GRU
More than Energy

GAINESVILLE REGIONAL UTILITIES

Energy Delivery

February 22, 2017

Penelope Buys
Engineering Specialist
Division of Engineering
Florida Public Service Commission
pbuys @psc.state.fl.us

Dear Ms. Buys:

Attached is the Gainesville Regional Utilities (GRU) 2016 Storm Hardening Report. We believe all reporting requirements of Rule 25-6.0343 have been addressed and satisfied; however, should there be any unanswered questions or need for further expansion or clarification we will address such needs in a timely manner upon notice. GRU has been proactive historically in nearly all facets of the Storm Hardening initiative; we are pleased to report our programs and successes to the Commission.

Sincerely,

Gary Baysinger,
Energy Delivery Officer

P.O. Box 147117, Station A26 , Gainesville, Fl 32614-7117 Telephone: (352) 393-1565 Fax: (352) 334-2962

GRU Storm Hardening Report
to the Florida Public Service Commission
Pursuant to Rule 25-6.0343, F.A.C.
Calendar Year 2016

1) Introduction

a) Gainesville Regional Utilities (GRU)

b) 4747 N. Main Street
PO Box 147117, Station E2A
Gainesville, Florida 32614-7117

c) Gary Baysinger
Officer, Energy Delivery
Office: (352) 393-1565
Fax: (352) 334-2784
baysingergl@gru.com

2) Number of customers served in calendar year 2016

GRU serves Gainesville proper as well as Gainesville's urban fringe but does not serve the University of Florida main campus. The average number of electric customers served in calendar year 2016 was 95,161 which can be broken down by class as follows:

Residential Customers:	84,358
Non-Residential Customers:	10,803
Total:	95,161

3) Standards of Construction

(a) National Electrical Safety Code Compliance

GRU's Material and Construction Standards are continuously maintained and updated to ensure compliance with the applicable version of the National Electric Safety Code (NESC). Construction standards, policies, guidelines, practices and procedures for electric distribution facilities installed prior to December 16, 2012 adhered to the requirements of the version of the NESC in effect at the time of installation. Electric distribution facilities installed subsequent to December 16, 2012 complied with the 2012 version of the NESC.

(b) Extreme Wind Load Standards

GRU's current Material and Construction Standards are guided by the extreme wind loading requirements specified by http://windspeed.atcouncil.org/ as recommended by the 2017 NESC. These standards have been applied to: 1) new construction initiated on or after February 15 2017 and 2) major planned work that requires the expansion, rebuild or relocation of existing facilities initiated on or after December 16, 2006. Electric distribution facilities installed prior to December 16, 2012 were constructed in compliance with the applicable version of the NESC at that time.

(c) Flooding and Storm Surges

GRU is located in north central Florida, roughly equidistant to both coasts. GRU's electric distribution facilities are not subject to storm surges and have limited exposure to flooding. Where there has been significant flooding GRU evaluates the opportunity to relocate facilities, underground and overhead, to more secure locations.

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

Electrical construction standards, policies, guidelines, practices, and procedures at GRU provide for the placement of new and replacement distribution facilities in a manner that ensures safe and efficient access for installation and maintenance.

GRU has instituted a Continuous Improvement Program. The reliability of each distribution circuit is analyzed monthly. When warranted, a plan is developed to improve the reliability of poor performing circuits once the root cause issues have been identified. The work is prioritized based on the anticipated reduction and frequency of service interruptions and best value (cost/benefit) to be realized. The program also identifies the worst performing operating devices and most compromised primary voltage underground cable. Outages are reviewed on a daily basis to determine if any device has repetitive problems. The renewal and/or replacement of problem devices and cables are prioritized based on the anticipated customer service improvement and best value to be realized.

As part of this program, existing difficult access facilities are evaluated to determine if they can be relocated. Historically, GRU has found it very difficult to relocate rear-lot facilities along the roadway due to cost to convert to underground facilities to front lot facilities, including the cost of relocating the customer meter. Therefore, when it is not possible to relocate limited access facilities to a more accessible location, other solutions are developed to enhance circuit and operating device reliability. GRU has also adopted the use of motorized and non-motorized rear-lot construction and maintenance equipment to facilitate the replacement and/or repair of limited access facilities. Also, long distribution laterals are reconfigured and shortened (segmented) when possible to further improve system reliability.

As mentioned above, the Continuous Improvement Program includes the evaluation of primary voltage underground cable performance and life expectancy. Specifically, direct buried cables are tested electrically and when viable, the cable insulation is restored through chemical injection. During the testing phase all transformers and underground cable connections are checked, renewed or replaced as necessary. The program goal is to extend the service life of the cables and supporting components by 30 years or more. Cables that fail the electric test are scheduled for replacement. The intent of this proactive program is to increase the life of older primary voltage cables and reduce the number of unplanned service interruptions due to cable burnouts. GRU resumed this program in April of 2015 and is continuing it at this time.

Another element of the Continuous Improvement Program is the redesign of the mainline underground distribution system within the GRU's most compact urban areas. With a focus on realizing increased system reliability and enhanced operability, problematic subsurface (manhole) switchgear is being replaced with surface-mount switchgear where feasible. Only 1 such device remains in the system.

GRU continues to advance a SCADA controlled distribution system re-closer program which enabling the utility to monitor and reconfigure its distribution circuits automatically and remotely. These devices enable the utility to minimize the scope and duration of service interruptions by quickly and effectively isolating faulted circuit segments.

GRU's transmission structure hardening program consisted on improving roads and culverts to facilitate restoration in case of outages.

(e) Attachment by Others

Electrical construction standards, policies, guidelines, practices, and procedures at GRU include written safety, pole reliability, pole loading capacity, and procedures for attachments by others to the utility's electric transmission and distribution poles.

GRU requires pole attachment agreements for entities that desire to attach to its structures. The agreements stipulate that such entities must submit a permit request to GRU prior to making any attachments, with the exception of attaching a service drop cable. Whenever a pole proposed for joint use is of insufficient height or strength for the existing or proposed attachments, the pole is replaced. There is an additional requirement imposed on such entities to install whatever guy and anchor system is necessary to sustain any unbalanced load their attachment places on the structure. Dependent upon the nature and age of GRU's pole attachment agreements, some agreements require that the permit request include an engineer's determination that the impact of the proposed attachment will satisfy the applicable NESC requirements.

4) Facility Inspections

a) Policies, guidelines, practices, and procedures for inspecting transmission and distribution lines, poles, and structures.

GRU has had a comprehensive and periodic pole inspection/treatment program since 1992.

Overview

- The inspection cycle has been established at eight (8) years.
- The inspection method is to sound and bore every wood pole greater than 10 years of age and to perform a complete visual inspection of those poles for cracks, splitting and obvious decay.
- The pole base is exposed (where possible) to 18 inches to inspect for indications of decay. Where such exposure is not possible, the pole is treated with MITC-fume, a pesticide that will migrate throughout the pole to prevent rot, decay and insect damage.
- Pole treatment is documented by pole inspection program maps and in electronic data files.

Transmission

GRU visually inspects all transmission lines for vegetation danger trees twice each year and following major storm events. GRU has detailed inspection and ground line treatment performed on all wood transmission poles following an 8-year cycle. The inspection and

treatment of those poles consists of a sound and bore to locate unseen decay pockets and a full visual inspection. The ground line inspection includes exposing the pole to a depth of 18 inches below ground line. After inspection any decay is removed and a preservative paste is applied to prevent future decay. Transmission lines are also treated with MITC-fume to prevent internal decay as well. MITC-fume is a pesticide that migrates throughout a pole to prevent rot, decay and insect damage. Visual inspections also provide information about other items such as damaged hardware, woodpecker holes, cracks, splits and decayed pole tops. GRU replaces all rejected poles within one year of the inspection date. Rejected poles determined to be a "priority" are replaced immediately.

Distribution

GRU performs a detailed inspection and ground line treatment on all wood distribution poles 10 years of age or older on an 8-year cycle. The inspection and treatment of these poles consists of sound and bore to locate unseen decay pockets and a full visual inspection. The ground line inspection includes exposing the pole to a depth of 18 inches below ground line where possible. After inspection, any decay discovered is removed and a preservative paste is applied to prevent future decay. Distribution poles that cannot be fully ground line inspected are treated with MITC-fume to prevent internal decay. Visual inspections also provide information on other problems such as damaged hardware, woodpecker holes, cracks, splits and decayed pole tops. GRU replaces all rejected poles within one year of the inspection date. Rejected poles determined to be a "priority" are replaced immediately.

b) Number and percentage of transmission and distribution inspections planned and completed for 2016.

No transmission pole inspections were scheduled for 2016. GRU planned 5,026 distribution pole inspections and completed a total of 5,026 (100% of planned work).

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

No transmission poles were planned or identified for replacement. Of the 5,026 distribution poles inspected, 95 poles were identified for replacement (replacement percentage 1.9 %). The replacements were caused by shell rot, exposed pockets, carpenter ants.

d) Number and percentage of transmission poles and structures and distribution poles, by pole type and class of structure, replaced or for which remediation was taken after4inspection, including a description of the remediation taken.

Transmission Poles

None inspected.

Distribution Poles

Height/Class	# in Class	% of Total	Remediation
25/7	5	4.5%	Replacement in process
30/5	1	1%	Replacement in process
30/6	27	31%	Replacement in process
35/4	4	4.5%	Replacement in process
35/5	10	11%	Replacement in process

35/6	1	1%	Replacement in process
40/2	1	1%	Replacement in process
40/4	9	10%	Replacement in process
40/5	7	8%	Replacement in process
40/6	1	1%	Replacement in process
45/3	2	2%	Replacement in process
45/4	11	12.6%	Replacement in process
50/3	3	3.4%	Replacement in process
55/3	2	2%	Replacement in process
60/2	4	4.5%	Replacement in process

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 management practices are sufficient.

GRU's Vegetation Management work group establishes and maintains the clearances required to reliably operate approximately 560 miles of overhead distribution lines on a three-year rotating cycle. The work plan each year is defined, scheduled and executed by specific distribution circuits which range in size from approximately two to twenty-five miles in length. Prioritizing of these circuits is based upon reliability and visual inspections. GRU completed its 9th maintenance cycle in 2016. The vegetation management program includes maintenance of primary, secondary and service drops. We also have an aggressive herbicide program to reduce the density of undesirable vegetation as well as a tree growth regulator program to address specific problems. As much as it is possible to identify potentially hazardous trees from beyond the limits of the right-of-way/easement, we have had a program to negotiate with the property owner to remove these trees and provide the owner with a voucher redeemable for low growing species if need be.

The distribution vegetation maintenance program is based upon nationally recognized standards of tree care and vegetation management practices and adapted to Gainesville's environment and specific operating concerns. These standards and practices include, but are not limited to, the following:

- National Electric Safety Code
- ANSI A300 (Tree care - standard practices)
- ANSI Z133.1 (Tree care - safety practices)
- Shigo - Pruning trees near electrical utility lines
- Shigo - Tree Pruning
- Matheny and Clark - Evaluation of hazardous trees in urban areas

Components of the distribution maintenance program are:

- Routine utility tree pruning
- Selective tree removals based upon hazardous conditions
- Selective use of herbicides
- Selective use of tree growth regulators
- Wood chip recycling

Appropriate Planting

GRU has produced a "Plant the Right Tree in the Right Place" brochure with a list of compatible tree species. By compatible we mean that these species may be planted within ten feet of an overhead power line. The mature height of these species is such that they should never reach GRU facilities.

GRU maintains a number of different types of ground level electric facilities. The two that we are concerned with are switchgear and pad-mount transformers. It is imperative that customers do not plant shrubs and small trees directly in front of these facilities. Each structure has a decal that reflects the above recommendations.

We have also developed a set of tree planting guidelines for use by developers and engineers as to appropriate species to be planted within prescribed distances from our facilities.

The City of Gainesville enjoys an especially dense tree canopy, one that is clearly favored by our community and its citizens. As a neighbor and responsive municipal electric utility, GRU has long acknowledged our obligation to serve our customers in this environment in the most effective yet least intrusive manner. Consequently, our ratio of underground to overhead electric distribution facilities is among the highest in the State.

GRU's Vegetation Management program was developed over time with a care and control agenda that has been recognized as a model program for electric utilities. GRU records and continually monitors vegetation-related service interruptions. GRU records tree-related outages in one of three categories: **Tree Preventable** – vegetation to be maintained within our easements; **Tree Non-Preventable** – vegetation from outside of our easements; and **Vines**. There were zero preventable tree caused outages in 2016.

Transmission Program

GRU was the subject of a North American Electric Reliability Council (NERC) performance and readiness audit in April 2006 where GRU's Vegetation Management Program received a Potential Example of Excellence (PEOE).

Their report stated ***"GRU has a well-documented and comprehensive vegetation management policy, program and knowledgeable staff. The GRU vegetation management program and staff oversight is identified as a potential example of***

excellence for its comprehensive, detailed procedures and performance of the program itself."

An FRCC Spot Audit was conducted in the latter half of 2009. The results found the vegetation management program was in compliance with all requisite requirements.

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

GRU's Transmission and distribution right-of way maintenance of vegetation is a routine and on-going, year-round program accomplished through a utility approved contractor directed and inspected by GRU Forestry professionals and Utility management staff.

Transmission System Information
76.2 corridor miles @138 kV
2.5 corridor miles @ 230kV (falls into NERC Standard FAC-003-1)
GRU applies NERC Guideline FAC-003-1 over our entire transmission system.

Transmission Inspections
The program calls for semi-annual inspections (spring and fall) to identify conditions which would pose a near-term threat to the operation of the system such as insect infestations or any other factor that would impact tree mortality or structural integrity. The program also calls for a complete inspection immediately following any significant events such as hurricanes, tornadoes or fires.

Inspections cover 100% of the transmission system and are conducted by GRU Vegetation Management personnel.

Spring 2016 Inspection Summary:
Inspected 100% of Transmission system.
Results: 19 trees were identified for trimming and/or removal.
Follow-up activities: Work orders issued and completed by contract tree crews.

Fall 2016 Inspection Summary:
Inspected 100% of Transmission system.
Results: 29 trees were identified for trimming and/or removal.
Follow-up activities: Work orders issued and completed by contract tree crews.

Transmission Maintenance
GRU adhered to its five-year transmission system floor maintenance cycle in 2016 and treated two transmission system corridors as programmed. The floor of the transmission system was maintained by scheduled herbicide spot applications which were selective and targeted to those species which are capable of growing to a mature height that would interfere with the transmission system conductors. The program was designed to incorporate the research from Bramble and Burn's Game lands 33 project which was a long-term study on rights-of-way treatments; Project Habitat principles and ANSI A300 Part 7 Integrated Vegetation Management for Electric utilities Rights-of-way.

Distribution Maintenance

GRU adhered to its three-year distribution system maintenance cycle in 2016 and trimmed approximately 200 miles of programed work in accordance with our cyclic trimming program. Additional emphasis is being placed on hazard trees that are located out of our easements and right-of-ways as well as using various herbicides and growth regulators to increase trimming effectiveness.

Summary

GRU's cycle-based line clearance practices embrace the philosophy of storm hardening on critical feeders, double circuits and three-phase backbone circuits. Our trimming best practices include targeting dead, diseased or damaged trees, the removal of overhanging branches and increased tree clearance. Out-of-cycle activities include frequent patrols/year round monitoring targeting danger trees. GRU continuously reviews and improves its vegetation maintenance programs. This effort is realized in part by evaluating and using information presented in forums such as the Public Utility Research Center vegetation maintenance conference which was held January 26-27, 2009. That report was made available to GRU by the FMEA.

6) Storm Hardening Research

GRU is a member of the Florida Municipal Electric Association (FMEA), which is participating with all of Florida's electric utilities in storm hardening research through the Public Utility Research Center at the University of Florida. Under separate cover, FMEA is providing the FPSC with a report of research activities. For further information, contact Amy Zubaly, Interim Executive Director, FMEA, 850-224-3314, ext. 7 or mailto:AZubaly@PublicPower.com