrounding projects.

The collaborative has refined the computer model developed by Quanta Technologies and there has been a collective effort to learn more about the function and functionality of the computer code. PURC and the Project Sponsors have worked to fill information gaps for model inputs and significant efforts have been invested in the area of forensics data collection.

In addition, PURC has worked with doctoral and master’s candidates in the University of Florida Department of Civil and Coastal Engineering to assess some of the inter-relationships between wind speed and other environmental factors on utility equipment damage. PURC has also been contacted by engineering researchers at the University of Wisconsin and North Carolina State University with an interest in the model, though no additional relationships have been established. In addition to universities, PURC was again contacted by researchers at the Argonne National Laboratory who expressed interest in modeling the effects of storm damage. The researchers developed a deterministic model, rather than a probabilistic one, but did use many of the factors that the Collaborative have attempted to quantify. They are currently working to incorporate stochastic elements into their model and have consulted PURC for guidance. Every researcher that contacts PURC cites the model as the only non-proprietary model of its kind.

The research discussed in previous years’ reports on the relationship between wind speed and

rainfall is still under review by the engineering press. Further results of this and related research can likely be used to further refine the model.

IV. Wind Data Collection

The Project Sponsors entered into a wind monitoring agreement with WeatherFlow, Inc., in 2007. Under the agreement, Florida Sponsors agreed to provide WeatherFlow with access to their properties and to allow WeatherFlow to install, maintain and operate portions of their wind monitoring network facilities on utility-owned properties under certain conditions in exchange for access to wind monitoring data generated by WeatherFlow's wind monitoring network in Florida. WeatherFlow's Florida wind monitoring network includes 50 permanent wind monitoring stations around the coast of Florida, including one or more stations located on utility-owned property. The wind monitoring agreement expired in early 2012; however, it was renewed in April 2017 and will renew automatically annually on the effective date for an additional one year period, unless terminated by the parties to the agreement.

V. Public Outreach

In last year's report we discussed the impact of increasingly severe storms on greater interest in storm preparedness. PURC researchers continue to discuss the collaborative effort in Florida with the engineering departments of the state regulators in Connecticut, New York, and New Jersey, Pennsylvania, and regulators in Jamaica, Grenada, Curacao, Samoa, and the Philippines. While all of the regulators and policymakers showed great interest in the genesis of the collaborative effort, and the results of that effort, they have not, at this point, shown further interest in participating in the research effort. PURC researchers also engaged with the popular media in preparation for, and in the wake of, Hurricane Irma.

VI. Conclusion

In response to the FPSC's Order 06-0351, IOUs, municipal electric utilities, and rural electric cooperatives joined together and retained PURC to coordinate research on electric infrastructure hardening. The steering committee has taken steps to extend the research collaboration MOU so that the industry will be in a position to focus its research efforts on undergrounding research, granular wind research and vegetation management when significant storm activity affects the state.