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Progress Energy

May 7, 2007

VIA HAND DELIVERY

Ms. Ann Cole, Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, FL 32399-0850

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COMMISSION CLERK

Re: 2007 – 2009 Storm Hardening Plan 070298

Dear Ms. Cole:

Pursuant to Rule 25-6.0342, F.A.C., attached for filing on behalf of Progress Energy Florida, Inc. is its Petition for Commission approval of its Storm Hardening Plan.

Thank you for your assistance in this matter, and please feel free to contact me should you have any questions.

Sincerely,

John T. Burnett LMS

John T. Burnett

JTB/lms
Enclosures

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BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition to Approve Progress Energy Florida's Rule 25-6.0342 Storm Hardening Plan.	Docket No. 070298 Filed: May 7, 2007

PETITION

1. Petitioner, Progress Energy Florida, Inc. ("PEF"), is an investor-owned utility subject to the jurisdiction of the Commission under Chapter 366, Florida Statutes. PEF's general offices are located at 299 First Avenue North, St. Petersburg, Florida, 33701.

2. All notices, pleadings and other communications required to be served on petitioner should be directed to:

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Post Office Box 14042
St. Petersburg, FL 33733-4042
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For express deliveries by private courier, the address is as stated in paragraph 1.

3. Rule 25-6.0342, Florida Administrative Code, requires investor-owned electric utilities in Florida to file a Storm Hardening Plan with the Florida Public Service Commission ("FPSC") on or before May 7, 2007 and every three years thereafter as a matter of course. Rule 25-6.0342 specifies what must be included in utility storm hardening plans, and PEF has tracked those rule provisions in its Storm Hardening Plan which is attached hereto as Exhibit A.

4. Pursuant to Rule 25-6.0342, PEF hereby submits this petition for approval of its Storm Hardening Plan.

WHEREFORE, PEF respectfully requests that the Commission enter an order granting this petition and approving PEF's Storm Hardening Plan attached hereto as Exhibit A.

Respectfully submitted,

John T. Burnett LMS

John T. Burnett
Fla. Bar No. 173304
ASSOCIATE GENERAL COUNSEL
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Attorney for Progress Energy Florida, Inc.

ORIGINAL

Progress Energy

Storm Hardening Plan
2007 – 2009

May 7, 2007

Docket No. 060172-EI
Docket No. 060173-EI

I. **Introduction:**

Rule 25-6.0342, Florida Administrative Code, requires investor-owned electric utilities in Florida to file a Storm Hardening Plan with the Florida Public Service Commission ("FPSC") on or before May 7, 2007 and every three years thereafter as a matter of course. Rule 25-6.0342 specifies what must be included in utility storm hardening plans, and Progress Energy Florida, Inc. ("PEF") has tracked those rule provisions in its Storm Hardening Plan below:

25-6.0342(3): *Each utility storm hardening plan shall contain a detailed description of the construction standards, policies, and procedures employed to enhance the reliability of overhead and underground electrical transmission and distribution facilities.*

PEF's construction standards, policies, practices, and procedures related to storm hardening issues are listed below and are attached hereto as Attachment A:

Distribution OH Construction Manual

i. Cover page
   1. *Addresses NESC adherence standards.*
ii. General Overhead section
   1. *Discusses company policy on extreme wind.*
   2. *Details Florida's extreme wind contour lines.*
   3. *Discusses the use of the Pole Foreman program.*
iii. Guys and Anchors Section
   1. *Discusses PEF's standard pole strengths, sizes, and limitations.*
iv. Primary Construction section
   1. *Discusses corporate practices for primary line construction.*
v. Coastal and Contaminated area section
   1. *Discusses corporate practices for primary line construction in coastal areas.*

Distribution UG Construction Manual

vi. Cover page
    1. *Addresses NESC adherence standards.*
vii. Underground General Section
    1. *Discusses location of UG facilities in accessible locations.*
viii. OH-UG Transition section
    1. *Discusses corporate practices for primary framing on dip poles.*
ix. Trenching and Conduit section
    1. *Discusses corporate practices for trenching and use of conduit on primary UG circuits.*
x. Pads & Pullboxes Section
    1. *Discusses corporate practices for the placement and installation of transformer & switchgear pads and boxes.*
xi. Enclosures & Pedestals Section
    1. *Discusses corporate practices for the placement and installation of pedestals and secondary termination cabinets.*
xii. Cable Accessories Section
    1. *Discusses corporate procedures for the installation of UG terminations in non-storm surge areas.*
xiii. Flooding and Storm Surge Requirements
    1. *Discusses corporate procedures for the installation of UG equipment in areas targeted for storm surge hardening.*

Distribution Engineering Manual

xiv. Overhead Design guide section
    1. *Addresses line location in accessible location.*
    2. *Addresses NESC compliance.*
    3. *Discusses Pole Foreman program.*
xv. Underground Design guide section
    1. *Addresses line location in accessible location.*
    2. *Addresses NESC compliance.*

Transmission - Extreme Wind Loading Design Criteria Guideline for Overhead Transmission Line Structures

xvi. Standards Position Statement
1. *Addresses NESC compliance.*
2. *Addresses American Society of Civil Engineer's Manual 74 (ACSE 74).*
3. *Discusses transmission line importance for reliability.*
4. *Details Florida's extreme wind contour lines.*

Transmission - Line Engineering Design Philosophy

xvii. Overhead Line Design philosophy
1. *Addresses NESC compliance.*
2. *Addresses insulator loading criteria.*
3. *Addresses guy / anchor capacity ratings.*
4. *Addresses design load cases.*
5. *Addresses extreme wind guidelines.*
6. *Addresses structural guidelines.*

Joint Use – Pole Attachment Guidelines and Clearances

xviii. Pole Attachment Guidelines
1. *Addresses Pole Attachment and Overlash Procedures.*
2. *Addresses Joint Use Construction.*
3. *Addresses Guys and Anchors.*

xix. Joint Use Clearances
1. *Addresses Line Clearances.*
2. *Addresses Joint Use Clearances.*

In addition to the standards, practices, policies, and procedures identified above, PEF's Wood Pole Inspection Plan, Vegetation Management Plan, and Ongoing Storm Preparedness Plan all contain standards, practices, policies, and procedures that address system reliability and issues related to extreme weather events. These plans are included herewith as Attachment B.

<u>25-6.0342(3)(a)</u>: *Each filing shall, at a minimum, address the extent to which the utility's storm hardening plan complies, at a minimum, with the National Electric Safety Code that is applicable pursuant to subsection 25-6.0345(2), F.A.C.*

All standards, practices, policies, and procedures in the manuals and plans listed above are based on accepted industry practices designed to meet or exceed the requirements of the National Electric Safety Code (NESC). These standards, practices, policies, and procedures are followed on all new construction and all rebuilding and relocations of existing facilities.

<u>25-6.0342(3)(b)</u>: *Each filing shall, at a minimum, address the extent to which the utility's storm hardening plan adopts the extreme wind loading standards specified by Figure 250-2(d) of the 2007 edition of the NESC for new construction, major planned work, and critical infrastructure.*

<u>New Construction</u>:

PEF has extensive service experience with Grade C and Grade B construction standards as defined by the NESC. That experience, which includes the 2004 and 2005 hurricane seasons and other severe weather events, indicates that properly constructed and maintained distributions lines meeting all provisions of the NESC perform satisfactorily and provide a prudent and responsible balance between cost and performance. PEF's design standards can be summarized as: 1) quality construction in adherence with current NESC requirements, 2) well defined and consistently executed maintenance plans, and 3) prudent end-of-life equipment replacement programs. When these elements are coupled with a sound and practiced emergency response plan, construction grades as defined by the NESC provide the best balance between cost and performance.

With these facts in mind, extreme wind standards have not been adopted for all new distribution construction. It is important to note that section 250C of the 2007 version of the NESC calls for the extreme wind design standard only for distribution poles in excess of sixty feet in height. Thus, the NESC itself, the source of Figure 250-2(d), makes clear that the extreme wind standard <u>does not apply</u> to typical distribution construction. In fact, the NESC rules committee engaged in extensive studies regarding the application of the extreme wind standard to distribution poles prior to the 2007 version of the NESC being issued and the rules committee found that based on current research, data and information, there is no known benefit to applying the extreme wind standard of construction to distribution poles. See Exhibit 4, Docket No. 060172-EU, August 31, 2006 Workshop (Attachment C hereto).

In addition to the NESC Rules Committee findings, all credible research that PEF is aware of shows that there is no benefit to applying the extreme wind standard to distribution construction. See, e.g., Exhibit 4, Docket No. 060172-EU, August 31, 2006 Workshop (Attachment C hereto); Testimony of Mr. Nelson Bingel, Docket No. 060173-EU, April 17, 2006 Workshop at pages 51-70 (Attachment D hereto); Testimony of Dr. Larry Slavin, Docket No. 060173-EU, August 31, 2006 Workshop at pages 2-59 (Attachment E hereto); Composite Materials Regarding Extreme Wind Construction (Attachment F hereto). Utility experience from around the country further indicates that electrical distribution structures under sixty feet in height are damaged in extreme wind events by trees, tree limbs, and other flying debris. See 2007 NESC Subcommittee Decision Regarding CP2766. Thus, applying the extreme wind standard to distribution poles results in large increases in cost and design complexity without a commensurate benefit. See id.

In addition to the fact that PEF has not seen any objective data supporting the application of the extreme wind standard to distribution-level construction, PEF's individual experience in the 2004 and 2005 storm seasons showed that PEF's distribution system performed well in all the multiple hurricanes and tropical storms that impacted PEF's system during those years. PEF's experience was consistent with that of the other utilities around the nation who found that vegetation and flying debris were the main causes of distribution pole damage, a condition that the extreme wind standard will not address. With respect to pure wind-caused pole damage, PEF found that wind events such as tornados and "micro-bursts" were responsible, and even transmission poles designed to meet or exceed the extreme wind standard failed under those "super extreme" wind conditions. See, e.g., Attachment G hereto.

While no current data or research supports the application of the extreme wind standard to distribution pole construction, PEF, as discussed in detail below, will analyze the extreme wind standard along with other grades of distribution construction by using its Asset Investment Strategy model for implementation purposes in selected locations throughout PEF's service territory. In conjunction with wind measuring devices and other data collection devices, PEF will study the performance of various grades of distribution construction at these various sites and will compare and analyze any information collected throughout the year from any storms or extreme weather that PEF may encounter. From this process, PEF expects to continue to learn and adapt its extreme weather strategy based on information that it will collect and based on the information gathered by other utilities in Florida and throughout the nation as new standards and applications are applied and tested.

With respect to new construction for transmission poles, PEF's transmission department is building all new construction with either steel or concrete pole material. Virtually all new transmission structures exceed a height of sixty feet above ground and therefore will be constructed using the NESC Extreme Wind Loading criteria.

Major planned work:

For the reasons discussed in the new construction section above, PEF has not adopted the extreme wind standard for major planned work, including expansions, rebuilds, or relocations of existing facilities in the distribution system. Consistent with NESC Rule 250C, PEF will use the extreme wind standard for all major planned transmission work, including expansions, rebuilds, and relocations of existing facilities.

Critical infrastructure:

PEF first notes that Rule 25-6.0342 does not provide a definition of what "critical infrastructure" means, so that term is susceptible to various subjective definitions throughout the investor-owned electric utilities in Florida. Under any definition, however, PEF, for the reasons discussed in the new construction section above, has not adopted the extreme wind standard for any of its distribution level infrastructure. Again PEF and industry experience shows that flying debris and vegetation are the primary causes of distribution pole damage, and these are conditions that the extreme wind standard, and any other overhead construction standard, cannot address. Thus, placing distribution poles constructed to extreme wind standards around facilities such as hospitals and police stations in PEF's service territory would unnecessarily increase costs and restoration time if those poles are knocked down by falling trees or flying debris such as roofs or signs. Additionally, PEF's experience in the 2004 and 2005 hurricane seasons and other extreme weather events showed that even with pure wind-based pole impacts, PEF's current level of construction, around critical facilities and around all other facilities, performed well and any pole failures due solely to wind impact were caused by "super extreme" wind events such as tornados and "micro bursts," conditions that would have caused and did cause extreme wind construction to fail as well. As part of PEF's effort to gain more experience and information with various hardening construction options, however, PEF, as discussed more fully below, plans to underground up to nineteen major highway crossings and is working with several coastal communities in Pinellas County to underground portions of PEF's distribution system, which will help mitigate the impact of flying debris and super extreme weather events.

With respect to transmission, virtually all new transmission structures exceed a height of sixty feet above ground and therefore are constructed using the NESC extreme wind loading criteria. Accordingly, PEF will use the extreme wind standard for all major planned transmission work, including expansions, rebuilds, and relocations of existing facilities, irrespective of whether they can be classified as "critical" or "major."

25-6.0342(3)(c): *Each filing shall, at a minimum, address the extent to which the utility's storm hardening plan is designed to mitigate damage to underground and supporting overhead transmission and distribution facilities due to flooding and storm surges.*

Based on PEF's experience in the 2004 and 2005 hurricane seasons, along with the experiences of other utilities in Florida reported to the FPSC after those seasons, PEF has concluded that underground applications may not be best suited for all areas. For example, in the FPSC sponsored storm hardening workshops in 2006, Gulf Power Company reported that during the 2005 hurricane season, some of its underground assets and equipment were actually washed out to sea in some of its costal communities, and that overhead equipment may have made more sense in those areas with regard to restoration and safety. See Attachment H. Similarly, PEF has identified areas in its service territory where current underground equipment should be replaced with overhead due to the fact that those areas are subject to frequent and prolonged flooding resulting in damage from water intrusion on underground equipment. Thus, one of PEF's most effective tools in its hardening arsenal is to identify areas where underground equipment should not be used, and PEF's hardening plan takes this fact into account.

In areas where underground equipment may be exposed to minor storm surge and/or shorter term water intrusion, however, PEF has used its Asset Investment Strategy Model (discussed in detail below) to identify areas where certain mitigation projects will be put into place to test whether flood mitigation techniques and devices can be used to protect equipment such as switchgears, padmounted transformers and pedestals. In these selected project sites, PEF will test:

- Stainless steel equipment;
- Submersible connectors;
- Raised mounting boxes;
- Cold shrink sealing tubes; and
- Submersible secondary blocks.

Throughout the year, PEF will monitor these installations to collect and analyze data to determine how this equipment performs relative to PEF's current design with respect to outage prevention, reduced maintenance, and reduced restoration times. From this process, PEF will continue to learn and will adapt its flood and storm surge strategies based on information that it will collect and based on the information gathered by other utilities in Florida and throughout the nation as new standards and applications are applied and tested.

In addition to the actions discussed above, during major storm events, substations that are in the forecast strike zone will have sandbags placed in strategic areas to attempt to eliminate water intrusion into control houses. In the event of water intrusion causing extensive damage requiring prolonged repair, PEF will employ mobile substations to affected areas, where possible, in order to restore power.

25-6.0342(3)(d): *Each filing shall, at a minimum, address the extent to which the utility's storm hardening plan provides for the placement of new and replacement distribution facilities so as to facilitate safe and efficient access for installation and maintenance pursuant to Rule 25-6.0341, F.A.C.*

PEF will continue to use front lot construction for all new distribution facilities and all replacement distribution facilities unless a specific operational, safety, or other site-specific reason exists for not using such construction at a given location. See Distribution Engineering Manual, Section xv(1).

25-6.0342(4): *Each utility storm hardening plan shall explain the systematic approach the utility will follow to achieve the desired objectives of enhancing reliability and reducing restoration costs and outage times associated with extreme weather events.*

As part of its systematic approach to storm hardening, PEF engaged industry expert Davies Consulting ("DCI") in developing a comprehensive prioritization model that will help PEF identify potential hardening projects, procedures, and strategies.
DCI has worked with a number of utilities nationally to evaluate their power delivery system major storm preparedness. They have also evaluated options for infrastructure hardening to improve performance and reliability not only day-to-day, but also during major storms. Collaborating with DCI, PEF created an evaluation framework for various hardening options and prioritization of potential alternatives.

PEF and DCI worked together to load and analyze potential hardening alternatives into DCI's proprietary Asset Investment Strategy ("AIS") model. The model is based on a structured methodology for evaluating the costs and benefits associated with various hardening options. The AIS model evaluates potential hardening options based on several sets of criteria and variables and gives those hardening options a "score" that PEF can use to identify highest value projects, policies, and procedures for storm hardening. PEF and DCI worked together to develop an evaluation template used to determine specific costs and benefits associated with each hardening alternative identified. The following components of the evaluation framework were established:

- Financial parameters for PEF (e.g., discount rates, allowable return, tax rates, depreciation schedules, etc.);

- Key strategic criteria for the evaluation (e.g. financial, customer satisfaction, storm restoration effectives, etc);

- Specific key attributes that will be evaluated for each hardening alternative;

- Hard and soft dollar cost and benefits (e.g., cost per mile underground, cost of pole upgrades, cost per avoided storm interruption);

- Qualitative attribute evaluation questions (e.g., customer satisfaction, safety, quicker restoration of critical infrastructure, etc.);

- Relative weights across the attributes; and

- Long term costs and benefits of the initiatives.

Under the foregoing components of the evaluation framework, the AIS model is set up to analyze the following hardening alternatives for PEF:

- OH-to-UG Conversions
  - Taking existing overhead (OH) electric lines and facilities and placing them underground (UG) via the use of specialized UG equipment and materials. The primary purpose of this hardening activity is to attempt to eliminate tree and debris related outages in the area of exposure. When applied to crossings on major highways, this hardening activity can also mitigate potential interference with first responders and other emergency response personnel caused by fallen lines.
- Small Wire Upgrade
  - The conversion of an existing overhead line currently with either #4 or #6 conductor to a thicker gauge conductor of 1/0 or greater. The primary purpose of this hardening activity is to attempt to utilize stronger conductor that may be better able to resist breakage from falling tree branches and debris.
- Backlot to Frontlot Conversion
  - Taking an existing overhead line located in the rear of a customer's

property and relocating it to the front of the customers property. This involves the removal of the existing line in the rear of the property and construction of a new line in the front of the property along with re-routing service drops to individual customer meters. The primary purpose of this hardening activity is to minimize the number of tree exposures to the line to prevent outages and to expedite the restoration process by allowing faster access in the event an outage occurs.

- Submersible UG
  - Taking an existing UG line and equipment and hardening it to withstand a storm surge via the use of the current PEF storm surge standards. This involves the use of specialized stainless steel equipment and submersible connections. The primary purpose of this hardening activity is to attempt to minimize the damage caused by a storm surge to the equipment and thus expedite the restoration after the storm surge has receded.
- Alternative NESC Construction Standards
  - Building OH line and equipment segments to grade B construction or the extreme wind standard as shown in the NESC extreme wind contour lines of figure 250-2(d). This will be done via the use of the current PEF grade B and extreme wind standards which call for the use of the industry accepted Pole Foreman program to calculate the necessary changes. Typical changes include shorter span lengths and higher class (stronger poles). The primary purpose of this hardening activity is to attempt to reduce the damage caused by elevated winds during a major storm. Locations have been chosen to provide contrasting performance data between open costal and inland heavily treed environments.

The key strategic criteria that the AIS model uses to evaluate these five potential hardening options are:

- Financial Cost
  - Provides the financial value of the proposed project based on Net

Present Value (NPV) of total costs associated with the project (Capital and O&M) and associated potential benefits such as avoided O&M costs, avoided outages, etc.

- Major Storm Impact
  - Determines the potential benefits that the project provides during a major storm based on reduced damages or the ability to restore power more rapidly.
- Community Storm Impact
  - Evaluates the potential benefits that the proposed project will have on a community's ability to cope with damage.
- Third Party Impact
  - Captures complexities of proposed projects in terms of coordination with third parties such as telecommunication, Cable TV, permitting, costs, etc.
- Overall Reliability
  - Captures the overall potential reliability benefits that the project provides on an on-going basis in terms of reduced customer interruptions and outage duration.

Finally, in evaluating potential hardening options, the AIS model is set up to address the following hardening project questions:

- At the end of this project, what percent of the exposure will be hardened?
- How many customers are served from this device?
- What will be the impact of this project on the restoration time during major storm?
- What is the annual probability of wind over 70 mph in the area served by this device?
- At what level of hurricane will the area served by the device flood due to storm surges?
- What is the tree density in the area served by this device?
- What level of tree damage will this project mitigate during a major storm?
- How many critical customers does this project address?

- How valuable will the project be to the community?
- What are any major obstacles/risks for completing the project this year?
- What type of investment, if any, is required by joint users to complete this project?
- What is the three year average CEMI4 number of customers on this feeder?
- How many customer outages will this project potentially eliminate annually?
- What is the potential change in the annual CAIDI that this project will result in?
- Will this project potentially reduce the number of momentary customer interruptions on this section?
- What will be the potential change in the number of customers experiencing outages longer than three hours as a result of this project?

In implementing the AIS framework, DCI worked with PEF to challenge some of the assumptions used in the model and to provide industry experience and expertise to ensure that the benefits and cost estimates used were accurate and realistic. DCI also worked with PEF in developing various "what-if" scenarios and assessed different funding options at the portfolio level. This helped assess whether the proposed alternatives were maximizing the total value of the portfolio.

PEF is using the AIS model to ensure a systematic and analytical approach to deploying hurricane hardening options within its service territory. For proven hardening options that PEF is already using as part of its construction standards and policies, the AIS model will help PEF best locate and prioritize areas within its system where those options should be used. For unproven or experimental hardening options, such as the extreme wind standard for distribution pole construction, PEF is using the AIS model to identify areas within its service territory where analytical data collection projects can be used to evaluate the performance and results of such hardening options. Examples of specific projects taking place in 2007 are discussed below.

25-6.0342(4)(a): *A description of the facilities affected, including technical design specifications, construction standards, and construction methodologies employed.*

All of PEF's facilities are affected to some degree by the standards, policies, procedures, practices, and applications discussed throughout this document. Specific facilities are also addressed herein in detail (i.e. upgrading all transmission poles to concrete and steel, using front lot construction for all new distribution lines where possible). Technical design specifications, construction standards, and construction methodologies are specifically discussed at pages 1 through 3 of this plan and are included in Attachments A and B.

25-6.0342(4)(b): *The communities and areas within the utility's service area where the electric infrastructure improvements are to be made.*

As discussed above, all of PEF's facilities are affected to some degree by the standards, policies, procedures, practices, and applications discussed throughout this document, so all of areas of PEF's service territory are impacted by PEF's storm hardening efforts. With respect to specific projects that employ some or all of the hardening options that PEF has identified based on its recent storm experience and/or though the AIS system, please see the following:

Distribution:

OpCenter	Project Name	Sub Category
Monticello	St George Is – Plantation	Submersible UG
Apopka	US 441 west of Hwy 19	OH to UG Conversion
Seven Springs	Floramar Subdivision	Submersible UG
Longwood	I-4 @ Oranole Road/Lake Destiny Dr.	OH to UG Conversion
Inverness	Homosassa – Riverhaven	Submersible UG
Inverness	US 98 – Brooksville	Small Reconductor
St Petersburg	Coquina Key	Small Reconductor

Monticello	A192 – Luraville	Small Reconductor
Clearwater	Indigo	Small Reconductor
Ocala	US 301 – Citra	Small Reconductor
St Petersburg	Feeder X220	Extreme Wind Upgrades
SE Orlando	Sprint Earth Station & Cocoa Water Wells	Small Reconductor
Lake Wales	Highland Park	Small Reconductor
Lake Wales	Hibiscus Feeder Tie	Small Reconductor
Inverness	R448 – Dunnellon	Back lot to Front lot conversion
SE Orlando	Hoffner Ave and feeder Tie	Small Reconductor
SE Orlando	Holden Ave E) Orange Blossom Trail	Small Reconductor
Buena Vista	Calle De Sol	OH to UG Conversion
Jamestown	SR-408 @ Woodbury Rd	OH to UG Conversion
Buena Vista	Winderlakes	OH to UG Conversion
SE Orlando	Florida Turnpike @ Sandlake Rd (746')	OH to UG Conversion
Buena Vista	OH Crossing of Turnpike (K68 @K5255)	OH to UG Conversion
Longwood	Us 17/92 & SR-436	OH to UG Conversion
SE Orlando	OH Cross of Trnpke 2 (K1780 @ K6434991 and K1775 @ K5021)	OH to UG Conversion
SE Orlando	Florida Turnpike @ Sandlake Rd (485')	OH to UG Conversion
SE Orlando	OH Crossing of Turnpike (K1780 @K2379)	OH to UG Conversion
SE Orlando	OH Crossing of Turnpike (K1025 @ K1025 & K1028 @ K128)	OH to UG Conversion
Longwood	I-4 @ SR-436	OH to UG Conversion
SE Orlando	Florida Turnpike @ Orange Blossom Trail	OH to UG Conversion
Longwood	I-4 @ EE-Wiliamson Rd	OH to UG Conversion
Longwood	I-4 @ SR-434	OH to UG Conversion
Eustis	I-4 @ Lee Rd	OH to UG Conversion
Longwood	I-4 @ Kennedy Blvd	OH to UG Conversion
Longwood	I-4 @ North St	OH to UG Conversion
Longwood	I-4 @ Fairbanks Ave	OH to UG Conversion
Longwood	I-4 @ Orange St.	OH to UG Conversion

With regard to system hardening projects in general, PEF's approach is to consider the unique circumstances of each potential location considered for hardening by taking into account variables such as:

- operating history and environment;
- community impact and customer input;
- exposure to storm surge and flooding;
- equipment condition;
- historical and forecast storm experience; and
- potential impacts on third parties;

This surgical approach leads to the best solution for each discrete segment of the delivery system.

For example, PEF has identified areas in its service territory where current underground equipment should be replaced with overhead due to the fact that those areas are subject to frequent and prolonged flooding resulting in potential safety hazards and damage from water intrusion on underground equipment. This hardening option works for these specific locations based on all the factors for consideration listed above, but it would not work well in other areas of PEF's service territory. This is a real life example of why "one size does not fit all" when it comes to storm hardening.

In areas like Gulf Boulevard and other coastal communities in Pinellas County, local governments have worked with PEF to identify areas where overhead facilities have been or will be placed underground, and this option will help to mitigate storm outages caused by vegetation and flying debris. PEF is also working in these areas to evaluate upgrading portions of those facilities to the surge-resistant design discussed above. Again, these hardening options may work well in these communities, but may not be ideal or desirable in others.

Transmission:

The Transmission Department is employing a system-based approach to changing out wood poles to either concrete or steel poles based upon the inspection cycle and condition of pole. These projects are identified during the transmission pole inspection cycles. Specific new, rebuilt or relocated projects that are planned over the next three years are listed below:

Coastal Transmission Area	Project Type	County	Third Party Impact
TZ-466 to TZ-485 Relocation Wiregrass Ranch	Customer Request	Pasco	Unlikely
Clearwater Village LECW Relocation Project	Governmental	Pinellas	Possible
BZ 69 kV Relocation Pasco County Tommy town North	Governmental	Pasco	Possible
LSP 230kV Relocation Pinellas County #865 Park St/Starkey Road	Governmental	Pinellas	Possible
ANL 230 kV US 19 Pinellas County Relocation	Governmental	Pinellas	Highly Unlikely
ANEC 230 kV US 19 Pinellas County Relocation	Governmental	Pinellas	Highly Unlikely
NC 230 kV Double Circuit US 19 Relocation	Governmental	Pinellas	Highly Unlikely
Higgins – Oldsmar 115 kV line – Rebuild	Rebuild	Pinellas	Highly Unlikely
Oldsmar – Curlew 115 kV line – Rebuild	Rebuild	Pinellas	Highly Unlikely
LTW 69 kV Line – Rebuild	Rebuild	Pinellas	Possible
Hudson – Hudson (WREC) Purchase/Rebuild 115 kV line	Purchase	Pasco	Possible
North East – Fortieth Street 230 kV Rebuild	Rebuild	Pinellas	Possible
New River-Zephyrhills North 115 kV line	New	Pasco	Possible
New River – Loop TZ 69 kV line into New PEF Substation	New	Pasco	Possible
North East – 32nd Street 115 kV line	New	Pinellas	Possible

Southern Transmission Area	Project Type	County	Third Party Impact
ICLB Relocation for Road improvement at CR 545	Governmental	Polk / Osceola	Possible
LV 69 kV Relocation for Orange County Wildwood Area Network	Governmental	Orange	Possible
WR 245 Relocation Walgreen's Entrance Conway Road	Customer Request	Orange	Possible
OSC Relocation for Seaworld	Customer Request	Orange	Possible
WIC Relocation for Seaworld	Customer Request	Orange	Possible
TD-74 thru TD-85 Volusia County Project Rhode Island	Governmental	Volusia	Possible
WCE 340-342.5 for Hartle Grove	Customer Request	Orange	Likely
ICB-69 kV – Poinciana Parkway	Governmental	Polk / Osceola	Possible
ICLW 69kV relo Ernie Caldwell Blvd from CR547 to US17/92 (Possibly completed)	Governmental	Polk	Possible
AH 69 Line Westridge Development Relocation City of Ocoee	Customer Request	Orange	Possible
ILB 230 kV Relocation for Disney	Customer Request	Orange	Unlikely
WR and RW 69 kV Relocation for Lk Underhill and Econ Trail	Governmental	Orange	Possible
WR 69 kV Relocation for City of Orlando Conway Road Widening	Governmental	Orange	Likely
WLL/WLLW Relocation US 27 SR 60 Towerview	Governmental	Polk	Unlikely
WF 69 kV Relocation Rouse Road Orange County	Governmental	Orange	Possible
WR Relocation for Bee Line SR 528 Improvements	Governmental	Orange	Possible

Southern Transmission Area	Project Type	County	Third Party Impact
SLE 69 kV line Relocation for Kennedy Blvd Orange County	Governmental	Orange	Likely
NLA Line Replace wood Poles with Steel Poles	Rebuild	Seminole	Possible
Deleon Springs – Deland West 115 kV Rebuild	Rebuild	Volusia	Possible
AL 69kV rebuild (Indian Lakes Estates Tap)	Rebuild	Polk	Possible
WCE 69 kV (Woodsmere – Ocoee) line Rebuild	Rebuild	Orange	Likely
WCE 69 kV (Clermont East – Montverde) Rebuild	Rebuild	Orange	Likely
AH 69 kV (Avalon – Lake Luntz) Rebuild	Rebuild	Orange	Possible (but unlikely)
WCE 69 kV (Ocoee-Winter Garden) Rebuild	Rebuild	Orange	Likely
WLIC 230 kV Rebuild to Double Circuit	Rebuild / new line	Polk / Osceola	Highly unlikely
ICLB 69 kV Rebuild (Intercession City – Lake Wilson)	Rebuild	Polk / Orange	Possible
ICB 69kV relo for Ronald Regan Parkway from W. of Champions Gate to W. of I-4	Governmental	Polk / Osceola	Likely
ICB 69 kV Rebuild (Intercession City to Barnum City)	Rebuild	Polk / Osceola	Likely
Lake Bryan 230 kV Rebuild Circuit #1 and add circuit #2	Rebuild / new	Orange	Highly unlikely
Avalon to Gifford 230 kV line	New	Orange	Highly unlikely
Clarcona – Crown Point 69 kV line	New	Orange	Likely
AF2 Line Conversion to 230 kV	Rebuild	Polk	Highly unlikely
Lake Placid North 69 kV line	New	Highlands	Possible
Hines – West Lake Wales 230 kV Circuit #1	New	Polk	Highly unlikely
CF Industries 69 kV from Fort Green #11 (Project Complete)	New	Hardee	Highly unlikely

Northern Transmission Area	Project Type	County	Third Party Impact
HB-98 69 kV Croft Avenue Citrus County	Governmental	Citrus	Possible

Northern Transmission Area	Project Type	County	Third Party Impact
CFS 230 kV CR44A and Estes Road Lake County	Governmental	Lake	Unlikely
TQ-23-2 line relocation for Capital Walks Apts	Customer Request	Leon	Possible
TQ 69 kV Line Rebuild (Tallahassee – Oak City)	Rebuild	Leon	Unlikely
FP 69 kV Perry – Smith Tap (FP – 4)	Rebuild	Taylor / Lafayette	Unlikely
FP-69 kV Smith Tap – Lauraville (FP-3)	Rebuild	Lafayette / Suwannee	Unlikely
Silver Springs – Santos Ocala Tap 69 kV	Rebuild	Marion	Possible
Groveland – Camp Lake 69 kV Line Rebuild Circuit #1	Rebuild	Lake	Possible
JS Line for PCS White Springs Tap – Rebuild	Rebuild	Hamilton	Unlikely
Ginne to High Springs 69 kV line – Rebuild	Rebuild	Alachua	Possible
Westwood Acres Tap West Wood Acres (SECO)	New	Marion	Possible
Central Florida – American Cement 230 kV Line	New	Sumter	Unlikely
Bushnell East – Bushnell 69 kV 69 kV lines	New	Sumter	Unlikely
Bushnell East – Bushnell (SECO) 69 kV line	New	Sumter	Possible
Port St. Joe to Apalachicola 69 kV line 2nd circuit	New	Franklin / Gulf	Possible
CSB 115 kV Tap Line to Lecanto (Project Complete)	New	Citrus	No

25-6.0342(4)(c): *The extent to which the electric infrastructure improvements involve joint use facilities on which third-party attachments exist.*

In the description of specific hardening projects above, PEF has provided information as to whether the projects involve joint use facilities on which third-party attachments exist. Also, on March 2, 2007 and again on April 10, 2007, PEF met with all joint use attachers that have provided PEF contact information pursuant to Rule 25-6.0342(6). In those meetings, PEF provided those attachers with information on where specific hardening projects are taking place. PEF provided detailed written project descriptions and locations those third-party attachers on April 10 and 24, 2007 and has subsequently interacted with any affected joint attacher in an effort to identify any cost or impact to those attachers. Written responses received from third-party attachers are provided herewith in Attachment I.

25-6.0342(4)(d): *An estimate of the costs and benefits to the utility of making the electric infrastructure improvements, including the effect on reducing storm restoration costs and customer outages.*

With respect to system-wide storm and extreme weather applications identified in Attachment B, PEF has provided any available cost/benefit information within the documents in Attachment B. Additionally, please see the following chart for money that PEF has spent or will spend during 2006 and 2007 on storm hardening and maintenance:

Progress Energy Florida Storm Hardening and Maintenance Costs

Description	2006	2007
Vegetation Management (Distribution & Transmission)	$24,235,263	$24,949,339
Joint Use Pole Inspection Audit	$1,100,000	$470,000
Transmission Pole Inspections	$3,526,899	$2,996,257
Other Transmission Inspections and Maintenance	$12,121,889	$11,502,308
Transmission Hardening Projects	$43,300,000	$38,000,000
Distribution Pole Inspections	$2,300,000	$2,490,000
Distribution Hardening Projects	$10,200,000	$10,610,000
Total	**$96,784,051**	**$91,017,904**

Note: Some 2007 costs contain projected/budgeted figures.

25-6.0342(4)(e): *An estimate of the costs and benefits, obtained pursuant to Rule 25-6.0342(6), to third-party attachers affected by the electric infrastructure improvements, including the effect on reducing storm restoration costs and customer outages realized by the third-party attachers.*

With respect to system-wide storm and extreme weather applications identified in Attachments A and B, PEF believes that any entity jointly attached to PEF's equipment would enjoy any benefit that PEF would enjoy from that same application, and PEF has provided any available cost/benefit information within the documents in those attachments. With respect to specific information received from joint attachers, please see Attachment I.

25-6.0342(5): *Each utility shall maintain written safety, reliability, pole loading capacity, and engineering standards and procedures for attachments by others.*

Please see Attachments A and J.

25-6.0342(5): *The attachment standards and procedures shall meet or exceed the NESC so as to assure that third-party facilities do not impair electric safety, adequacy, or pole reliability; do not exceed pole loading capacity; and are constructed, installed, maintained, and operated in accordance with generally accepted engineering practices for the utility's service territory.*

All third-party joint use attachments on Progress Energy Florida's distribution and transmission poles are engineered and designed to meet or exceed current NESC clearance and wind loading standards. New attachment requests are field inspected before and after attachments to assure company construction standards are being met. All entities proposing to attach joint use attachments to Progress Energy Florida's distribution and transmission poles are given a copy of the company-prepared "Joint Use Attachment Guidelines." Attached hereto as Attachment J. These guidelines are a comprehensive collection of information spelling out the company's joint use process, construction standards, timelines, financial responsibilities, and key company contacts responsible for the completing permit requests. All newly proposed joint use attachments are field checked and designed using generally accepted engineering practices to assure the new attachments do not overload the pole or impact safety or reliability of the electric or other attachments. Additionally, annual and full-system audits are performed as detailed in PEF's annual March 1 comprehensive reliability report. For details on this activity, please see Attachment B.

<u>25-6.0342(6)</u>: *Each utility shall seek input from and attempt in good faith to accommodate concerns raised by other entities with existing agreements to share the use of its electric facilities.*

On March 2, 2007 and again on April 10, 2007, PEF met with all joint use attachers that have provided PEF contact information pursuant to Rule 25-6.0342(6). In those meetings, PEF provided those attachers comprehensive and detailed information on PEF's storm hardening plan. PEF provided written project descriptions and locations those third-party attachers on April 10 and April 24, 2007 and has subsequently interacted with any affected joint attacher in an effort to identify any costs, impacts to those attachers, or concerns. Written responses received from third-party attachers are provided herewith in Attachment I. PEF has also answered any questions and addressed any concerns expressed verbally by joint attachers, and PEF has taken all input received into consideration in the development and finalization of its storm hardening plan.

Progress Energy

Distribution OH Construction Manual

MECHANICAL LOADING REQUIREMENTS

THE MECHANICAL LOADINGS ON POLES, INSULATORS, GUY WIRES, BRACKETS, CROSS ARMS, ETC. ARE DYNAMIC AND VARY AS A FUNCTION OF WEATHER AND ELECTRICAL LOAD. THE NATIONAL ELECTRICAL SAFETY CODE SPECIFIES THREE WEATHER LOADINGS THAT MUST BE CONSIDERED WHEN DESIGNING OVERHEAD DISTRIBUTION LINES.

COMBINED ICE AND WIND DISTRICT LOADING

STRUCTURES AND SUPPORTS MUST BE ABLE TO SUPPORT THE LOADS CREATED BY THE COMBINATION OF ICE AND WIND EXPECTED FOR THE DISTRICT WHERE THE LINE WILL BE LOCATED. THE CAROLINA REGIONS LIE IN THE MEDIUM LOADING DISTRICT AS DEFINED BY THE NESC. THE FLORIDA REGIONS LIE IN THE LIGHT LOADING DISTRICT AS DEFINED BY THE NESC. THE DISTRIBUTION SPECIFICATIONS ARE CREATED TO SUPPORT DESIGNS THAT WILL MEET THE LOADING REQUIREMENT OF THE COMBINED ICE AND WIND DISTRICT LOADING RULE.

EXTREME WIND LOADING

IF A STRUCTURE OR ANY SUPPORTED FACILITY IS GREATER THAN 60 FT ABOVE GROUND, THEN THE STRUCTURE AND SUPPORTS MUST BE DESIGNED TO MEET THE REQUIREMENTS OF EXTREME WIND LOADING. THIS IS IN ADDITION TO THE REQUIREMENTS OF COMBINED ICE AND WIND DISTRICT LOADING. THE EXTREME WIND MAPS ON PEF DWG. 01.00–03 AND PEC DWG. 01.00–04 SHOW THE WIND SPEED TO BE USED FOR THIS DETERMINATION. THE POLE FOREMAN PROGRAM IS THE COMPANY STANDARD FOR STRUCTURE DESIGN TO ENSURE COMPLIANCE WITH THIS RULE. ASSET ENGINEERING AND/OR STANDARDS SHOULD BE CONSULTED TO DETERMINE COMPLIANCE UTILIZING THE POLE FOREMAN PROGRAM.

NOTE: IN FLORIDA, THE PSC HAS DETERMINED THAT THE EXTREME WIND LOADING REQUIREMENTS WILL APPLY TO ALL STRUCTURES ON SOME CIRCUITS, REGARDLESS OF HEIGHT. ASSET MANAGEMENT SHALL IDENTIFY THESE LOCATIONS. POLE FOREMAN SHALL BE USED ON FACILITIES CONSTRUCTED ON THESE CIRCUITS TO ENSURE COMPLIANCE.

EXTREME ICE AND CONCURRENT WIND LOADING

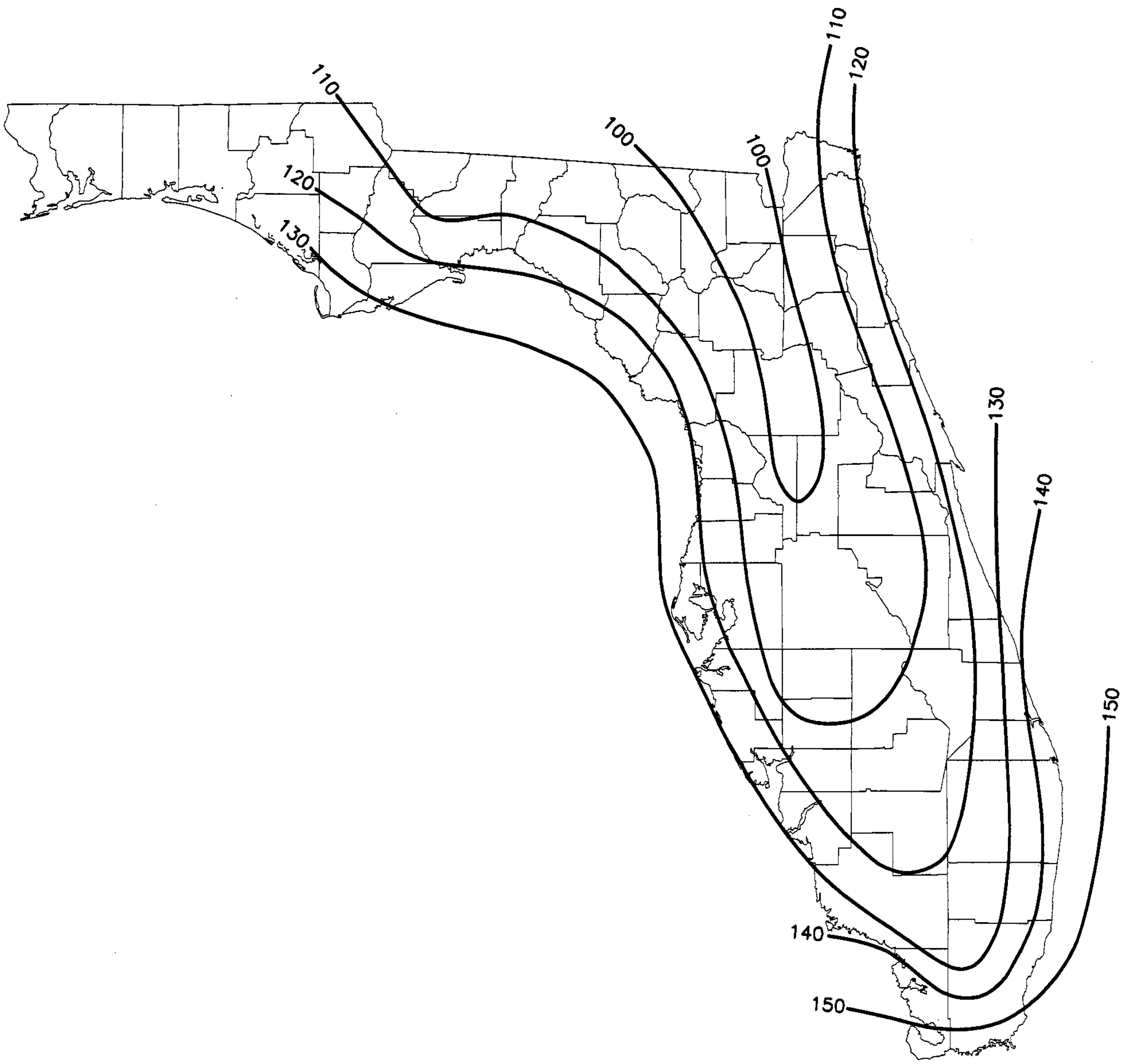
IF A STRUCTURE OR ANY SUPPORTED FACILITY IS GREATER THAN 60 FT ABOVE GROUND, THEN THE STRUCTURE AND SUPPORTS MUST BE DESIGNED TO MEET THE REQUIREMENTS OF EXTREME ICE AND CONCURRENT WIND LOADING. THIS IS IN ADDITION TO THE REQUIREMENTS OF COMBINED ICE AND WIND DISTRICT LOADING. THE EXTREME ICE AND CONCURRENT WIND MAPS ON PEC DWG. 01.00–05 SHOW THE WIND SPEED AND ICE TO BE USED FOR THIS DETERMINATION. THE POLE FOREMAN PROGRAM IS THE COMPANY STANDARD FOR STRUCTURE DESIGN TO ENSURE COMPLIANCE WITH THIS RULE. WHEN CONDITIONS REQUIRE CONSIDERATION OF EXTREME ICE AND CONCURRENT WIND LOADING, COMPLIANCE OF ALL STRUCTURES SHALL BE DETERMINED UTILIZING THE POLE FOREMAN PROGRAM.

3				
2				
1				
0	11/8/06	BURLISON	GUINN	HOYT
REVISED		BY	CK'D	APPR.

MECHANICAL LOADING REQUIREMENTS

Progress Energy

PGN DWG. 01.00–02



NOTES:

1. THIS MAP SHOWS THE VALUES OF NOMINAL DESIGN 3-SECOND GUST WIND SPEEDS IN MILES PER HOUR AT 33 FT ABOVE GROUND. THESE ARE THE VALUES TO BE USED TO DETERMINE COMPLIANCE WITH THE EXTREME WIND LOADING REQUIREMENTS OF THE NESC RULE 250C. SEE DWG. 01.00-02 TO DETERMINE IF A PARTICULAR LINE MUST BE DESIGNED TO MEET EXTREME WIND LOADING. THESE VALUES ARE TO BE USED IN THE POLEFOREMAN PROGRAM AS DEFINED BY DWG. 01.00-06. WHEN BETWEEN CONTOUR LINES, UTILIZE THE HIGHER VALUE. (EXAMPLE: IF THE LOCATION LIES BETWEEN THE 110 AND 120 CONTOUR LINES, UTILIZE 120 MPH IN THE POLEFOREMAN PROGRAM)

3				
2				
1				
0	11/8/06	BURLISON	GUINN	HOYT
REVISED		BY	CK'D	APPR.

FLORIDA EXTREME WIND REGIONS

Progress Energy

FLA DWG. 01.00-03

POLEFOREMAN

POLEFOREMAN IS A COMPUTER PROGRAM WRITTEN BY POWER LINE TECHNOLOGY INC. ITS FUNCTION IS CLASSING POLES, CALCULATING GUY WIRE TENSIONS AND PERFORMING JOINT USE ANALYSIS TO HELP ASSURE COMPLIANCE WITH A COMPANY'S STANDARDS AND THE NATIONAL ELECTRICAL SAFETY CODE (NESC). PROGRESS ENERGY HAS ADOPTED THIS PROGRAM AS ITS STANDARD TOOL FOR THIS PURPOSE. THE STANDARDS DEPARTMENT HAS CREATED AND MAINTAINS TEMPLATES FOR USE IN THE PROGRAM. A TEMPLATE REPRESENTS A BASIC SPECIFICATION WITH THE RELATIVE CONDUCTOR AND GUY LOCATIONS PRESET. THE USER MUST PROVIDE SPAN LENGTHS, GUY LEADS, EQUIPMENT CHARACTERISTICS, AND ANY ADDITIONAL CONDUCTORS OR ATTACHMENTS. THE PROGRAM UTILIZES THIS INFORMATION AND ACCURATELY CALCULATES THE MECHANICAL LOADING ON THE POLE AND GUYS BASED ON THE LOADING REQUIREMENTS OF SECTION 25 OF THE NESC. IT THEN COMPARES THE LOADS TO THE ANSI STANDARD CAPABILITIES OF THE POLES AND GUYS TO ASSURE COMPLIANCE WITH THE STRENGTH REQUIREMENTS OF SECTION 26 OF THE NESC.

DWG. 01.00–07 IS AN EXAMPLE OF THE OUTPUT FROM POLEFOREMAN. THE INFORMATION CAN BE USED TO VALIDATE COMPLIANCE WITH THE NESC AND ALSO THE FLORIDA PUBLIC SERVICE COMMISSION.

PoleForeman
Monday, October 09, 2006

SPANS

Span: 1 **Span Length (ft): 200** **Direction: 90°**

Circuit: 1

Primary	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension (lbs)	Sag (in)
795 AAC (37)	250	9	6	6	6443	20
795 AAC (37)	250	9	42	42	6443	20
795 AAC (37)	250	9	78	78	6443	20

Neutral	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension (lbs)	Sag (in)
1/0 AAAC (7) RT	250	1	138	138	1682	25

Span: 2 **Span Length (ft): 200** **Direction: 270°**

Circuit: 1

Primary	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension (lbs)	Sag (in)
795 AAC (37)	250	9	6	6	6443	20
795 AAC (37)	250	9	42	42	6443	20
795 AAC (37)	250	9	78	78	6443	20

Neutral	Ruling Span (ft)	Offset (in)	Attach A (in)	Attach B (in)	Tension (lbs)	Sag (in)
1/0 AAAC (7) RT	250	1	138	138	1682	25

INSULATORS

Insulator	Attach	Loading	Angle
15KV Horz Post	6"	40% (250C)	0°
15KV Horz Post	42"	40% (250C)	0°
15KV Horz Post	78"	40% (250C)	0°
Spool	138"	19% (250C)	0°

PoleForeman
Monday, October 09, 2006

ANALYSIS DATA

Pole: 45/1	Loading District: Light	Construction Grade: Grade C (Elsewhere)
Horizontal Loading:	83% (250C)	Rule 250B Loading: Wind (psf): 9 Ice (in): 0
Vertical Loading:	18% (250C)	Rule 250C Loading: Wind (mph): 130 MPH

POLES

Pole	Length (ft)	Depth (ft)	Elevation (ft)
0	45	6.5	0
1	45	6.5	-5
2	45	6.5	-5

3					POLEFOREMAN – OUTPUT EXAMPLE	Progress Energy
2						
1						PGN DWG. 01.00-07
0	11/8/06	BURLISON	GUINN	HOYT		
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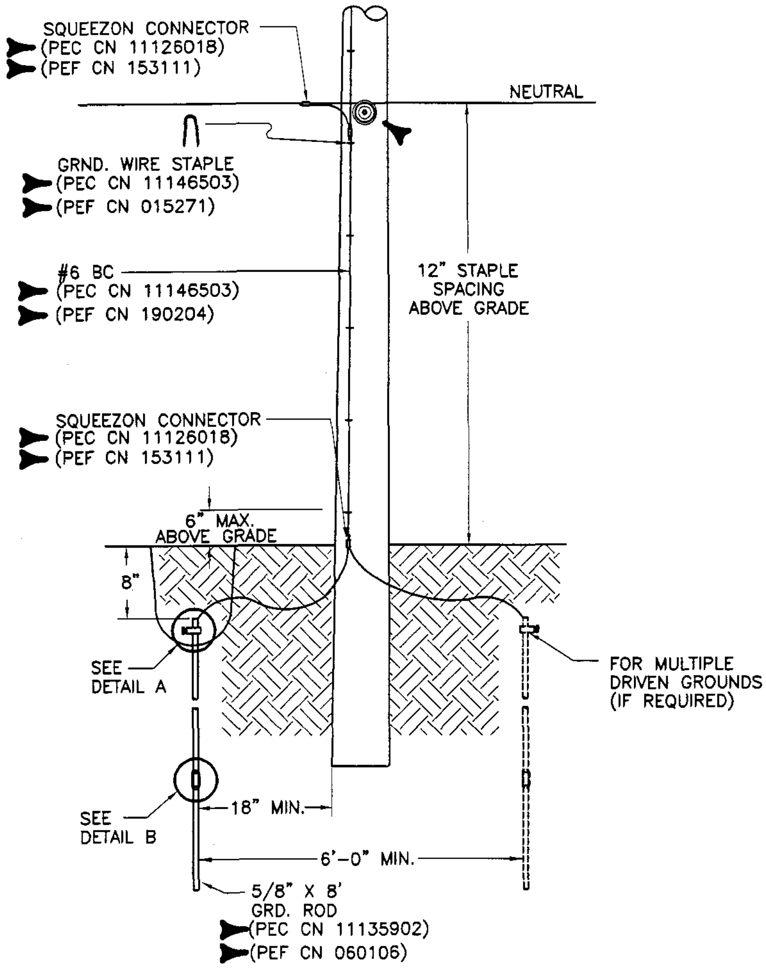
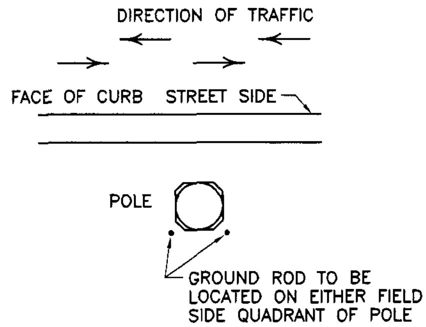
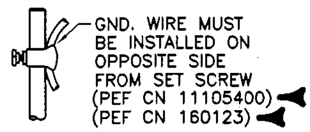
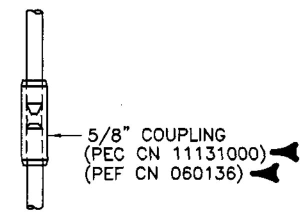


FRONT VIEW





DETAIL 'A'



DETAIL B

NOTES:

1. THE GROUNDING CONDUCTOR SHALL BE ATTACHED TO THE POLE. USE #6 SOLID BARE COPPER FOR THE DRIVEN GROUND CONDUCTOR UNLESS A DIFFERENT SIZE IS SPECIFICALLY CALLED FOR ON A WORK ORDER OR BY A SPECIFICATION FOR A PARTICULAR SITUATION. IF THE POLE HAS AN EXISTING POLE GROUND WHICH IS SMALLER THAN SPECIFIED, STRIP THE OLD GROUND AND INSTALL A NEW GROUND.
2. FOR ALL DISTRIBUTION GROUNDS, USE COPPER WIRE AND BRONZE CLAMPS. THE AREA OF THE ROD AT THE CLAMP SHALL BE GREASED WITH INHIBITOR COMPOUND. SECTIONAL COPPER-CLAD RODS SHALL NOT BE DRIVEN CLOSE TO KNOWN STEEL PIPES OR CONDUITS.
3. RUN GROUND FROM ROD TO TOP DEVICE ON POLE. JUMPER FROM OTHER DEVICE AND SYSTEM NEUTRAL TO POLE GROUND.

CAROLINAS ONLY:

GROUNDING MAY BE INSTALLED TO AVAILABLE EXTENSIVE WATER PIPE SYSTEMS INSTEAD OF DEEP DRIVEN GROUNDS WHERE GROUNDING TO THE METALLIC WATER PIPE SYSTEM IS PERMITTED. SEE DWG. 01.01-10 FOR DETAILS.

3	6/16/04	ROBSEON	NUNNERY	WOOLSEY
2	11/7/03	CECCONI	SIMPSON	WOOLSEY
1	7/21/03	CECCONI	SIMPSON	WOOLSEY
0	8/16/02	CECCONI	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

EQUIPMENT POLE GROUNDING DETAIL

Progress Energy

PGN DWG. 01.01-05

GENERAL

1. STANDARD POLE GROUND CONDUCTORS ARE AS FOLLOWS:

FEEDER TERMINATION POLES	#2 COPPER
NEUTRAL TO SUBSTATION GRID	4/0 COPPER
ALL OTHER OH GROUNDS	#6 COPPER

2. DRIVEN GROUNDS SHALL BE TESTED TO DETERMINE RESISTANCE VALUES USING THE OPEN CIRCUIT GROUND RESISTANCE CHECKER BETWEEN THE GROUND ROD AND THE SYSTEM NEUTRAL. MAXIMUM RESISTANCE SHALL BE AS FOLLOWS:

TERMINAL POLES	15 OHMS
ALL OTHER EQUIPMENT	25 OHMS

3. A SINGLE DRIVEN GROUND IS PREFERABLE OVER MULTIPLE DRIVES. ADDITIONAL ROD SECTIONS SHOULD BE ADDED TO A SINGLE GROUND UP TO A MAXIMUM LENGTH OF 100 FEET.
4. IF THE MAXIMUM RESISTANCE CANNOT BE REACHED BY DRIVING A SINGLE GROUND, MULTIPLE DRIVES MAY BE REQUIRED. WHEN MULTIPLE GROUND ROD DRIVES ARE NECESSARY, ALL RODS SHOULD BE TIED TOGETHER AND THEIR COMBINED RESISTANCE TESTED. SEE DWG 01.01-05.

GROUNDING OF CONCRETE POLES

ALL HARDWARE ON CONCRETE POLES SHALL BE BONDED TO THE NEUTRAL WITH A PIECE OF #6 CU. WIRE. ATTACH GROUND WIRE WITH A FLAT WASHER AND NUT AT EACH BOLT LOCATION. SEE DWG 02.02-06.

USE OF TRANSMISSION STATIC LINE GROUNDS

WHEN A DISTRIBUTION GROUND IS REQUIRED ON A TRANSMISSION UNDERBUILD POLE, THE EXISTING TRANSMISSION STATIC LINE GROUNDING CONDUCTOR AND GROUND ROD SHOULD BE USED EXCEPT AS NOTED. IN GENERAL, A SEPARATE DISTRIBUTION GROUNDING CONDUCTOR TO THE GROUND IS NEITHER REQUIRED NOR DESIRABLE. *DISTRIBUTION NEUTRALS ARE NOT TO BE BONDED TO STATIC LINE GROUNDS ON STEEL TRANSMISSION POLES EMBEDDED IN EARTH. THEY MAY BE BONDED IF THE STEEL POLES ARE EMBEDDED IN CONCRETE.

*IN ST. PETERSBURG AND CLEARWATER, THERE ARE THREE EXCEPTIONS THAT REQUIRE ALL DISTRIBUTION GROUNDS TO BE ON SEPARATE INTERMEDIATE DISTRIBUTION POLES BECAUSE OF CATHODIC PROBLEMS. THESE LINES ARE:

1. NORTHEAST - 40TH STREET 230 KV LINE
2. ANCLOTE - LARGO 230 KV LINE - SECTION ANL129 TO ANL147 AND POLES ANL99, 105 AND 111.
3. DISSTON TO KENNETH CITY SUBSTATION - KD-35 TO KD-57.

3				
2				
1				
0	8/19/02	CECCONI	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

INSTALLATION OF GROUNDS AND GROUND WIRE

Progress Energy

FLA FLORIDA DWG. 01.01-06

REVISED	DATE	BY	CK'D	APPR.
4	1/17/06	CECCONI	GUINN	HOYT
3	9/1/05	CECCONI	GUINN	HOYT
2	5/19/04	CECCONI	NUNNERY	WOOLSEY
0	8/8/02	YOUNTS	SIMPSON	WOOLSEY

SECTION 2 – POLES, GUYS AND ANCHORS
TABLE OF CONTENTS

Progress Energy

FLA DWG. 02.00–00B

POLE LOCATION

POLES SHALL BE LOCATED AS SPECIFIED ON THE WORK ORDER. POLES FOR NEW LINES ALONG CITY STREETS SHOULD BE BACK OF THE SIDEWALK OR ACCORDING TO CITY/TOWN SPECIFICATIONS. IF CURBS ARE NOT ALREADY ESTABLISHED, APPROPRIATE AUTHORITIES SHOULD BE CONTACTED IN ORDER TO CONDUCT A SURVEY AND ESTABLISH FUTURE CURB LINES. A 3' CLEARANCE IS REQUIRED FROM HYDRANTS.

POLES OUTSIDE OF A TOWN'S CORPORATE LIMITS MAY NOT BE SET ON THE RIGHT-OF-WAY OF ANY PUBLIC ROAD OR HIGHWAY WITHOUT THE APPROVAL OF COMPANY ENGINEERING AND THE APPROPRIATE HIGHWAY OFFICIALS.

CARE AND CONSIDERATION OF PROPERTY OWNER'S INCONVENIENCE SHOULD BE TAKEN INTO ACCOUNT IN DETERMINING BOTH POLE AND GUY LOCATIONS.

ORIENTATION

WHEN SETTING NEW POLES ON DEADENDS OR ANGLES OF UP TO 59 DEGREES, THE POLE'S BIRTHMARK SHOULD BE FACING THE ANCHOR. ON ANGLED POLES EXCEEDING 59 DEGREES, THE BIRTHMARK SHOULD FACE THE ANCHORS THAT SUPPORT THE LARGEST STRAIN AND CONDUCTOR TENSION. WHEN TENSIONS ARE EQUAL, TURN THE BIRTHMARK TOWARD EITHER ANCHOR, PREFERABLY PARALLEL TO A ROAD IF ONE EXISTS.

POLE SIZING

POLES ARE A LARGE ITEM OF EXPENSE ON DISTRIBUTION SYSTEMS. CARE SHOULD BE TAKEN WHEN SELECTING THE PROPER CLASS FOR A GIVEN LOAD AND THE PROPER HEIGHT FOR A GIVEN CONDITION.

USE OF DIFFERENT SIZES AND CLASSES SHOULD BE ON A CASE BY CASE BASIS. THE GUY LEAD LENGTH IS THE MAIN DETERMINING FACTOR OF POLE CLASS. TALLER POLES SHOULD BE SPECIFIED WHERE TERRAIN, JOINT-USE, ANTICIPATED EQUIPMENT AND CONDUCTORS, AND CONDUCTOR GROUND CLEARANCES SO DICTATE. HEAVIER CLASS POLES SHOULD BE SPECIFIED WHERE REASONABLY ANTICIPATED FUTURE MECHANICAL LOADS SO DICTATE.

THE WOOD POLES SHOWN ON DWG. 02.02-03 ARE STOCKED. UNUSUAL QUANTITIES, NON-STOCK, OR NON-STANDARD POLES WILL NEED TO BE SPECIAL ORDERED.

STANDARD CONCRETE POLES					SIZE POLES ACCORDING TO DISTRIBUTION ENGINEERING MANUAL
	HEIGHT	TYPE	ASSEMBLY	CN	
FLORIDA	15'	0	PC15	034150	LIGHTING
	30'	II	PC301	034301	SECONDARY POLES
	35'	I	PC351	034351	
	35'	III	PC353	034353	SINGLE PHASE PRIMARY
	40'	III	PC403	034403	SINGLE PHASE PRIMARY
	45'	III	PC453	034453	3 PHASE AND DOUBLE CIRCUITS
	50'	IV	PC502	034502	POLES W/ LARGE EQUIPMENT
	55'	IV	PC552	034552	

4	5/10/05	NUNNERY	NUNNERY	SPRINGER
3	8/16/04	CECCONI	NUNNERY	SPRINGER
2	2/26/04	CECCONI	SIMPSON	WOOLSEY
0	4/23/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

POLES – GENERAL

Progress Energy

PGN DWG. 02.02-02

STANDARD STOCKED WOOD POLES (CAROLINAS)

HEIGHT	CLASS	ASSEMBLY	CATALOG NUMBER	CONDUCTORS	CONFIGURATION	GRADE	JOINT USE	MAX. SPAN (FEET)
				TANGENT CONSTRUCTION – MAXIMUM SPAN LIMITATIONS LIMITATIONS ON USE (BASED ON 2002 NESC – MEDIUM LOADING DISTRICT)				
30	6	30C6A	10410603	LIGHTING BRACKETS SHOWN ON DWG. 30.02-01	–	–	–	–
				SECONDARY/SERVICE SPANS PER DWG. 04.00-01	–	–	–	–
35	5	35C5A	10411007	1 PH, #1/0 AAAC PRI AND NEUTRAL	TANGENT	C	NONE	500
40	5	40C5A	10411650	THREE – 50 KVA TRANSFORMERS	–	–	–	–
				1 PH, #1/0 AAAC PRI AND NEUTRAL	TANGENT	C	ONE-1 IN CABLE	500
				1 PH, #1/0 AAAC PRI AND NEUTRAL	TANGENT	B	ONE-1 IN CABLE	400
				3 PH, #477 SAC PRI, 1/0 AAAC NEUTRAL	WOOD CROSSARM	C	NONE	400
				3 PH, #477 SAC PRI, 1/0 AAAC NEUTRAL	WOOD CROSSARM	C	ONE-1 IN CABLE	350
45	4	45C4A	10412203	THREE – 75 KVA TRANSFORMERS NOTE: USE 50C3 WITH 5 FT. CUT FROM TOP FOR 3-100 OR 3-167 KVAS.	–	–	–	–
				3 PH, #477 SAC PRI, 1/0 AAAC NEUTRAL	DELTA	C	ONE-1 IN CABLE	350
				3 PH, #477 SAC PRI, 1/0 AAAC NEUTRAL	DELTA	B	ONE-1 IN CABLE	225
				3 PH, #477 SAC PRI, 1/0 AAAC NEUTRAL	DELTA	B	NONE	275
				3 PH #1/0 AAAC PRI AND NEUTRAL	DELTA	B	ONE-1 IN CABLE	300
				3 PH #1/0 AAAC PRI AND NEUTRAL	DELTA	B	NONE	350
50	3	50C3A	10463701	THREE – 100 KVA TRANSFORMERS NOTE: USE 55C3 POLE WITH 5 FT. CUT FROM TOP FOR 3-167 KVAS.	–	–	–	–
				DOUBLE CIRCUIT 6 #477 SAC PRI, #4/0 AAAC NEUTRAL	VERTICAL	C	ONE-1 IN CABLE	275
				DOUBLE CIRCUIT 6 #477 SAC PRI, #4/0 AAAC NEUTRAL	VERTICAL	B	ONE-1 IN CABLE	185

STANDARD STOCKED WOOD POLES (FLORIDA)

HEIGHT	CLASS	ASSEMBLY	CATALOG NUMBER	CONDUCTORS	CONFIGURATION	GRADE	JOINT USE	MAX. SPAN (FEET)
				TANGENT CONSTRUCTION – MAXIMUM SPAN LIMITATIONS LIMITATIONS ON USE (BASED ON 2002 NESC – LIGHT LOADING DISTRICT)				
30	6	P306	030306	LIGHTING BRACKETS SHOWN ON DWG. 30.02-25	–	–	–	–
				SECONDARY/SERVICE SPANS PER DWG. 04.00-01	–	–	–	–
35	5	P355	030355	1 PH, #1/0 AAAC PRI AND NEUTRAL	TANGENT	C	NONE	600
40	5	P405	030405	THREE – 50 KVA TRANSFORMERS	–	–	–	–
				1 PH, #1/0 AAAC PRI AND NEUTRAL	TANGENT	C	ONE-1 IN CABLE	450
				1 PH, #1/0 AAAC PRI AND NEUTRAL	TANGENT	B	ONE-1 IN CABLE	300
				3 PH, #1/0 AAAC PRI AND NEUTRAL	WOOD CROSSARM	C	ONE-1 IN CABLE	400
				3 PH, 336 AAC PRI AND #1/0 AAAC NEUTRAL	WOOD CROSSARM	C	ONE-1 IN CABLE	250
				3 PH, 795 AAC PRI AND #1/0 AAAC NEUTRAL	WOOD CROSSARM	C	ONE-1 IN CABLE	225
45	4	P454	030454	THREE – 75 KVA TRANSFORMERS	–	–	–	–
				1 PH, #1/0 AAAC PRI AND NEUTRAL	TANGENT	B	ONE-1 IN CABLE	250
				3 PH, #1/0 AAAC PRI AND NEUTRAL	VERTICAL	C	ONE-1 IN CABLE	600
				3 PH, #1/0 AAAC PRI AND NEUTRAL	VERTICAL	B	ONE-1 IN CABLE	290
				3 PH, 336 AAC PRI AND #1/0 AAAC NEUTRAL	VERTICAL	C	ONE-1 IN CABLE	250
				3 PH, 336 AAC PRI AND #1/0 AAAC NEUTRAL	VERTICAL	B	ONE-1 IN CABLE	200
				3 PH, 795 AAC PRI AND #1/0 AAAC NEUTRAL	VERTICAL	C	ONE-1 IN CABLE	250
				3 PH, 795 AAC PRI AND #1/0 AAAC NEUTRAL	VERTICAL	B	ONE-1 IN CABLE	140
				DOUBLE CIRCUIT 6#795 SAC PRI, #1/0 AAAC NEUTRAL	VERTICAL	C	ONE-1 IN CABLE	190
45	2	P452	030452	THREE – 100 OR 167 KVA TRANSFORMERS	–	–	–	–
				3 PH, 795 AAC PRI AND #1/0 AAAC NEUTRAL	VERTICAL	B	ONE-1 IN CABLE	250
				DOUBLE CIRCUIT 6#795 SAC PRI, #1/0 AAAC NEUTRAL	VERTICAL	C	ONE-1 IN CABLE	250
				DOUBLE CIRCUIT 6#795 SAC PRI, #1/0 AAAC NEUTRAL	VERTICAL	B	ONE-1 IN CABLE	140

NOTES:

1. SPAN LENGTHS ABOVE ARE ABSOLUTE MAXIMUMS. THEY ARE EITHER LIMITED BY POLE CLASS OR HARDWARE STRENGTH.
2. NO SECONDARY OR AERIAL CABLE AT THE NEUTRAL POSITION IS INCLUDED. THESE ITEMS COULD REDUCE SPAN LENGTH.
3. NO OVERHEAD SERVICES INCLUDED. THESE ITEMS COULD REDUCE SPAN LENGTH.
4. TRANSFORMER BANK SIZES ARE BASED ON TANGENT OR DEADEND GRADE C CONSTRUCTION.

REVISED		BY	CK'D	APPR.
3				
2				
1	8/30/05	NUNNERY	NUNNERY	HOYT
0	5/10/05	NUNNERY	NUNNERY	SPRINGER

STANDARD POLE SIZING – WOOD

Progress Energy

PGN DWG. 02.02-03

APPLICATION GUIDE FOR REUSE OF WOOD DISTRIBUTION POLES

ALL CCA DISTRIBUTION POLES REMOVED FROM SERVICE WILL USUALLY BE CANDIDATES FOR REUSE. AGE IS NOT A MAJOR FACTOR IN DETERMINING THE REUSE OF CCA POLES. IN GENERAL, PENTA AND CREOSOTE POLES ON THE SYSTEM ARE 15+ YEARS OLD AND WILL NOT CLASSIFY AS CANDIDATES FOR REUSE. A CAREFUL INSPECTION AS TO THE SOUNDNESS AND CLASSIFICATION FOR REUSE OF ALL POLES WILL BE THE RESPONSIBILITY OF FIELD CONSTRUCTION PERSONNEL.

CLASSIFICATION

POLE SHALL BE FREE OF EXCESSIVE AMOUNTS OF THE FOLLOWING DEFECTS:

A. ROT
B. WEATHER CRACKS
C. BREAKS
D. SPLINTER WOOD
E. HOLES

FINAL DETERMINATION SHOULD BE MADE BY THE CONSTRUCTION PERSONNEL AT THE TIME THE POLE IS TO BE REUSED, BASED ON THE OVERALL CONDITION OF THE POLE AND THE TYPE OF APPLICATION FOR USE AT THE TIME THE POLE IS TO BE INSTALLED.

TYPES OF USE

RECLAIMED CCA POLES CAN BE REUSED FOR MOST ALL APPLICATIONS DEPENDING ON POLE CONDITION. THE LIFE OF A CCA POLE IS EXPECTED TO EXTEND BEYOND THAT OF PENTA OR CREOSOTE IN TERMS OF PRESERVATIVE RETENTION.

1. IN GENERAL, RECLAIMED POLES CAN BE USED ON FUSED TAP/BRANCH LINES, STREETLIGHT INSTALLATIONS, GUY STUBS, TANGENT POLES, AND OTHER SIMILAR INSTALLATIONS.

2. RECLAIMED POLES SHOULD NOT BE USED FOR FEEDERS.

3. RECLAIMED POLES WITH BAD TOPS SHOULD BE CUT BACK TO A SIZE THAT CAN BE RECLASSIFIED AND REUSED.

GREY CELLON POLE REPLACEMENT PROCEDURE (CAROLINAS ONLY)

GREY CELLON POLES ARE NO LONGER STANDARD FOR DISTRIBUTION LINES. CCA POLES ARE TO BE USED FOR REPLACEMENT.

POLE TOPPING, CAPPING, AND SAWING

CCA POLES SHOULD NOT BE SAWED OFF FOR CONDUCTOR TRANSFERS, FOREIGN ATTACHMENTS, ETC., UNLESS NECESSARY.

CCA OR CREOSOTE POLES WHICH REQUIRE SAWING SHALL BE SAWED OFF NO LESS THAN 25' ABOVE THE GROUND LINE. POLES WHICH HAVE BEEN SAWED OFF 25' ABOVE THE GROUND LINE, MAY BE LATER USED AS 30' AREA LIGHT AND SECONDARY LIFT POLES.

➤ ALL POLES WHICH HAVE THEIR TOPS CUT OFF SHOULD BE CAPPED USING POLE CAP (CN 9220132559) IF THEY ARE TO REMAIN IN SERVICE.

➤ POLE PAINTING

PAINTING OF DISTRIBUTION LINE POLES IS NOT PERMITTED. FOR INFORMATION ON PAINTING OF STREET LIGHT POLES, SEE CAROLINAS DWG. 30.01-07.

3				
2	7/29/05	ROBESON	NUNNERY	HOYT
1	7/15/03	YOUNTS	SIMPSON	WOOLSEY
0	4/23/02	YOUNTS	SIMPSON	CRANE
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➤ DISTRIBUTION LINE POLE MAINTENANCE

Progress Energy

PGN DWG. 02.02-04

PILASTER POLE INSTALLATION

THE MAIN PURPOSE OF THE SLAG IS TO PROVIDE AN INSULATING LAYER TO PROTECT PERSONNEL FROM HARMFUL STEP AND TOUCH POTENTIALS DURING SYSTEM FAULTS. OTHER REASONS ARE WEED CONTROL, WATER DRAINAGE, AND FIRE CONTROL (OR CONTAINMENT). IN ORDER TO MAINTAIN ITS INSULATING CHARACTERISTICS THE SLAG SHOULD REMAIN AS DIRT FREE AS POSSIBLE.

*AT PILASTER POLE LOCATIONS, PROCEED AS FOLLOWS:

1. REMOVE TOP LAYER OF CLEAN SLAG FROM AN AREA WIDER THAN THE EXPECTED DIRT SPRAY RADIUS OF THE AUGER BIT. THE SLAG IS TO BE REMOVED TO WITHIN ONE INCH OF THE DIRT GRADE BY SHOVELING AND/OR RAKING BACK THE REQUIRED DISTANCE. DO NOT ALLOW DIRTY SLAG TO MIX WITH CLEAN SLAG.
2. PLACE A TARP OR HEAVY DUTY (4-6 MILS) POLYETHYLENE FILM (VISQUEEN) MATERIAL AT A SUITABLE LOCATION AND PLACE THE REMAINING ONE INCH OF DIRTY SLAG ON IT.
3. SET PALISTER/POLE, BACKFILL, AND COMPACT.
4. EXCESS SOIL SHOULD BE SPREAD AT SUBSTATION SITE.
5. SPREAD DIRTY SLAG EVENLY OVER AREA.
6. SPREAD CLEAN SLAG OVER AREA AND RAKE TO MATCH EXISTING SLAG GRADE.
7. SEE DWG. 02.02-07 FOR BONDING/GROUNDING CONNECTION TO CONCRETE AND STEEL POLES.

* ALL SOIL EXCAVATED MUST REMAIN ON SUBSTATION SITE.

* SEE UNDERGROUND SECTION FOR ADDITIONAL INFORMATION ON PILASTER POLE INSTALLATIONS

CONCRETE POLE CONSTRUCTION

1. ALL PRIMARY HARDWARE SHOULD BE GROUNDED ON CONCRETE POLES.
2. SPRING WASHERS ARE NOT REQUIRED HARDWARE ON CONCRETE POLES.
3. FLAT WASHERS ARE USED IN PLACE OF CURVED WASHERS ON CONCRETE POLES.
4. USE 35KV POST INSULATORS ON CONCRETE POLES.

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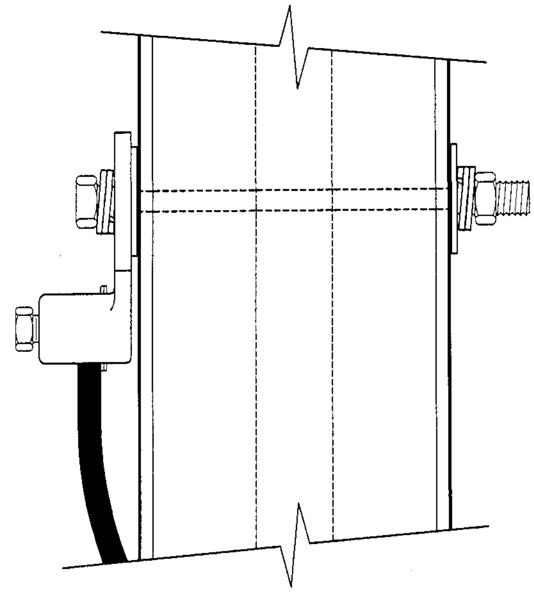
3				
2				
1	9/1/05	CECCONI	GUINN	HOYT
0	4/23/02	YOUNTS	SIMPSON	CRANE

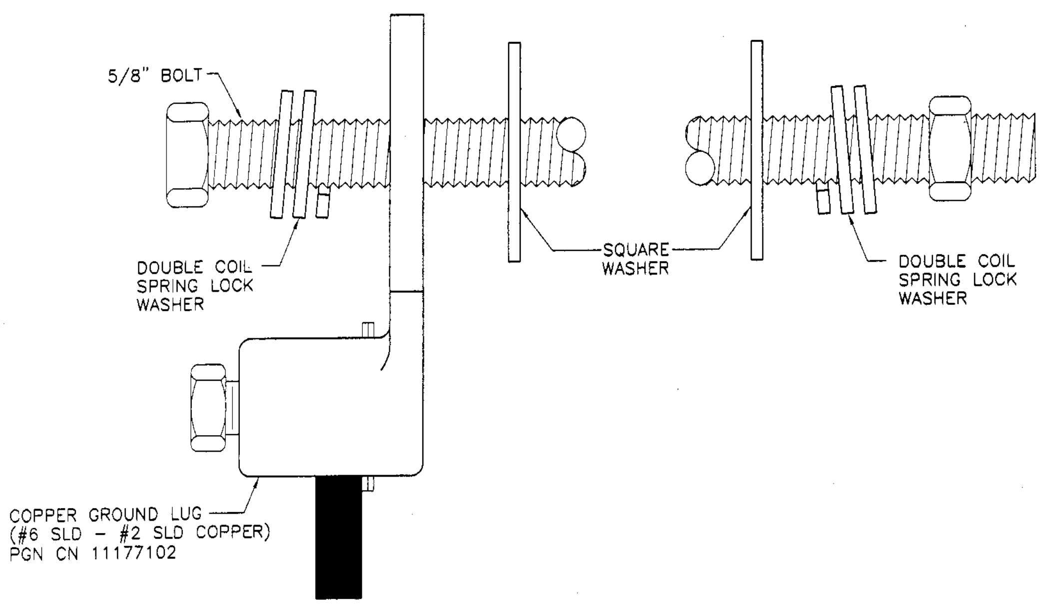
PILASTER AND CONCRETE POLE CONSTRUCTION

Progress Energy

FLA DWG. 02.02-06



CONCRETE AND STEEL POLES, AND EQUIPMENT HARDWARE GROUND
(ALL HARDWARE)



EXPANDED GROUNDING DETAIL
NOT TO SCALE

3				
2				
1				
0	9/'/05	CECCONI	GUINN	HOYT
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BONDING/GROUNDING CONNECTION
TO CONCRETE AND STEEL POLES, AND EQUIPMENT

Progress Energy

PGN DWG. 02.02-07

CLASS		1	2	3	4	5	6	7
MIN. TOP CIRC. (IN.)		27	25	23	21	19	15	17
MIN. TOP DIA. (IN.)		8.6	8.0	7.3	6.7	6.1	4.8	5.4
LENGTH OF POLE IN FT.	*GRD. LINE DIST. FROM BUTT (FT)	MINIMUM CIRCUMFERENCE AT 6' FROM BUTT (INCHES)						
30	5.5	36.5	34.0	32.0	29.5	27.5	25.0	23.5
35	6.0	39.0	36.5	34.0	31.5	29.0	27.0	25.0
40	6.0	41.0	38.5	36.0	33.5	31.0		
45	6.5	43.0	40.5	37.5	35.0	32.5		
50	7.0	45.0	42.0	39.0	36.5	34.0		
55	7.5	46.5	43.5	40.5	38.0			
60	8.0	48.0	45.0	42.0	39.0			
65	8.5	49.5	46.5	43.5	40.5			
70	9.0	51.0	48.0	45.0	41.5			
75	9.5	52.5	49.0	46.0				
80	10.0	54.0	50.5	47.0				
85	10.5	55.0	51.5	48.0				
90	11.0	56.0	53.0	49.0				

*THE FIGURES IN THIS COLUMN ARE INTENDED SOLELY FOR USE WHENEVER A DEFINITION OF A GROUND LINE IS NECESSARY IN ORDER TO APPLY SPECIFICATION REQUIREMENTS TO SCARS, STRAIGHTNESS, ETC. SEE DWG. 02.02-14 FOR SETTING DEPTH.

**WEIGHTS CCA DISTRIBUTION POLES 0.6 LB. BY ASSAY

CLASS	H-1	1	2	3	4	5	6	7
BREAKING*** STR. (LBS.)	XXXX	4500	3700	3000	2400	1900	1500	1200
LENGTH (FT.)	CCA	CCA	CCA	CCA	CCA	CCA	CCA	CCA
30		1395	1180	1005	855	720	600	495
35		1710	1465	1260	1095	940	810	705
40		2055	1770	1530	1330	1155	1005	880
45		2425	2085	1815	1575	1390	1215	1065
50		2820	2415	2100	1840	1630	1450	1275
55		3265	2800	2400	2110	1875	1705	
60	4692	3765	3210	2740	2385	2130	1965	
65		4380	3645	3070	2680	2440		
70		5040	4125	3430	2980	2715		

WEIGHTS (LBS) OF CONCRETE DISTRIBUTION POLES

CLASS/TYPE IN LENGTH (FT)	TYPE 0	TYPE I	TYPE II	TYPE III	TYPE IV	CLASS II
15	457					
18			992			
30		1350				
30					3170	
35		1832				
35				3173		
35					3460	
40				3961		
45				4600		
50					6913	
50						7800
55					8383	
55						9500

** AVERAGE FIGURES AND VARIATIONS MUST BE ACCEPTED
*** AVERAGE LOAD AT 2' FROM TOP THAT WILL BREAK POLE

3				
2				
1	8/12/04	CECCONI	NUNNERY	SPRINGER
0	4/23/02	YOUNTS	SIMPSON	CRANE
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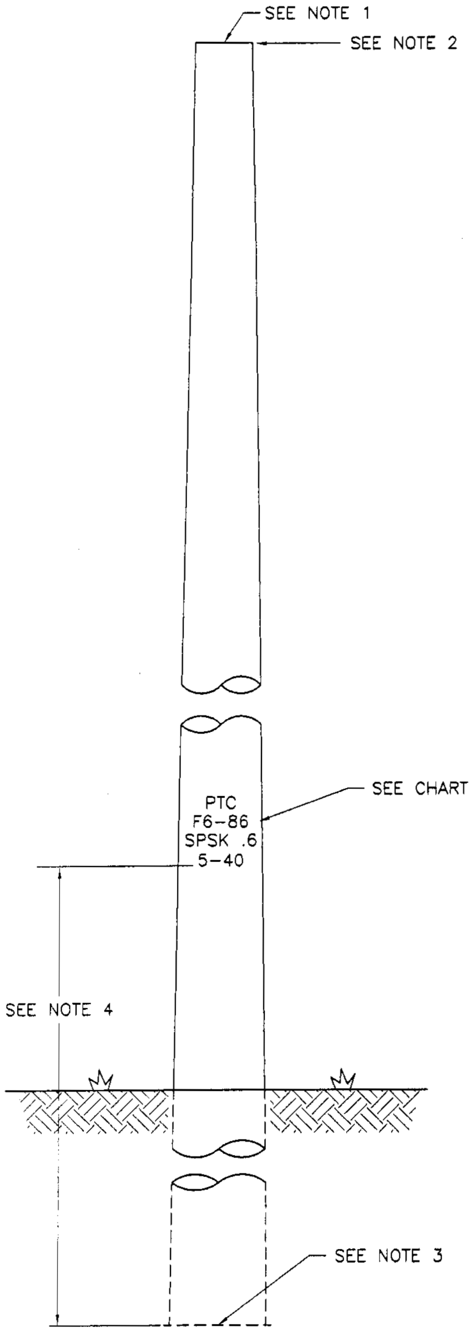
AVERAGE SIZE AND WEIGHT OF CCA TREATED AND CONCRETE POLES

Progress Energy

PGN DWG. 02.02-08



CODE	DESCRIPTION
PTC	POLE TREATING COMPANY I.D.
F6-86	PLANT LOCATION, MONTH AND YEAR OF TREATMENT
SPSK .6	SOUTHERN PINE CCA, .6 LBS RETENTION
5-40	POLE CLASS AND LENGTH
MARKING AND CODE LETTERS:	PER ANSI 05.1 LATEST REVISION (PARAGRAPH 7.5)

NOTES:

1. PRETREATMENT INSPECTION STAMP, LENGTH, AND CLASS STAMPED IN TOP.
2. ROOF OF POLE SHALL BE FLAT CUT WITH NO SLANT. THERE SHALL BE NO PRE-DRILLED HOLES OR SLAB GAIN.
3. POST TREATMENT INSPECTION STAMP AND METAL TAG SHOWING LENGTH AND CLASS.
4. PRIOR TO MARCH 2002, PROGRESS ENERGY CAROLINAS REQUIRED THE BIRTHMARK BE LOCATED 12 FOOT MIN. FROM THE POLE BUTT. PROGRESS ENERGY CAROLINAS AND FLORIDA NOW COMPLY WITH ANSI 05.1 WHICH REQUIRES THE BIRTHMARK TO BE LOCATED (±2") 10 FEET FROM THE BUTT FOR POLES 50 FOOT AND BELOW AND 14 FEET FOR POLES 55 FOOT AND ABOVE.

3				
2	12/29/06	CECCONI	GUINN	HOYT
1	10/10/06	CECCONI	GUINN	HOYT
0	5/28/02	YOUNTS	SIMPSON	CRANE
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STANDARD FRAMING AND BRANDING
FOR DISTRIBUTION CCA POLES

Progress Energy

PGN DWG. 02.02-10

THE FOLLOWING TABLE LISTS THE ALLOWABLE DISTRIBUTION TRANSFORMER LOADS ON SOUTHERN YELLOW PINE POLES THAT WILL PRODUCE A DEFLECTION NO GREATER THAN 2 PERCENT OF THE FREE HEIGHT OF THE POLE. CAROLINAS DWG. 06.00-11 AND FLORIDA DWG. 06.00-12 MAY BE USED TO APPROXIMATE EQUIPMENT WEIGHTS FOR SIZING POLES.

MAXIMUM ALLOWABLE WEIGHT OF ALL EQUIPMENT AT VARIOUS DISTANCES FROM POLE TOP							
LENGTH	CLASS	4 FT.	6 FT.	8 FT.	10 FT.	12 FT.	16 FT.
35'	5	1980	2160	2360	2610	2910	–
	4	2645	2870	3125	3450	3840	–
	3	3780	4110	4490	4940	5520	–
	2	5050	5480	5955	6575	7325	–
	1	6600	7155	7790	8580	9535	–
40'	5	1875	2030	2190	2400	2620	–
	4	2595	2800	3035	3290	3600	–
	3	3650	3950	4265	4640	5065	–
	2	4830	5200	5600	6100	6650	–
	1	6250	6700	7225	7855	8580	–
45'	4	2580	2775	2990	3220	3490	4175
	3	3455	3710	3980	4315	4645	5525
	2	4700	5030	5400	5820	6310	7525
	1	6040	6455	6920	7465	8045	9600
50'	4	2490	2650	2850	3050	3295	3650
	3	3295	3525	3765	4040	4335	5085
	2	4455	4745	5080	5445	5850	6825
	1	5900	6290	6720	7180	7720	9020

REVISED		BY	CK'D	APPR.
3				
2	7/15/03	YOUNTS	SIMPSON	WOOLSEY
1	9/12/02	YOUNTS	SIMPSON	WOOLSEY
0	3/22/02	YOUNTS	SIMPSON	CRANE

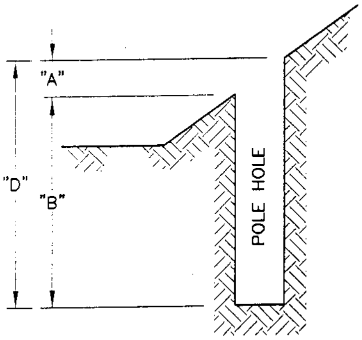
A GUIDE FOR WOOD POLE SELECTION BASED ON ECCENTRIC LOADING DUE TO EQUIPMENT WEIGHT

Progress Energy

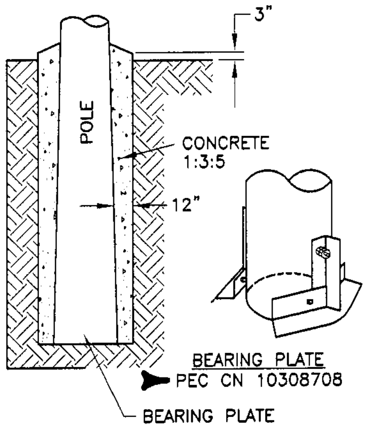
PGN DWG. 02.02-12

POLE LENGTH	CLAY		SAND OR MARSH		SOLID ROCK	
	CAROLINAS	FLORIDA	CAROLINAS	FLORIDA	CAROLINAS	FLORIDA
20'	4'-0"	5'-0"	5'-0"	5'-0"	3'-6"	3'-6"
25'	4'-0"	5'-0"	5'-0"	5'-0"	3'-6"	3'-6"
30'	4'-6"	5'-6"	5'-6"	5'-6"	3'-6"	3'-6"
35'	5'-0"	6'-0"	6'-0"	6'-0"	3'-6"	3'-6"
40'	5'-0"	6'-0"	6'-0"	6'-0"	3'-6"	3'-6"
45'	5'-6"	6'-6"	6'-6"	6'-6"	4'-0"	4'-0"
50'	6'-0"	7'-0"	7'-0"	8'-0"	4'-0"	4'-0"
55'	6'-6"	7'-6"	7'-6"	8'-6"	4'-0"	4'-0"
60'	7'-0"	8'-0"	8'-0"	9'-0"	4'-0"	4'-0"
65'	7'-6"	8'-6"	8'-6"	9'-6"	4'-6"	4'-6"
70'	8'-0"	9'-0"	9'-0"	10'-0"	4'-6"	4'-6"
75'	8'-6"	9'-6"	9'-6"	10'-6"	4'-6"	4'-6"
OTHER	SEE TRANSMISSIONS SPEC.					
BACKFILL SOLID ROCK HOLES WITH 1:3:5 CEMENT MIX						

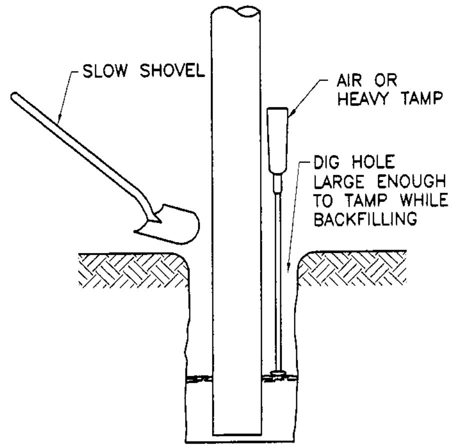
MAKE "D" EQUAL TO SETTING DEPTH IN LEVEL GROUND 'B" PLUS "A"



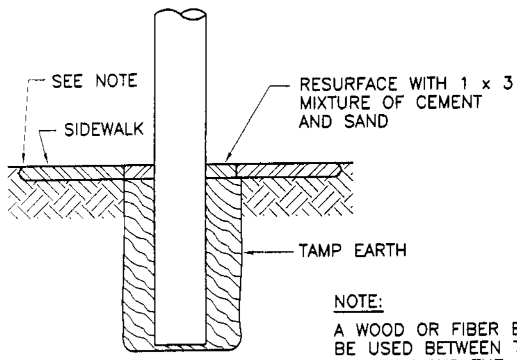
SETTING DEPTH FOR SLOPES



SETTING FOR EXCEPTIONAL STABILITY

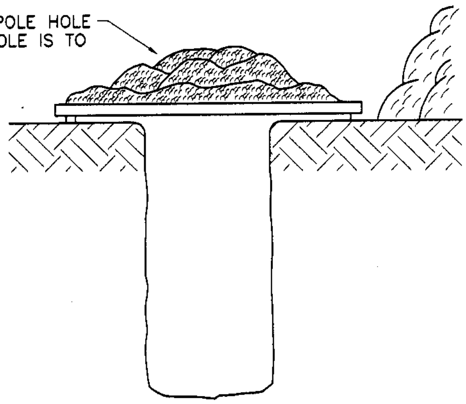


BACKFILLING



SIDEWALK PATCHING

NOTE:
A WOOD OR FIBER BARRIER MAY BE USED BETWEEN THE EXISTING SIDEWALK AND THE PORTION TO BE RESURFACED IN ORDER TO FACILITATE FUTURE POLE REPLACEMENTS.



TEMPORARY POLE HOLE PROTECTION

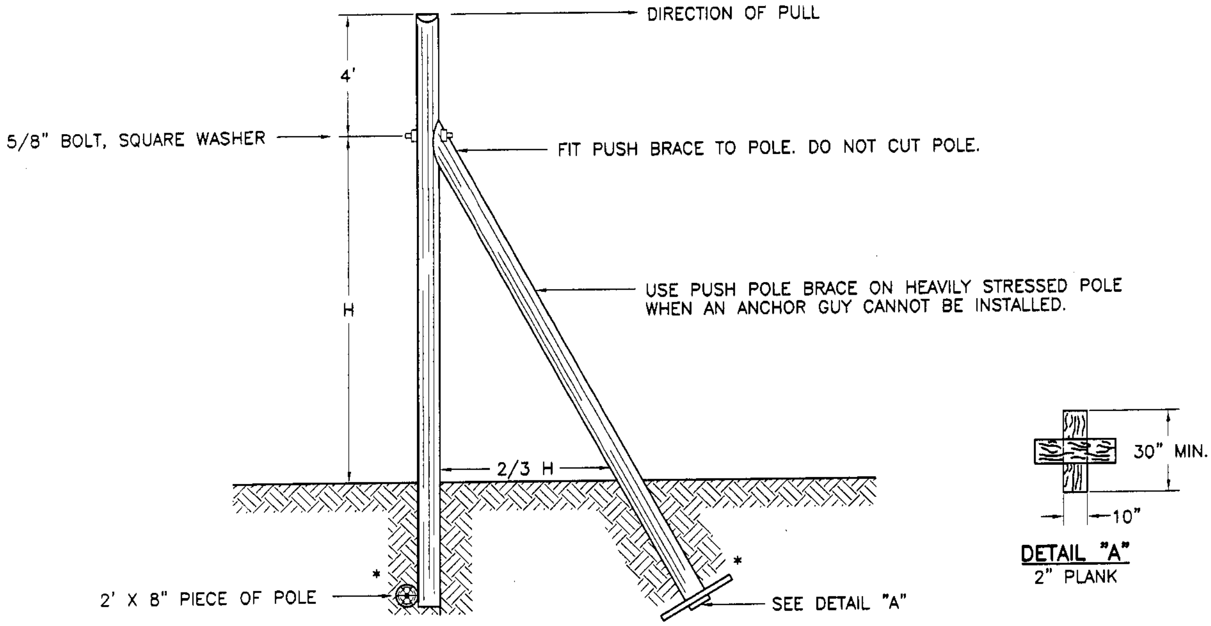
REVISED		BY	CK'D	APPR.
3				
2				
1	7/15/03	YOUNTS	SIMPSON	WOOLSEY
0	4/23/02	YOUNTS	SIMPSON	CRANE

POLE SETTING DEPTH IN LEVEL GROUND AND INSTALLATION METHODS

Progress Energy

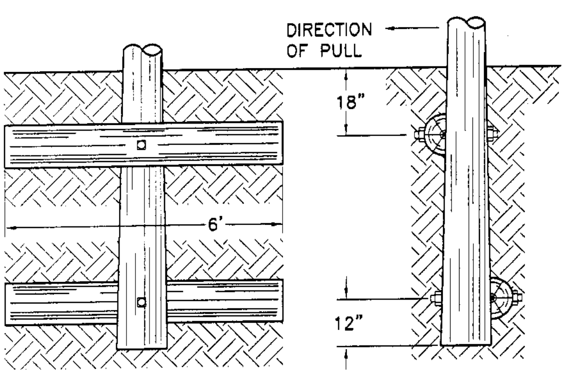
PGN DWG. 02.02-14

METHOD OF INSTALLING PUSH POLE BRACE



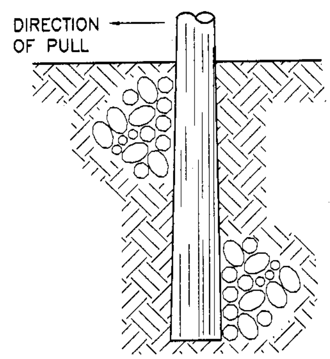
*TO BE INSTALLED IF REQUIRED BY SOIL CONDITIONS.

METHOD OF BRACING MEDIUM STRESSED POLE



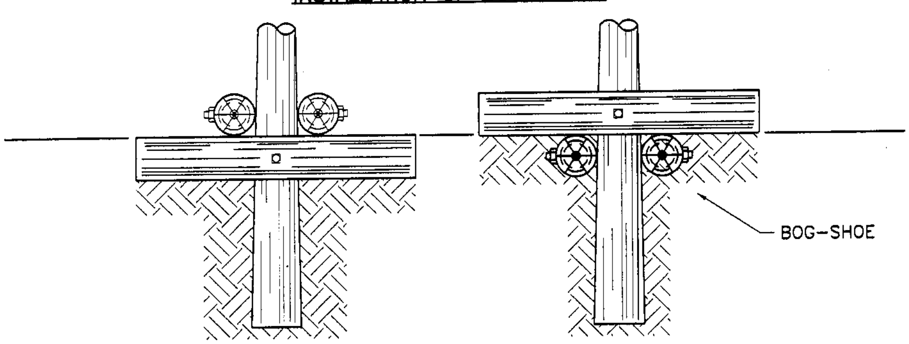
THIS METHOD OF BRACING MAY BE USED FOR REINFORCING A MEDIUM STRESSED POLE WHERE AN ANCHOR GUY CANNOT BE INSTALLED.

METHOD OF BRACING POLE IN SERVICE



ROCKS MAY BE USED FOR CRIBBING, INSTEAD OF LOGS, FOR POLES IN SERVICE.

INSTALLATION OF BOG SHOES



BOG SHOES SHOULD BE USED IN SOFT OR SWAMPY GROUND WHERE POLES MIGHT SETTLE EXCESSIVELY. SHOES ARE MADE OF 6' SECTIONS OF OLD CREOSOTED OR SIMILARLY TREATED WOOD POLES SECURELY FASTENED TO THE POLE AS SHOWN. POLE MUST BE GUYED AS SPECIFIED BY ENGINEER.

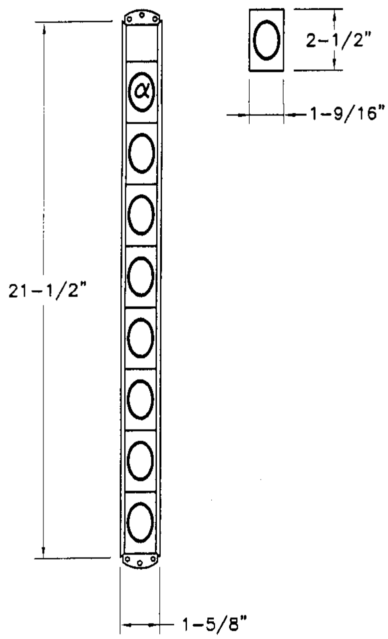
3					
2					
1					
0	4/24/02	YOUNTS	SIMPSON	CRANE	
REVISED		BY	CK'D	APPR.	

POLE BRACING

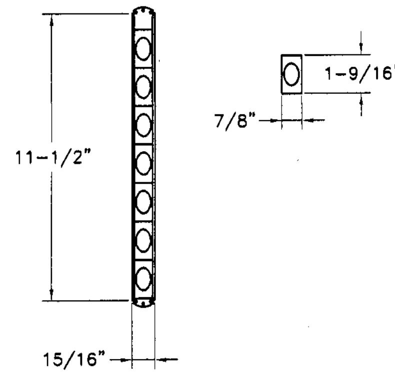
Progress Energy

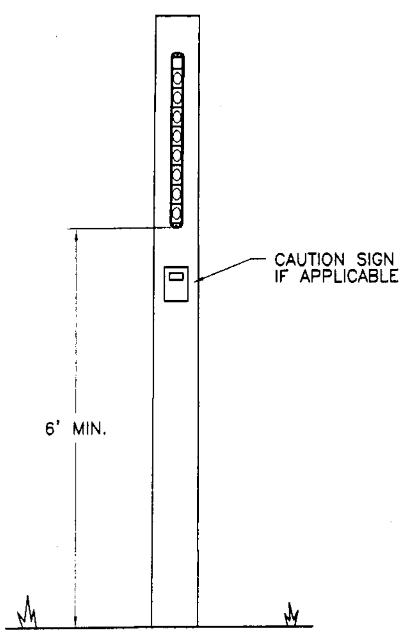
PGN DWG. 02.02-16

POLES WITH SOLID BLADE CUTOUTS



POLES WITHOUT SOLID BLADE CUTOUTS





NOTES:

1. IDENTIFY POLE WITH ONE 7 DIGIT EQUIPMENT ID NUMBER ASSIGNED BY GIS.
2. ON OH SOLID SWITCH POLES ADD THE ALPHA CHARACTER REPRESENTING THE AREA TO THE BEGINNING OF THE 7 DIGIT EQUIPMENT ID NUMBER.
3. TRANSFORMER BANKS – ASSIGNED THE SAME 7 DIGIT NUMBER AS THE POLE IN THE GIS. NO ADDITIONAL TAGGING IS REQUIRED.
4. MULTIPLE UNDERGROUND FEEDS ON POLE – USE THE POSITION NUMBER ASSIGNED BY FRAMME TO IDENTIFY EACH TERMINATION.
5. SWITCHABLE DEVICES – ASSIGN THE SAME EQUIPMENT ID NUMBER AS THE POLE TO FUSES, SWITCHES, RECLOSERS, AND SECTIONALIZERS.

TYPE	DESCRIPTION
WOOD	USE TWO ROOFING TYPE NAILS ➤FLORIDA CN 015171
CONCRETE	APPLY ADHESIVE ➤FLORIDA CN 400140
FIBERGLASS	ATTACH WITH ADHESIVE ➤FLORIDA CN 400149
*TAG MAY BE PAINTED TO MATCH POLE	

** INSTALL TAGS OF ROAD SIDE OF POLE

** MAINTAIN AND REUSE ANY EXISTING NUMBERS WHEN REPLACING POLES OR EQUIPMENT

REVISED		BY	CK'D	APPR.
3				
2				
1	7/15/03	YOUNTS	SIMPSON	WOOLSEY
0	4/23/02	YOUNTS	SIMPSON	CRANE

➤(LOCID) POLE NUMBERS AND LABELS

Progress Energy

FLA FLORIDA DWG. 02.02–22

PROCEDURES:

1. GUYING SHOULD BE DONE IN ACCORDANCE WITH THE WORK ORDER INSTRUCTIONS TO ASSURE COMPLIANCE WITH STRENGTH REQUIREMENTS AND CONSTRUCTION STANDARDS. CHOOSE GUY STRAIN INSULATORS BASED ON GUY WIRE SIZE AND REQUIRED CLEARANCE.
2. CAROLINAS – REFER TO SECTION 3, OVERHEAD PRIMARY CONSTRUCTION, TO SEE THE EXACT NUMBER AND POSITION OF GUY WIRES. USE SPAN TABLES (PEC DWGS. 02.04–32, 02.04–34, 02.04–36) TO DETERMINE TENSION IN GUY WIRE BASED ON DIFFERENT LEAD TO HEIGHT RATIOS FOR EACH CONDUCTOR.
3. FLORIDA – SEE PEF DWG. 02.04–12 FOR VISUAL REPRESENTATION AND STORMS INSTRUCTION.

NOTES:

1. GUYS AND ANCHORS SHOULD BE INSTALLED PRIOR TO THE INSTALLATION OF CONDUCTORS.
2. GUYS SHOULD BE BONDED TO THE SYSTEM NEUTRAL EXCEPT IN HIGHLY CORROSIVE AREAS. SEE PEC COASTAL SECTION 12 OR PEF COASTAL SECTION 12.
3. CONCRETE POLE GUYING – SEE GUYING ATTACHMENT DWG. 02.04–06.
4. CUT END OFF GUY STRAND AS CLOSE AS BOLT CUTTERS WILL PERMIT. END OF GUYSTRAND MUST NOT PROTRUDE OUTSIDE OF TRAFFIC GUARD.
5. AVOID USING PLIERS TO WRAP THE LAST FEW STRANDS OF A GUY GRIP. SPLIT THE STRANDS AND WRAP BY HAND OR USE A SCREWDRIVER FOR LEVERAGE.
6. GROUND GUY WIRE TO WRAP BUTT GROUND WHERE ONE EXISTS.
7. KUDZU GUARDS ARE AVAILABLE FOR HEAVY KUDZU GROWTH AREAS. SEE DWG. 02.04–19.

NOTICE:

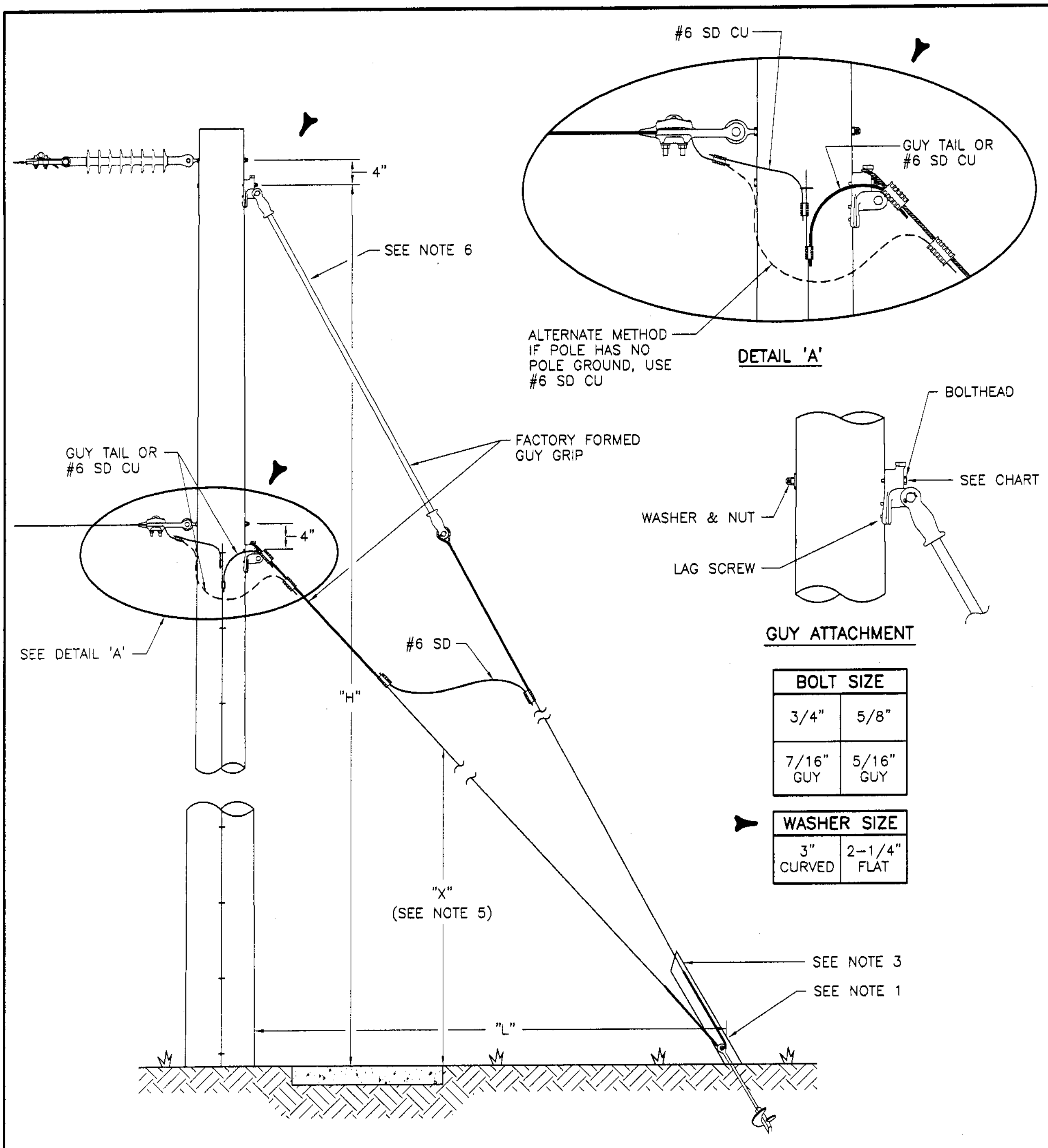
ALL GUYS ABOVE THE NEUTRAL POSITION MUST HAVE A GUY INSULATOR (LINK) OF SUFFICIENT LENGTH TO EXTEND BEYOND THE LOWEST ENERGIZED COMPONENT BY 24".

REVISED		BY	CK'D	APPR.
3				
2	1/17/06	MCINTIRE	QUINN	HOYT
1	7/15/03	YOUNTS	SIMPSON	WOOLSEY
0	4/23/02	YOUNTS	SIMPSON	CRANE

GUYING – GENERAL CONSTRUCTION NOTES

Progress Energy

PGN DWG. 02.04–02



BOLT SIZE	
3/4"	5/8"
7/16" GUY	5/16" GUY

WASHER SIZE	
3" CURVED	2-1/4" FLAT

NOTES:

1. ENGINEER TO INSTALL STAKE AT POINT WHERE ANCHOR ROD ENTERS THE GROUND "L" TO BE 2/3 OF "H" UNLESS STAKED OTHERWISE AND NOTED ON WORK ORDER.
2. ALL UNINSULATED ANCHOR GUYS MUST BE GROUNDED TO THE COMMON NEUTRAL OR TO A POLE GROUND AT THE POLE.
3. USE TRAFFIC GUARDS (ON TOP GUYSTRAND ONLY) ALONG CITY STREETS AND IN OTHER LOCATIONS EXPOSED TO VEHICULAR AND PEDESTRIAN TRAFFIC.
4. IF GUYS ARE INSTALLED DIFFERENTLY THAN ABOVE, MAINTAIN A MINIMUM OF 4" AND A MAXIMUM OF 12" BETWEEN WIRE ATTACHMENT POINT AND GUY ATTACHMENT POINT.
5. FOR WALKWAYS AND RESIDENTIAL DRIVEWAYS, "X" MUST BE A MINIMUM OF 15.5'. FOR OTHER VEHICULAR TRAFFIC, "X" MUST BE A MINIMUM OF 18' (NC & FL DOT).
6. ALL GUYS ABOVE NEUTRAL POSITION MUST HAVE A GUY INSULATOR (LINK) OF SUFFICIENT LENGTH TO EXTEND BEYOND THE LOWEST ENERGIZED COMPONENT BY 24".

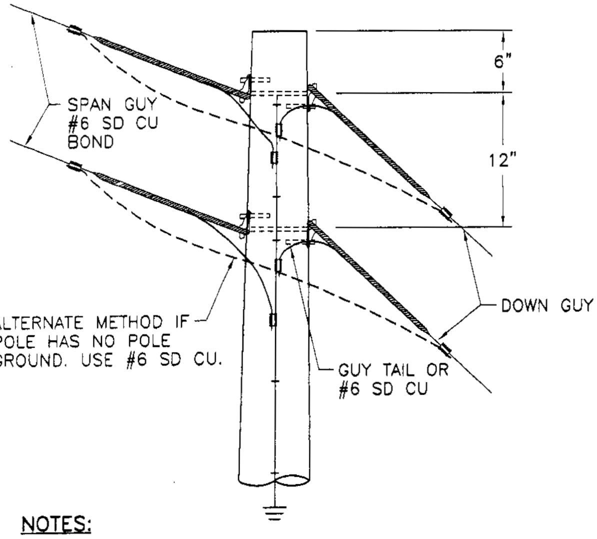
REVISED		BY	CK'D	APPR.
4	3/17/06	SIMPSON	SIMPSON	HOYT
3	4/9/04	NUNNERY	NUNNERY	WOOLSEY
2	7/15/03	YOUNTS	SIMPSON	WOOLSEY
0	4/25/02	YOUNTS	SIMPSON	CRANE

GUYING – CONSTRUCTION

Progress Energy

PGN DWG. 02.04-04

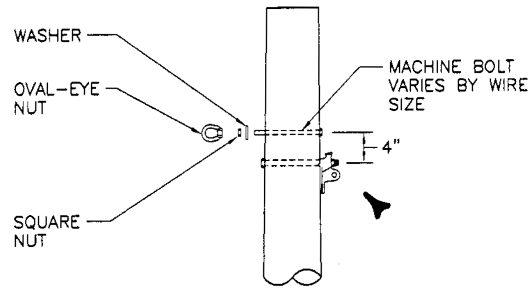
STUB POLE GUY ATTACHMENT

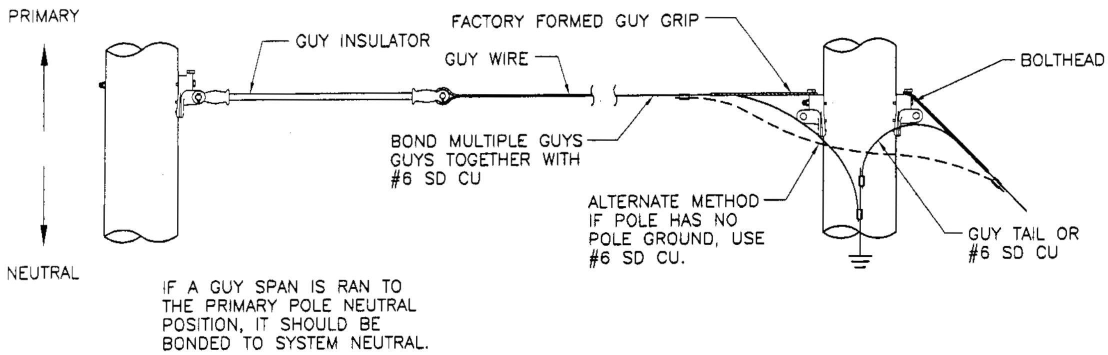


NOTES:

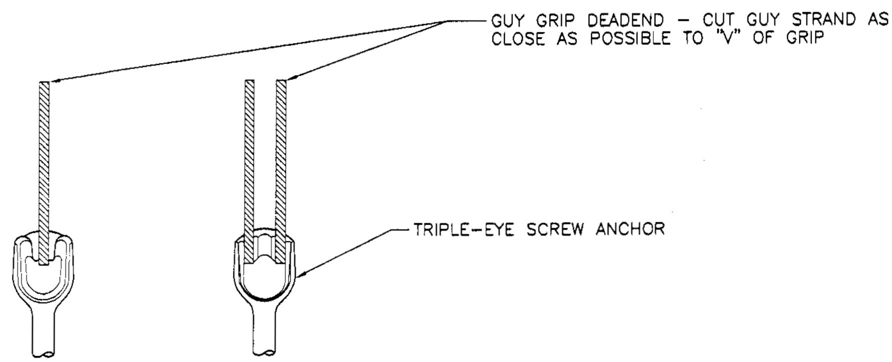
1. INSERT MACHINE BOLT WITH THREADED END OF BOLT ON SPAN GUY SIDE OF POLE
2. ADDITIONAL SPAN GUYS ARE 12" APART

SPAN OR DOWN GUY ATTACHMENT– CONCRETE POLE





SPAN GUY

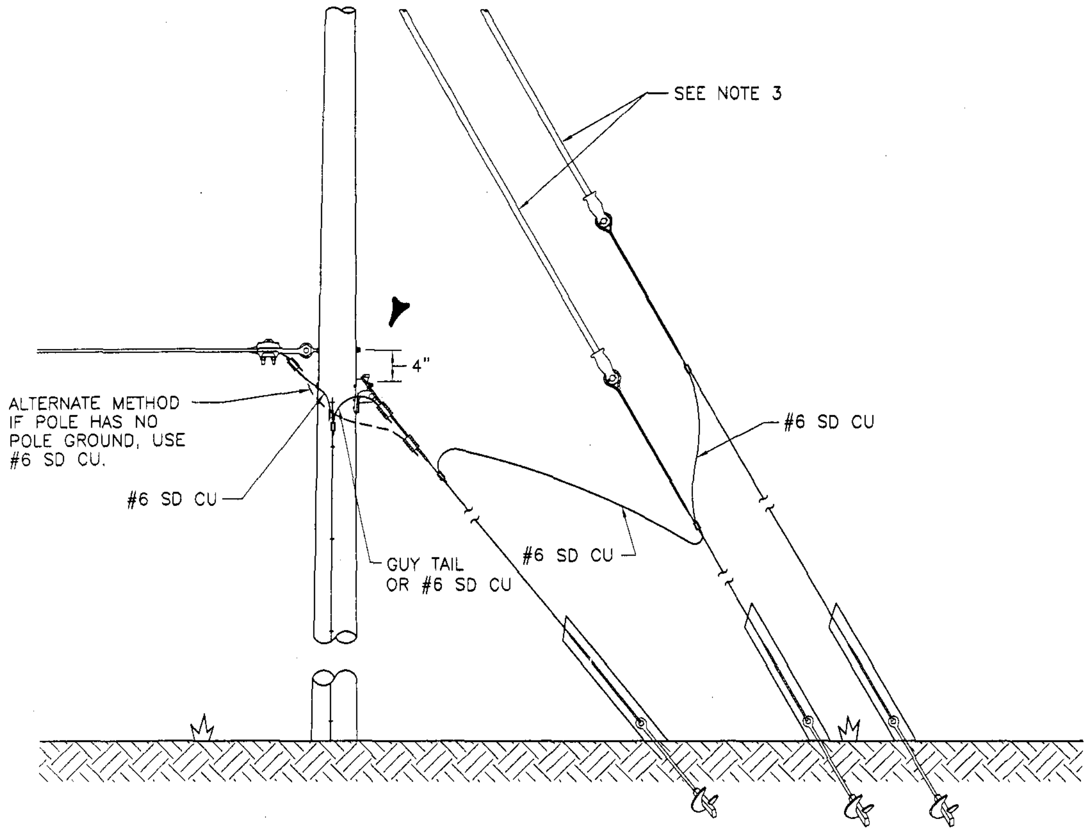


3				
2	10/6/06	GUINN	GUINN	HOYT
1	4/12/04	NUNNERY	NUNNERY	WOOLSEY
0	4/25/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

GUYING ATTACHMENTS

Progress Energy

PGN DWG. 02.04–06



NOTES:

1. FOR MULTIPLE GUY, SINGLE ANCHOR GROUNDING INSTALLATIONS, SEE DWG. 02.04-04.
2. TO ELIMINATE POSSIBLE VOLTAGE POTENTIAL DIFFERENCES BETWEEN MULTIPLE ANCHORS INSTALLED IN TANDEM WHERE INSULATED (PRIMARY) AND NON-INSULATED (NEUTRAL AND/OR SECONDARY) GUYS ARE INSTALLED, ALL GUYS SHALL BE BONDED BELOW THE GUY INSULATORS WITH A MINIMUM #6 SD CU CONDUCTOR.
3. ALL GUYS EXTENDING ABOVE THE NEUTRAL POSITION SHALL HAVE A GUY STRAIN INSULATOR INSTALLED PER DWG. 02.04-18.

REVISED		BY	CK'D	APPR.
3	6/19/06	QUINN	QUINN	HOYT
2	4/9/04	NUNNERY	NUNNERY	WOOLSEY
1	7/15/03	YOUNTS	SIMPSON	WOOLSEY
0	4/25/02	YOUNTS	SIMPSON	CRANE

MULTIPLE ANCHOR GUY GROUNDING INSTALLATIONS

Progress Energy

PGN DWG. 02.04-08

	5/16 HIGH STRENGTH GUY WIRE			7/16 UT. GRADE GUY WIRE		
	CAROLINAS ASSEMBLY	CATALOG NUMBER		CAROLINAS ASSEMBLY	CATALOG NUMBER	
		CAROLINAS	FLORIDA		CAROLINAS	FLORIDA
GUY STRAND CN		10305100	210504 (500 FT. COILS) 210505 (REELS)		10305316	210206 (REELS)
GUY GRIP		10048403	152160		10047504	152162
GUY GRIP COLOR CODE		BLACK			GREEN	
78" INSULATOR	GUYINS7815	76334922 (15K)	115737	GUYINS7821	76334927 (21K)	115738
120" INSULATOR	GUYINS12015	76334921 (15K)	115761	GUYINS12021	76334920 (21K)	115762
GUY SPLICE		10053106	120315		10053502	10053502
GUY WIRE HOLDING STRENGTH (POUNDS)						
GRADE C 90 % ULT. STRENGTH FS=1.1 (NESC'02)	6545			14754		
GRADE B 90 % ULT. STRENGTH FS=1.65 (NESC'02)	4364			9836		

NOTES:

1. USE GUY STRAIN INSULATORS (STICKS) RATED AT 15,000 LBS. FOR 5/16" GUY WIRE AND 21,000 LBS. FOR 7/16" GUY WIRE SIZES.
2. SEE CAROLINAS SECTION 12 AND FLORIDA SECTION 12, COASTAL INSTALLATIONS FOR ALUMOWELD DETAILS.

3				
2				
1	4/18/05	ROBESON	NUNNERY	SPRINGER
0	5/25/04	NUNNERY	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

GUY STRAND, GUY GRIPS AND GUY SPLICES

Progress Energy

PGN DWG. 02.04-10

PHASE OF CONDUCTOR

FIBERGLASS LINKS (0=NO LINK, 1=120" LINK, 7=78" LINK)

GUY WIRE (5=5/16", 7=7/16")

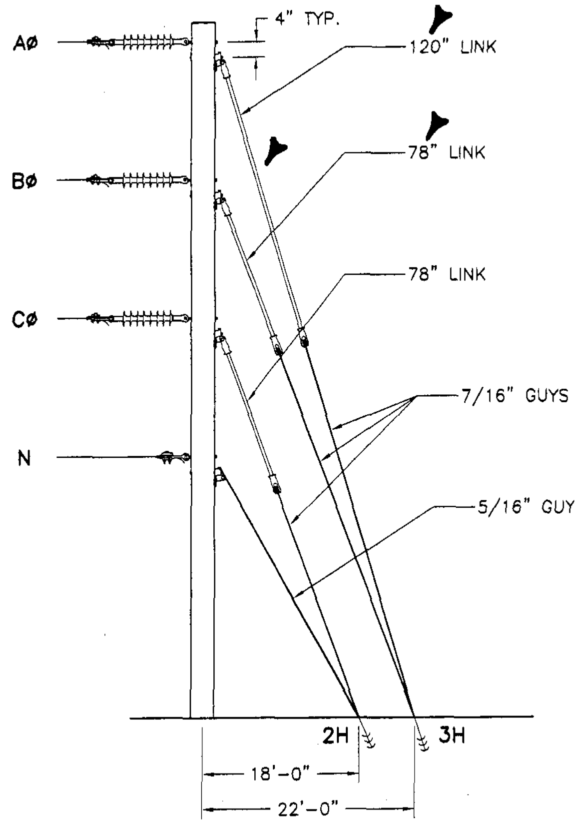
TYPE OF ANCHOR 8=8" ANCHOR, 10=10" ANCHOR, 2H=DOUBLE HELIX ANCHOR, 3H=TRIPLE HELIX ANCHOR, 8P=8" PISA

ANCHOR LEAD LENGTH IN FEET

Ø	*FL	*W	A	LL
A	1	7	3H	22
B	7	7		
C	7	7	2H	18
N	0	5		

*OPTIONAL TO WORK LOCATION

EQUALS



GUY ASSEMBLY WORK INSTRUCTIONS (TYPICAL)	
1GA375	1 GUY ASSY 3PH 795, APH 7/16" & BPH 7/16-3H, CPH 7/16 & N 5/16-2H (31-***A)
1FL1A	INSTALL FIBERGLASS LINK 120"
1FL7B	INSTALL FIBERGLASS LINK 78" ON B PHASE
1FL7C	INSTALL FIBERGLASS LINK 78" ON C PHASE

NOTES:

1. GUYING AND ANCHORING SHOULD NOT BE CHANGED WITHOUT APPROVAL FROM ENGINEERING.

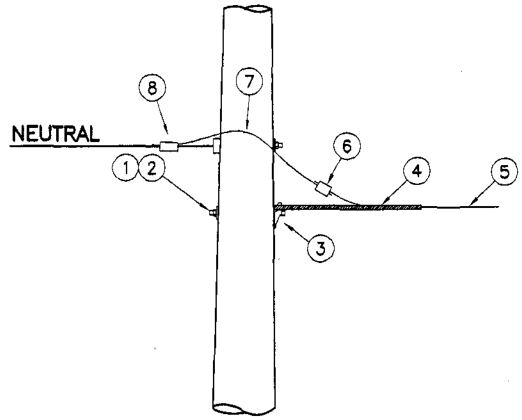
REVISED		BY	CK'D	APPR.
3	11/30/06	CECCONI	GUINN	HOYT
2	6/30/06	CECCONI	GUINN	HOYT
1	1/13/03	YOUNTS	SIMPSON	WOOLSEY
0	4/25/02	YOUNTS	SIMPSON	CRANE

GUY ASSEMBLY WORK ORDER INFORMATION

Progress Energy

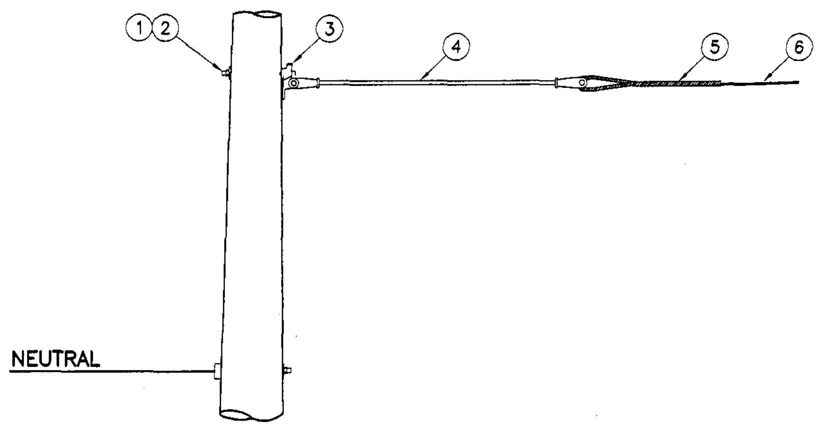
FLA DWG. 02.04-12

GUY, SPAN – WITHOUT FIBERGLASS LINK
CODE G S 0 (GUY WIRE SIZE)



FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	MATERIAL ITEM	QUANTITY	DESCRIPTION
1	–	–	1	BOLT WITH NUT (VARIES WITH GUY WIRE SIZE)
2	–	–	1	WASHER (VARIES WITH GUY WIRE SIZE)
3	–	152180	1	HOOK, GUY
4	–	–	1	GRIP, GUY (VARIES WITH GUY WIRE SIZE)
5	–	–	50	WIRE, GUY (VARIES WITH SIZE)
6	–	153109	1	CONNECTOR, 2 STR. TO 2 STR. MAX
7	–	190404	3	WIRE, #6 SD CU, BARE (FEET)
8	–	153111	1	CONNECTOR, 2/0 STR. TO 2 STR. MAX

GUY, SPAN – WITH FIBERGLASS LINK
CODE G S (SIZE OF LINK) (GUY WIRE SIZE)



FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	MATERIAL ITEM	QUANTITY	DESCRIPTION
1	–	–	1	BOLT WITH NUT (VARIES WITH GUY WIRE SIZE)
2	–	–	1	WASHER (VARIES WITH GUY WIRE SIZE)
3	–	152180	1	HOOK EYE PLATE, GUY
4	–	–	1	LINK, FIBERGLASS (VARIES WITH SIZE)
5	–	–	1	GRIP, GUY (VARIES WITH GUY WIRE SIZE)
6	–	–	50	WIRE, GUY (VARIES WITH SIZE)

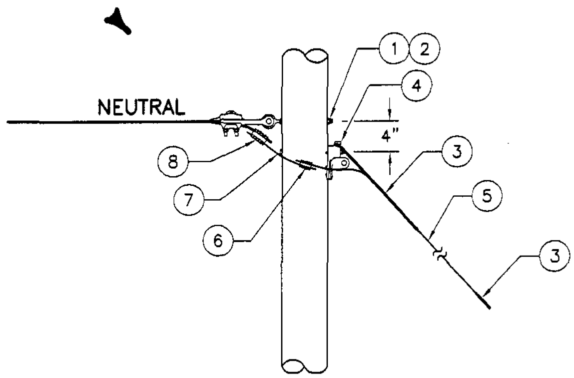
REVISED		BY	CK'D	APPR.
3				
2	3/18/04	NUNNERY	NUNNERY	WOOLSEY
1	2/24/03	YOUNTS	SIMPSON	WOOLSEY
0	4/24/02	YOUNTS	SIMPSON	CRANE

SPAN GUYS

Progress Energy

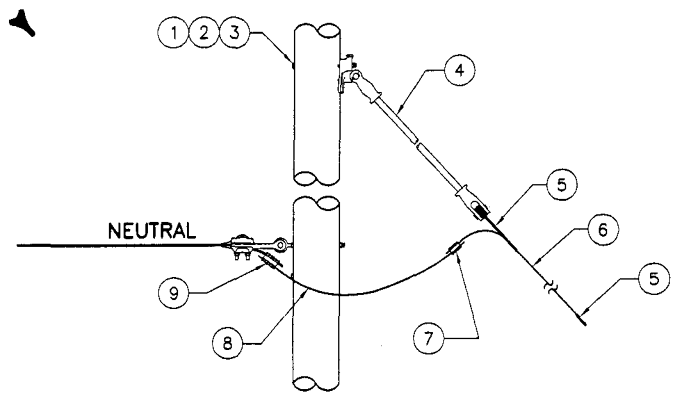
FLA FLORIDA DWG. 02.04–14

GUY, DOWN – WITHOUT FIBERGLASS LINK
CODE G D ø (GUY WIRE SIZE)



FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	MATERIAL ITEM	QUANTITY	DESCRIPTION
1	–	–	1	BOLT WITH NUT (VARIES WITH GUY WIRE SIZE)
2	–	–	1	WASHER (VARIES WITH GUY WIRE SIZE)
3	–	–	2	GRIP, GUY (VARIES WITH GUY WIRE SIZE)
4	–	152180	1	HOOK, GUY
5	–	–	50	WIRE, GUY (VARIES WITH SIZE)
6	–	153109	1	CONNECTOR, 2 STR. TO 2 STR. MAX
7	–	190404	3	WIRE, #6 SD CU BARE (FEET)
8	–	153111	1	CONNECTOR, 2/0 STR. TO 2 STR. MAX

GUY, DOWN – WITH FIBERGLASS LINK
CODE G D (SIZE OF LINK) (GUY WIRE SIZE)



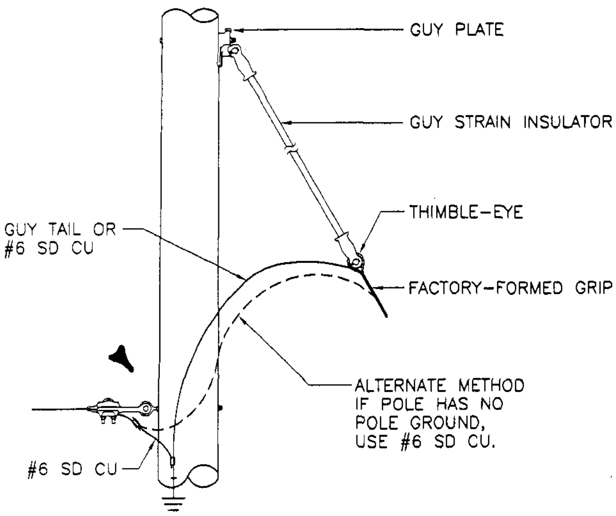
FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	MATERIAL ITEM	QUANTITY	DESCRIPTION
1	–	–	1	BOLT WITH NUT (VARIES WITH GUY WIRE SIZE)
2	–	–	1	WASHER (VARIES WITH GUY WIRE SIZE)
3	–	152180	1	HOOK EYE PLATE, GUY
4	–	–	1	LINK, FIBERGLASS (SIZE VARIES WITH CODE NO.)
5	–	–	2	GRIP, GUY (VARIES WITH SIZE)
6	–	–	50	WIRE, GUY (VARIES WITH SIZE)
7	–	153109	1	CONNECTOR, 2 STR. TO 2 STR. MAX
8	–	190404	3	WIRE, #6 SD CU, BARE (FEET)
9	–	153111	1	CONNECTOR, 2/0 STR. TO 2 STR. MAX

3	6/30/06	QUINN	QUINN	HOYT
2	3/18/04	NUNNERY	NUNNERY	WOOLSEY
1	2/24/03	YOUNTS	SIMPSON	WOOLSEY
0	4/23/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

DOWN GUYS

Progress Energy

FLA DWG. 02.04–16



NOTES:

1. 78" OR 120" GUY STRAIN INSULATORS MAY BE USED.
2. REMOVE SECTION OF GUY STRAND EQUIVALENT TO INSULATOR LENGTH.
3. IF TAIL LENGTH IS SUFFICIENT TO REACH POLE GROUND THEN BOND DIRECTLY TO POLE GROUND IF AVAILABLE. IF GUY TAIL IS NOT LONG ENOUGH TO BOND TO POLE GROUND, USE #6 SD BONDING JUMPER.

SEE DWG. 02.04-10 FOR GUY WIRE STRENGTH AND PROGRESS ENERGY CAROLINAS CATALOG NUMBERS.
SEE DWG. 02.04-12 FOR PROGRESS ENERGY FLORIDA WORK ORDER INSTRUCTIONS.

FIBERGLASS GUY STRAIN INSULATORS (LINKS), ARE USED TO INCREASE THE POLES' BASIC INSULATION LEVEL (BIL), TO PREVENT LIGHTNING FLASHOVER, AND/OR PROTECT AGAINST THE GUY BECOMING ENERGIZED SHOULD IT COME IN CONTACT WITH SUPPLY CONDUCTORS.

INSTALLATION:

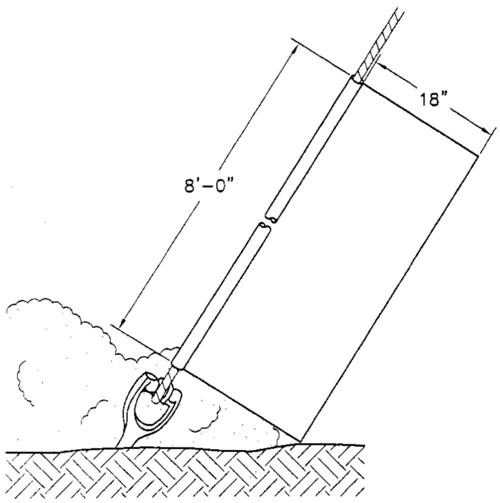
1. ALL GUYS INSTALLED ABOVE THE NEUTRAL POSITION, IN PRIMARY CONSTRUCTION, SHALL BE INSTALLED WITH GUY STRAIN INSULATORS SUCH THAT A TWO FOOT SECTION OF THE GUY STRAIN INSULATOR EXTENDS BELOW THE LOWEST ENERGIZED COMPONENT ON THE POLE.
2. POLES WITH GUYED OPEN-WIRE SECONDARY CONDUCTORS ONLY (NON-INSULATED) ENERGIZED WITH VOLTAGES GREATER THAN 300 VOLTS MUST CONTAIN A GUY INSULATOR.
3. POLES WITH GUYED SECONDARY CONDUCTORS ONLY (TRIPLEX CABLES, QUADRAPLEX CABLES OR OPEN-WIRE SECONDARY CONDUCTORS (NON-INSULATED) ENERGIZED WITH 300 VOLTS OR LESS) DO NOT REQUIRE GUY STRAIN INSULATORS.
4. GUY INSULATORS SHALL BE INSTALLED AT LEAST 12 FT. ABOVE GROUND.
5. GUY STRAIN INSULATORS INSTALLED IN SUPPLY SPACE (BETWEEN PRIMARY AND NEUTRAL) MUST MAINTAIN A 12" CLEARANCE FROM SUPPLY CONDUCTORS.
6. THE FIBERGLASS GUY STRAIN INSULATOR IS VOLTAGE IMPULSE RATED ONLY. UNDER NO CIRCUMSTANCES SHOULD IT BE IN CONTACT WITH AN ENERGIZED CONDUCTOR OR USED IN-LINE AS AN EXTENSION LINK.

5	6/19/06	GUINN	GUINN	HOYT
4	1/25/05	ROBESON	NUNNERY	SPRINGER
3	7/13/04	SIMPSON	SIMPSON	SPRINGER
0	4/23/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

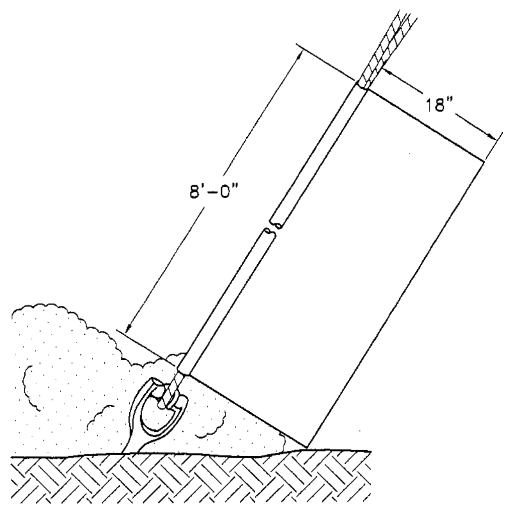
GUY STRAIN INSULATORS

Progress Energy

PGN DWG. 02.04-18



SINGLE GUY WIRE DEVICE



MULTIPLE GUY WIRE DEVICE

CAROLINAS ASSEMBLY	FLORIDA ASSEMBLY	PGN CATALOG NUMBER	DESCRIPTION
KUDZU-GRD-S	GGKS	9220137415	KUDZU GUARD, SINGLE GUY DEVICE
KUDZU-GRD-M	GGKM	9220127403	KUDZU GUARD, MULTIPLE GUY DEVICE
KUDZU-GRD-PW	PGK	9220137412	POLE WRAP, 36" X 25' ROLL

NOTES:

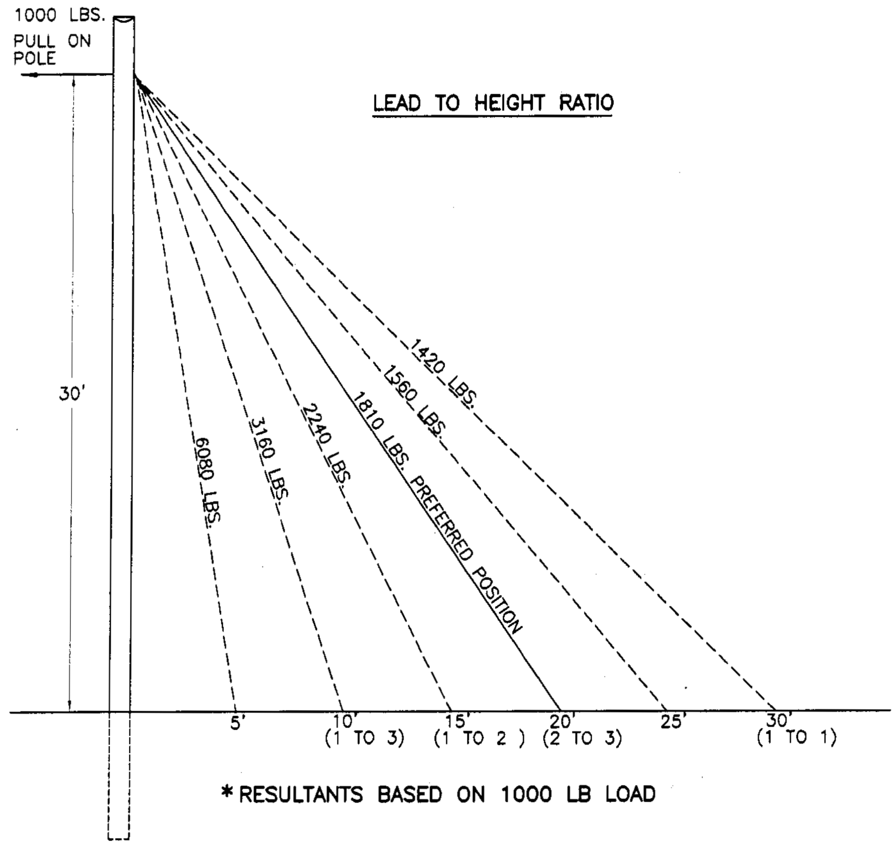
1. IN AREAS OF HEAVY KUDZU GROWTH, KUDZU GUARDS MAY BE USED TO PREVENT VINES FROM CLIMBING GUY WIRES.
2. KUDZU GUARD POLE WRAP IS AVAILABLE FOR USE ON WOOD POLES WITH HARDWARE AT OR NEAR GROUND LEVEL (I.E. RISERS, GANG-SWITCH HANDLES).
3. KUDZU GUARDS ARE NOT INTENDED TO WORK ON OTHER VEGETATION TYPES DUE TO DIFFERENCE IN GROWTH CHARACTERISTICS.

3				
2				
1				
0	1/17/06	MCINTIRE	GUNN	HOYT
REVISED		BY	CK'D	APPR.

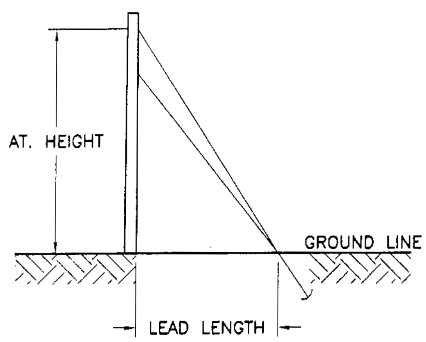
KUDZU GUARDS FOR GUYS AND POLES

Progress Energy

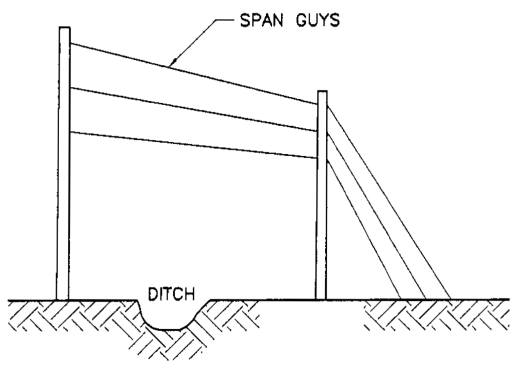
PGN DWG. 02.04-19



MULTIPLE GUYS



MULTIPLE GUYS AND GUY STUBS



NOTES:

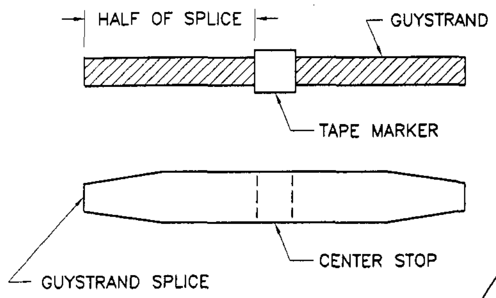
1. WHEN MULTIPLE GUYS ARE REQUIRED ON THE SAME ANCHOR, THE LEAD LENGTH IS NOT TO EXCEED THE GUY ATTACHMENT HEIGHT OF THE HIGHEST GUY. UNLESS OTHERWISE SPECIFIED, GUY LEAD LENGTH SHOULD BE 2/3 THE HEIGHT (1.5 TO 1 RATIO). THE MAXIMUM LEADS WILL BE 1:1.
2. IF LEAD LENGTH MUST BE GREATER THAN 1:1, A GUY STUB MUST BE USED.
3. CONSTRUCTION ON HILLSIDES OR ROCKFACE IS ONLY EXCEPTION.

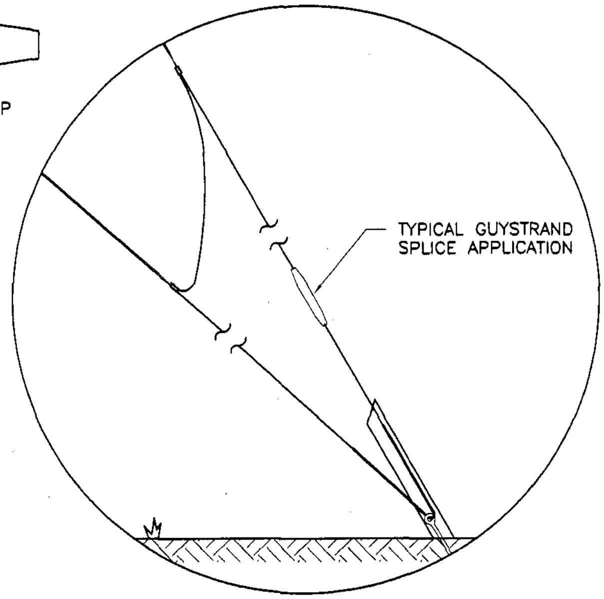
3				
2				
1				
0	4/23/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

GUY TENSIONS WITH POINT LOAD, MULTIPLE GUYS AND GUY STUBS

Progress Energy

PGN DWG. 02.04–20





GUYSTRAND	*CAROLINAS	*FLORIDA
5/16", 7 STR. HIGH STRENGTH	10053106	120315
7/16", 7 STR. UTILITIES GRADE	10053502	NONE

*SEE CAROLINAS DWG. 02.08-02 FOR REPLACEMENT OR MAINTENANCE PART NUMBERS AND ASSEMBLIES

NOTES:

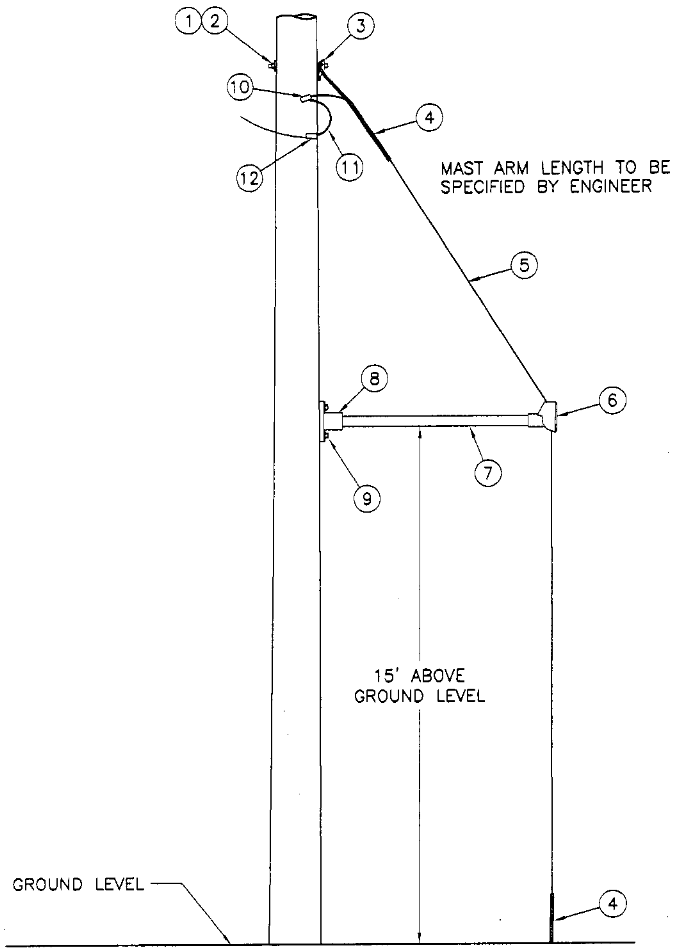
1. GUYSTRAND SPLICES ARE DESIGNED TO PROVIDE A QUICK AND ECONOMICAL MEANS OF REPAIRING BROKEN OR DAMAGED GUYSTRAND, OR FOR OTHER APPLICATIONS WHERE THE ENTIRE GUY MAY OTHERWISE HAVE TO BE REPLACED.
2. STRAIGHTEN STRAND AND TAPE TO INSURE STRAND STAYING IN LAY WHEN CUTTING. REMOVE TAPE AFTER CUTTING. USING HALF THE LENGTH OF THE OVERALL SPLICE AS A GAUGE, PLACE A SECOND TAPE MARKER ON THE STRAND AT THIS POINT.
3. INSERT STRAND IN PILOT CUP AND THRUST INTO JAW ASSEMBLY UNTIL IT HITS THE BUILT IN CENTER STOP. DO NOT CONSIDER THE INSTALLATION SAFE NOR PROPER UNLESS THE TAPE MARKER IS WITHIN 1/2" FROM END OF SPLICE.
4. SET JAWS BY PULLING STRAND BACK FIRMLY BY HAND.
5. DO NOT ATTEMPT TO REUSE SPLICES.

3			
2			
1 7/15/03	YOUNTS	SIMPSON	WOOLSEY
0 4/23/02	YOUNTS	SIMPSON	CRANE
REVISED	BY	CK'D	APPR.

GUYSTRAND SPLICE INSTALLATION

Progress Energy

PGN DWG. 02.04-22



NOTE: USE ONLY WHEN PEDESTRIAN TRAFFIC IS EXPECTED BETWEEN POLE AND ANCHOR

STORMS CODE
GM05

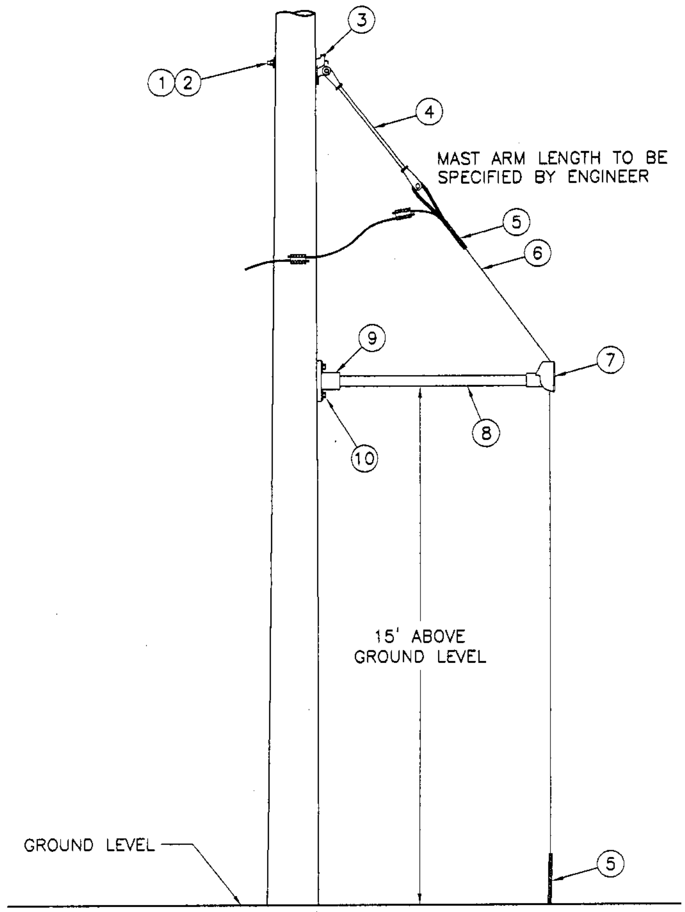
FLORIDA BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	–	152106	1	BOLT, 5/8" X 10" GALVANIZED WITH NUT
2	–	013308	1	WASHER, 2-1/4" SQUARE
3	–	050492	1	HOOK, GUY
4	–	050225	2	GRIP, GUY 5/16"
5	–	210504	40	WIRE, GUY 5/16"
6	–	050411	1	CLAMP, MAST ARM GUY
7	–	383208	1	PIPE, STEEL-MAST ARM, 2" GALVANIZED
8	–	050412	1	FLANGE, MAST ARM GUY
9	–	014114	1	SCREW, LAG 1/2" X 4"
10	–	153109	1	CONNECTOR, 2 STR. TO 2 STR. MAX
11	–	190404	1	WIRE, #6 SD CU, BARE (FEET)
12	–	153111	1	CONNECTOR, 2/0 STR. TO 2 STR.

REVISED		BY	CK'D	APPR.
4	11/27/06	BURLISON	GUINN	HOYT
3	3/18/04	NUNNERY	NUNNERY	WOOLSEY
2	7/15/03	YOUNTS	SIMPSON	WOOLSEY
0	4/23/02	YOUNTS	SIMPSON	CRANE

GUY, MAST ARM – WITHOUT FIBERGLASS LINK – 5/16" GUY WIRE

Progress Energy

FLA DWG. 02.04-26



NOTE: USE ONLY WHEN PEDESTRIAN TRAFFIC IS EXPECTED BETWEEN POLE AND ANCHOR

STORMS CODE
GM_5

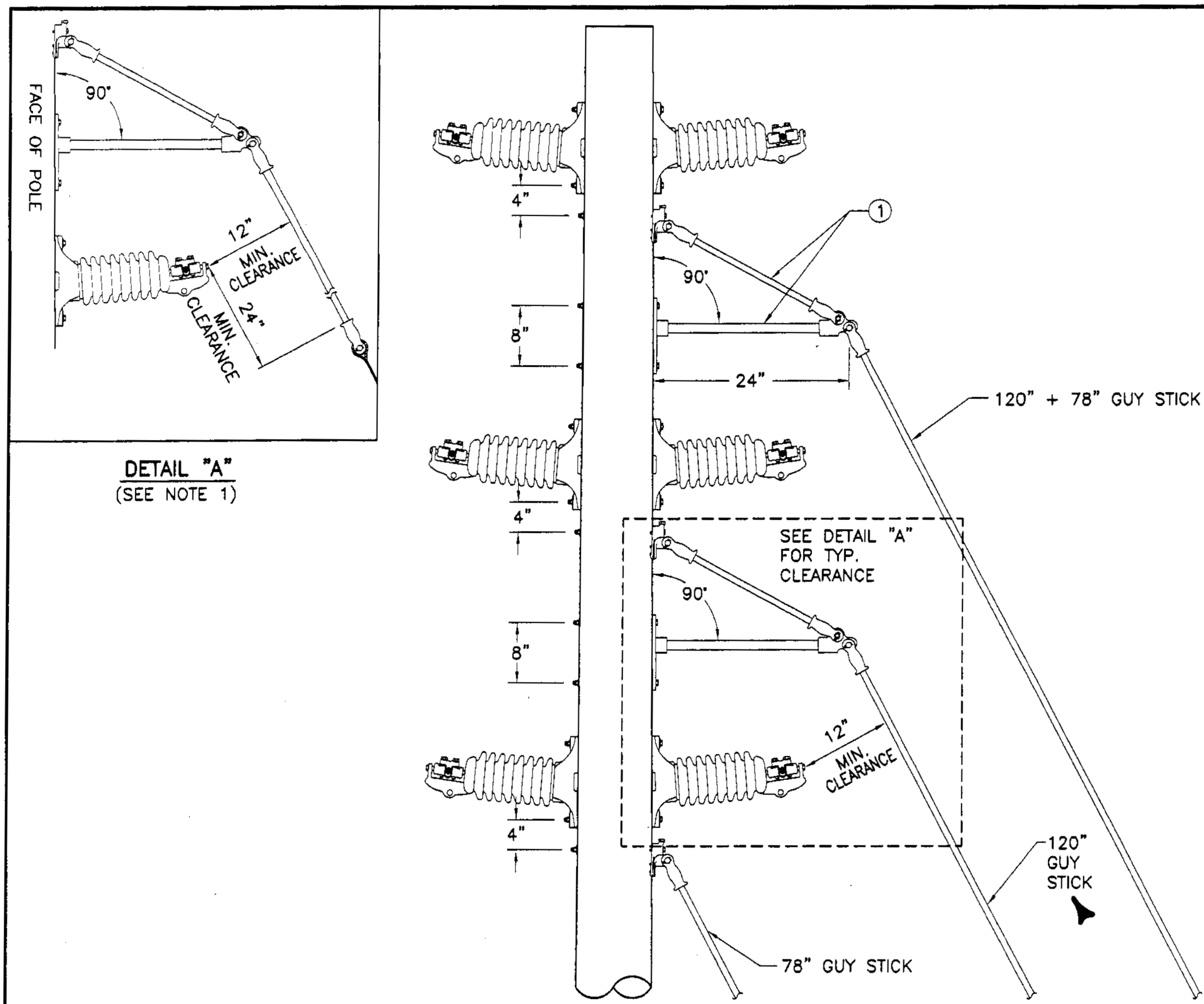
FLORIDA BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	–	152106	1	BOLT, 5/8" X 10" GALVANIZED WITH NUT
2	–	013308	1	WASHER, 2-1/4" SQUARE
3	–	050492	1	HOOK EYE PLATE GUY
4	–	–	1	LINK, FIBERGLASS (VARIES WITH SIZE)
5	–	050225	2	GRIP, GUY 5/16"
6	–	210504	40	WIRE, GUY 5/16"
7	–	050411	1	CLAMP, MAST ARM GUY
8	–	383208	1	PIPE, STEEL-MAST ARM, 2" GALVANIZED
9	–	050412	1	FLANGE, MAST ARM GUY
10	–	014114	2	SCREW, LAG 1/2" X 4"
11	–	153109	1	CONNECTOR, 2 STR. TO 2 STR. MAX
12	–	190404	3	WIRE, #6 SD CU, BARE (FEET)
13	–	153111	1	CONNECTOR, 2/0 STR. TO 2 STR. MAX

4	11/27/06	BURLISON	QUINN	HOYT
3	3/18/04	NUNNERY	NUNNERY	WOOLSEY
2	7/15/03	YOUNTS	SIMPSON	WOOLSEY
0	4/23/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

GUY, MAST ARM – WITH FIBERGLASS LINK – 5/16" GUY WIRE

Progress Energy

FLA DWG. 02.04-28



CAROLINAS BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	BKT-GUY-S024	10044204	1	GUY STANDOFF BRACKET

FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	MATERIAL ITEM	QUANTITY	DESCRIPTION
1	*GB__	152153	1	GUY STANDOFF BRACKET

*SEE FLORIDA DWGS. 01.03-03A AND 01.03-03B TO COMPLETE ASSEMBLY FOR THE ABOVE APPLICATION.

NOTES:

1. MAINTAIN 12" MINIMUM CLEARANCE FROM GUY STRAIN INSULATOR TO NEAREST HOT POINT. FIBERGLASS GUY STRAIN INSULATOR MUST EXTEND 24" BELOW LOWEST ENERGIZED COMPONENT. USE 78" OR 120" GUY STRAIN INSULATORS AS REQUIRED.
2. MAXIMUM INDIVIDUAL GUY TENSION SHALL NOT EXCEED 9000 LBS.
3. ALWAYS USE 3 GUYS TO DISTRIBUTE GUY LOADING. (POSITION AS SHOWN)
4. USE STANDOFF BRACKET WHEN RIGHT OF WAY CANNOT BE OBTAINED FOR EXTENDED GUY LEADS. DEPENDING ON POLE HEIGHT, SLOPE OF RIGHT OF WAY, AND MAINTAINING 12" CLEARANCE TO GUY STRAIN INSULATORS, ANCHORS MAY EXTEND OUTSIDE RIGHT OF WAY.
5. MINIMUM GUY LEAD TO HEIGHT RATIO TO BE 2:3 TO MAINTAIN CLEARANCE.

REVISED		BY	CK'D	APPR.
3	6/17/03	YOUNTS	SIMPSON	WOOLSEY
2	1/9/03	YOUNTS	SIMPSON	WOOLSEY
1	12/4/02	YOUNTS	SIMPSON	WOOLSEY
0	4/25/02	YOUNTS	SIMPSON	CRANE

DOUBLE CIRCUIT GUY STANDOFF BRACKET FOR ANGLES UP TO 25 DEGREES

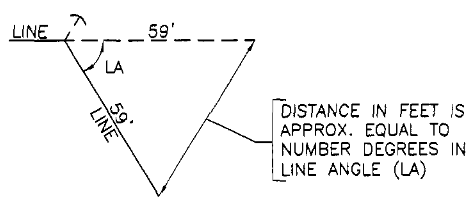
Progress Energy

PGN DWG. 02.04-30

TABLE A
TENSION IN GUY WIRE FOR ONE CONDUCTOR
(MULTIPLY BY NUMBER OF CONDUCTORS FOR TOTAL GUY TENSION)

LINE ANGLE DEGREES	6 BC 4 ACSR	4 BC 2 ACSR 2AAAC	2 BC 1/0 ACSR 1/0 AAAC	1/0 STR CU	2/0 STR CU	336 AAC	4/0 STR CU	795 AAC	LEAD TO HEIGHT
SPAN GUY									
10	379	396	547	571	679	799	953	1342	SPAN GUY
20	542	562	804	848	1022	1229	1475	2205	
30	702	724	1057	1121	1358	1651	1988	3053	
40	858	883	1303	1386	1685	2062	2488	3880	
50	1008	1035	1540	1642	2001	2459	2970	4678	
60	1152	1181	1768	1887	2303	2838	3432	5443	
DE	946	963	1493	1609	1989	2497	3032	5005	
LEAD TO HEIGHT = 2 TO 3 (PREFERRED)									
10	684	714	987	1030	1225	1440	1718	2420	3 / 2
20	977	1013	1450	1530	1842	2216	2660	3976	
30	1266	1306	1905	2020	2448	2977	3584	5504	
40	1547	1591	2349	2498	3038	3718	4485	6994	
50	1818	1867	2777	2960	3608	4433	5355	8434	
60	2077	2130	3187	3402	4152	5117	6187	9813	
DE	1705	1736	2692	2901	3586	4502	5466	9023	
LEAD TO HEIGHT = 1 TO 2									
10	848	886	1224	1277	1519	1787	2131	3002	2 / 1
20	1212	1256	1799	1897	2285	2748	3299	4931	
30	1570	1620	2363	2506	3036	3692	4446	6827	
40	1918	1974	2913	3099	3768	4611	5563	8675	
50	2255	2315	3444	3671	4475	5498	6642	10461	
60	2577	2642	3953	4219	5150	6347	7674	12171	
DE	2115	2153	3338	3598	4448	5583	6780	11192	
LEAD TO HEIGHT = 1 TO 3									
10	1199	1253	1731	1807	2148	2527	3014	4245	3 / 1
20	1714	1777	2544	2683	3231	3886	4666	6974	
30	2220	2291	3342	3544	4294	5221	6288	9655	
40	2713	2792	4120	4382	5329	6521	7867	12269	
50	3189	3274	4871	5192	6328	7776	9393	AVOID	
60	3644	3736	5590	5967	7284	8976	10853	AVOID	
DE	2992	3045	4721	5088	6290	7896	9588	AVOID	

EXAMPLE: 180 FT. SPANS, LINE ANGLE 60°, LEAD 2 TO 3, CL 5 SOIL, 3-336 PRIMARY WITH 1/0 AAC NEUTRAL. PRIMARY TENSION EQUALS 3 X 5117 LBS = 15,351 LBS (FROM TABLE A) PLUS 3187 LBS FOR NEUTRAL. USE 5/16" GUY WIRE PER POSITION. FROM DWG. 02.06-02, USE TRIPLE HELIX ANCHORS FOR PRIMARIES AND 8" SCREW ANCHOR FOR NEUTRAL.



NOTES:
1. USE 7/16" UG GUY WIRE OR MULTIPLE GUYS TO CARRY LOAD IN SHADED REGIONS.

3				
2	8/18/05	NUNNERY	GUINN	HOYT
1	6/2/05	NUNNERY	NUNNERY	HOYT
0	3/31/05	NUNNERY	NUNNERY	SPRINGER
REVISED		BY	CK'D	APPR.

SHORT SPAN GUYING TABLES
SPANS LESS THAN 200 FT.

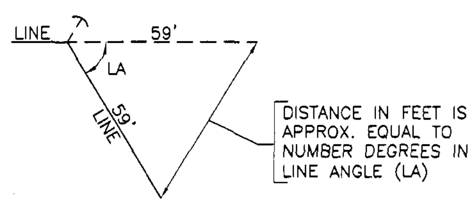
Progress Energy

FLA DWG. 02.04-33

TABLE B
TENSION IN GUY WIRE FOR ONE CONDUCTOR
(MULTIPLY BY NUMBER OF CONDUCTORS FOR TOTAL GUY TENSION)

LINE ANGLE DEGREES	6 BC 4 ACSR	4 BC 2 ACSR 2AAAC	2 BC 1/0 ACSR 1/0 AAAC	1/0 STR CU	2/0 STR CU	336 AAC	4/0 STR CU	795 AAC	LEAD TO HEIGHT
SPAN LIMIT	400	400	400	400	400	250	400	250	
SPAN GUY									
10	454	495	668	677	822	859	1129	1431	SPAN GUY
20	629	683	950	961	1166	1306	1637	2321	
30	801	868	1226	1239	1503	1744	2134	3195	
40	968	1047	1495	1509	1829	2170	2616	4046	
50	1128	1219	1753	1769	2143	2582	3081	4868	
60	1281	1383	2000	2017	2442	2975	3524	5655	
DE	1022	1099	1643	1654	2006	2596	2960	5164	
LEAD TO HEIGHT = 1 TO 1									
10	641	700	945	958	1163	1215	1597	2024	1 / 1
20	889	966	1344	1360	1649	1847	2315	3282	
30	1132	1227	1734	1753	2125	2466	3018	4518	
40	1368	1480	2114	2135	2587	3069	3700	5722	
50	1595	1724	2479	2502	3031	3651	4357	6885	
60	1812	1955	2828	2853	3454	4207	4983	7998	
DE	1445	1554	2324	2339	2837	3671	4186	7303	
LEAD TO HEIGHT = 2 TO 3 (PREFERRED)									
10	818	892	1204	1221	1483	1549	2035	2580	3 / 2
20	1134	1232	1713	1733	2102	2354	2951	4184	
30	1443	1564	2211	2234	2709	3144	3847	5759	
40	1744	1887	2695	2721	3297	3912	4717	7294	
50	2034	2197	3161	3190	3863	4654	5554	8776	
60	2310	2493	3605	3637	4402	5363	6353	10195	
DE	1842	1981	2962	2982	3616	4680	5336	9310	
LEAD TO HEIGHT = 1 TO 2									
10	1014	1107	1494	1515	1839	1921	2524	3200	2 / 1
20	1406	1528	2124	2150	2608	2920	3660	5190	
30	1790	1940	2742	2771	3360	3899	4771	7144	
40	2163	2340	3342	3375	4090	4853	5850	9047	
50	2523	2725	3920	3957	4792	5772	6889	10886	
60	2865	3092	4472	4511	5461	6651	7879	12645	
DE	2285	2457	3674	3698	4486	5805	6619	11547	

EXAMPLE: 250 FT. SPANS, LINE ANGLE 60°, LEAD 2 TO 3, CL 5 SOIL, 3-336 PRIMARY WITH 1/0 AAC NEUTRAL. PRIMARY TENSION EQUALS 3 X 5363 LBS = 16,089 LBS (FROM TABLE B) PLUS 3605 LBS FOR NEUTRAL. USE 5/16" GUY WIRE PER POSITION. FROM DWG. 02.06-02, USE TRIPLE HELIX ANCHORS FOR PRIMARIES AND 8" SCREW ANCHOR FOR NEUTRAL.



NOTES:
1. USE 7/16" UG GUY WIRE OR MULTIPLE GUYS TO CARRY LOAD IN SHADED REGIONS.

3				
2	8/18/05	NUNNERY	GUINN	HOYT
1	6/2/05	NUNNERY	NUNNERY	HOYT
0	3/31/05	NUNNERY	NUNNERY	SPRINGER
REVISED		BY	CK'D	APPR.

MEDIUM SPAN GUYING TABLES
200 FT. TO LESS THAN 400 FT.

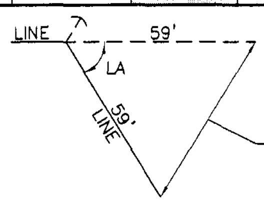
Progress Energy

FLA DWG. 02.04-35

TABLE C
TENSION IN GUY WIRE FOR ONE CONDUCTOR
(MULTIPLY BY NUMBER OF CONDUCTORS FOR TOTAL GUY TENSION)

LINE ANGLE DEGREES	4 BC 4 ACSR	2 BC	2 ACSR 2 AAAC	1/0 ACSR 1/0 AAAC	1/0 STR CU	2/0 STR CU	4/0 STR CU	LEAD TO HEIGHT
SPAN LIMIT	500	500	600	600	500	500	500	
SPAN GUY								
10	492	502	594	791	730	894	1219	SPAN GUY
20	674	695	806	1100	1016	1238	1721	
30	853	884	1012	1403	1296	1574	2212	
40	1026	1067	1213	1696	1567	1900	2687	
50	1192	1244	1405	1978	1829	2213	3145	
60	1351	1412	1587	2246	2077	2510	3580	
DE	1065	1126	1238	1807	1671	2013	2934	
LEAD TO HEIGHT = 1 TO 1								
10	695	710	840	1119	1032	1264	1723	
20	953	983	1140	1556	1437	1751	2434	
30	1206	1250	1432	1984	1833	2226	3128	
40	1451	1510	1715	2399	2217	2687	3801	1
50	1686	1759	1986	2797	2586	3129	4447	
60	1911	1997	2244	3176	2938	3550	5062	1
DE	1506	1592	1751	2555	2363	2847	4149	
LEAD TO HEIGHT = 2 TO 3 (PREFERRED)								
10	886	905	1071	1426	1315	1611	2197	
20	1215	1253	1453	1984	1831	2232	3102	
30	1537	1594	1825	2529	2336	2838	3987	
40	1849	1924	2186	3058	2826	3425	4845	3
50	2149	2242	2532	3566	3296	3989	5669	
60	2435	2545	2861	4049	3745	4525	6453	2
DE	1920	2030	2232	3258	3012	3629	5289	
LEAD TO HEIGHT = 1 TO 2								
10	1099	1123	1329	1769	1632	1998	2725	
20	1507	1554	1802	2461	2272	2768	3848	
30	1906	1977	2264	3137	2898	3520	4945	
40	2294	2387	2711	3793	3505	4248	6009	2
50	2666	2781	3141	4423	4089	4948	7032	
60	3021	3157	3549	5022	4645	5612	8004	
DE	2381	2518	2768	4041	3736	4501	6561	1

EXAMPLE: 400 FT. SPAN, DEADEND, LEAD 2 TO 3, CL 5 SOIL, #1/0 AAC PRIMARY WITH #1/0 AAC NEUTRAL. PRIMARY TENSION EQUALS 3258 LBS (FROM TABLE C) PLUS 3258 LBS FOR NEUTRAL. USE 5/16" GUY WIRE PER POSITION. FROM DWG. 02.06-02, USE 8" PISA.



DISTANCE IN FEET IS APPROX. EQUAL TO NUMBER DEGREES IN LINE ANGLE (LA)

NOTES:
1. USE 7/16" UG GUY WIRE OR MULTIPLE GUYS TO CARRY LOAD IN SHADED REGIONS.

REVISED	DATE	BY	CK'D	APPR.
3				
2	8/18/05	NUNNERY	GUINN	HOYT
1	6/2/05	NUNNERY	NUNNERY	HOYT
0	3/31/05	NUNNERY	NUNNERY	SPRINGER

LONG SPAN GUYING TABLES
400 FT. TO 600 FT.

Progress Energy

FLA DWG. 02.04-37

ANCHOR HOLDING POWER - POUNDS (FS=2.00)

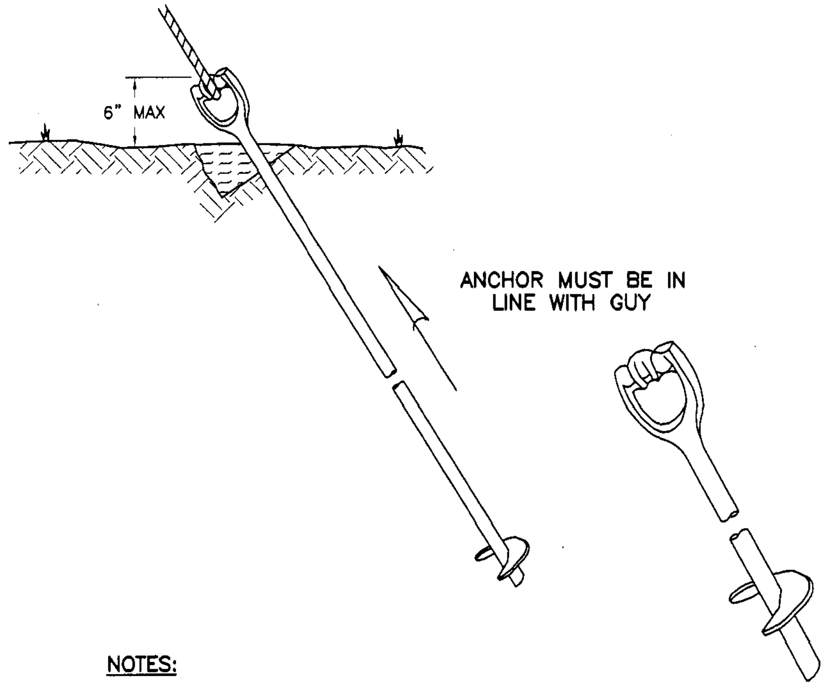
CLASS:	CLASS 1	CLASS 2	CLASS 3	CLASS 4	CLASS 5	CLASS 6	CLASS 7
TYPE SOIL:	SOLID BED ROCK	LAMINATED ROCK, SANDSTONE	SHALE, HARDPAN	GRAVEL, CLAYPAN	FIRM CLAY, COMPACT COURSE SAND	SOFT CLAY, LOOSE COARSE SAND COMPACT FINE SAND	FILL WET CLAY SILT, LOOSE FINE SAND
PROBE TORQUE (INCH-LBS)	-	OVER 600	500-600	400-500	300-400	200-300	100-200
ANCHOR	-	-	-	-	-	-	-
6" SCREW ANCHOR*	-	-	-	-	3250	2500	1250
8" SCREW ANCHOR	-	-	-	-	5500	4500	3000
10" SCREW ANCHOR	-	-	-	-	6500	5000	3500
15" SCREW ANCHOR *	-	-	-	-	10000	9000	7500
2 HELIX ANCHOR	-	20500	18000	16000	13500	11500	9500
3 HELIX ANCHOR	-	29000	25500	23000	19500	16000	13000
8" PISA*	-	12750	11500	9000	7500	6000	3750
10" PISA**	-	13750	12000	10500	8750	6500	5000
TWIN 10" PISA*	-	17000	16500	15000	12500	10000	8000
EXPANSION ANCHOR *	-	-	12250	10250	8500	7000	4500
ROCK ANCHOR*	11500	10000	-	-	-	-	-

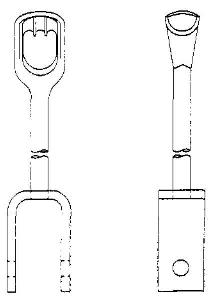
*USED IN CAROLINAS ONLY
**USED IN CAROLINAS AND INVERNESS ONLY

NOTES:

1. WHEN SELECTING ANCHORS, IT IS MORE ECONOMICAL TO USE ONE ANCHOR RATHER THAN MULTIPLE ANCHORS.
2. INSTALL ANCHORS DEEP ENOUGH, BY USE OF EXTENSIONS, TO PENETRATE CLASS 5, 6, OR 7 SOIL UNDERLYING MUSHY SILT OR QUICKSAND.
3. IF SATISFACTORY PENETRATION CANNOT BE ACHIEVED, REDUCE ANCHOR ONE SIZE AND USE NEXT LOWER SOIL CLASS FOR RATING (ENGINEERING APPROVAL REQUIRED).
4. ANCHORS SHOULD BE INSTALLED SUCH THAT THE ENTIRE ANCHOR ROD IS IN DIRECT LINE WITH THE TENSION ON THE GUY.
5. SEE CAROLINAS SECTION 12 AND FLORIDA SECTION 12 FOR COASTAL AND CONTAMINATED AREA APPLICATIONS.
6. ANCHOR HOLDING STRENGTH BASED ON MANUFACTURING TEST DATA.

SCREW ANCHOR

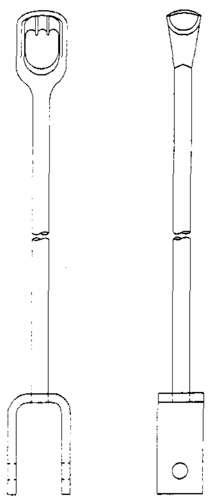




24" EXTENSION
PEC CN 10013613

NOTES:

1. SCREW INTO UNDISTURBED EARTH WITH TURNING BAR OR WITH ADAPTER ON POWER AUGER. USE CARE TO AVOID ANCHOR SPINNING IN A PLACE INSTEAD OF ADVANCING PROPERLY.



6' EXTENSION

PEC CN	PEF CN
10012508	40216

SINGLE HELIX SCREW ANCHOR

FLORIDA BILL OF MATERIALS		
ASSEMBLY	MATERIAL ITEM	DESCRIPTION
AN08	040108	ANCHOR SCREW, 8", SINGLE HELIX
AN10	040110	ANCHOR SCREW, 10" SINGLE HELIX

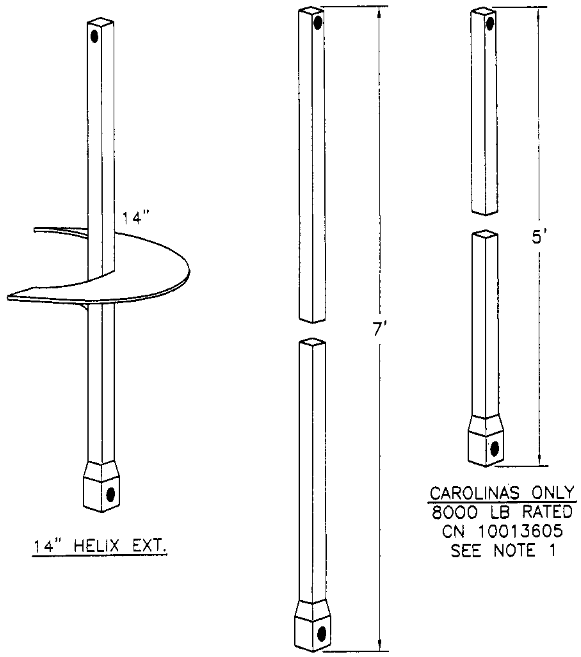
CAROLINAS BILL OF MATERIALS		
ASSEMBLY	CATALOG NUMBER	DESCRIPTION
ANC-SCR6	10012003	6" SCREW ANCHOR, 3/4" X 66"
ANC-SCR8	10012409	8" SCREW ANCHOR, 1" X 66"
ANC-SCR10	10012607	10" SCREW ANCHOR 1-1/4" X 96"
ANC-SCR15	10012805	15" SCREW ANCHOR, 1-1/4" X 96"

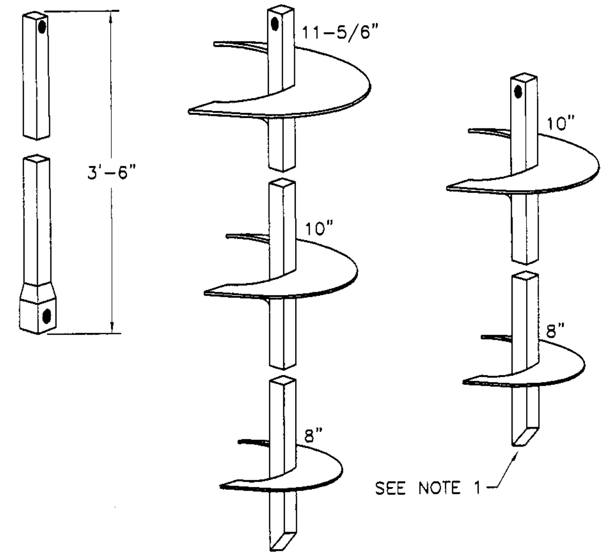
3				
2				
1	7/15/03	YOUNTS	SIMPSON	WOOLSEY
0	4/25/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

SCREW ANCHORS (NO WRENCH)

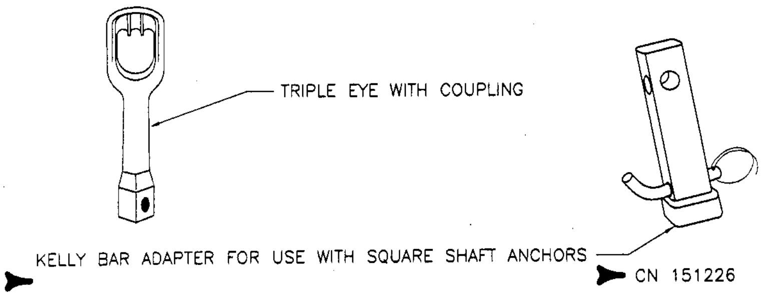
Progress Energy

PGN DWG. 02.06-06





STANDARD EXTENSION



NOTES:

1. 5' ANCHOR EXTENSION RATED FOR A HIGH TORQUE APPLICATION AND LABELED WITH GREEN PAINT. MATCHING DOUBLE HELIX AVAILABLE ALSO AVAILABLE (CAROLINAS ONLY CN 10013704).

2. INSTALL DOUBLE HELIX FIRST. IF ENOUGH TORQUE CANNOT BE REACHED, BACK THE DOUBLE OUT AND USE A TRIPLE. IF NEEDED, USE THE 14" HELIX EXTENSION IN WORST CASE SCENARIOS.

DOUBLE AND TRIPLE HELIX SQUARE SHAFT ANCHORS

FLORIDA BILL OF MATERIALS

ITEM NO.	ASSEMBLY	MATERIAL ITEM	QUANTITY	DESCRIPTION
1	AN2H	040132	1	ANCHOR, TRIPLE EYE, DOUBLE HELIX, 8" - 10"
		040204	1	ROD, EXT. ANCHOR, SQUARE SHAFT, 1-1/2" X 7'
		040232	1	EXTENSION, TRIPLE EYE
2	AN3H	040154	1	ANCHOR, TRIPLE EYE, TRIPLE HELIX, 8" - 10" - 12"
		040204	1	ROD, EXT. ANCHOR, SQUARE SHAFT, 1-1/2" X 7'
		040232	1	EXTENSION, TRIPLE EYE

CAROLINAS BILL OF MATERIALS

ITEM NO.	ASSEMBLY	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	ANC-THLX	10013209	1	ANCHOR, TRIPLE HLX, 7'
		10013506	1	ANCH, EXT, TRIPLE HLX, 7'
		10310605	1	TRIPLE EYE W/ COUPLING
2	ANC-DHLX	10013100	1	ANCHOR, DOUBLE HLX, 5'
		10013506	1	ANCHOR, EXT, TRIPLE HLX, 7'
		10310605	1	TRIPLE EYE W/ COUPLING
3	ANC-HLX-EXT4	10013407	1	ANCHOR, EXT, DBHLX 3.5'

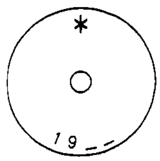
REVISED		BY	CK'D	APPR.
3				
2	8/16/06	SIMPSON	SIMPSON	HOYT
1	7/15/03	YOUNTS	SIMPSON	WOOLSEY
0	4/23/02	YOUNTS	SIMPSON	CRANE

DOUBLE AND TRIPLE HELIX
SQUARE SHAFT ANCHORS

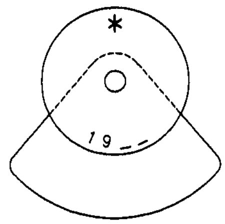
Progress Energy

PGN DWG. 02.06-08

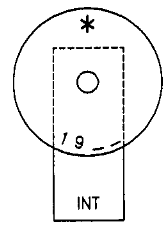
1. GROUND LINE TREATED.



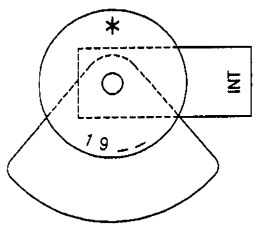
2. GROUND LINE TREATED AND FUMIGANT TREATED.



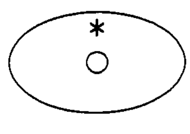
3. GROUND LINE TREATED AND INTERNAL TREATED.



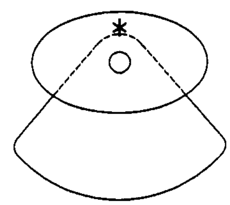
4. GROUND LINE TREATED. WOODFUMED AND INTERNAL TREATED OR WOODFUMED AND INTERNAL TREATED ONLY.



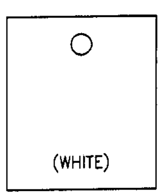
5. VISUAL BUT NOT GROUND LINE TREATED (VISUAL OR SOUND AND BORE).



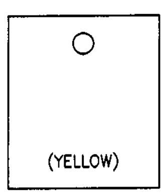
6. FUMIGANT TREATED ONLY.



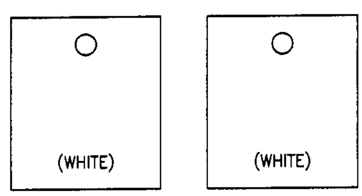
7. REJECT–POLE DOES NOT MEET STRENGTH REQUIREMENTS AND SHOULD BE REPLACED.



8. REJECT–POLE DOES NOT MEET STRENGTH REQUIRE– MENTS, BUT CAN BE GROUND LINE TREATED AND REINFORCED.



9. REJECT–POLE DOES NOT MEET STRENGTH REQUIREMENTS, SHALL NOT BE CLIMBED, AND SHOULD BE REPLACED AS SOON AS POSSIBLE.



NOTES:

1. ALL OF THE INSPECTION TAGS SHOWN ABOVE ARE ALUMINUM.
2. INSPECTION TAGS 7, 8 AND 9 SHOWN ABOVE ARE PAINTED THE COLOR INDICATED ON THE TAG.
3. INSPECTION TAGS 7, 8 AND 9 (REJECT TAGS) ARE ATTACHED AND CENTERED ON EXISTING POLES 2" BELOW THE DIS NUMBER. IF FOUND, REPORT TO LOCAL OPERATIONS CENTER.

3				
2				
1				
0	3/22/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

OSMOSE POLE INSPECTION TAGS (O&M)

Progress Energy

PGN DWG. 02.08–04

STANDARD PROCEDURES BULLETIN

1. GROUNDLINE TREATMENT OF POLES TO BE REINFORCED

THE NORMAL SEQUENCE OF THE CREOSOTE-TREATED WOOD POLE INSPECTION / TREATMENT / REINFORCEMENT ACTIVITIES AS PRESCRIBED IN THE DISTRIBUTION SYSTEM PREVENTATIVE MAINTENANCE PROGRAM IS:

A. FIRST, THE POLE IS TO BE INSPECTED PER THE SPECIFICATIONS FOR THE INSPECTION AND GROUNDLINE TREATMENT OF WOOD POLES. THIS INSPECTION WILL IDENTIFY REINFORCEABLE POLES, AS WELL AS THE TREATMENT(S) THE POLE NEEDS TO RECEIVE.

B. NEXT, THE SPECIFICATION CALLS FOR THE POLE DETERMINED TO BE REINFORCEABLE TO BE FULLY TREATED WITH ALL OF THE GROUNDLINE TREATMENTS DETERMINED NECESSARY BY THE INSPECTION. THE PAYTOX POLE BANDAGE IS NOT ONE OF THE TREATMENTS CALLED FOR IN THE INSPECTION. PAYTOX IS THE PRESERVATIVE WRAP SPECIFIED BY DWG. 02.08-08 FOR RETREATING CREOSOTE POLES WHICH EITHER:

1. HAVE BEEN REMOVED FROM SERVICE, CLASSIFIED FOR REUSE, AND ARE BEING REINSTALLED.
2. ARE MORE THAN 5 YEARS OLD AND MORE THAN HALF OF THE SURROUNDING EARTH HAS BEEN EXCAVATED FOR MAJOR UNDERGROUND CONSTRUCTION (*e.g.* BULK FEEDER RISER INSTALLATION).

2. STEEL REINFORCER SHALL BE HEAVY DUTY GALVANIZED OSMO-C-TRUSS™ OR OSMO-C2-TRUSS™. SEE DWG. 02.08-10 FOR TRUSS SELECTION GUIDE.

3. THE HEIGHT OF STEEL ABOVE THE GROUNDLINE SHALL BE AS SHOWN ON DWG. 02.08-12.

4. TO ACHIEVE MAXIMUM STRENGTH, POSITION THE TRUSS SO THAT ITS STRONGEST AXIS IS PARALLEL TO THE DIRECTION OF FALL. SEE DETAILS A-E ON DWG. 02.08-14.

5. THE STEEL REINFORCER SHALL BE DRIVEN TO A DEPTH OF AT LEAST 6" DEEPER THAN THE POLE DESIGN EMBEDMENT SHOWN ON DWG. 02.02-08. SEE DWG. 02.08-12.

6. BANDING SHALL BE HEAVY-DUTY GALVANIZED STEEL STRAPPING 2" WIDE X 0.060" THICK WITH COATING OF 2 OZ PER SQUARE FT. (MIN.), OR EQUIVALENT STAINLESS STEEL BAND. STRAPPING MUST RESIST A LOAD OF 10,000 LBS. TENSION, AND HAVE MINIMUM TENSILE STRESS OF 82,000 PSI.

7. SEE DETAILS A & B ON DWG. 02.08-12 FOR REQUIRED QUANTITY AND LOCATIONS OF BANDING.

8. BAND SEALS SHALL BE HEAVY-DUTY GALVANIZED STEEL. EACH BAND SHALL BE SECURED WITH TWO CRIMPED SEALS.

9. POLES REINFORCED WITH 7" OR 8" TRUSSES SHALL BE SINGLE WRAPPED WITH STEEL STRAPPING AND SECURED WITH TWO BANDING SEALS. POLES REINFORCED WITH 9" OR 10" TRUSSES SHALL BE DOUBLE WRAPPED WITH STEEL STRAPPING SECURED WITH TWO DOUBLE BANDING SEALS AND DOUBLE BANDS.

10. DOUBLE TRUSSES ARE **NOT PERMITTED** ON DISTRIBUTION POLES.

11. REINFORCED POLES SHALL BE TAGGED WITH A COMPANY-APPROVED TAG SHOWING YEAR REINFORCED AND COMPANY REINFORCING (PROGRESS ENERGY COMPANY OR CONTRACTOR).

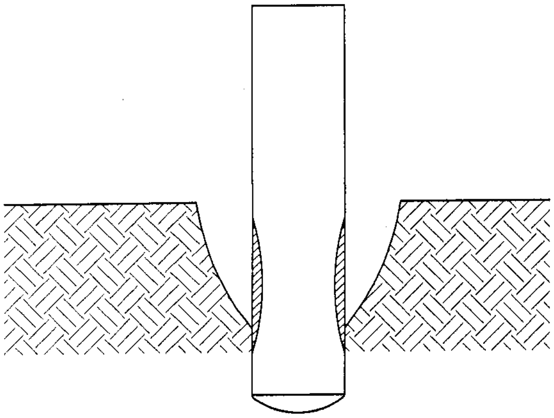
12. REFER TO POLE GROUNDLINE INSPECTION AND TREATMENT SPECIFICATION FOR RELATED INFORMATION.

3			
2			
1 6/30/06	CECCONI	QUINN	HOYT
0 4/25/02	YOUNTS	SIMPSON	CRANE
REVISED	BY	CK'D	APPR.

POLE REINFORCING (O&M)

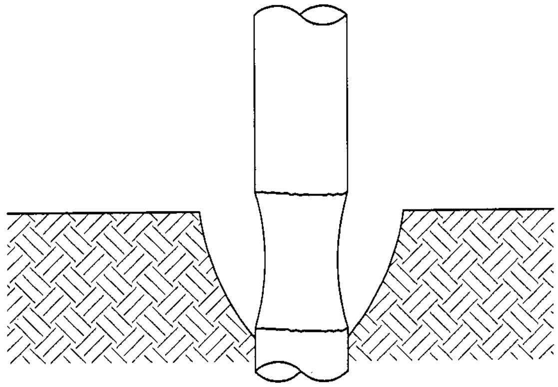
Progress Energy

PGN DWG. 02.08-06

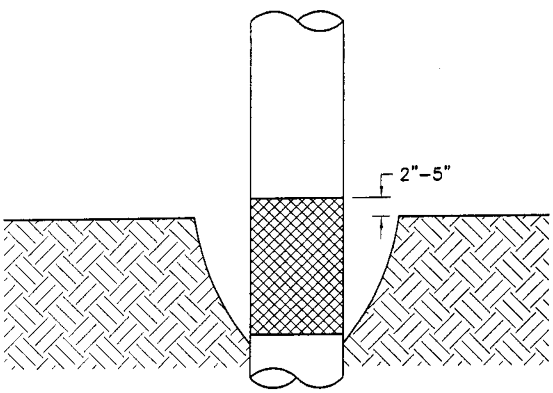


A. 1. <u>EXISTING POLES:</u>
EXCAVATE 18" DEEP, SOUND AND PROD–TEST POLE TO EVALUATE INTERIOR STRENGTH. (ONCE A POLE IS EXCAVATED IT MUST BE TREATED OR REJECTED. A POLE SHOULD BE REJECTED WHEN EXTERNAL ROT REDUCES THE CIRCUMFERENCE OF THE POLE 3" OR MORE.)

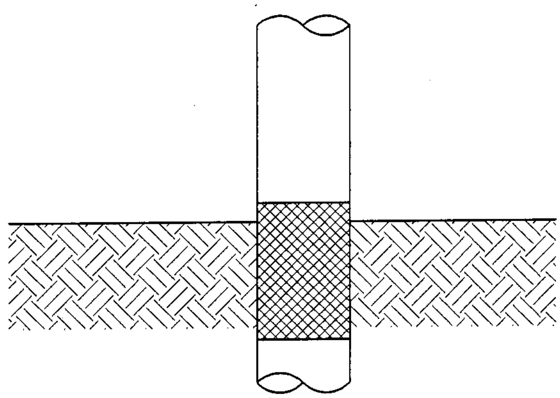
2. <u>REINSTALLED POLES:</u>
SET POLE AND BACK–FILL (& TAMP) TO LEVEL 18" FROM GRADE.



B. REMOVE EXTERNAL DECAY, AND WIRE BRUSH ADHERING SOIL FROM POLE.



C. A FIBERGLASS POLE WRAP (PATOX) IS APPLIED SO THAT 2" – 5" OF COVERING IS ABOVE NORMAL GROUND LEVEL. STAPLE OR TACK WRAP TO POLE TO HOLD IN PLACE. ENSURE WRAP MAKES GOOD CONTACT WITH POLE SURFACE, LEAVING NO AIR VOIDS BETWEEN WRAP AND POLE.



D. EXCAVATION IS BACK–FILLED AND TAMPED.

<u>NOTES:</u>

1. ALL CREOSOTE WOOD POLES THAT ARE REMOVED FROM SERVICE AND CLASSIFIED FOR REUSE WILL BE GROUND–LINE TREATED AT THE TIME THE POLE IS REINSTALLED.
2. TREAT ALL CREOSOTE POLES OVER 5 YEARS OLD WHEN DIRT IS EXCAVATED FROM MORE THAN HALF OF THE POLE CIRCUMFERENCE BY MAJOR U.G. CONSTRUCTION. CCA (SALT GREEN) POLES DO NOT REQUIRE TREATMENT.
3. WHEN EXISTING U.G. RISERS ARE ENCOUNTERED, INSTALL WRAP AROUND POLE TO THE EXTENT POSSIBLE.

3				
2				
1				
0	4/23/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

GROUNDLINE RE–TREATMENT – CREOSOTE POLES
(O&M)

Progress Energy

PGN DWG. 02.08–08

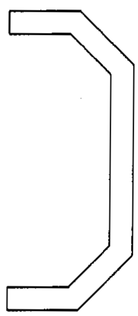
REINFORCING TRUSS SELECTION CHART

POLE HEIGHT	POLE CLASS			
	2	3	4	5
	TRUSS SIZE			
35 FT.				7X10 OR 7X11
40 FT.		9X10 OR 9X11	8X10 OR 8X11	8X10 OR 8X11
45 FT.	9HDX12	9X10 OR 9X11	9X10 OR 9X11	8X10 OR 8X11
50 FT.	9HDX12	9HDX12	9X10 OR 9X11	9X10 OR 9X11
55 FT.	10HDX13	9HDX13	9X10 OR 9X11	
60 FT.	10HDX13	9HDX13	9HDX13	

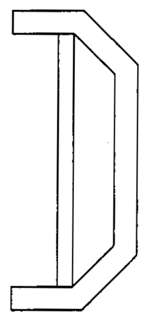
NOTES:

1. "HD" SUFFIX FOR TRUSS SIZE INDICATES TRUSS IS HEAVY DUTY. HEAVY DUTY TRUSSES ARE REINFORCED WITH A STIFFENER PLATE.
2. FOR POLES HIGHER THAN 60', CONTACT DISTRIBUTION STANDARDS FOR REQUIRED TRUSS SIZES AND ARRANGEMENTS.

TRUSS PROFILES



STANDARD



HEAVY DUTY

NOTES:

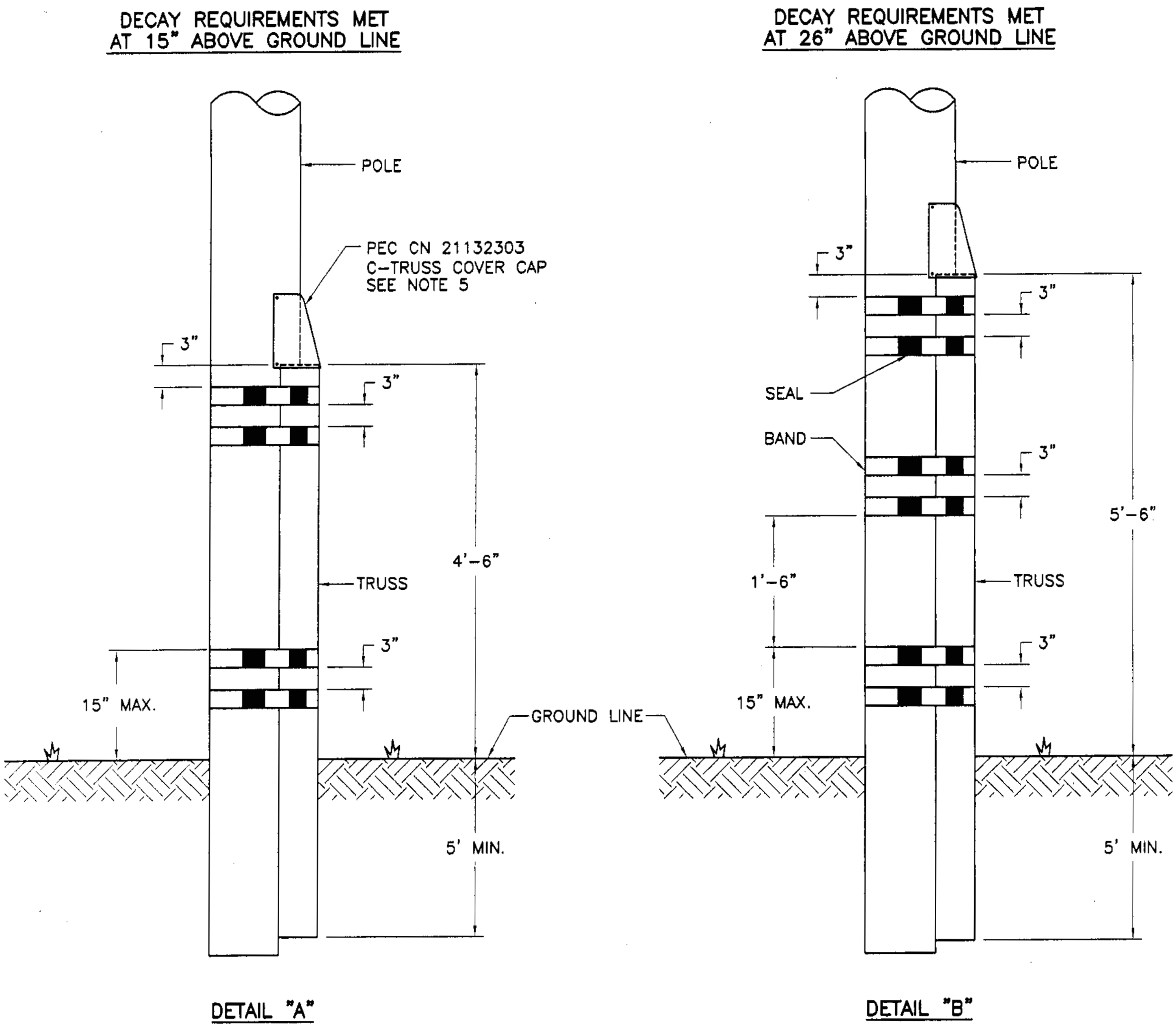
1. THE FOLLOWING TYPES OF POLES ARE NOT ECONOMICAL TO REINFORCE:
   A. SERVICE POLES
   B. 35' SINGLE-PHASE TANGENT LINE POLES WITH NO PRIMARY EQUIPMENT (E.G. TRANSFORMERS, RECLOSERS)
2. DO NOT REINFORCE RAILROAD AND LIMITED ACCESS HIGHWAY CROSSING POLES DUE TO THE POSSIBILITY OF REDUCED STRENGTH AT THE POLE TOP.

3				
2				
1	11/7/03	CECCONI	SIMPSON	WOOLSEY
0	4/23/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

POLE REINFORCING (O&M)

Progress Energy

PGN DWG. 02.08-10



METHOD FOR DETERMINING REQUIRED TRUSS SIZE

1. DETERMINE MINIMUM LENGTH OF STEEL REQUIRED ABOVE GROUNDLINE (4.5' OR 5.5' FROM REJECTED POLE SUMMARY).
2. REQUIRED MINIMUM LENGTH OF TRUSS IS 1.0' + 5.0' (EITHER 9.5' OR 10.5').
3. DETERMINE MINIMUM TRUSS SIZE FOR POLE CLASS AND LENGTH FROM DWG. 02.08-10.
4. POLES REINFORCED WITH 7" OR 8" TRUSSES SHALL BE SINGLE WRAPPED WITH STEEL STRAPPING SECURED WITH TWO BANDING SEALS. POLES REINFORCED WITH 9" OR 10" TRUSSES SHALL BE DOUBLE WRAPPED WITH STEEL STRAPPING SECURED WITH TWO DOUBLE BANDING SEALS.
5. DO NOT INSTALL C-TRUSS COVER CAP AT TIME OF C-TRUSS INSTALLATION. PERMANENTLY INSTALL C-TRUSS COVER, ONLY PRIOR TO CLIMBING POLE.

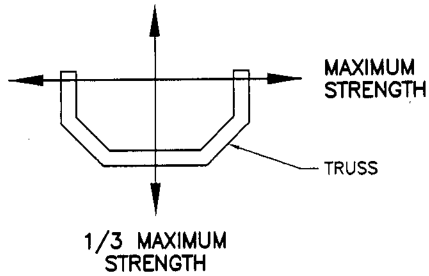
3				
2				
1				
0	3/22/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

POLE REINFORCING (O&M)

Progress Energy

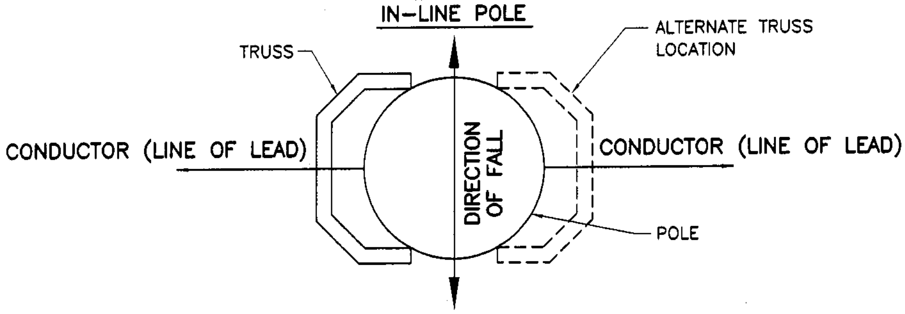
PGN DWG. 02.08-12

TRUSS STRENGTH



DETAIL "A"

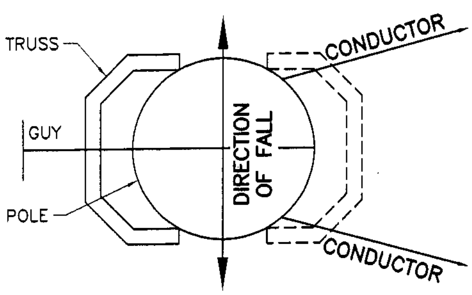
TANGENT
IN-LINE POLE



(PLACE TRUSS IN THE LINE OF LEAD)

DETAIL "B"

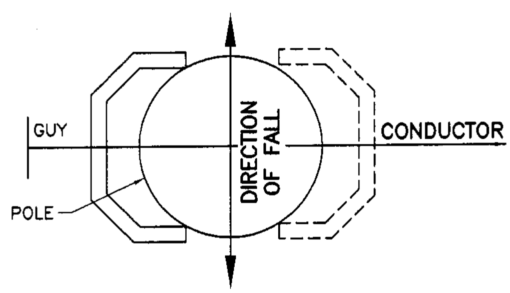
ANGLE OR
CORNER POLE



(PLACE TRUSS SO THAT ITS
STRONGEST AXIS IS PARALLEL TO
THE DIRECTION OF FALL)

DETAIL "C"

DEAD END POLE



(PLACE TRUSS SO THAT ITS
STRONGEST AXIS IS PARALLEL TO
THE DIRECTION OF FALL)

DETAIL "D"

NOTES:

1. IN DETAILS B, C, & D, THE TWO TRUSS ORIENTATIONS SHOWN ARE THE ONLY PERMISSIBLE ORIENTATIONS. ALTERNATE TRUSS LOCATION IS SHOWN BY THE DASHED LINE.
2. IF POLE CONFIGURATION/LOADING IS ALTERED, RE-EVALUATE THE POLE TO DETERMINE IF RELOCATION OF REINFORCEMENT OR POLE REPLACEMENT IS REQUIRED.

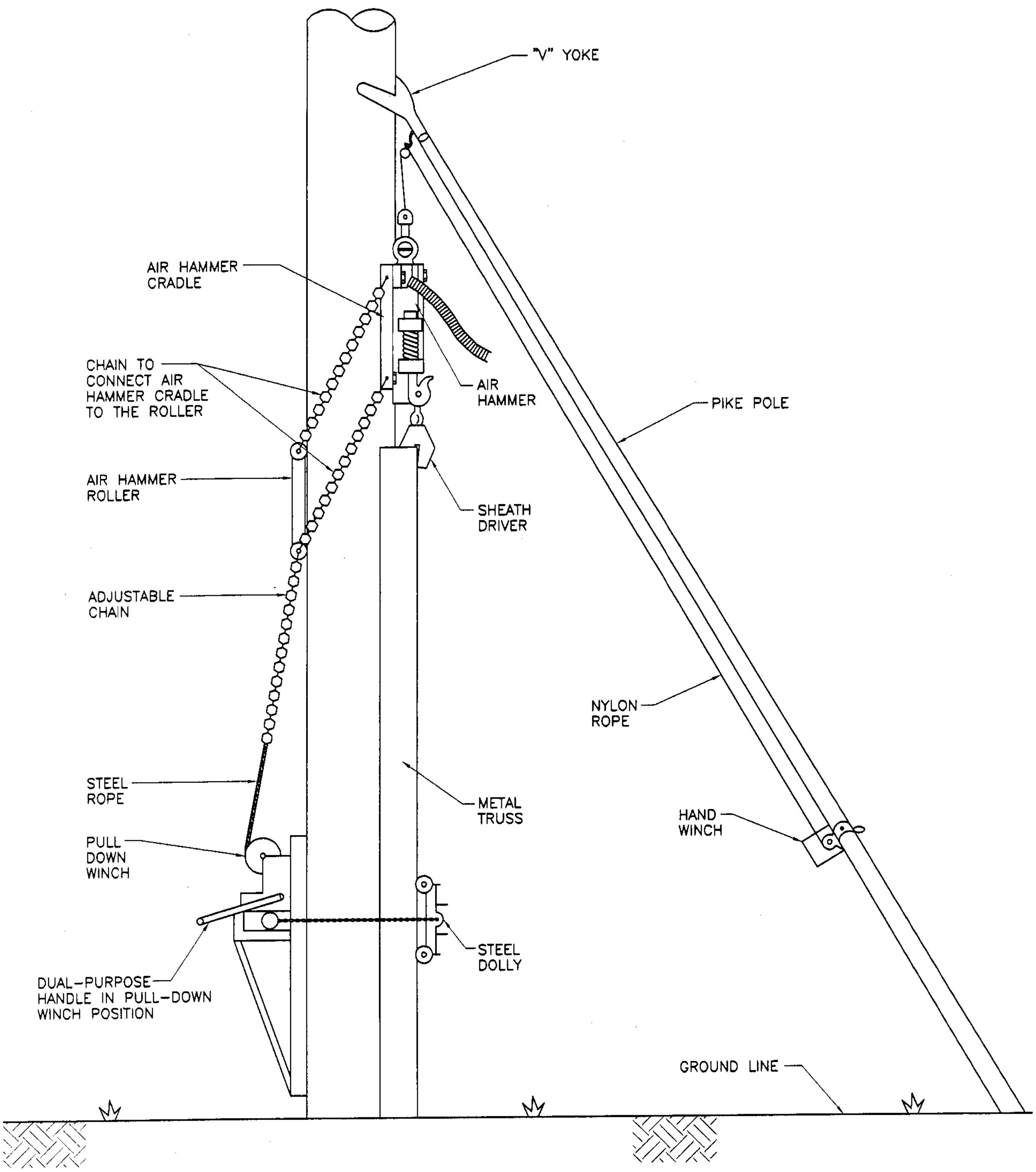
3			
2			
1			
0 4/23/02	YOUNTS	SIMPSON	CRANE
REVISED	BY	CK'D	APPR.

POLE REINFORCING
ORIENTATION OF TRUSS (O&M)

Progress Energy

PGN DWG. 02.08-14

SETTING UP PIKE POLE WINCH, AIR HAMMER, AIR HAMMER ROLLER AND PULL DOWN WINCH FOR DRIVING TRUSS INTO GROUND



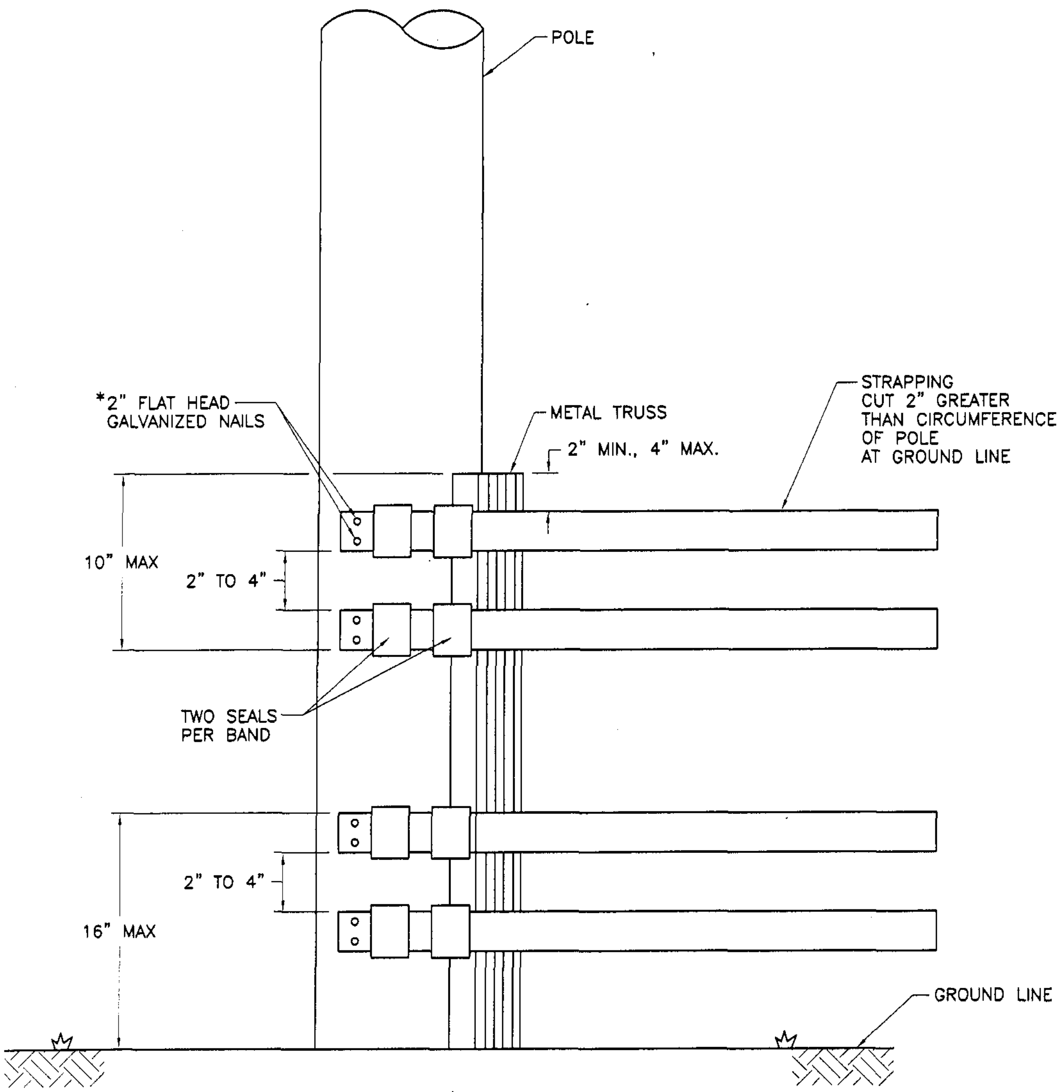
3				
2				
1				
0	4/23/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

POLE REINFORCING – SETUP DETAIL (O&M)

Progress Energy

PGN DWG. 02.08–16

NAILING STRAPPING TO POLE – PLACING SEALS ON STRAPPING



NOTES:

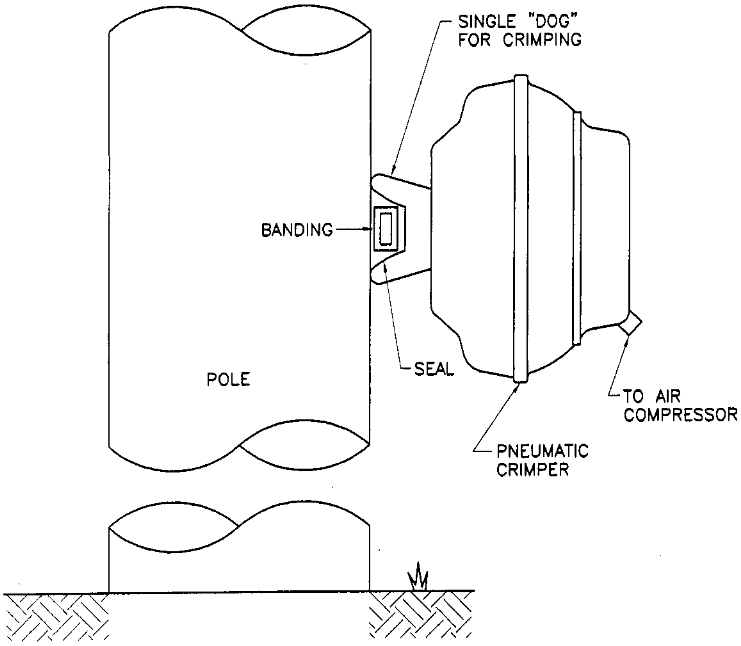
1. NAILS TO HOLD BANDS ARE NOT NECESSARY WHEN USING A PNEUMATIC TENSIONER.

3				
2				
1				
0	4/25/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

POLE REINFORCING
STRAPPING PLACEMENT (O&M)

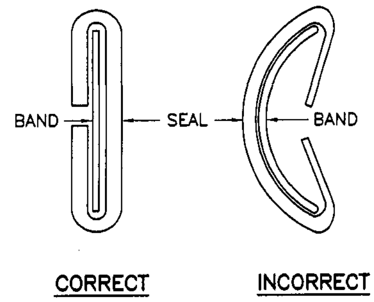
Progress Energy

PGN DWG. 02.08–18



CRIMPING THE SEALS ON BANDING STRAPS
(METAL TRUSS OMITTED FOR CLARITY)

SEAL AND BAND INSTALLATION



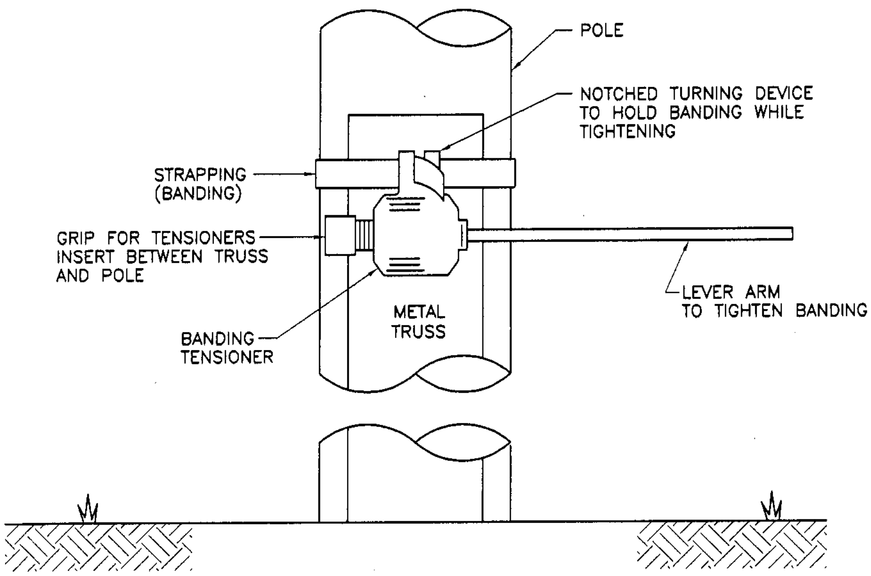
CRIMPING SEALS

TRUSS SIZE	SEAL TYPE
7" & 8"	2 SEALS PER BAND (SINGLE WRAP BANDING)
9" & 10"	2 SEALS PER BAND (DOUBLE WRAP BANDING)

NOTE:

1. WHEN SEAL IS CRIMPED, NEITHER SEAL NOR BAND SHALL BE TORN BY CRIMPING. EACH SEAL SHALL BE CRIMPED IN TWO PLACES.

TENSIONING BANDING AROUND TRUSS AND POLE



NOTE:

1. USE THREE TENSIONERS IN ONE OPERATION FOR TIGHTENING BANDS. START WITH THE TOP BAND AND TENSION TOP THREE BEFORE CRIMPING. (TWO TENSIONERS AND BANDING OMITTED FOR CLARITY PURPOSES)

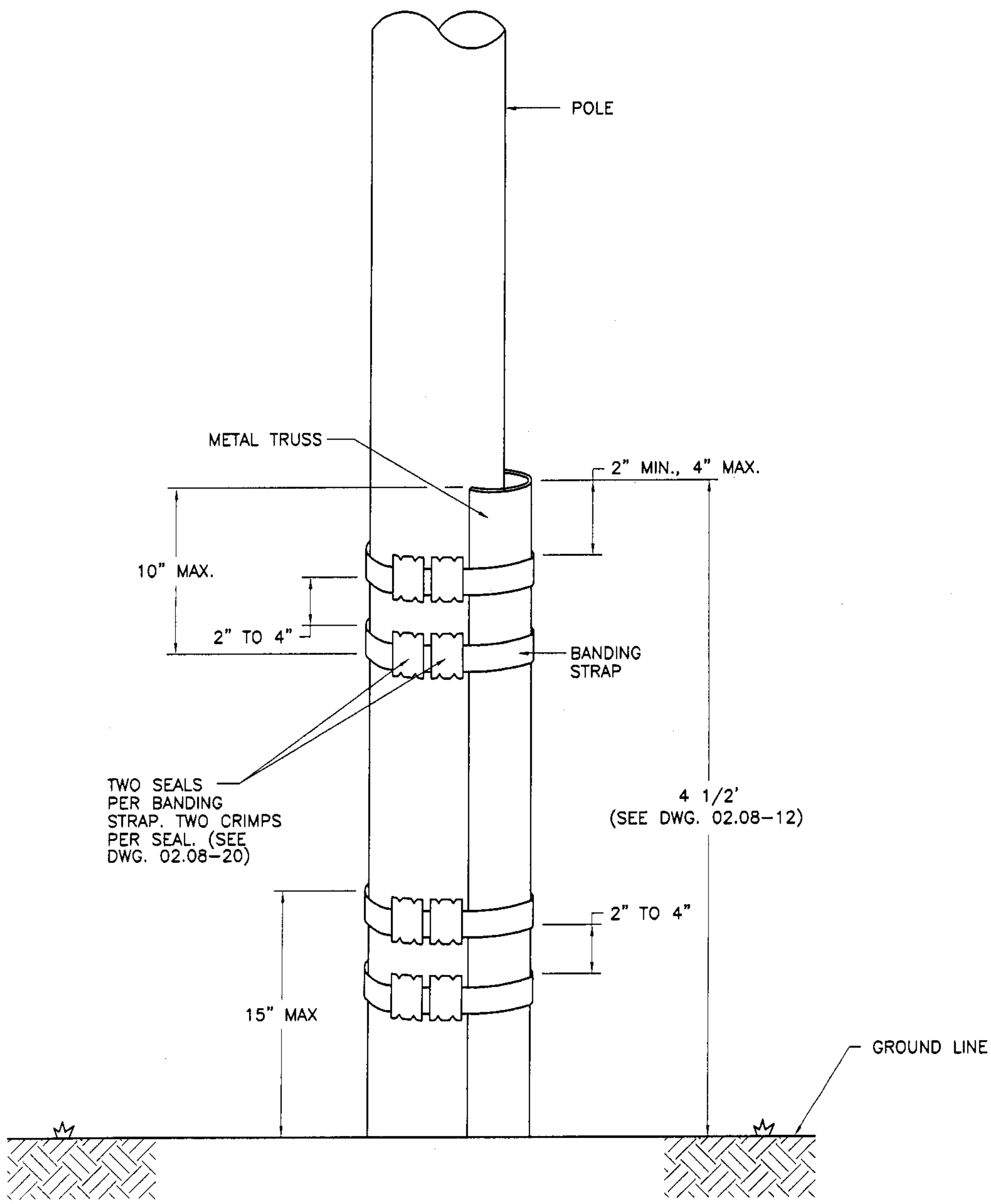
3				
2				
1				
0	4/25/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

POLE REINFORCEMENT TENSIONING BANDS & CRIMPING SEALS (O&M)

Progress Energy

PGN DWG. 02.08-20

BANDING STRAP LOCATIONS AND AMOUNT OF TRUSS EXPOSURE ON POLE AFTER DRIVING



3				
2				
1				
0	4/25/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

POLE REINFORCING – COMPLETE INSTALLATION
(O&M)

Progress Energy

PGN DWG. 02.08–22

3				
2	7/3/06	CECCONI	GUINN	HOYT
1	6/30/04	CECCONI	NUNNERY	WOOLSEY
0	7/31/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

STANDARD PRIMARY CONSTRUCTION:

SPECIFICATIONS AS OUTLINED IN THIS SECTION ARE CONSIDERED TO BE THE PREFERRED CONSTRUCTION. THE LOCATION OF HARDWARE IS POSITIONED TO BE THE BEST FOR OVERALL APPLICATION. ALTERNATE CONSTRUCTION SHOULD BE CONSIDERED ONLY WHEN ABSOLUTELY NECESSARY. FRAME POLES WITH HARDWARE BEFORE ERECTING WHENEVER POSSIBLE.

PROGRESS ENERGY CAROLINAS:
IN URBAN AREAS AND FOR NEW BULK FEEDERS (I.E., FEEDERS WITH PRIMARY CONDUCTORS SIZED 2/0 AND LARGER), DELTA IS THE STANDARD CONSTRUCTION. IN RURAL AREAS, CROSSARM IS THE STANDARD FOR PRIMARY CONDUCTORS 1/0 AND SMALLER.

PROGRESS ENERGY FLORIDA:
VERTICAL PHASE OVER PHASE IS THE STANDARD CONSTRUCTION WITH HORIZONTAL AVAILABLE WHERE ROW IS NOT A FACTOR.

DOUBLE CIRCUIT CONSTRUCTION IS VERTICAL PHASE OVER PHASE FOR THE CAROLINAS AND FLORIDA. IF A SECOND CIRCUIT IS PLANNED, THE INITIAL CIRCUIT SHALL BE CONSTRUCTED VERTICALLY.

VERTICAL PHASE OVER PHASE SPACING IN THE SPAN:

THE STANDARD PHASE OVER PHASE SPACING SHALL BE 42" FOR 25KV CIRCUITS OR DOUBLE CIRCUITS OF ANY VOLTAGE. THE STANDARD PHASE OVER PHASE SPACING FOR 12KV CIRCUITS SHALL BE 36".

NEUTRALS:

1. NEUTRALS SHALL BE MULTI-GROUNDED AND IN A POSITION ON THE POLE COMMON TO BOTH THE PRIMARY AND SECONDARY SYSTEMS, EXCEPT FOR OVERHEAD GROUND WIRE CONSTRUCTION.

2. THE NEUTRAL AND SECONDARY SHOULD BE INSTALLED ON THE FIELD SIDE OF THE POLE WHERE POSSIBLE TO IMPROVE THE GENERAL APPEARANCE OF THE OVERHEAD SYSTEM AND TO FACILITATE AN EASIER POLE REPLACEMENT.

CONDUCTORS:

1. OVERHEAD CONDUCTORS WILL BE BARE ON ALL CIRCUITS EXCEPT SERVICES AND SLACK SPANS THROUGH 1/0. IN THESE LOCATIONS, MULTIPLEX OR COVERED SOFT DRAWN WIRE SHALL BE USED.

2. PLACE CONDUCTORS ON THE INSULATORS SO THAT THE WIRE TENSION HOLDS IT AGAINST THE INSULATOR (EXCEPT FOR CLAMP TYPE). FACTORY TIES SHALL BE USED WITH THE CONDUCTORS COMPLETELY FREE FROM CONDUCTOR INSULATION UNDER THE TIE.

3. CONDUCTORS MUST BE ACCURATELY SAGGED ACCORDING TO THE CORRECT SPAN LENGTH TABLE TAKING INTO CONSIDERATION THE PREVAILING TEMPERATURE OF THE CONDUCTOR.

4. WHEN SPLICING OR CONNECTING CONDUCTORS, BE SURE TO USE THE PROPER CONNECTOR FOR THE JOB AND ADEQUATELY PREPARE THE WIRE AND CONNECTOR TO ENSURE A SOLID CONNECTION.

CUTOUTS:

ARRANGE CUTOUTS SO THAT THE DISCHARGE FROM THE BLOWN FUSE WILL NOT BE DIRECTED TOWARD THE OPERATOR. ENSURE THAT THE FUSE HOLDER IS CLEAR OF ANY ENERGIZED EQUIPMENT WHEN IN THE OPEN POSITION AND REMOVABLE WITHOUT CONTACT TO ANY ENERGIZED CIRCUIT.

GUYING:

GUYING ATTACHMENTS SHOWN ON DRAWINGS ARE TO INDICATE NORMAL POSITIONS WHEN GUYING IS NECESSARY. WHEN THERE IS A DOUBT AS TO THE EXACT LOCATION OF A GUY IT SHOULD BE SPECIFIED BY THE ENGINEER.

INSTALL AN INSULATOR ON ALL GUYS ABOVE THE NEUTRAL POSITION. THE GUY INSULATORS SHALL BE LONG ENOUGH TO PREVENT THE GUY STRAND FROM CONTACTING ANY ENERGIZED COMPONENT IN THE EVENT OF FAILURE.

3				
2	3/9/04	NUNNERY	NUNNERY	WOOLSEY
1	1/28/04	CECCONI	NUNNERY	WOOLSEY
0	4/22/03	ROBESON	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

PRIMARY CONSTRUCTION

Progress Energy

PGN DWG. 03.00-02

GRADE OF CONSTRUCTION:

THE NORMAL CONSTRUCTION GRADE FOR PROGRESS ENERGY LINE DESIGN IS NESC GRADE C. SUPPORTS FOR PORTIONS OF PRIMARY LINES CROSSING OVER RAILROAD TRACKS AND LIMITED-ACCESS HIGHWAYS MUST BE BUILT TO NESC GRADE B. UNLESS OTHERWISE NOTED, THE DRAWINGS GIVE DETAILS FOR GRADE C CONSTRUCTION. REFER TO DWG. 03.10-14 (CAROLINAS ONLY) FOR SPECIFIC RAILROAD CROSSING DETAILS AND DWG. 03.10-10 FOR LIMITED-ACCESS HIGHWAY CROSSINGS.

CONSTRUCTION REQUIREMENTS FOR GRADE B:
GENERALLY, STANDARD SPECIFICATIONS FOR LINE SUPPORTS MAY BE USED FOR GRADE B APPLICATIONS PROVIDED THE FOLLOWING MODIFICATIONS ARE MADE:

1. CROSSARM CONSTRUCTION- USE DOUBLE WOOD ARMS AND PINS.
2. ARMLESS AND CROSSARM CONSTRUCTION (CENTER PHASE) - USE POLE TOP BRACKET AND 35KV VERTICAL CLAMP TOP INSULATOR IN PLACE OF POLE TOP PIN AND PIN INSULATOR.
3. ARMLESS CONSTRUCTION - USE 35KV HORIZONTAL LINE POST INSULATOR IN PLACE OF EITHER A STEEL OFFSET BRACKET AND ROUND BASE POST INSULATOR ASSEMBLY OR A FIBERGLASS BRACKET AND PIN INSULATOR ASSEMBLY.

DEADEND ARRANGEMENTS ARE SATISFACTORY FOR BOTH GRADES B AND C.

REFER TO ENGINEERING MANUAL FOR PROPER POLE SIZING AND CAROLINAS SECTION 2 AND FLORIDA SECTION 2 FOR GUY AND ANCHOR SIZES TO USE FOR GRADE B AND C CONSTRUCTION.

TRANSMISSION UNDERBUILT:

1. USE 10' CROSSARMS FOR ALL HORIZONTAL CONSTRUCTION.
2. ALL PRIMARY TAP PHASE CONNECTIONS ARE TO BE MADE AT LEAST 4'-6" OUT ON THE SOURCE LINE.
3. THE DISTANCE BETWEEN THE DISTRIBUTION PRIMARY PHASE CONDUCTOR AND THE TRANSMISSION CONDUCTOR IS TO BE SPECIFIED BY THE ENGINEER.
4. FOR STEEL POLE CONSTRUCTION, WHEN THE NECESSARY ATTACHMENTS ARE NOT PROVIDED, BAND ANY ADDITIONAL REQUIRED ATTACHMENTS TO THE POLE WITH STAINLESS STEEL BANDING.

LOCKWASHERS:

THE STANDARD LOCKWASHERS FOR WOOD POLE HARDWARE ARE THE GALVANIZED DOUBLE COIL SPRING WASHER. THE STANDARD LOCKWASHERS FOR CONCRETE POLE HARDWARE ARE THE GALVANIZED SINGLE COIL SPLIT WASHER.

COASTAL CONSTRUCTION:

USED IN AREAS OF HIGH AIRBORNE CONTAMINATION (I.E. BEACHES, PAPER PLANTS, PHOSPHATE PROCESSING PLANTS, ETC.) SEE CAROLINAS SECTION 12 AND FLORIDA SECTION 12 FOR CONSTRUCTION SPECIFICATIONS AND AVAILABLE MATERIALS.

TRANSITION FROM HORIZONTAL TO VERTICAL CONSTRUCTION IS NORMALLY MADE MID-SPAN.

FOR CONSTRUCTION REQUIRING ANGLES OF 6° TO 59°, ARMOUR RODS ARE REQUIRED FOR AAC AND ACSR TYPE CONDUCTORS. ONCE USED, THESE ARMOUR RODS SHOULD NOT BE RETURNED TO STORES.

POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATION ON WOOD POLES WHEN THE POLE DOES NOT HAVE SLAB GAINS OR WHEN THE CONDUCTOR IS 336.4 KCM OR LARGER. GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS (THIS INCLUDES SLACK SPANS).

FOR POST INSULATOR INSTALLATION ON WOOD POLES, USE A SPRING WASHER AND A 3" CURVED WASHER.

WHEN INSTALLING STAND-OFF BRACKETS ON WOOD POLES, USE A 3" CURVED WASHER FOR WIRE SIZES ABOVE 1/0 AAAC AND 2-1/4" FLAT WASHERS FOR WIRE SIZES 1/0 AAAC AND SMALLER.

CONCRETE POLE CONSTRUCTION:

1. ALL HARDWARE IS TO BE GROUNDED.
2. USE 35KV POST INSULATORS.
3. USE FLAT WASHERS IN PLACE OF CURVED WASHERS.
4. USE SINGLE COIL LOCK WASHERS.
5. WHEN INSTALLING STAND-OFF BRACKETS ON CONCRETE POLES, USE 2-1/4" FLAT WASHERS.

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PRIMARY CONSTRUCTION –
PROGRESS ENERGY FLORIDA SPECIAL NOTES

Progress Energy

FLA DWG. 03.00-06

PIN INSULATORS AND PIN INSULATOR SUPPORTS

SUPPORTS FOR PIN INSULATORS (E.G., SHOULDER PINS, POLE-TOP PINS, PIERCE PINS, FIBERGLASS BRACKETS) MAY HAVE LEAD THREADS OR THE STANDARD COMPOSITE NYLON.

PINS WITH NYLON AND LEAD THREADS

THE PROPER WAY TO INSTALL AN INSULATOR ON A POLE-TOP PIN WITH COMPOSITE NYLON THREADS IS AS FOLLOWS:

CAREFULLY THREAD THE INSULATOR INTO THE PIN, KEEPING THE PROPER VERTICAL ALIGNMENT, ENSURING THAT THE INSULATOR SPINS AS FREELY AS POSSIBLE ON THE PIN. SPIN THE INSULATOR CLOCKWISE ONTO THE PIN TO 'SNUG' (THAT POINT WHERE THE INSULATOR WILL NO LONGER SPIN FREELY). FROM THE SNUG POSITION, FURTHER TIGHTEN THE INSULATOR (NOT MORE THAN 1/2 A TURN) TO THE CONDUCTOR ALIGNMENT.

LEAD THREAD NOTES (O&M)

1. INSULATOR INSTALLATION

LEAD IS A SOFTER MATERIAL THAN THE PORCELAIN OF THE PIN INSULATORS. THE PORCELAIN THREADS WILL CUT THE LEAD THREADS TO THE PORCELAIN THREAD'S FORM. TAKE CARE NOT TO CROSS-THREAD THE INSULATOR ONTO THE PIN; OTHERWISE, SUFFICIENT INSULATOR-PIN ENGAGEMENT NECESSARY FOR PROPER SUPPORT WILL NOT BE OBTAINED.

IF TOO MUCH FORCE IS EXERTED IN TURNING THE INSULATOR ON THE PIN, THE INSIDE OF THE LEAD THREAD CAP CAN SHEAR FROM ITS STEEL BASE, ALLOWING THE INSULATOR AND LEAD THREAD CAP TO SPIN FREELY ON THE PIN. THE INSULATOR WILL THEN HAVE TO BE BROKEN TO BE REMOVED. IF THIS OCCURS, NEITHER THE PIN, BRACKET, OR INSULATOR WILL BE RE-USABLE.

2. HANDLING

LEAD IS RELATIVELY SOFT, SO CARE MUST BE TAKEN TO INSURE THAT THE THREADS ARE NOT DEFORMED PRIOR TO INSTALLATION. REMOVE THE THREAD'S PROTECTIVE CARDBOARD COVERING AND INSPECT THREAD CONDITION PRIOR TO THE INSTALLATION ON THE POLE, AND THEN REPLACE THE CARDBOARD COVERING AGAIN UNTIL AFTER THE PIN OR BRACKET IS INSTALLED ON THE POLE OR ARM IS READY TO ACCEPT THE INSULATOR.

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PIN INSULATOR INSTALLATION

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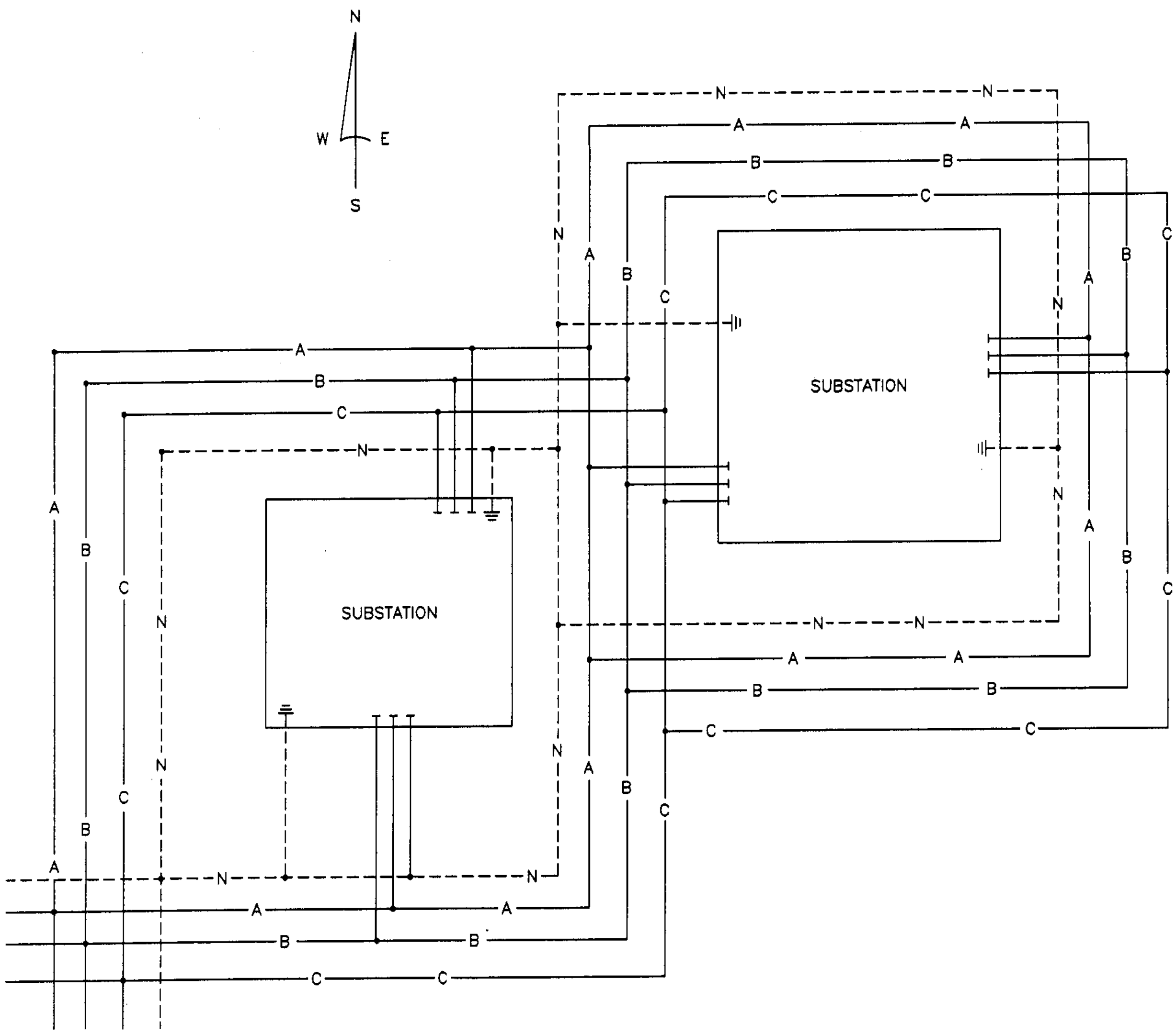

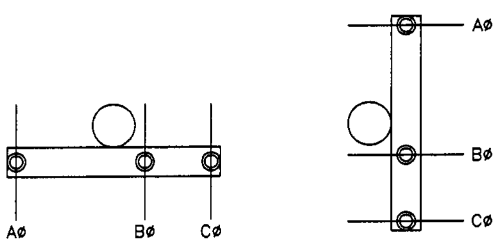

FACING NORTH

FACING WEST

HORIZONTAL CONSTRUCTION
TOP VIEWS

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STANDARD DISTRIBUTION PHASING FOR ALL AREAS EXCEPT ST. PETERSBURG

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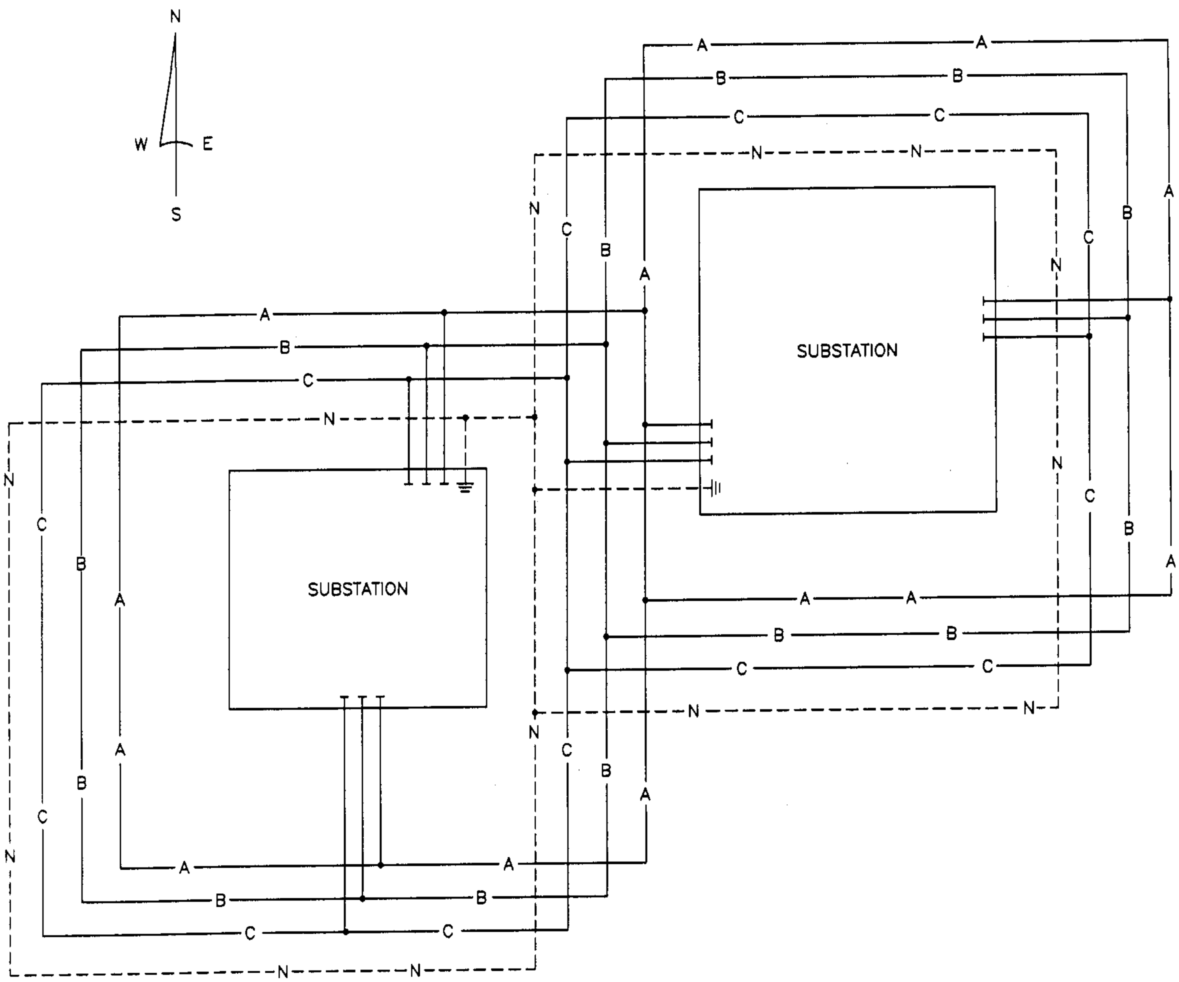
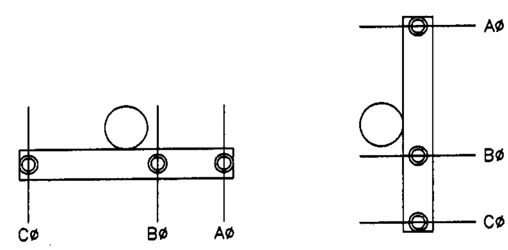
ST. PETERSBURG AREA





HORIZONTAL CONSTRUCTION
TOP VIEWS

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STANDARD DISTRIBUTION PHASING
FOR ST. PETERSBURG AREA ONLY

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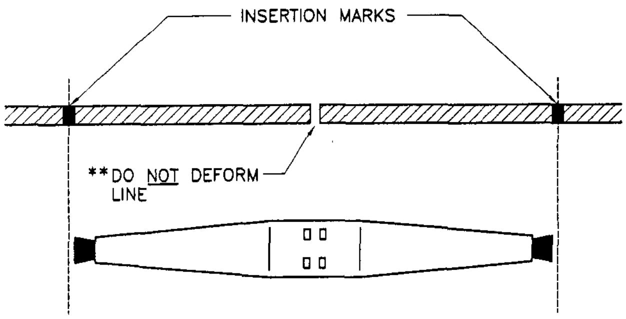
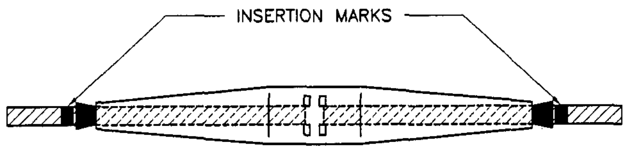


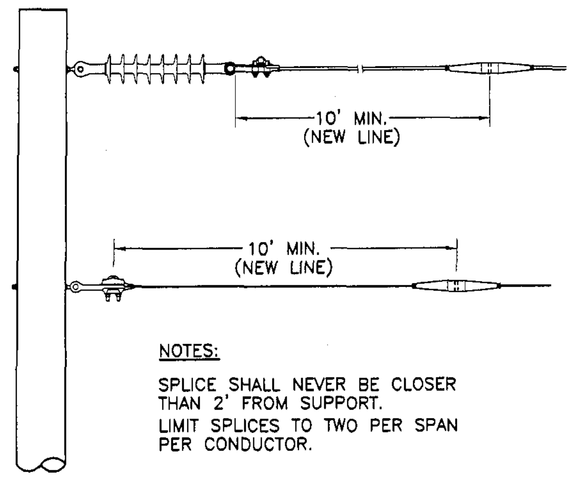
**WIRE BRUSH CONDUCTOR AND CONDUCTOR ENDS CLEAN, BRIGHT AND FREE FROM BURRS. SPLICE MUST ALSO BE CLEAN, FREE FROM DIRT AND JAWS FREE IN HOUSING. MEASURE AND MARK CONDUCTOR FOR INSERTION FROM KNURL TO END OF FUNNEL GUIDE. MARK WITH TAPE OR MARKER.



INSERT CONDUCTORS TO FULL DEPTH: PUSH SLOWLY AND DO NOT TWIST. NEXT, PULL CONDUCTORS TO MAKE SURE JAWS FIRMLY GRIP. CHECK INITIAL GRIP WITH MOMENTARY PULL ON CONDUCTOR PRIOR TO APPLYING LINE TENSION. TAP SLEEVE LIGHTLY WITH A HAND TOOL TO SEAT JAWS.

NOTES:

1. NO AUTOMATIC SPLICE IS TO BE USED UNLESS CONDUCTOR IS UNDER FULL TENSION.
2. USE CABLE CUTTOR OR HACKSAW TO MAKE A CLEAN WIRE CUT. THE OBJECT IS TO AVOID FLATTENING THE ENDS OF THE CONDUCTOR WHICH CAUSES PARTIAL INSERTION AND FAILURE.



NOTES:

SPLICE SHALL NEVER BE CLOSER THAN 2' FROM SUPPORT.

LIMIT SPLICES TO TWO PER SPAN PER CONDUCTOR.

CONDUCTOR	COLOR CODE	CAROLINAS CN	FLORIDA CN
#4 AAAC, AAC, ACSR	ORANGE	11144003	–
#2 AAAC, AAC, ACSR	ORANGE/RED	11144102	142423
#4 AAAC, ACSR	–	–	–
#1/0 AAAC, AAC ACSR	YELLOW	11144201	142426
#4/0 AAAC, AAC, ACSR	PINK	11144508	–
336.4 ACSR (18/1)	GREEN	11144805	11144805
477 SAC	BLUE/AQUA	11145000	–
556.5 ACSR (18/1)	–	11144300	11144300
795 AAC	–	–	9220109736
#6 SOLID CU	–	11143500	11143500
#4 SOLID CU	–	11143609	11143609
#2 SOLID CU	–	9220109732	9220109732
#2 3 STR. CU	–	6714	6714
#1 3 STR. CU	–	6716	–
#2/0 F CU WLD	–	6717	–
252 AWA MESSENGER, 1/0	–	–	9220106228

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AUTOMATIC SPLICE INSTALLATION

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AUTOMATIC FULL TENSION SPLICES & DEADENDS

FOR AAAC CONDUCTORS ONLY:
142423 – #4 (7) STR. AAAC
142426 – 1/0 (7) STR. AAAC

NOTES:

1. DO NOT INSTALL ON ACSR CONDUCTOR.
2. DO NOT INSTALL AUTOMATIC SLEEVES OR DEADENDS IN SLACK SPAN CONSTRUCTION.
3. DO NOT REUSE AUTOMATIC SLEEVES.
4. FOR #4 (6–1) ACSR, USE SLEEVE #142411.
5. FOR 1/0 (6–1) ACSR, USE SLEEVE #142414.

INSTALLATION STEPS

SELECT THE PROPER SLEEVE FOR THE CONDUCTOR.

MAKE CERTAIN THE GUIDE CUPS ARE IN PLACE AND FREE OF DIRT.

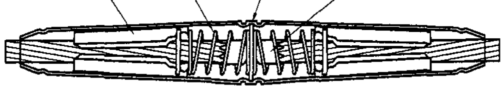
MEASURE AND MARK CONDUCTOR FOR FULL INSERTION. WIRE BRUSH AND SQUARE CUT CONDUCTOR.

REMOVE ANY BURRS. KEEP STRANDS IN LAY AND CONDUCTOR STRAIGHT.

INSERT CONDUCTOR SMOOTHLY TO CENTER STOP. (GUIDE CUP) MUST PASS COMPLETELY THROUGH THE JAWS, BEFORE THE JAWS WILL CLAMP DOWN ON THE CONDUCTOR. DO NOT TWIST CONDUCTOR.

AFTER FULL INSERTION, A FIRM PULL WILL SET THE JAWS. WITH PARTIAL TENSION APPLIED, TAP SLEEVE LIGHTLY WITH HAND TOOL.

GUIDE CUP MUST PASS COMPLETELY THROUGH THE JAWS BEFORE THE JAWS WILL CLAMP DOWN ON THE CONDUCTOR.



JUMPERS: GENERAL

JUMPER CLAMPS ARE RATED FOR 400 AMPS CONTINUOUS MAXIMUM RATING. THIS RATING IS DEPENDENT ON THE RATING OF THE JUMPER CABLES USED WITH THE CLAMPS.

15 KV INSULATED JUMPERS*

SIZE A.W.G.	RATING AMPS
#2	192
1/0	258
2/0	298
4/0	400

PRIMARY LOAD PICKUP JUMPER*

JUMPER HEAD IS RATED AT 200 AMPS CONTINUOUS REGARDLESS OF JUMPER WIRE SIZE. THE LOAD PICKUP JUMPER IS INTENDED FOR USE AS A TEMPORARY JUMPER TO ESTABLISH A CIRCUIT BETWEEN ENERGIZED AND NON–ENERGIZED SECTIONS OF A LINE, AND NOT TO BE USED BETWEEN DIFFERENT PHASES, OR AS A TEMPORARY GROUND.

CAUTION:

*TO AVOID POSSIBLE CABLE DAMAGE AND HIGH LEAKAGE CURRENTS, JUMPER CABLES MUST BE POSITIONED AWAY FROM GROUNDED SURFACES OR ENERGIZED CONDUCTORS OTHER THAN THOSE TO WHICH THEY ARE CONNECTED.

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AUTOMATIC FULL TENSION SPLICES, DEADENDS AND JUMPERS

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FLA FLORIDA DWG. 03.02–02

GENERAL:

ALL APPROVED CONNECTORS, COMPRESSION OR BOLTED, SHOULD PERFORM IN A SATISFACTORY MANNER PROVIDED THE CORRECT SIZE IS SELECTED FOR THE APPLICATION AND IS INSTALLED CORRECTLY. THE QUALITY OF THE ELECTRICAL CONNECTION IS GREATLY AFFECTED BY THE SURFACE CONDITION OF THE CONDUCTORS CONTACT AREA TO BE JOINED.

SELECTING A CONNECTOR:

THERE ARE THREE CONSIDERATIONS IN SELECTING A CONNECTOR OR SLEEVE:

1. OBTAIN THE CONNECTOR WITH THE PROPER WIRE OR CABLE RANGE. THE RANGE IS MARKED ON ALL CONNECTORS AND SPLICES.

2. USE ALUMINUM CONNECTORS FOR COPPER TO ALUMINUM CONNECTIONS.

WHEN COPPER CONNECTORS ARE USED ON ALUMINUM CONDUCTORS, THE INITIAL PRESSURE IS MAINTAINED ONLY AS LONG AS THE TEMPERATURE REMAINS CONSTANT. WHEN THE TEMPERATURE RISES, THE ALUMINUM CONDUCTOR EXPANDS MORE THAN THE COPPER CONNECTOR THAT SURROUNDS IT. AS A RESULT, THE CONNECTOR BECOMES TOO SMALL FOR THE CONDUCTOR, AND DUE TO THE TREMENDOUS PRESSURE, THE ALUMINUM EXTRUDES OUT OF THE CONNECTOR. WHEN THE JOINT COOLS, THE REVERSE ACTION TAKES PLACE. THE ALUMINUM CONDUCTOR CONTRACTS AT A GREATER RATE THAN THE COPPER CONNECTOR, AND THE COPPER CONNECTOR CANNOT SHRINK ENOUGH TO MAKE A GOOD TIGHT CONNECTION ON THE REDUCED DIAMETER ON THE CONDUCTOR. THIS CYCLE, WHEN REPEATED MANY TIMES, RESULTS IN A LOOSE CONNECTION. THE CONNECTOR HEATS UP AND EVENTUALLY FAILS.

3. USE FULL TENSION SLEEVES FOR ALL STRAIN APPLICATIONS. PARTIAL TENSION, JUMPER SLEEVES, ARE TO BE USED ONLY IN NON-STRAIN APPLICATIONS.

COMPRESSION TOOL AND DIE:

THE EFFICIENCY OF THE CONNECTOR DEPENDS ON THE PERMANENT "SET" WHICH HAS BEEN INTRODUCED. IF AN IMPROPER DIE IS USED, OR IF THE TOOL IS NOT PROPERLY ADJUSTED, THE CONNECTOR COULD BE OVER OR UNDER DEFORMED RESULTING IN AN INEFFECTIVE JOINT.

TYPES OF DIES:
1. ROUND OR CIRCULAR DIES REQUIRE UNCRIMPED SPACE BETWEEN EACH CRIMP. CRIMPS SHOULD BE APPROXIMATELY 1/16" APART.
2. HEXAGONAL DIES REQUIRE CRIMPS TO BE OVERLAPPED

MARKINGS ON CONNECTORS:
1. CONNECTORS AND SLEEVES ARE STAMPED WITH KNURL MARKS. WHEN CIRCULAR DIES ARE USED, ONE CRIMP SHOULD BE PLACED BETWEEN EACH SET OF KNURL MARKS.
2. DIE AND WIRE SIZES ARE ALSO STAMPED ON EACH CONNECTOR.

WIRE BRUSHING:

THE INVISIBLE ALUMINUM OXIDE FILM THAT FORMS ON ALUMINUM AND THE HARD COPPER OXIDE SCALE THAT FORMS ON COPPER ACT AS INSULATORS. THEY TEND TO INSULATE THE CONDUCTOR STRAND FROM THE CONDUCTOR BODY AND INSULATE THE INDIVIDUAL STRANDS FROM EACH OTHER. THIS OXIDE FILM MUST BE REMOVED BY WIRE BRUSHING THE CONTACT AREA UNTIL THERE IS A FRESH BRIGHT COLOR. A COATING OF INHIBITOR MUST BE APPLIED IMMEDIATELY TO REDUCE THE FORMATION OF ADDITIONAL OXIDES.

ALL ALUMINUM LUGS AND TRANSFORMER BLOCKS ARE TIN PLATED. TIN PLATING ELIMINATES THE FORMATION OF ALUMINUM OXIDE ON THE CONNECTOR. DO NOT WIRE BRUSH TIN PLATED SPADES OR CONNECTORS, JUST APPLY INHIBITOR.

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INSTALLATION GUIDE FOR CONNECTORS

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PGN DWG. 03.02-04

INHIBITOR

INHIBITORS ARE USED AFTER WIRE BRUSHING. THE APPLICATION OF THE INHIBITOR AND THE NUMBER OF CRIMPS PROPERLY INSTALLED WILL SEAL THE ELECTRICAL CONNECTIONS FROM OXYGEN AND MOISTURE AND STOP THE FORMATION OF OXIDES.

ALUMINUM TO COPPER JOINTS MUST BE SEALED FROM MOISTURE PENETRATION TO PREVENT THE COPPER OXIDES FROM ATTACKING THE ALUMINUM CONNECTOR. THE SEALANT IS THE INHIBITOR PREPACKED IN THE CONNECTOR. ANY CONNECTOR THAT DOES NOT HAVE ENOUGH INHIBITOR TO COMPLETELY COVER THE CONDUCTOR SHOULD HAVE INHIBITOR ADDED WHEN INSTALLED.

WHEN INSTALLING AN ALUMINUM TO COPPER CONNECTOR, ALWAYS PLACE THE ALUMINUM WIRE ABOVE THE COPPER WIRE. THIS REDUCES THE AMOUNT OF CORROSIVE COPPER OXIDES THAT WILL RUN DOWN THE ALUMINUM CONNECTOR. THE ALUMINUM OXIDE WILL NOT CORRODE THE COPPER.

TYPES OF INHIBITORS:
PREFILLED CONNECTORS CONTAIN AN INHIBITOR WITH A GRIT ADDED TO THE BASE COMPOUND. MOST MATERIALS USED AS A GRIT SUCH AS ALUMINUM OXIDE, SILICONECARBIDE, OR GLASS, ACT AS INSULATORS. MATERIALS USED AS GRIT ARE HARDER THAN THE CONNECTOR OR THE CONDUCTOR. PARTICLES ARE PUSHED INTO THE CONNECTOR AND CONDUCTOR CAUSING THE METAL TO FORM CRATERS AROUND THEM. THIS RAISES NON-OXIDIZED METAL AROUND THE RIM OF THE CRATER FORMING A GOOD CONNECTION. IF INSUFFICIENT FORCE IS APPLIED, THE GRIT WILL NOT PENETRATE, BUT WILL ACTUALLY SEPARATE THE CONNECTOR AND CONDUCTOR CREATING AN INSULATED SPACE BETWEEN THE SURFACES. THIS EXPLAINS THE IMPORTANCE OF A PROPER COMPRESSION FOR GOOD CONDUCTIVITY AND CORROSION PREVENTION.

CRIMPING:

INSTALLING THE PROPER NUMBER OF CRIMPS ON A CONNECTOR CANNOT BE OVER-EMPHASIZED. ON SLEEVES, ALL CRIMPS INDICATED ARE REQUIRED IN ORDER TO MEET THE RATED TENSION TEST AND ELECTRICAL TEST. ON "H" BLOCKS, ALL CRIMPS ARE NECESSARY IN ORDER TO PASS THE ELECTRICAL TEST AND TO PROVIDE AN EFFECTIVE MOISTURE SEAL ON THE CONNECTOR. THIS IS ESPECIALLY IMPORTANT IN AN ALUMINUM TO COPPER CONNECTION.

BARREL TYPE CONNECTORS ARE FILLED WITH INHIBITOR AND IT IS SOMETIMES NECESSARY TO TWIST THE CONNECTOR TO ALLOW EASIER AND FULL INSERTION OF THE CONDUCTOR INTO THE BARREL. IT IS SUGGESTED THAT THE CONDUCTOR BE MARKED TO THE DEPTH OF THE BARREL TO INSURE FULL INSERTION. ON LUG TYPE CONNECTORS WITH ONE OPEN END, BEGIN CRIMPING AT THE CLOSED END OF THE COMPRESSION BARREL AND WORK TOWARDS THE OPEN END. ON SLEEVE TYPE CONNECTORS WITH BOTH ENDS OPEN, BEGIN CRIMPING AT THE CENTER OF THE SLEEVE AND WORK OUT TO THE END. DO NOT LEAVE SPACES BETWEEN CRIMPS TO COME BACK AND CRIMP LATER. THIS CAUSES "COLD FLOW" WHICH ESSENTIALLY RELIEVES THE COMPRESSIVE FORCE ON THE ADJACENT CRIMPS. AFTER CRIMPING, "FLASHING" (METAL PROTRUSTIONS) CAUSED BY THE COMPRESSION DIE IS SOMETIMES PRESENT ON THE CONNECTOR. THE FLASHING MUST BE FILED OFF SINCE IT COULD CUT THROUGH THE SPLICE OR CABLE INSULATION AND CAUSE A FAILURE.

ALUMINUM COMPRESSION CONNECTORS ON COPPER CONDUCTORS:

USE THE FOLLOWING PROCEDURE:

1. THOROUGHLY CLEAN BOTH CONDUCTORS BY WIRE BRUSHING TO REMOVE OXIDE AND CONTAMINATES.
2. USE THE PROPER SIZE ALUMINUM CONNECTOR. INSPECT THE COMPRESSION CONNECTOR ("SQUEEZE ON") TO BE SURE THAT A SUFFICIENT AMOUNT OF INHIBITOR IS IN EACH GROOVE TO THOROUGHLY COAT THE CONDUCTORS. IF THERE IS NOT A SUFFICIENT AMOUNT OF INHIBITOR, THEN ADD GRIT INHIBITOR AVAILABLE FROM THE GENERAL WAREHOUSE (CN 30524607).
3. POSITION THE CONDUCTORS SO THAT THE ALUMINUM CONDUCTOR IS LOCATED ABOVE THE COPPER CONDUCTOR TO PREVENT COPPER SALTS FROM ACCUMULATING ON THE CONNECTOR.
4. USE THE PROPER TOOL AND DIE TO COMPRESS THE CONNECTOR, BEGINNING IN THE MIDDLE AND WORKING TO EACH END WITH THE CORRECT NUMBER OF CRIMPS.

NOTE: FOR ALUMINUM TO ALUMINUM CONNECTIONS AND OTHER DETAILS, SEE DWGS. 03.02-09A AND 03.02-09B.

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INSTALLATION GUIDE FOR CONNECTORS

Progress Energy

PGN DWG. 03.02-06

ALUMINUM TO ALUMINUM

1. PREPARE ALUMINUM CONTACT AREAS AND APPLY INHIBITOR COMPOUND. FOR CAROLINAS, USE GRIT INHIBITOR (CAROLINAS CN 30524607). FOR FLORIDA, US GENERAL PURPOSE INHIBITOR (FLORIDA CN 403108).
2. MAKE CONNECTION USING ALUMINUM BOLTS AND TWO FLAT ALUMINUM WASHERS FOR FLAT CONNECTIONS. SINCE ALL METALS USED IN THIS CONNECTION ARE OF THE SAME MATERIAL, NO SPRING OR LOCK WASHERS ARE TO BE USED; HOWEVER, THE BOLT MUST BE TORQUED TO RECOMMENDED VALUES. ALTERNATELY TIGHTEN AND TORQUE THE BOLTS TO RECOMMENDED TORQUE VALUE FOR THE GIVEN BOLT SIZE. **CAUTION:** DO NOT OVERTIGHTEN LUBRICATED BOLTS.
3. DO NOT REMOVE EXCESS COMPOUND THAT SQUEEZES OUT OF THE CONNECTION. IT HELPS KEEP OUT DIRT AND MOISTURE.
4. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR CONNECTORS PREFILLED WITH INHIBITOR COMPOUND.
5. **CAUTION:** DO NOT REUSE ALUMINUM BOLTS. A BOLT THAT HAS BEEN TORQUED CANNOT BE DEPENDED UPON TO GIVE UNIFORM JOINT PRESSURE BECAUSE IT COULD HAVE BEEN DEFORMED (STRETCHED) AND WILL NOT HAVE THE SAME MECHANICAL PROPERTIES AS A NEW ONE.

RECOMMENDED TORQUE FOR ALUMINUM BOLTS		
BOLT SIZE	NON-LUBRICATED	LUBRICATED
5/16"	15 FT.-LBS.	10 FT.-LBS.
3/8"	20 FT.-LBS.	14 FT.-LBS.
1/2"	40 FT.-LBS.	25 FT.-LBS.
5/8"	55 FT.-LBS.	40 FT.-LBS.
3/4"	70 FT.-LBS.	60 FT.-LBS.

NOTE: USE VALUES LISTED IN THIS TABLE ONLY WHEN BOLT TORQUE IS NOT SPECIFIED BY CONNECTOR MANUFACTURER.

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ALUMINUM TO ALUMINUM FLAT CONNECTIONS

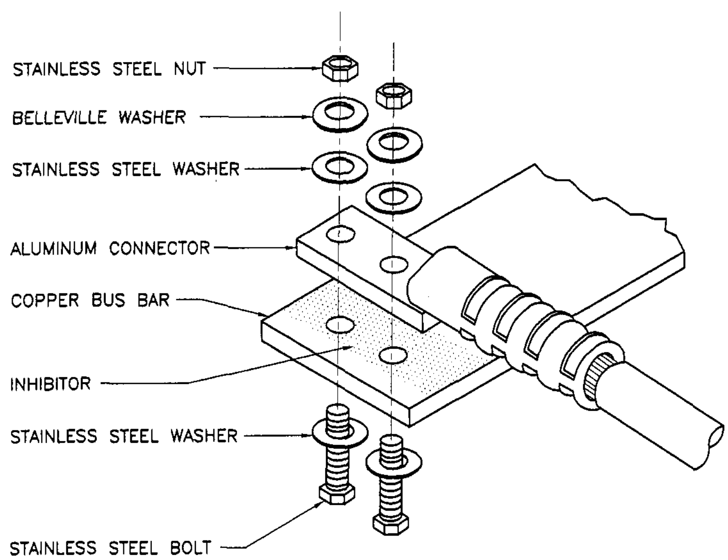
Progress Energy

PGN DWG. 03.02-09A

ALUMINUM CONNECTIONS TO COPPER BUS ARE MADE WITH STAINLESS STEEL BOLTS, FLAT WASHERS AND BELLEVILLE WASHERS. BELLEVILLE WASHERS ARE NECESSARY TO COMPENSATE FOR THE DIFFERENCE IN EXPANSION AND CONTRACTION OF THE DISSIMILAR METALS. ALWAYS USE A FLAT STAINLESS STEEL WASHER UNDER A BELLEVILLE WASHER TO PREVENT DAMAGE TO THE UNDERLYING METAL.

INHIBITOR IS REQUIRED WHERE AN ALUMINUM OR COPPER JOINT IS MADE.
FOR CAROLINAS USE NO-GRIT INHIBITOR (CN 30524300).
FOR FLORIDA, USE GENERAL PURPOSE INHIBITOR (CN 403108).

TIGHTEN THE NUT UNTIL THE BELLEVILLE SPRING WASHER IS FLATTENED AND TENSIONED, BUT APPLY NO MORE THAN 75 FT. LBS. OF TORQUE.



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ALUMINUM TO COPPER FLAT CONNECTIONS

Progress Energy

PGN DWG. 03.02-09B

STANDARD PROCEDURES BULLETIN

THE FOLLOWING GUIDELINES APPLY TO THE USE OF FULL-TENSION, PARTIAL-TENSION, AND MINIMUM-TENSION SPLICES.

FULL TENSION - (95% RATED BREAKING STRENGTH)

AUTOMATIC SPLICES AND COPPER SLEEVES ARE FULL-TENSION SPLICES. THEY ARE FOR USE ON CONDUCTORS IN FULL-TENSION APPLICATIONS. AUTOMATIC SPLICES SHOULD ALWAYS BE GIVEN AN INITIAL "SET" WHEN INSTALLED. A FIRM PULL BY HAND IS CONSIDERED SUFFICIENT TO "SET" THE SPLICE. THE RATED STRENGTH OF A FULL-TENSION SPLICE IS 95% OF THE CONDUCTOR BREAKING STRENGTH.

AUTOMATIC SPLICES SHOULD NEVER BE CLOSER THAN 10' ON A NEW LINE OR 2' ON AN EXISTING LINE TO THE CONDUCTOR ATTACHMENT POINT. IF A BREAK OCCURS NEARER THE STRUCTURE THAN 2', A SUITABLE LENGTH OF CONDUCTOR SHOULD BE SPLICED IN TO MEET THIS REQUIREMENT. TEMPORARY EMERGENCY REPAIRS MAY BE MADE CLOSER TO THE STRUCTURE THAN 2'.

PARTIAL TENSION - (40% RATED BREAKING STRENGTH)

PARTIAL- TENSION SPLICES (SEMI-TENSION) ARE SLEEVES FOR USE WHEN SPLICING JUMPERS, OR TPX/QPX NEUTRALS. PARTIAL-TENSION SPLICES MAY BE USED FOR TEMPORARY EMERGENCY REPAIRS OF SLACK SPANS. PARTIAL-TENSION SPLICES SHALL NOT BE USED IN FULL-TENSION APPLICATIONS. THE RATED STRENGTH OF A PARTIAL TENSION SPLICE IS 40% OF THE CONDUCTOR BREAKING STRENGTH.

CARE SHOULD BE TAKEN TO REDUCE THE POSSIBILITY OF INSULATION ABRASION ON A TPX/QPX SPLICE. LEAVING ADDITIONAL SLACK IN THE PHASE CONDUCTORS AROUND THE SPLICE WILL HELP ALLEVIATE THIS PROBLEM.

MINIMUM TENSION - (5% RATED BREAKING STRENGTH)

MINIMUM-TENSION SPLICES ARE INSULINKS AND SQUEEZONS USED TO CONNECT TPX/QPX PHASE CONDUCTORS. THE RATED STRENGTH OF A MINIMUM-TENSION SPLICE IS 5% OF THE CONDUCTOR BREAKING STRENGTH.

DO NOT INSTALL SPLICES IN RAILROAD CROSSING SPANS OR IN SPANS ADJACENT TO CROSSING SPANS.

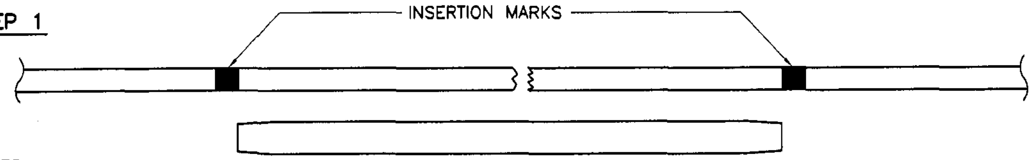
3				
2				
1				
0	4/23/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

OVERHEAD CONDUCTOR SPLICE APPLICATION

Progress Energy

PGN DWG. 03.02-10

STEP 1



NOTES:

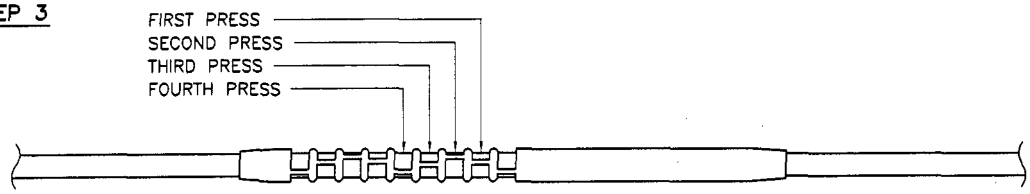
1. SLEEVES ARE MARKED TO INDICATE CONDUCTOR SIZE AND DIE SIZE. REFER TO ALUMINUM OR COPPER TABLE BELOW FOR SLEEVE CATALOG NUMBER.

STEP 2

NOTES:

1. WIRE BRUSH CONDUCTOR. SLIP SLEEVE OVER CONDUCTOR UNTIL IT REACHES CENTER STOP IN SPLICE.

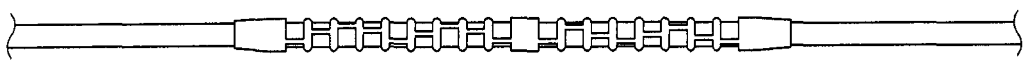
STEP 3



NOTES:

1. COMPRESS SLEEVE OVER ITS ENTIRE LENGTH, START AT MIDDLE AND WORKING TOWARD ENDS, ROTATE TOOL TO AVOID UNNECESSARY STRAIGHTENING.

STEP 4



NOTES:

1. STRAIGHTEN SPLICE TO PREVENT UNDUE STRESS ON CONDUCTOR.

ALUMINUM		
CONDUCTOR SIZE	SEMI–TENSION CAROLINAS SLEEVE CN	FULL TENSION FLORIDA SLEEVE CN
#6 ASCR	11151610	–
#4 ASCR, AAAC	11164001	142411
#2 ASCR, AAAC	11164100	142412
1/0 ASCR, AAAC	11165404	142414
4/0 ASCR, AAAC	11165602	142416
336.4 ASCR, AAC (18/1)	11165503	142321
795 AAC	–	142328

COPPER (FULL TENSION)		
CONDUCTOR SIZE	CAROLINAS SLEEVE CN	FLORIDA SLEEVE CN
#6 SOLID	11140217	142109
#4 SOLID	11140316	142111
#2 SOLID	11140423	142112
#4 STRANDED	–	142211
#2 STRANDED	–	142213
1/0 STRANDED	11140613	142214
2/0 STRANDED	11140712	142215
3/0 STRANDED	11140811	–
4/0 STRANDED	11140910	142217

ALUMINUM FLORIDA SEMI–TENSION SLEEVES	
CONDUCTOR SIZE	FLORIDA SLEEVE CN
#6 AL	140459
#4 AL	140462
#2 AL	140464
#1/0 AL	140466

NOTES:

1. CAROLINAS ALUMINUM SLEEVES ARE SEMI–TENSION. THEY SHOULD ONLY BE USED IN JUMPERS, TPX SERVICE NEUTRALS AND SLACK SPANS.

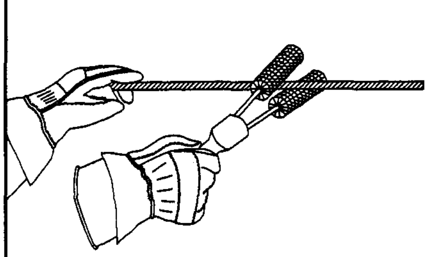
3				
2				
1	4/1/04	NUNNERY	NUNNERY	WOOLSEY
0	1/28/04	NUNNERY	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

ONE PIECE COMPRESSION SPLICE FOR OVERHEAD CONDUCTORS

Progress Energy

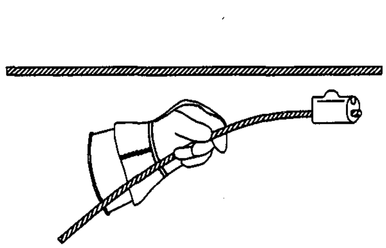
PGN DWG. 03.02–12

STEP 1



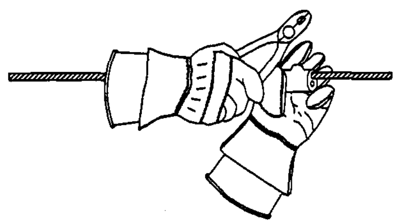
CLEAN BOTH CONDUCTORS THOROUGHLY BY WIRE BRUSHING

STEP 2



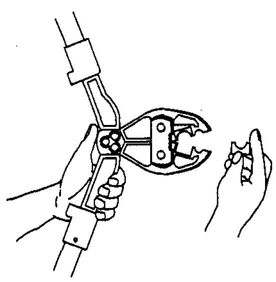
INSERT TAP CONDUCTOR IN TAP SIDE AND BEND TAB OVER CONDUCTOR IF USING DOUBLE TAB SQUEEZON

STEP 3



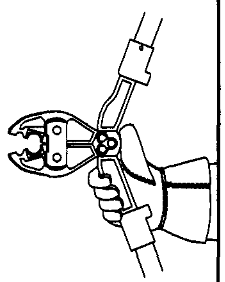
PLACE SQUEEZON ON LINE CONDUCTOR AND BEND TAB OVER CONDUCTOR

STEP 4



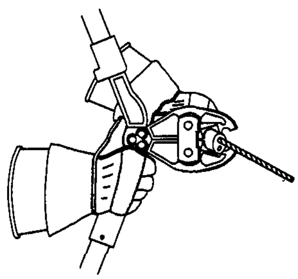
INSERT PROPER DIE TOOL FOR SQUEEZON BEING COMPRESSED

STEP 5



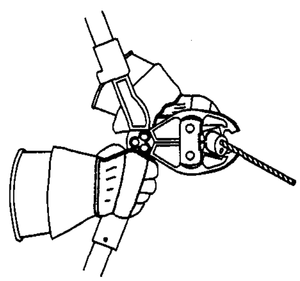
GRIP TOOL WITH THUMB POSITIONED AS SHOWN

STEP 6



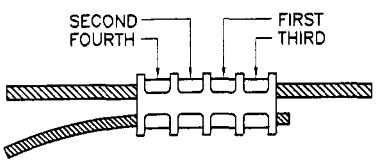
SLIDE TOOL OVER SQUEEZON AND POSITION TOOL TO MAKE CENTER COMPRESSION FIRST

STEP 7



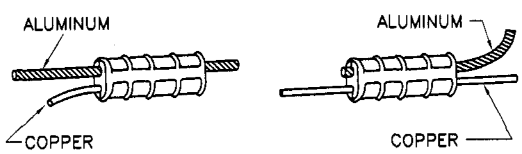
RELEASE THUMB PRESSURE SO THAT TOOL GRIPS SQUEEZON

STEP 8



MAKE COMPRESSIONS FROM CENTER OUT TO ENDS AS SHOWN ABOVE. ALL COPPER SQUEEZONS INSTALLED WITH 0-52-3 TOOL SHALL HAVE 3 COMPRESSIONS. ALUMINUM SQUEEZONS SHALL HAVE 4 OR MORE COMPRESSIONS AS INDICATED ON SQUEEZON.

STEP 9



ALWAYS POSITION SQUEEZON SO THAT ALUMINUM CONDUCTOR IS ABOVE COPPER WHEN CONNECTING ALUMINUM AND COPPER

NOTES:

1. THE SAME GENERAL PROCEDURE SHOULD BE FOLLOWED FOR INSTALLING SQUEEZE-ONS WITH THE HYDRAULIC TOOL. EXCEPT FEWER COMPRESSIONS WILL BE REQUIRED AND THE ENTIRE LENGTH OF SQUEEZE-ON IS TO BE COMPRESSED.

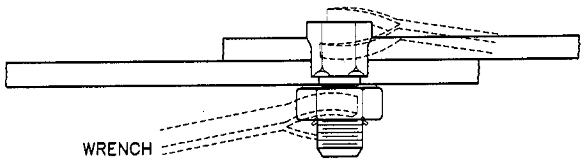
3			
2			
1			
0 4/23/03	YOUNTS	SIMPSON	WOOLSEY
REVISED	BY	CK'D	APPR.

INSTALLATION OF SQUEEZE-ON COMPRESSION CONNECTORS

Progress Energy

PGN DWG. 03.02-14

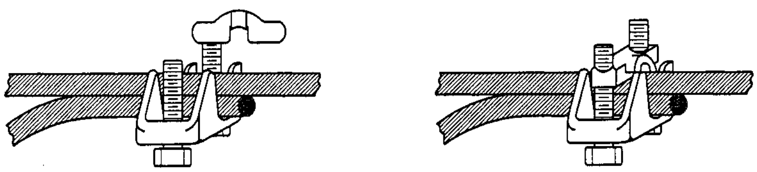
INSTALLATION OF SPLIT BOLT CONNECTION NO.2 COPPER AND SMALLER



NOTES:

1. BE SURE CONDUCTORS ARE CLEAN AND FREE FROM SCALE.
2. USE TWO WRENCHES.
3. TIGHTEN UNTIL CONDUCTORS SHOW FIRST TENDENCY TO TWIST OUT OF PARALLEL LAY.

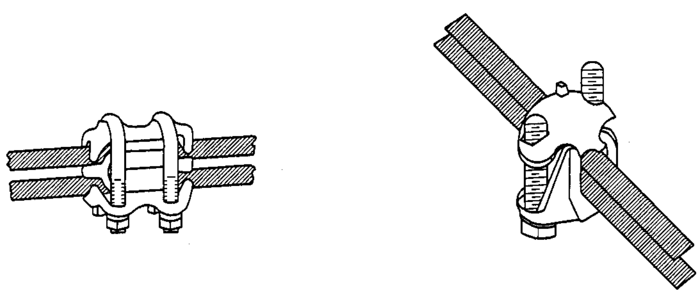
INSTALLATION OF TWO BOLT CONNECTION 1/0 COPPER AND LARGER



NOTES:

1. BE SURE CONDUCTORS ARE CLEAN AND FREE FROM SCALE.
2. DRAW UP CAP SCREWS EQUALLY UNTIL CONNECTOR IS SECURELY TIGHTENED.

INSTALLATION OF LARGE SERVICE CONNECTOR 336.4–1000 MCM AL, ACSR OR COPPER



NOTES:

1. BE SURE CONDUCTORS ARE CLEAN AND FREE FROM SCALE.
2. DRAW UP CAP SCREWS EQUALLY UNTIL CONNECTOR IS SECURELY TIGHTENED.

3				
2				
1				
0	4/23/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

SOLDERLESS CONNECTORS

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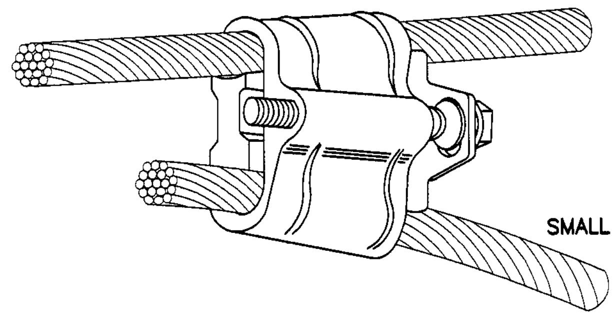
PGN DWG. 03.02–20



NOTES:

1. CLEAN BOTH CONDUCTORS THOROUGHLY BY WIRE BRUSHING.
2. NEW CONNECTORS COME WITH INHIBITOR.
3. POSITION CONNECTOR.
4. TIGHTEN BOLT UNTIL TORQUE CONTROL NUT SHEARS OFF.

WEDGE CONNECTOR WIRE TABLE		
CATALOG NUMBER	LARGE WIRE	SMALL WIRE
165214	2/0 STR	1/0 STR
165216	4/0 STR	1/0 STR
165219	4/0 STR	4/0 STR
165221	336.4	6 SOL
165227	336.4	2 STR
165230	336.4	1/0 STR
165233	336.4	2/0 STR
165236	336.4	3/0 STR
165239	336.4	4/0 STR
165242	336.4	336.4 STR
165243	336.4	336.4 ACSR
165254	500	2 STR
165255	500	1/0 STR
165258	500	4/0 STR
165261	500	336.4
165262	500	500
165263	556.5	556.5
165265	795	2
165266	795	1/0 STR
165267	795	2/0 STR
165269	795	4/0 STR
165272	795	336.4
165274	795	500
165277	795	795

3				
2				
1				
0	3/29/04	NUNNERY	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

WEDGE CONNECTORS

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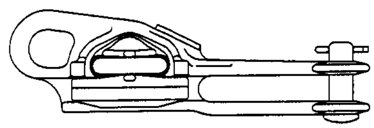
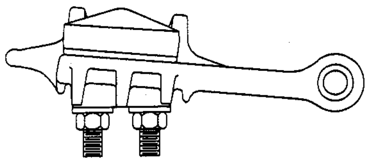
FLA FLORIDA DWG. 03.02-21

PEC CN 11104957
PEF CN 100708



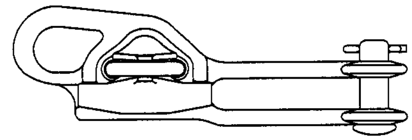


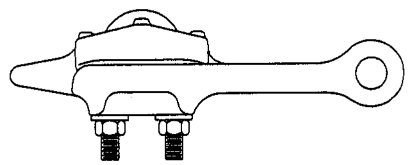
CONDUCTOR RANGE (0.160–0.570)
6–4/0 ACSR
4–4/0 AL
6–4/0 CU

NOTES:

1. FOR USE ON CONDUCTORS #6 TO 4/0.

PEC CN 11104916
PEF CN 101119



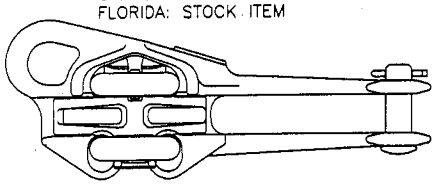


CONDUCTOR RANGE (0.410–0.880)
2/0–477
2/0–477

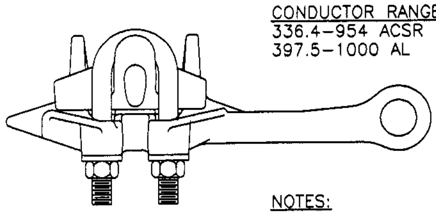
NOTES:

1. FOR USE ON 336.4 AND 477.

PGN CN 101125
CAROLINAS: SPECIAL ORDER
FLORIDA: STOCK ITEM

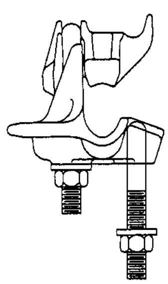


CONDUCTOR RANGE (0.680–1.16)
336.4–954 ACSR
397.5–1000 AL

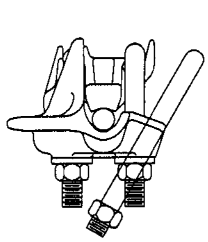


NOTES:

1. FOR USE ON 795 CONDUCTOR AND 556 ACSR (24/7).

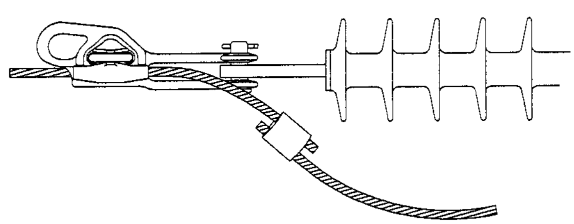


OPEN POSITION



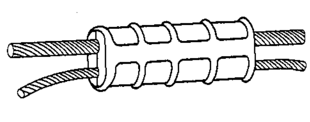
CLOSED POSITION

PREFERRED LOCATION FOR JUMPER CONNECTIONS

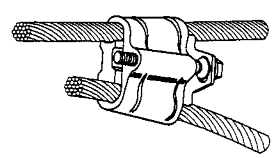


CONNECT JUMPER TO TAIL OF PRIMARY ON BACK SIDE OF DEADEND CLAMP

CONNECTOR DETAILS



SEE DWG. 03.02–14



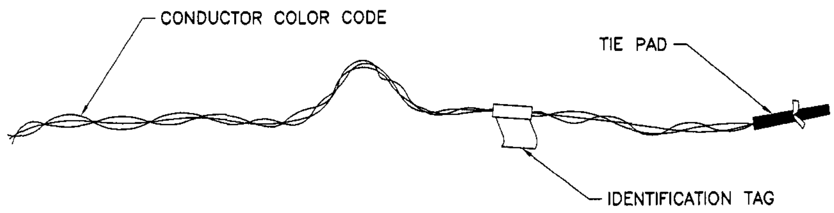
SEE PEF DWG. 03.02–21

REVISED		BY	CK'D	APPR.
3	1/25/06	MCINTIRE	GUINN	HOYT
2	5/6/04	NUNNERY	NUNNERY	WOOLSEY
1	10/28/03	NUNNERY	NUNNERY	WOOLSEY
0	7/15/03	YOUNTS	SIMPSON	WOOLSEY

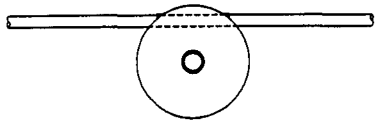
PRIMARY AND NEUTRAL
DEAD END ASSEMBLIES

Progress Energy

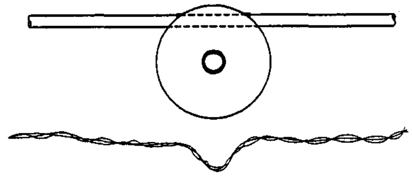
PGN DWG. 03.03–04



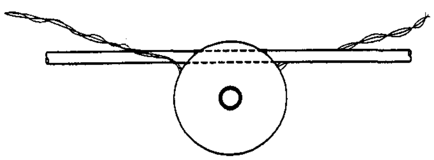
EZ–WRAP SPOOL TIE AS RECEIVED IN THE FIELD



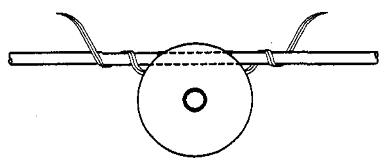
STEP 1: APPLY TIE PAD ON THE CONDUCTOR AND POSITION IT BETWEEN THE CONDUCTOR AND INSULATOR, MAKING SURE THE SLIT DOES NOT FACE THE INSULATOR. IF THE PAD IS NOT REQUIRED OR DESIRED, DISCARD IT.



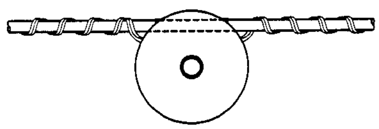
STEP 2: POSITION THE TIE LOOP UNDER THE INSULATOR SO THE LEGS ARE PARALLEL TO THE CONDUCTOR AS SHOWN.



STEP 3: PLACE THE LOOP TIGHTLY UP AGAINST THE INSULATOR'S GROOVE AND POSITION THE TIE LEGS, AS SHOWN, SO THEY CAN BE APPLIED TO THE CONDUCTOR.



STEP 4: APPLY THE LEGS BY WRAPPING THEM AROUND THE CONDUCTOR. MAKE SURE TO SNAP THE LEG ENDS INTO PLACE TO COMPLETE THE APPLICATION. MAKE SURE THE TIE LOOP IS TIGHT ON THE INSULATOR NECK.



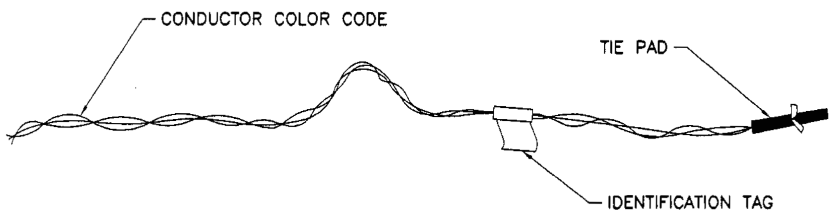
STEP 5: COMPLETED APPLICATION OF EZ–WRAP SPOOL TIE

3				
2				
1				
0	2/4/04	ROBESON	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

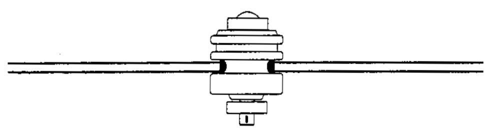
INSTALLATION GUIDE –
EZ–WRAP SPOOL TIE
HORIZONTAL POSITION

Progress Energy

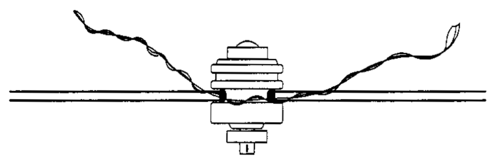
PGN DWG. 03.04–02



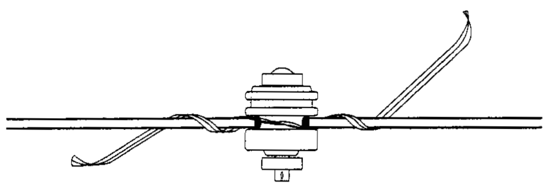
EZ-WRAP SPOOL TIE AS RECEIVED IN THE FIELD



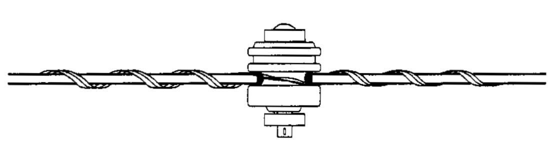
STEP 1: IN MOST CASES THE CONDUCTOR SHOULD BE PLACED BETWEEN THE INSULATOR AND THE STRUCTURE SO IT IS INSIDE THE CLEVIS, AS SHOWN. APPLY THE TIE PAD ON THE CONDUCTOR AND POSITION IT BETWEEN THE CONDUCTOR AND INSULATOR, MAKING SURE THE SLIT DOES NOT FACE THE INSULATOR.



STEP 2: POSITION THE TIE LOOP TIGHTLY AGAINST THE INSULATOR'S GROOVE, ON THE OPPOSITE SIDE FROM THE CONDUCTOR, AS SHOWN.



STEP 3: APPLY THE LEGS BY WRAPPING THEM AROUND THE CONDUCTOR. MAKE SURE TO SNAP THE LEG ENDS INTO PLACE TO COMPLETE THE APPLICATION. MAKE SURE THE TIE LOOP IS TIGHT ON THE INSULATOR NECK.



STEP 4: COMPLETED APPLICATION OF EZ-WRAP SPOOL TIE

NOTES:

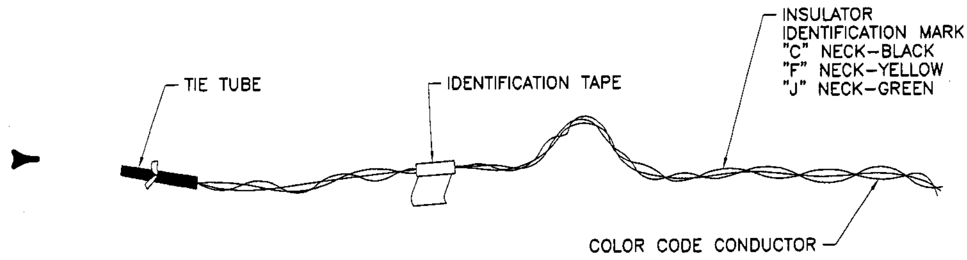
1. IF IT IS NECESSARY TO POSITION THE CONDUCTOR ON THE OUTSIDE OF THE CLEVIS AND INSULATOR, SUCH AS WHEN LINE ANGLES TURN INTO THE POLE, POSITION THE TIE ON THE INSIDE OF THE CLEVIS PRIOR TO APPLICATION. OTHERWISE FOLLOW THE SAME STEPS AS BEFORE.

3			
2			
1			
0 2/4/04	ROBESON	NUNNERY	WOOLSEY
REVISED	BY	CK'D	APPR.

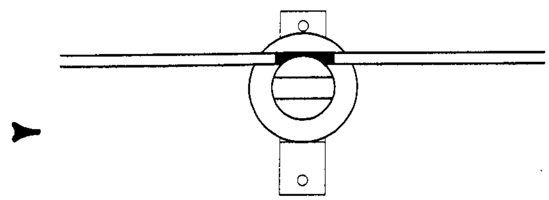
INSTALLATION GUIDE
EZ-WRAP SPOOL TIE
VERTICALLY MOUNTED INSULATORS

Progress Energy

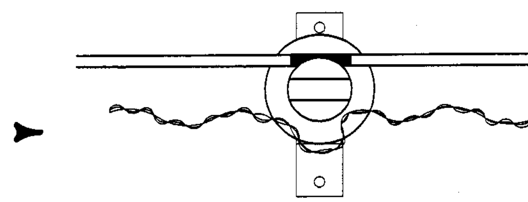
PGN DWG. 03.04-03



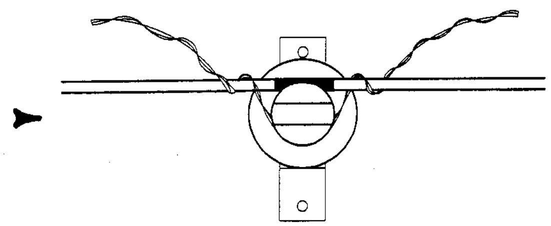
EZ–WRAP SIDE TIE AS RECEIVED IN THE FIELD



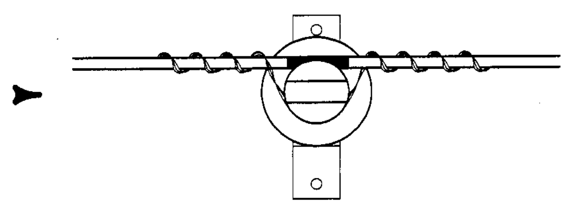
STEP 1: APPLY TIE TUBE ON TO CONDUCTOR, SLIT FACING UP SO THAT CONDUCTOR DOES NOT COME INTO DIRECT CONTACT WITH THE INSULATOR.



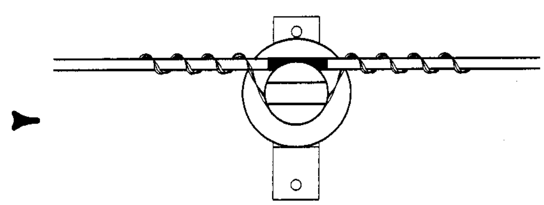
STEP 2: ALIGN THE EZ–WRAP SIDE TIE WITH THE CONDUCTOR. MAKE SURE THE TIE LOOP OF THE EZ–WRAP SIDE TIE IS FACING AWAY FROM THE CONDUCTOR AS SHOWN.



STEP 3: PLACE THE EZ–WRAP SIDE TIE IN POSITION AND START WRAPPING THE LEGS. NOTICE ONE LEG GOES OVER THE CONDUCTOR WHILE THE OTHER GOES UNDER THE CONDUCTOR.



STEP 4: WRAP BOTH LEGS COMPLETELY, SNAPPING THE ENDS IN PLACE WITH THUMB PRESSURE. MAKE SURE THE TIE LOOP IS TIGHT ON INSULATOR NECK AND UNDER INSULATOR HEAD.



STEP 5: COMPLETED APPLICATION OF EZ–WRAP SIDE TIE

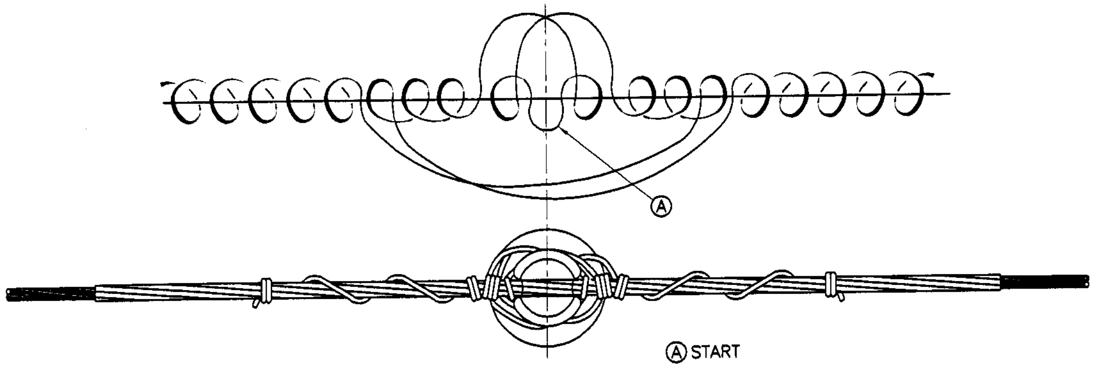
REVISED		BY	CK'D	APPR.
3				
2				
1	2/4/04	ROBESON	NUNNERY	WOOLSEY
0	4/22/03	YOUNTS	SIMPSON	WOOLSEY

INSTALLATION GUIDE –
PRIMARY EZ–WRAP SIDE TIES

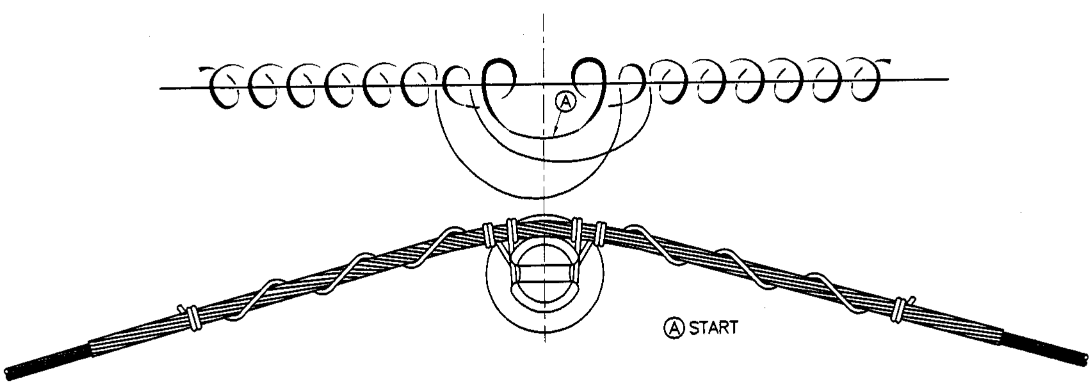
Progress Energy

PGN DWG. 03.04–04

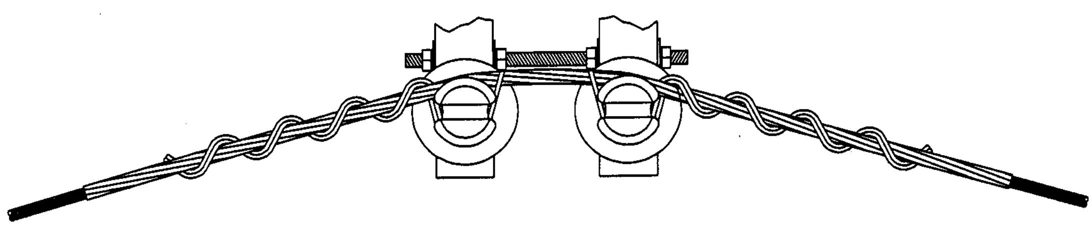
TOP GROOVE TIE



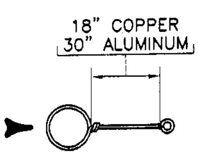
SIDE GROOVE TIE

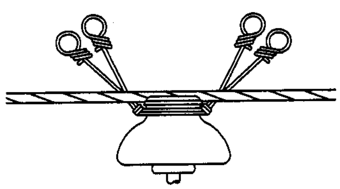


SIDE OR TOP GROOVE – TWO INSULATORS

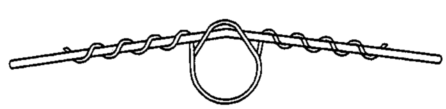


SIDE OR TOP HOT TIE





SPOOL TIE



NOTES:

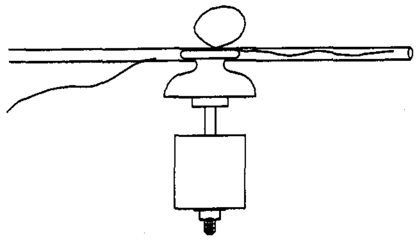
1. ON ALL TIES MAKE FIRST WRAP AS CLOSE TO INSULATOR AS POSSIBLE, AND MAKE A MINIMUM OF 4 WRAPS ON EACH SIDE OF THE INSULATOR.
2. USE ARMOR RODS WITH ALL HAND TIES FOR ALUMINUM PRIMARY CONDUCTORS.
3. TIE WIRE: CU – #6 S.D. CU.
   AL – #4 S.D. AL.
4. FACTORY FORMED TIES ARE THE PREFERRED METHOD FOR ATTACHING PRIMARY CONDUCTORS.

3				
2				
1	3/24/04	NUNNERY	NUNNERY	WOOLSEY
0	1/28/04	NUNNERY	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

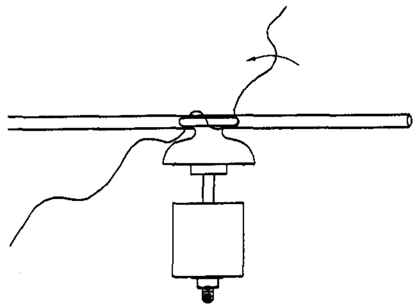
CONDUCTOR HAND TIES

Progress Energy

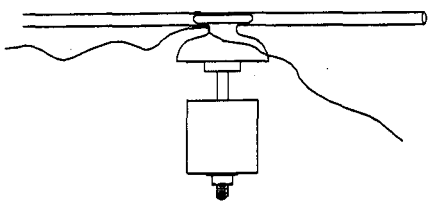
PGN DWG. 03.04–07



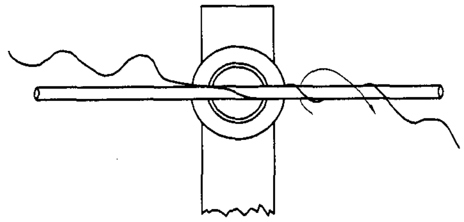
1. POSITION DISTRIBUTION TIE ON INSULATOR AS SHOWN, WITH BOTH LEGS PARALLEL TO THE CONDUCTOR.



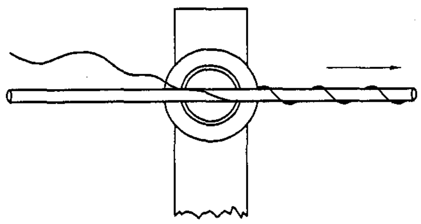
2. ROTATE THE DISTRIBUTION TIE IN A COUNTER–CLOCKWISE DIRECTION, MAKING CERTAIN THAT BOTH LEGS GO UNDER THE CONDUCTOR AS SHOWN.



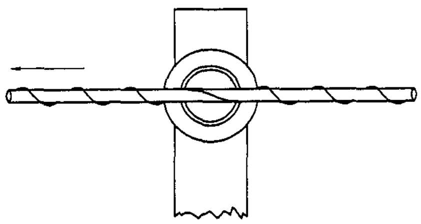
3. CONTINUE TO ROTATE THE LEGS AND THE DISTRIBUTION TIE WILL SEAT ITSELF AS SHOWN.



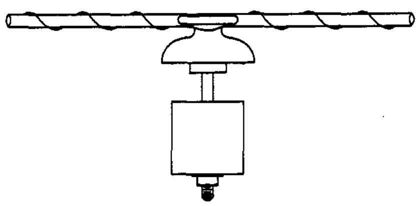
4. START TO WRAP ON ONE LEG OF THE DISTRIBUTION TIE AS SHOWN.



5. CONTINUE TO APPLY THE FIRST LEG TO COMPLETION. BE SURE TO SNAP THE END OF THE LEG INTO PLACE WITH SLIGHT THUMB PRESSURE.



6. WRAP ON THE OTHER LEG OF THE DISTRIBUTION TIE AS SHOWN AND SNAP THE LEG INTO POSITION IN THE SAME MANNER.



7. COMPLETED APPLICATION OF THE DISTRIBUTION TIE.

3			
2			
1			
0 3/9/04	CECCONI	VUNERY	WOOLSEY
REVISED	BY	CK'D	APPR.

TOP TIE

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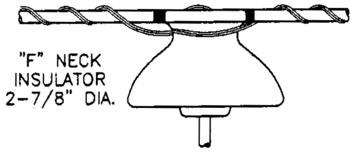
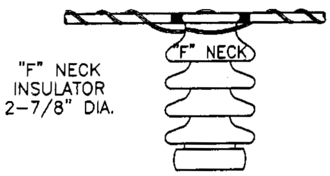
PGN DWG. 03.04–08

TOP TIE
23 KV PIN INSULATOR



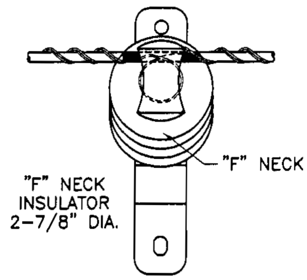
TOP TIE
27 KV ROUND BASE INSULATOR



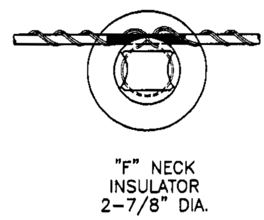
CONDUCTOR SIZE	CAROLINAS CN	FLORIDA CN	CONDUCTOR COLOR CODE
#4	11148301	121411	ORANGE
#2	11148400	11148400	RED
1/0	11148509	121415	YELLOW
4/0	11148608	–	PINK
336	–	121417	PURPLE
477	11148806	–	RED
795	–	121418	GREEN

CONDUCTOR SIZE	CAROLINAS CN	FLORIDA CN	CONDUCTOR COLOR CODE
#4	11158003	121423	ORANGE
#2	11158102	11158102	RED
1/0	11158201	121426	YELLOW
4/0	11158409	–	BROWN
336	–	121429	PURPLE
477	11152600	–	RED
795	–	121434	GREEN

SIDE TIE
27 KV ROUND BASE INSULATOR



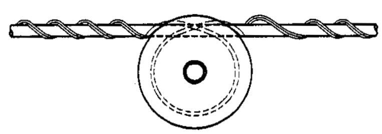
SIDE TIE
23 KV PIN INSULATOR



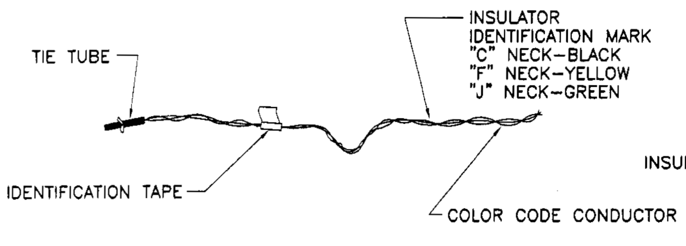
NOTE: 795 WILL NOT FIT IN THE SIDE GROOVE OF THIS PIN INSULATOR

SPOOL TIES (ACSR AND AAAC)

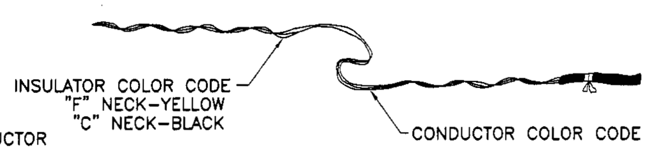
CONDUCTOR SIZE	PGN CN	COLOR CODE
#4	121463	ORANGE
#2	9220109798	RED
1/0	121466	YELLOW
4/0	9220111137	RED



EZ-WRAP
PRIMARY SIDE AND SPOOL TIE



TOP TIE



NOTES:
1. FACTORY FORMED TIES ARE SUITABLE FOR USE ON ALL SPAN LENGTHS.
2. ALL TIES SHOULD FIT TIGHTLY AROUND THE INSULATOR.
3. POSITION SPLIT IN PAD AWAY FROM PORCELAIN ON FACTORY TIES.
4. USE HAND TIES ON NEUTRAL, SECONDARY, AND PRIMARY CONDUCTORS OTHER THAN ALUMINUM.
5. ATTACHMENT OF ALUMINUM PRIMARY CONDUCTORS TO DISTRIBUTION POST AND PIN INSULATORS WILL BE MADE USING A FACTORY-FORMED GRIP WITH A PROTECTIVE PAD. THIS PREFERRED METHOD OF CONDUCTOR ATTACHMENT PROVIDES BOTH MAXIMUM HOLDING STRENGTH AND CONDUCTOR PROTECTION, WHICH ENSURES LONG-LASTING CONSTRUCTION. IF A FACTORY-FORMED GRIP IS NOT AVAILABLE, THEN A HAND TIE WITH AN ARMOR ROD MUST BE USED. ARMOR RODS SHALL ALSO BE USED WHEN INSTALLING ALUMINUM PRIMARY CONDUCTORS IN CLAMP-TYPE INSULATORS (EXCEPT FOR SLACK SPANS).

3				
2	5/12/04	ROBESON	NUNNERY	WOOLSEY
1	1/28/04	NUNNERY	NUNNERY	WOOLSEY
0	4/15/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

FACTORY FORMED CONDUCTOR TIES

Progress Energy

PGN DWG. 03.04-09

CONDUCTOR CHART				
CATALOG NUMBER		CONDUCTOR	DIAMETER OF EACH ROD	COLOR CODE
CAROLINAS	FLORIDA			
11150208	11150208	#2 AAAC	0.136	RED
11150505	121117	#1/0 AAAC	0.167	YELLOW
11150802	–	#4/0 AAAC	0.182	RED
–	121157	336.4 AAC	0.182	BROWN
11150307	–	477 AAC	0.250	BLUE
–	121167	795 AAC	0.310	BROWN

NOTES:

1. CONDUCTOR DIAMETER WITH ARMOR RODS WILL BE CONDUCTOR DIAMETER PLUS TWO TIMES ARMOR ROD DIAMETER.
2. DO NOT RE–USE ARMOR RODS AFTER INITIAL INSTALLATION.

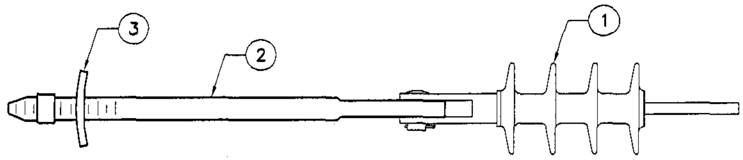
3				
2				
1				
0	6/2/04	ROBESON	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

ARMOR RODS

Progress Energy

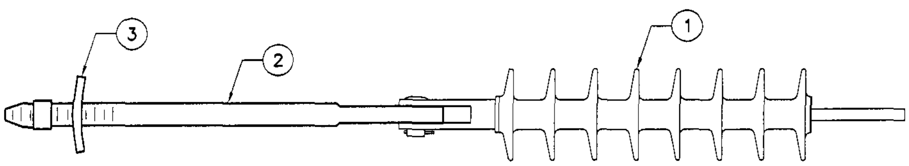
PGN DWG. 03.04–11

15 KV POLYMER
(REMOVAL ONLY)



FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	IS	0000080575	1	INSULATOR, 15KV POLYMER DEADEND
2		0000011708	1	BOLT, OVAL EYE, 5/8" X 10"
3		0000013308	1	WASHER, CURVED, 2-1/4" X 2-1/4" X 13/16"

27 KV POLYMER



FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	ID	0000080577	1	INSULATOR, 27KV POLYMER DEADEND
2		0000011708	1	BOLT, OVAL EYE, 5/8" X 10"
3		0000013346	1	WASHER, CURVED, 3" X 3" X 13/16"

CAROLINAS BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	DE-POLY23	11225604	1	POLYMER PRIMARY DEADEND
2		–	1	BOLT, EYE, 5/8", ALL
–		–	1	CLAMP, DE, ALL

NOTES:

1. STANDARD PROGRESS ENERGY CONSTRUCTION.

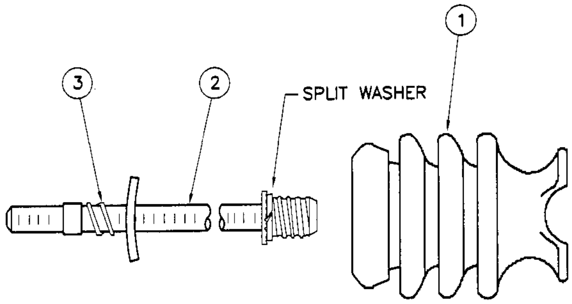
3				
2	3/9/04	NUNNERY	NUNNERY	WOOLSEY
1	12/30/03	NUNNERY	NUNNERY	WOOLSEY
0	7/7/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

POLYMER DEADEND ASSEMBLY

Progress Energy

PGN DWG. 03.06-02

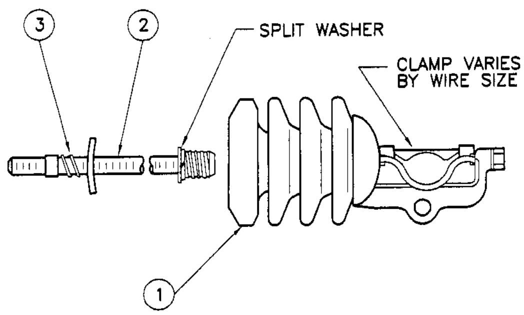
INSULATOR, POST 15 KV



FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	MATERIAL ITEM	QUANTITY	DESCRIPTION
1	IP	080212	1	INSULATOR, POST TIE 3/4 15 KV
2		072366	1	STUD, 5/8" X 10", 3/4" HEAD
3		013264	1	WASHER, SPRING COIL, 5/8"

NOTES:
1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE SLAB GAINS (NEW POLES DO NOT HAVE SLAB GAINS) OR WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER. GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS (THIS INCLUDES SLACK SPANS).

INSULATOR, CLAMP TOP, 15 KV



FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	MATERIAL ITEM	QUANTITY	DESCRIPTION
1	IC	080232	1	INSULATOR, POST CLAMP, HORIZONTAL, 15 KV
2		072367	1	STUD, 5/8" X 10", 3/4" HEAD
3		013264	1	WASHER, SPRING COIL, 5/8"

NOTES:
1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE SLAB GAINS (NEW POLES DO NOT HAVE SLAB GAINS) OR WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER. GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS (THIS INCLUDES SLACK SPANS).

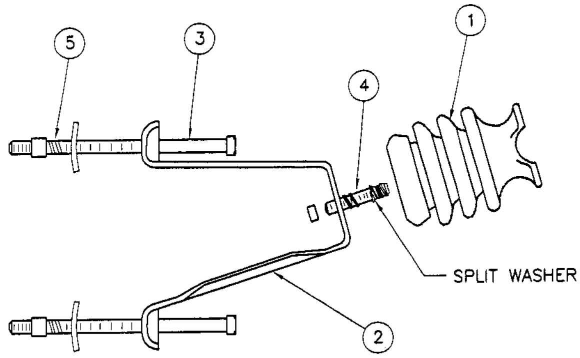
3				
2				
1	12/3/03	ROBESON	NUNNERY	WOOLSEY
0	4/17/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

INSULATORS

Progress Energy

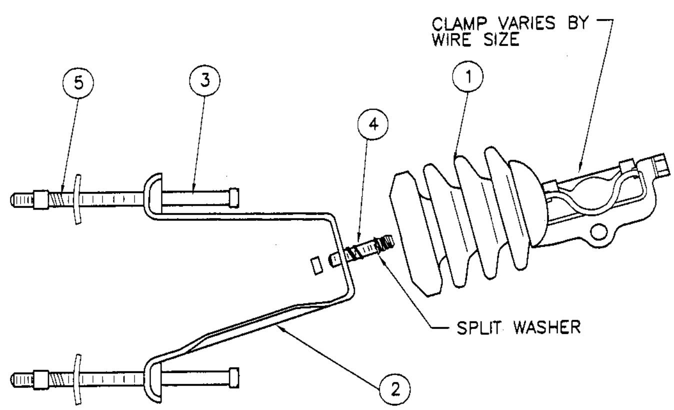
FLA FLORIDA DWG. 03.06-04

INSULATOR, POST 15 KV WITH STANDOFF BRACKET



FLORIDA BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	IPS	080212	1	INSULATOR, POST TIE 3/4 15 KV
2		070424	1	BRACKET, POST INSULATOR 8 BS
3		➤ 152107	2	BOLT MACHINE, 5/8" X 12"
4		072361	1	STUD, 5/8" X 1-3/4", 3/4" HEAD
5		013264	2	WASHER, SPRING COIL, 5/8"

CLAMP TOP, 15 KV WITH STANDOFF BRACKET



FLORIDA BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	IPCS	080232	1	INSULATOR, POST CLAMP, HORIZONTAL, 15 KV
2		070424	1	BRACKET, POST INSULATOR, 8 BS
3		➤ 152107	2	BOLT, MACHINE, 5/8" X 12"
4		072361	1	STUD, 5/8" X 1-3/4", 3/4" HEAD
5		013264	2	WASHER, SPRING COIL, 5/8"

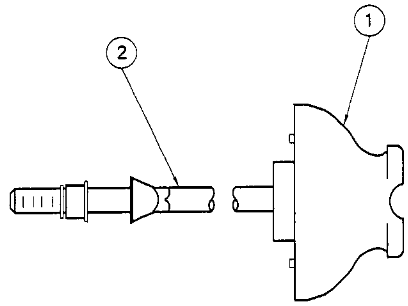
REVISED		BY	CK'D	APPR.
3				
2				
1	11/27/06	BURLISON	QUINN	HOYT
0	4/17/03	YOUNTS	SIMPSON	WOOLSEY

INSULATORS

Progress Energy

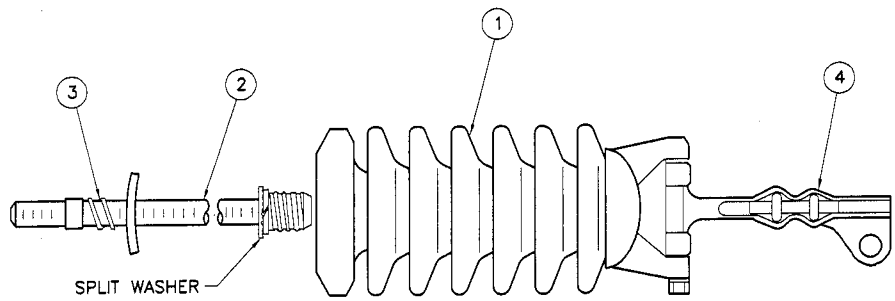
FLA DWG. 03.06-06

INSULATOR, PIN TYPE, CLASS B



FLORIDA BILL OF MATERIALS				
ITEM NO.	MATERIAL ITEM	ASSEMBLY	QUANTITY	DESCRIPTION
1	080304	IX	1	INSULATOR, PIN TYPE, CLASS B
2	072306		1	PIN, CROSSARM STRAIGHT, CLASS A&B

INSULATOR, SLACK SPAN, 35 KV, 1/0, 795 OR 336 CONDUCTOR
CODE I C S (WIRE SIZE)



FLORIDA BILL OF MATERIALS				
ITEM NO.	MATERIAL ITEM	ASSEMBLY	QUANTITY	DESCRIPTION
1	080375	ICS_	1	INSULATOR, STAINLESS STEEL POST 336-795
2	072367		1	STUD, 5/8" X 12", 3/4" HEAD
3	013264		1	WASHER, SPRING COIL, 5/8"
4	101397		1	SLACK SPAN DEADEND (USE WITH 336 - 795 AL.)
5	101392		1	SLACK SPAN DEADEND (USE WITH 1/0 AL.)

NOTES:

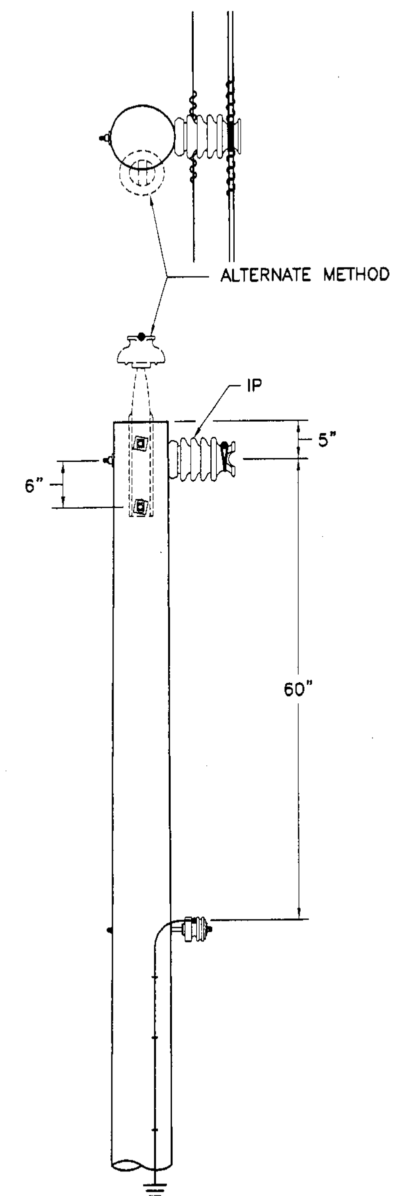
1. 1/0 DEADEND CLAMP TO BE USED ON CONCRETE POLE CONSTRUCTION.

3				
2				
1	2/3/03	ROBESON	NUNNERY	WOOLSEY
0	4/17/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

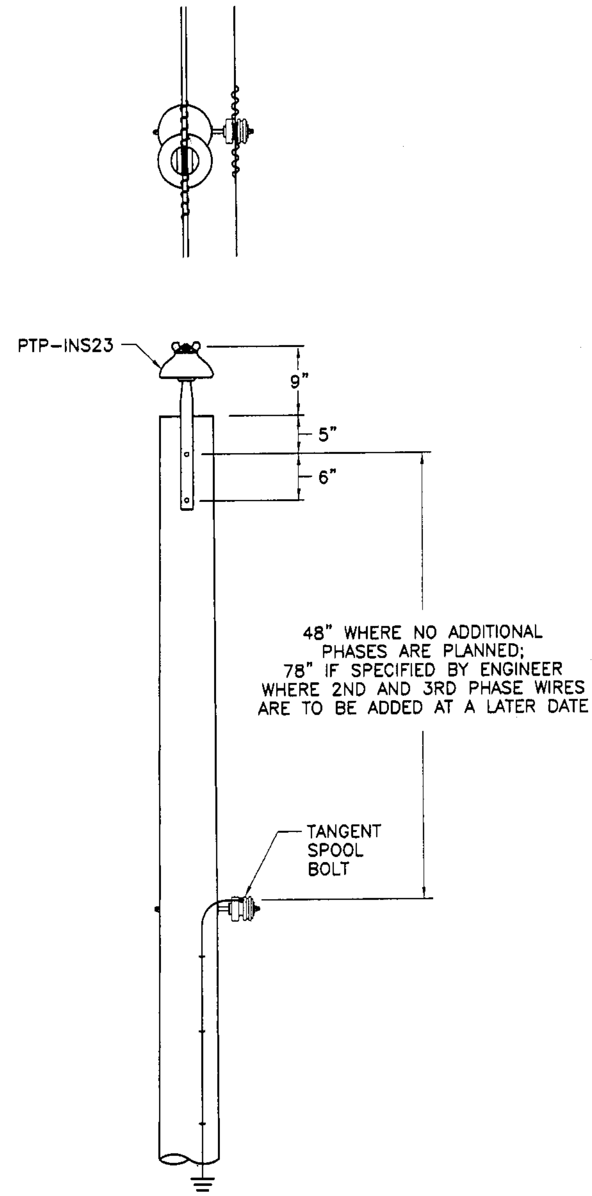
INSULATORS

Progress Energy

FLA FLORIDA DWG. 03.06-08



0° – 5° ANGLE
12KV
(STANDARD FLORIDA CONSTRUCTION)



0° – 5° ANGLE
23KV
(STANDARD CAROLINAS CONSTRUCTION)

NOTES:

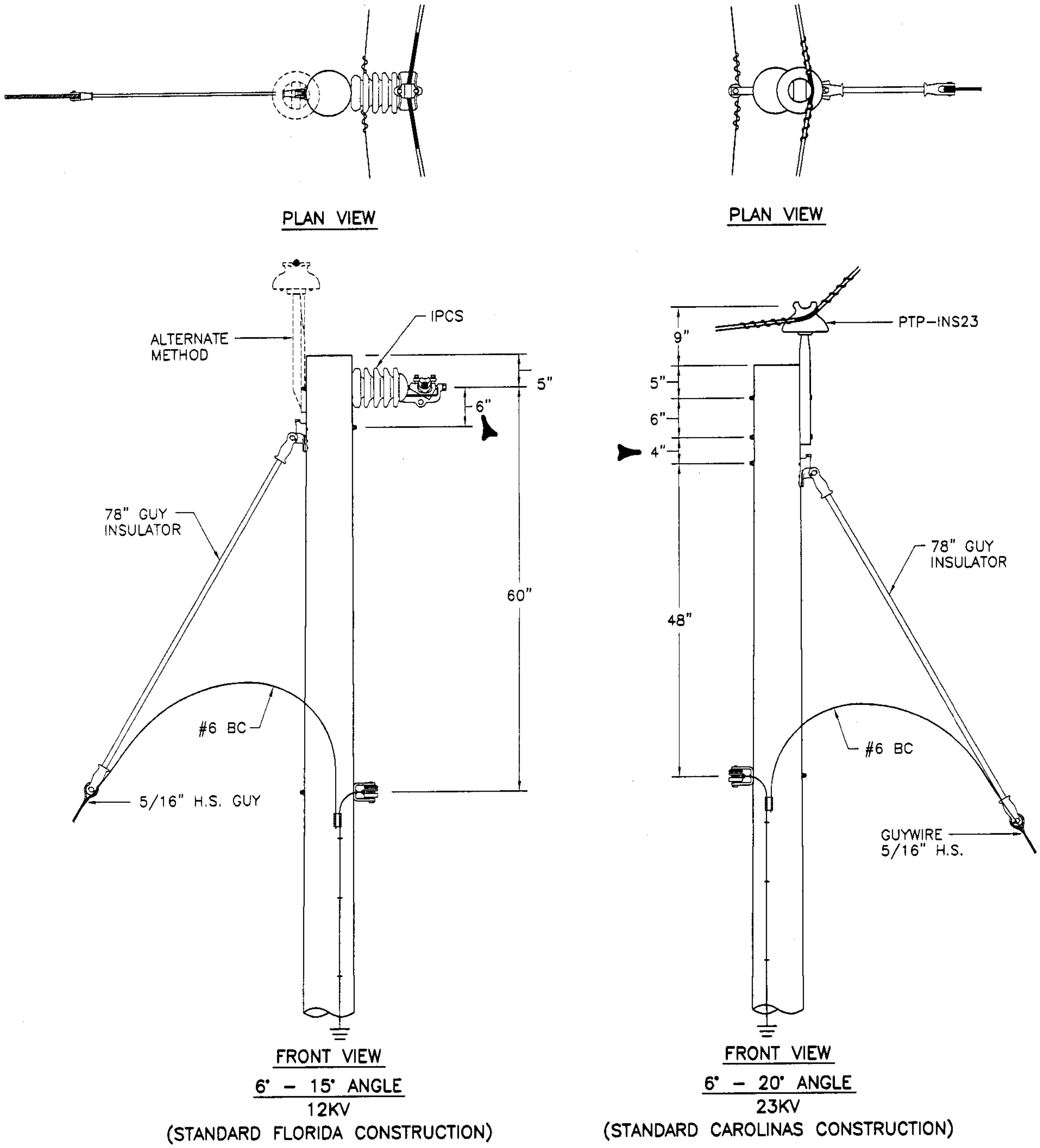
1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE SLAB GAINS (NEW POLES DO NOT HAVE SLAB GAINS) OR WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER. GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS (THIS INCLUDES SLACK SPANS).

3				
2				
1				
0	6/4/04	NUNNERY	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

SINGLE PHASE CONSTRUCTION – TANGENT

Progress Energy

PGN DWG. 03.08–01



NOTES:

1. ANGLE POLE TOP PIN SHOULD USE ONLY CONDUCTOR SIZES 1/0 AND SMALLER. USE ONLY THE SIDE GROOVE OF THE INSULATOR FOR TURNING ANGLES.
2. PRIMARY AND NEUTRAL MAY BE FRAMED ON GUY SIDE OF POLE AS AN ALTERNATE METHOD TO FACILITATE TRUCK ACCESSIBILITY.

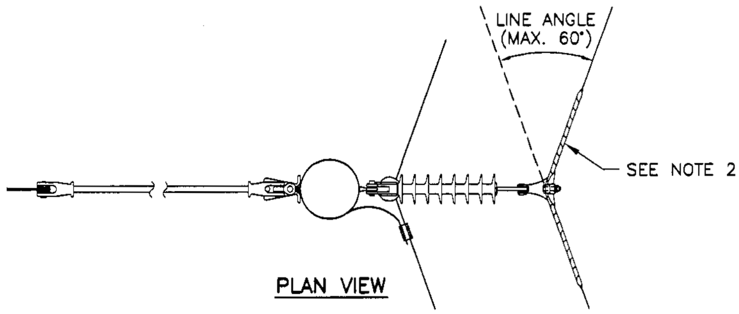
3				
2				
1	9/20/06	QUINN	QUINN	HOYT
0	6/4/04	NUNNERY	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

SINGLE–PHASE CONSTRUCTION – SMALL ANGLE POLES

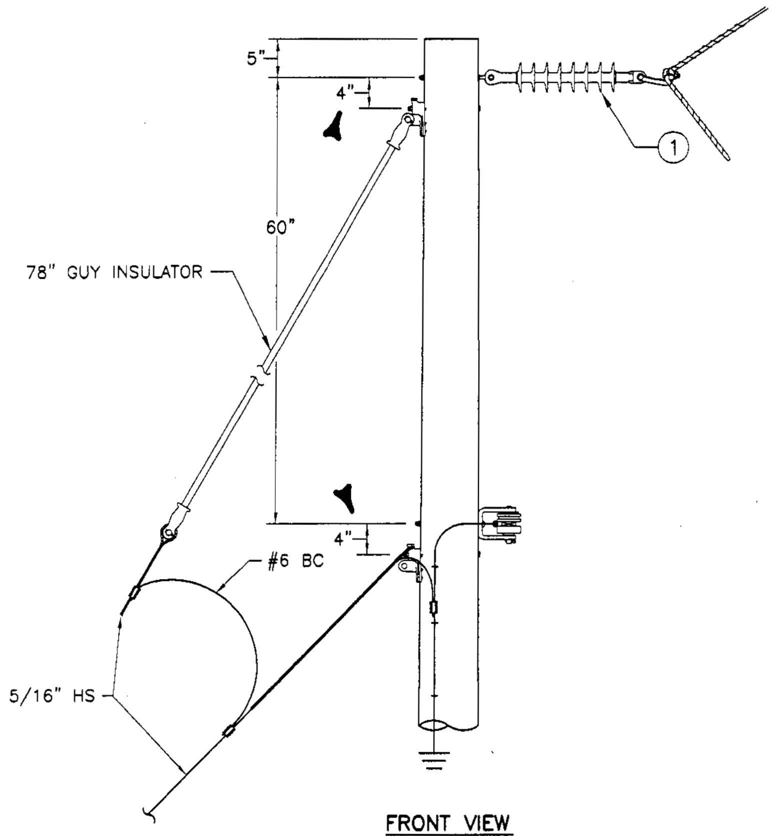
Progress Energy

PGN DWG. 03.08–02

SINGLE PHASE ANGLE



PLAN VIEW



FRONT VIEW

CAROLINAS BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	AA-POLY23	10026011	1	BOLT, EYE, 5/8, ALL
		11111028	1	CLAMP, SUSP, ALL
		11225604	1	INSULATOR, POLYMER, 15KV, 23KV DEAD-END

FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	ID	0000080577	1	INSULATOR, 27KV POLYMER DEADEND
		0000013346	1	WASHER, CURVED, 3" X 3" X 13/16"
		0000011708	1	BOLT, OVAL EYE, 5/8" X 10"

NOTES:

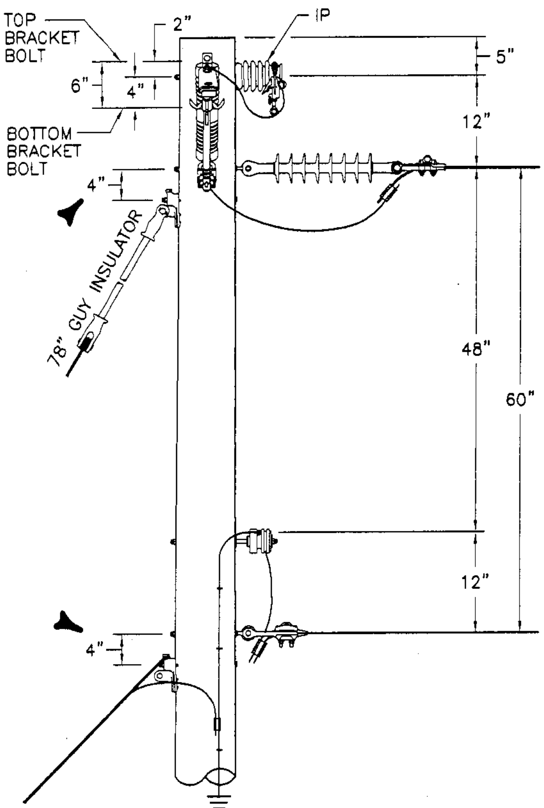
1. ALL GUYS MUST BE GROUNDED. REFER TO DWG. 02.04-04 FOR REQUIREMENTS FOR BONDING GUYS TO POLE GROUNDS.
2. ARMOR RODS REQUIRED FOR ANGLE ASSEMBLIES.

3				
2				
1	9/20/06	GUINN	GUINN	HOYT
0	1/28/04	CECCONI	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

SINGLE-PHASE - DEADENDS AND ANGLES 20 TO 60 DEGREES MAXIMUM

Progress Energy

PGN DWG. 03.08-04

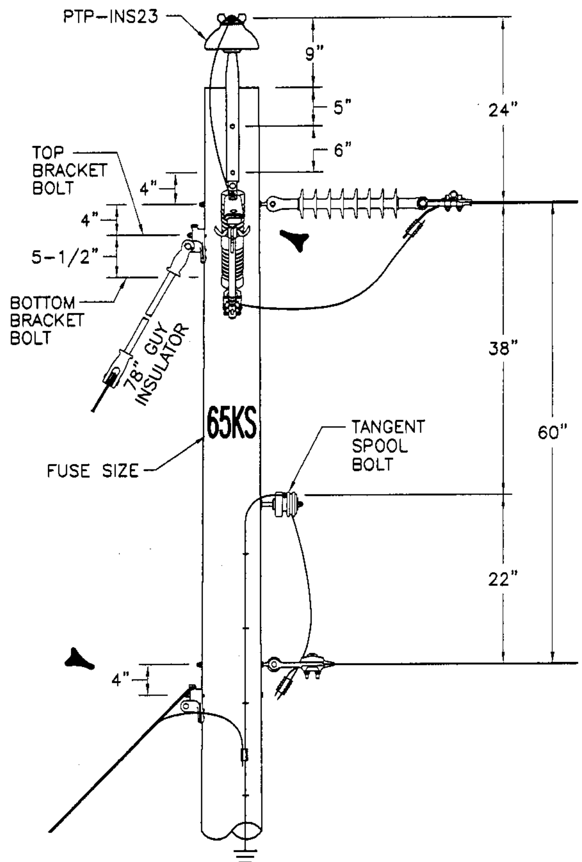


FRONT VIEW

0° – 5° ANGLE

12KV

(STANDARD FLORIDA CONSTRUCTION)



FRONT VIEW

0° – 5° ANGLE

23KV

(STANDARD CAROLINAS CONSTRUCTION)

NOTES:

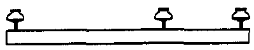
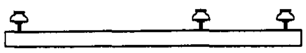
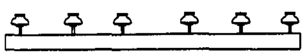
1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE SLAB GAINS (NEW POLES DO NOT HAVE SLAB GAINS) OR WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER. GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS (THIS INCLUDES SLACK SPANS).
2. SEE DWG. 03.12–20 FOR BILL OF MATERIALS.
3. SOMETIMES THE NEUTRAL FOR THE TAP LINE WILL CONFLICT WITH CATV ATTACHMENTS AND REQUIRE POLE CHANGEOUTS. IF POLE CHANGEOUT IS NOT DESIRED, THE TAP LINE NEUTRAL CAN BE RAISED TO MAINLINE NEUTRAL POSITION, PROVIDED FIRST TAP LINE SPAN IS LIMITED TO 200 FT. OR LESS.

REVISED		BY	CK'D	APPR.
3				
2				
1	9/20/06	GUINN	GUINN	HOYT
0	6/11/04	NUNNERY	NUNNERY	WOOLSEY

SINGLE–PHASE CONSTRUCTION – FUSED TAP

Progress Energy

PGN DWG. 03.08–05

CONFIGURATION	WIRE SIZE	SINGLE ARM FOR LINE USE		DOUBLE ARM FOR LINE USE	
		LIGHT	HEAVY	LIGHT	HEAVY
 8' ARM	6	—		—	
	4	—		—	
	2	—			—
	1/0	—			—
	2/0	—			—
	4/0	—			—
	336.4 KCM	—			—
	795 KCM		—		(—)
 8' ARM	6	—		—	
	4	—		—	
	2	—			—
	1/0	—			—
	2/0	—			—
	4/0	—			—
	336.4 KCM	—			—
	795 KCM		—		(—)
 10' ARM (SEE NOTE 2)	6	—		—	
	4	—		—	
	2	—			—
	1/0	—			—
	2/0	—			—
	4/0	—			—
	336.4 KCM	—			—
	795 KCM		—		(—)
 10' ARM	6	—		—	
	4	—		—	
	2	—			(—)
	1/0	—			(—)
	2/0	—			(—)
	4/0	—			(—)
	336.4 KCM	—			(—)

(—) ARMS AS INDICATED MUST BE GUYED

NOTES:

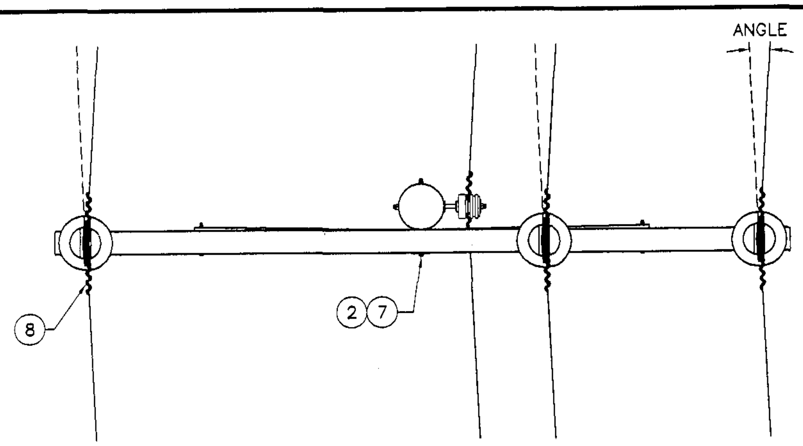
1. ARMS SUPPORTING CONDUCTORS LARGER THAN 1/0 AL OR #2 CU REQUIRE THE USE OF 60" BOW BRACES, ARMS SUPPORTING SMALLER CONDUCTORS REQUIRE FLAT BRACES.
2. USE 10 FOOT CROSSARM FOR ALL HORIZONTAL TRANSMISSION UNDERBUILD.

3				
2				
1				
0	4/17/01	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

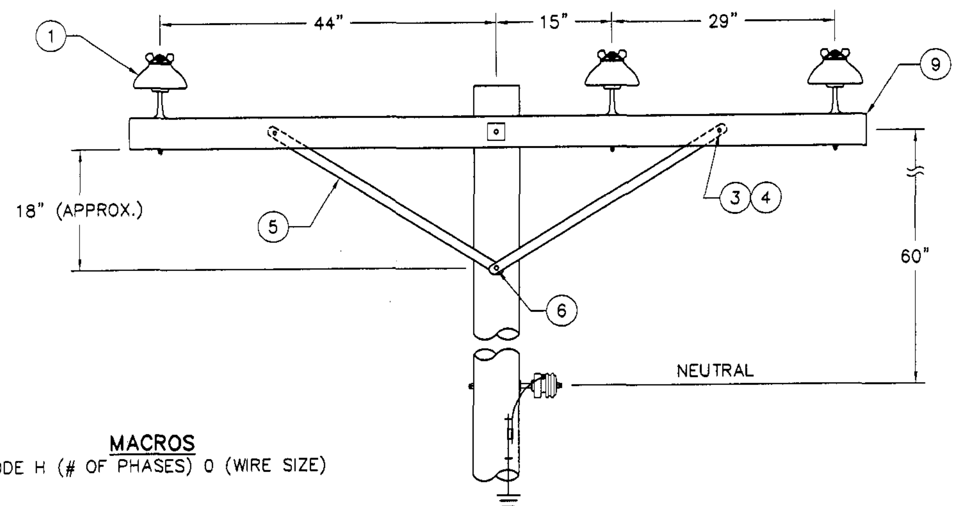
CROSSARMS FOR ALUMINUM AND COPPER CONDUCTORS

Progress Energy

FLA FLORIDA DWG. 03.11-01



PLAN VIEW



MACROS
CODE H (# OF PHASES) 0 (WIRE SIZE)

FRONT VIEW

FLORIDA BILL OF MATERIALS					
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY 2Ø	QUANTITY 3Ø	DESCRIPTION
1	IX	072306	2	3	PIN, CROSSARM
		080304	2	3	INSULATOR, PIN
		152108	2	3	BOLT, MACHINE, NUT, 5/8" X 16"
2	–	010441	1	1	BOLT, MACHINE 5/8" X 16"
3	–	011209	2	2	BOLT, CRG 3/8" X 4-1/2" (USE WITH FLAT BRACE)
3	–	010326	2	2	BOLT, MACHINE, 1/2" X 7" (USE WITH BOW BRACE)
4	–	013229	2	2	WASHER, ROUND (USE WITH BOW BRACE)
5	–	071206	1	1	BRACE, BOW 60" (USE WITH CONDUCTORS LARGER THAN 1/0 AL.)
5	–	071306	2	2	BRACE, FLAT 36" (USE WITH CONDUCTORS 1/0 AL. & SMALLER)
6	–	014114	1	1	SCREW, LAG, 1/2" X 4" (USE WITH FLAT BRACE)
6	–	152107	1	1	BOLT, MACHINE, 5/8" X 12" (USE WITH BOW BRACE)
7	–	013308	2	2	WASHER, SQUARE FLAT
8	–	–	2	3	TIES, TOP "F" NECK – DETERMINED BY WIRE SIZE
9	–	–	1	1	CROSSARM, 8' – SINGLE (VARIES WITH WIRE SIZE)

NOTES:

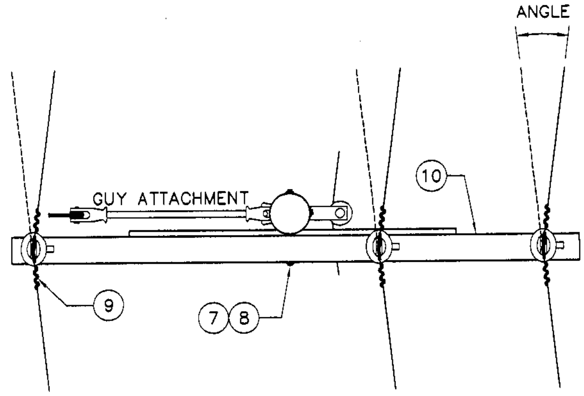
1. PLACE CONDUCTOR IN TOP GROOVE.
2. ARMS SUPPORTING CONDUCTOR LARGER THAN 1/0 AL. OR #2 CU. WILL REQUIRE THE USE OF 60" BOW BRACES.
3. SEE DWG 03.06–08 FOR PIN TYPE INSULATORS.

3	11/27/06	BURLISON	GUINN	HOYT
2	7/31/06	GUINN	GUINN	HOYT
1	8/10/04	NUNNERY	NUNNERY	SPRINGER
0	6/13/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

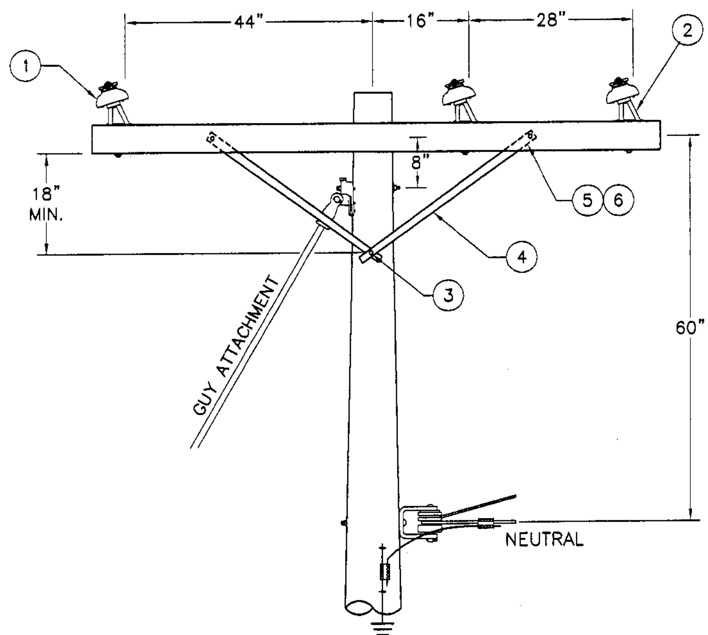
HORIZONTAL CONSTRUCTION –
0 DEGREES TO 5 DEGREES

Progress Energy

FLA DWG. 03.11–02



PLAN VIEW



FRONT VIEW

FLORIDA BILL OF MATERIALS					
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY 2ø	3ø	DESCRIPTION
1	IX	–	2	3	INSULATOR, PIN, CLASS B
2	–	072252	2	3	PIN, CROSSARM ANGLE
3	–	014114	1	1	SCREW, LAG, 1/2" X 4" (USE WITH FLAT BRACE)
3	–	➤ 152107	1	1	BOLT, MACHINE 5/8" X 12" (USE WITH FLAT BRACE)
4	–	071306	2	2	BOLT, FLAT, 36" (USE WITH CONDUCTOR 1/0 AL. & SMALLER)
4	–	071206	1	1	BRACE, BOW 60" (USE WITH CONDUCTOR LARGER THAN 1/0 AL.)
5	–	011209	2	2	BOLT, CRG 3/8", X 4-1/2" (USE WITH FLAT BRACE)
5	–	010326	2	2	BOLT, MACHINE, 1/2" X 7" (USE WITH BOW BRACE)
6	–	013229	2	2	WASHER, ROUND (USE WITH BOW BRACE)
7	–	013308	2	2	WASHER, SQUARE FLAT, 5/8"
8	–	010441	1	1	BOLT, MACHINE, 5/8" X 16"
9	–	–	2	3	TIE, SIDE "F" NECK (VARIES WITH WIRE SIZE)
10	–	–	1	1	CROSSARM (VARIES WITH WIRE SIZE)

NOTES:

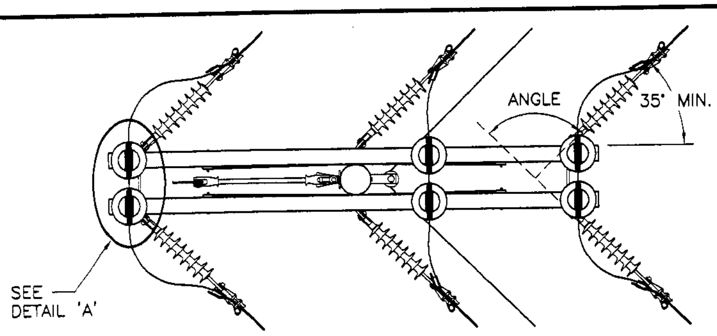
1. PLACE CONDUCTOR IN SIDE GROOVE.
2. SEE DWG 03.06-08 FOR PIN TYPE INSULATORS.

3				
2				
1	11/27/06	BURLISON	GUINN	HOYT
0	6/13/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

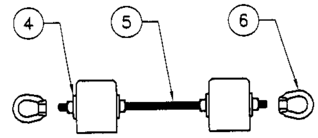
HORIZONTAL CONSTRUCTION –
6 DEGREES TO 15 DEGREES
CODE H (# OF PHASES) 1 (WIRE SIZE)

Progress Energy

FLA DWG. 03.11-04

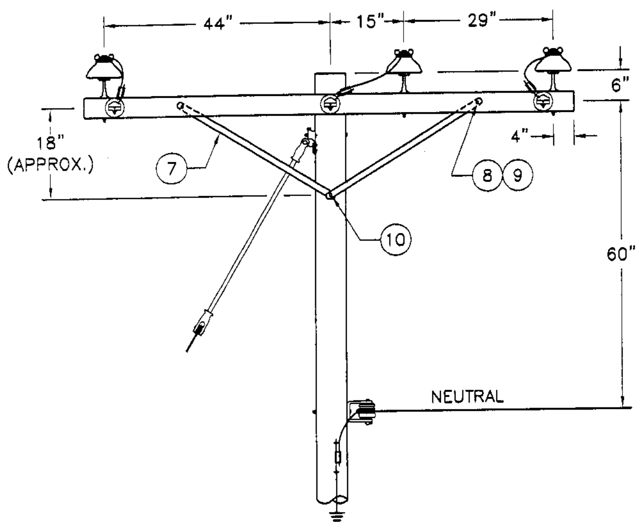


PLAN VIEW

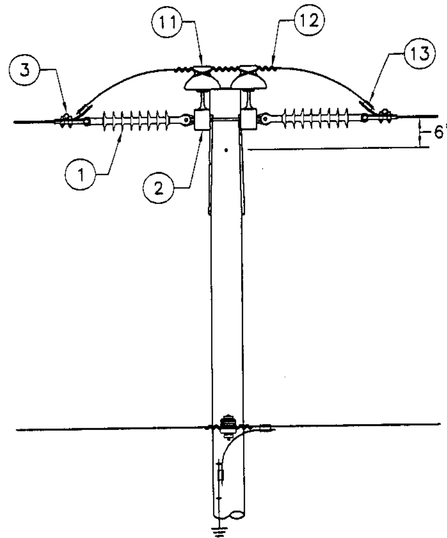


DETAIL "A"

SIDE VIEW
DOUBLE CROSSARM



FRONT VIEW



SIDE VIEW

FLORIDA BILL OF MATERIALS

ITEM NO.	ASSEMBLY	MATERIAL ITEM	QUANTITY 2ø	QUANTITY 3ø	DESCRIPTION
1	IS	080577	4	6	DEADEND, POLYMER, INSULATOR
		011708	4	6	BOLT, OVAL EYE, 5/8" X 10"
		013308	4	6	WASHER, 2-1/4" SQ., FLAT, 13/16" HOLE
2	–	–	1	1	CROSSARM, DOUBLE, 8' (DETERMINED BY WIRE SIZE)
3	–	–	4	6	DEADEND, CLAMP (DETERMINED BY WIRE SIZE)
4	–	013308	10	10	WASHER, SQUARE FLAT, 5/8"
5	–	011313	3	3	BOLT, DOUBLE ARM, 5/8" X 20"
6	–	012210	4	6	NUT, OVAL EYE, 5/8"
7	–	071206	2	2	BRACE, BOW 60" (USE WITH CONDUCTOR LARGER THAN 1/0 AL.)
7	–	071306	4	4	BRACE, FLAT, 36" (USE WITH CONDUCTOR 1/0 AL. & SMALLER)
8	–	011209	4	4	BOLT, CRG 3/8", X 4-1/2" (USE WITH FLAT BRACE)
8	–	010326	4	4	BOLT, MACHINE, 1/2" X 7" (USE WITH BOW BRACE)
9	–	013229	4	4	WASHER, ROUND (USE WITH BOW BRACE)
10	–	014114	2	2	SCREW, LAG, 1/2" X 4" (USE WITH FLAT BRACE)
10	–	152107	1	1	BOLT, MACHINE, 5/8" X 12" (USE WITH BOW BRACE)
11	IX	072306	4	6	PIN, CROSSARM
		080304	4	6	INSULATOR, PIN TYPE
		152108	4	6	BOLT, MACHINE, SQ, 5/8" X 16"
12	–	–	4	6	TIE, HAND (VARIES WITH WIRE SIZE)
13	–	–	2	3	CONNECTOR, COMPRESSION (VARIES WITH WIRE SIZE)

NOTES:

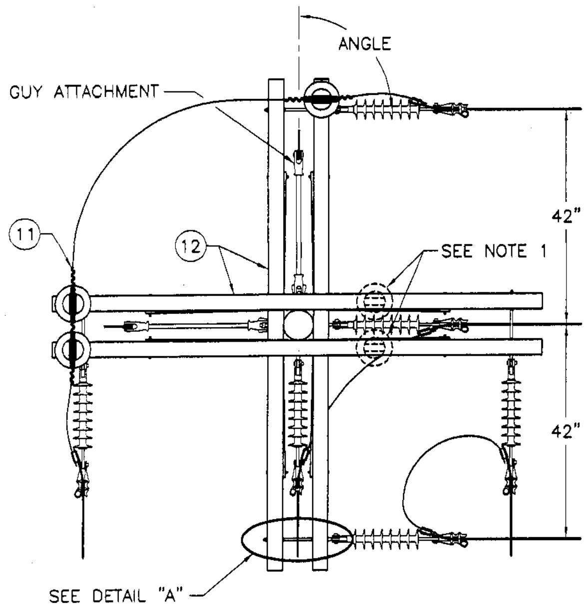
1. SEE DWG. 03.06-02 FOR 15KV AND 27KV POLYMERS.
2. SEE DWG. 03.06-08 FOR PIN TYPE INSULATORS.

REVISED		BY	CK'D	APPR.
3				
2	11/27/06	BURLISON	GUINN	HOYT
1	7/3/06	GUINN	GUINN	HOYT
0	7/4/03	YOUNTS	SIMPSON	WOOLSEY

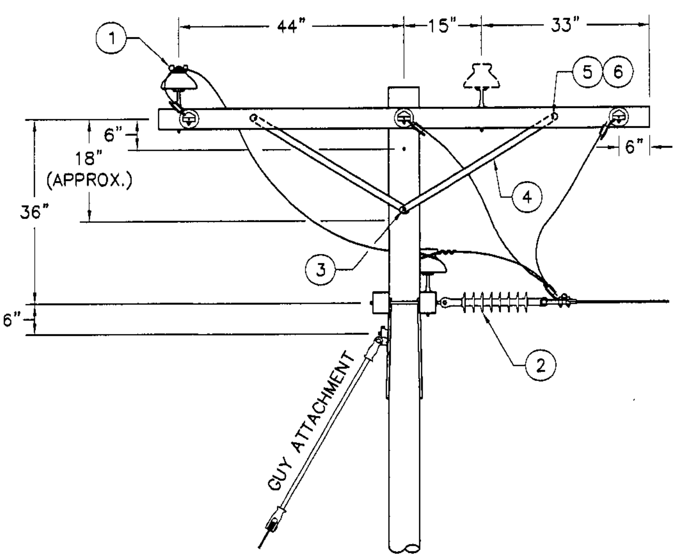
HORIZONTAL CONSTRUCTION –
16 DEGREES TO 59 DEGREES
CODE H (# OF PHASES) 2 (WIRE SIZE)

Progress Energy

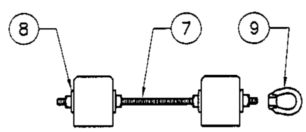
FLA DWG. 03.11-06



PLAN VIEW



FRONT VIEW



DETAIL "A"

SIDE VIEW
DOUBLE CROSSARM

MACROS

CODE H (# OF PHASES) 3 (WIRE SIZE)

FLORIDA BILL OF MATERIALS

ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY 2ø	QUANTITY 3ø	DESCRIPTION
1	IX	072306	3	5	PIN, CROSSARM
		080304	3	5	INSULATOR, PIN (SEE NOTE 2)
		152108	3	5	BOLT, MACHINE, 5/8" X 16"
2	ID	011708	4	6	BOLT. OVAL EYE, 5/8" X 10"
		013346	4	6	WASHER, 3" SQ, 13/16" HOLE
		080577	4	6	INSULATOR, POLYMER, 25KV, DE
3	–	014114	4	4	SCREW, LAG, 1/2" X 4" (USE WITH FLAT BRACE)
3	–	152107	2	2	BOLT, MACHINE, 5/8" X 12" (USE WITH BOW BRACE)
4	–	071206	4	4	BRACE, BOW 60" (USE WITH CONDUCTOR LARGER THAN 1/0 AL.)
4	–	071306	8	8	BRACE, FLAT, 36" (USE WITH CONDUCTOR 1/0 AL. & SMALLER)
5	–	011209	8	8	BOLT, CRG 3/8", X 4-1/2" (USE WITH FLAT BRACE)
5	–	010326	8	8	BOLT, MACHINE, 1/2" X 7", (USE WITH BOW BRACE)
6	–	013229	8	8	WASHER, ROUND (USE WITH BOW BRACES)
7	–	011313	6	6	BOLT, DOUBLE ARM, 5/8" X 20"
8	–	013308	20	20	WASHER, SQUARE FLAT, 5/8"
9	–	012210	4	6	NUT, OVAL EYE, 5/8"
10	–	–	4	6	DEADEND, CLAMP (VARIES WITH WIRE SIZE)
11	–	–	3	5	TIE, SIDE "F" NECK (VARIES WITH WIRE SIZE)
12	–	–	2	2	CROSSARM, DOUBLE (VARIES WITH WIRE SIZE)

NOTES:

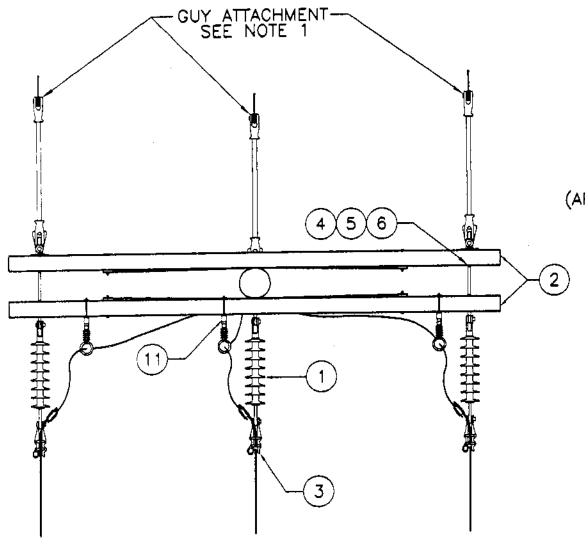
1. USE JUMPER INSULATOR WHEN NECESSARY TO PROVIDE CLEARANCE.
2. SEE DWG. 03.06-08 FOR PIN TYPE INSULATORS.

REVISED		BY	CK'D	APPR.
3	11/27/06	BURLISON	GUINN	HOYT
2	6/30/05	GUINN	GUINN	HOYT
1	8/10/04	NUNNERY	NUNNERY	SPRINGER
0	7/4/03	YOUNTS	SIMPSON	WOOLSEY

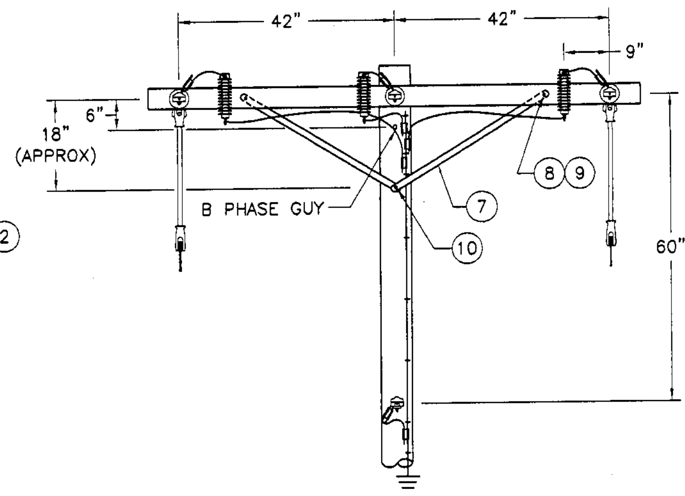
HORIZONTAL CONSTRUCTION – 60 DEGREES TO 90 DEGREES

Progress Energy

FLA DWG. 03.11–10



PLAN VIEW



FRONT VIEW

FLORIDA BILL OF MATERIALS					
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY 2Ø	QUANTITY 3Ø	DESCRIPTION
1	ID	011708	2	3	BOLT, OVAL EYE, 5/8" X 10"
		013346	2	3	WASHER, 3" SQ., 13/16" HOLE
		080577	2	3	INSULATOR, POLYMER, 25KV
2	–	–	1	1	CROSSARM, DOUBLE (DETERMINED BY WIRE SIZE)
3	–	–	2	3	DEADEND, CLAMP (DETERMINED BY WIRE SIZE)
4	–	013308	10	10	WASHER, SQUARE FLAT, 5/8"
5	–	011313	3	3	BOLT, DOUBLE ARM, 5/8" X 20"
6	–	012210	2	3	NUT, OVAL EYE, 5/8"
7	–	071206	2	2	BRACE, BOW 60" (USE WITH CONDUCTOR LARGER THAN 1/0 AL.)
7	–	071306	4	4	BRACE, FLAT, 36" (USE WITH CONDUCTOR 1/0 AL. & SMALLER)
8	–	011209	4	4	BOLT, CRG 3/8", X 4-1/2" (USE WITH FLAT BRACE)
8	–	010326	4	4	BOLT, MACHINE, 1/2" X 7", (USE WITH BOW BRACE)
9	–	013229	4	4	WASHER, ROUND (USE WITH BOW BRACE)
10	–	014114	2	2	SCREW, LAG, 1/2" X 4" (USE WITH FLAT BRACE)
10	–	➤152107	1	1	BOLT, MACHINE, 5/8" X 12" (USE WITH BOW BRACE)
11	–	070101	2	3	BRACKET, ARRESTER

NOTES:

1. ARMS MUST BE GUYED ONLY FOR 795 CONDUCTORS.
2. ARRESTERS ISSUED SEPARATELY, COMPATIBLE UNIT: AX_.
3. POLE GROUND ISSUED SEPARATELY, COMPATIBLE UNIT: GO.

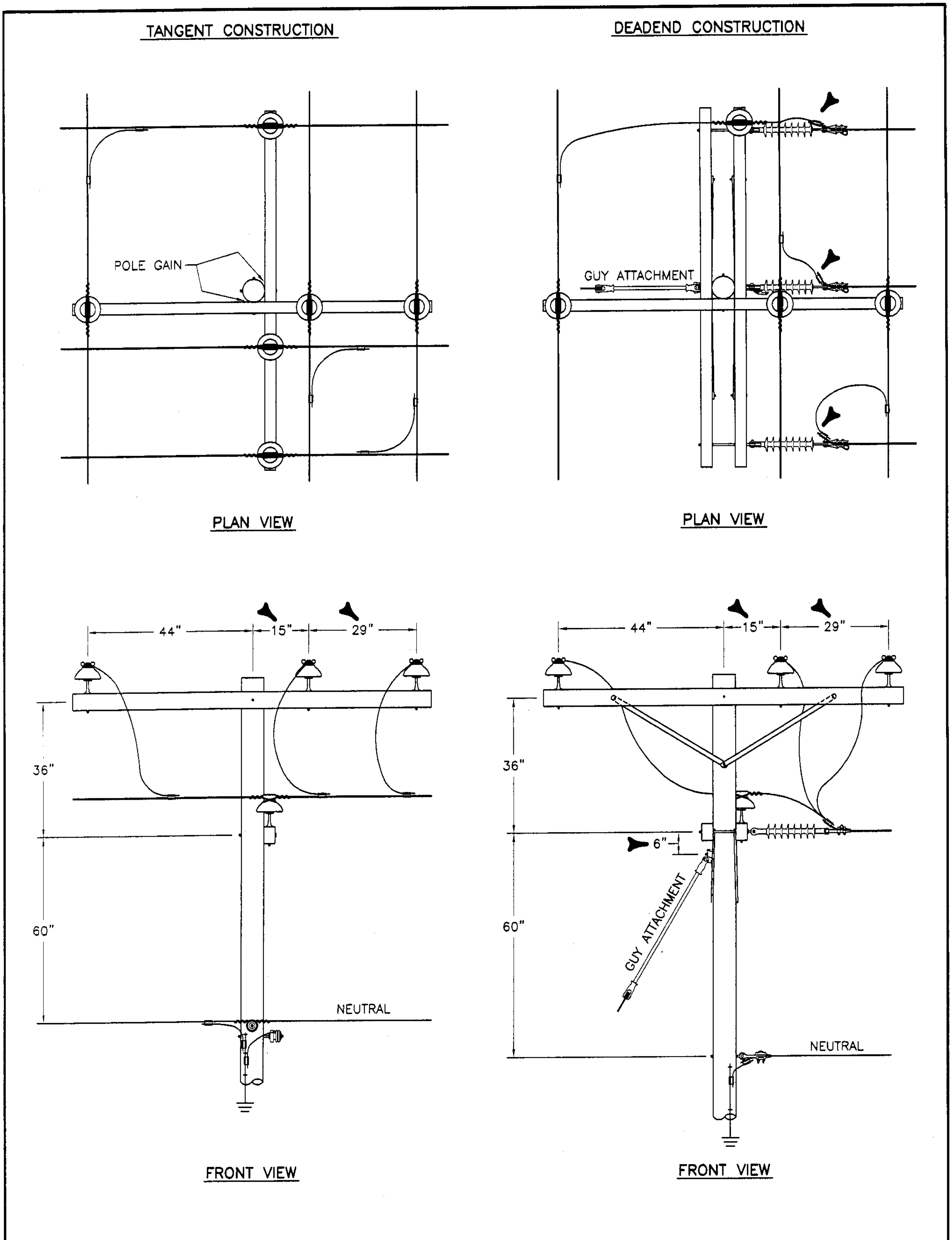
MACROS
CODE H (# OF PHASES) 4 (WIRE SIZE)

3	11/27/06	BURLISON	GUINN	HOYT
2	7/31/06	GUINN	GUINN	HOYT
1	8/10/04	NUNNERY	NUNNERY	SPRINGER
0	7/4/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

HORIZONTAL CONSTRUCTION –
DEADEND

Progress Energy

FLA DWG. 03.11-12

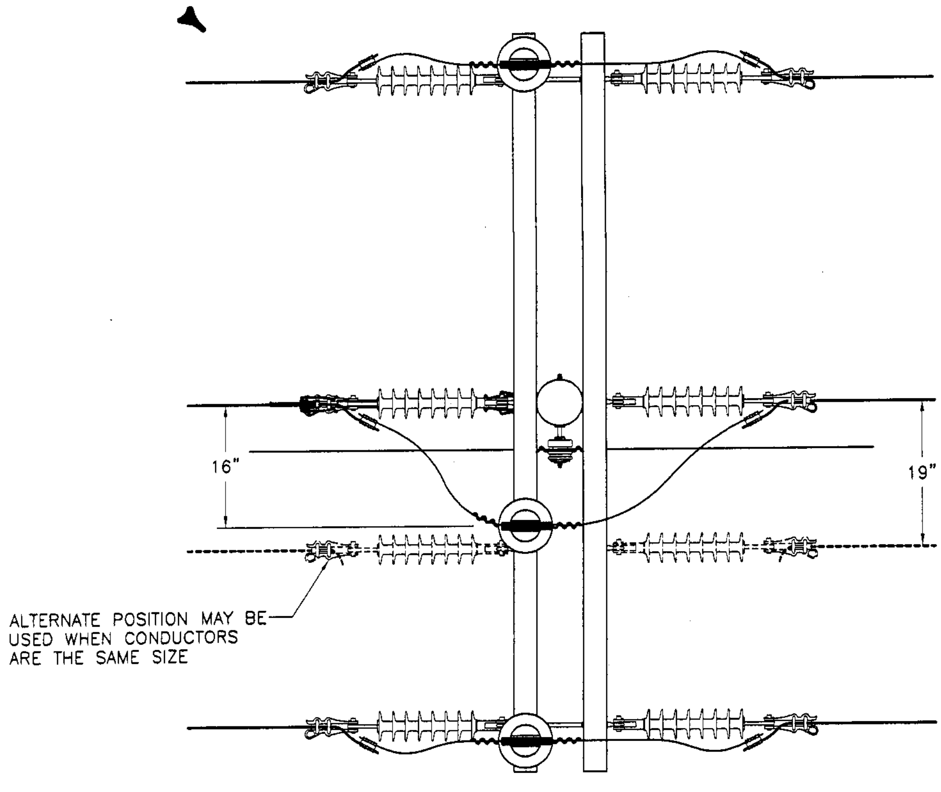


HORIZONTAL TANGENT WITH HORIZONTAL CONSTRUCTION

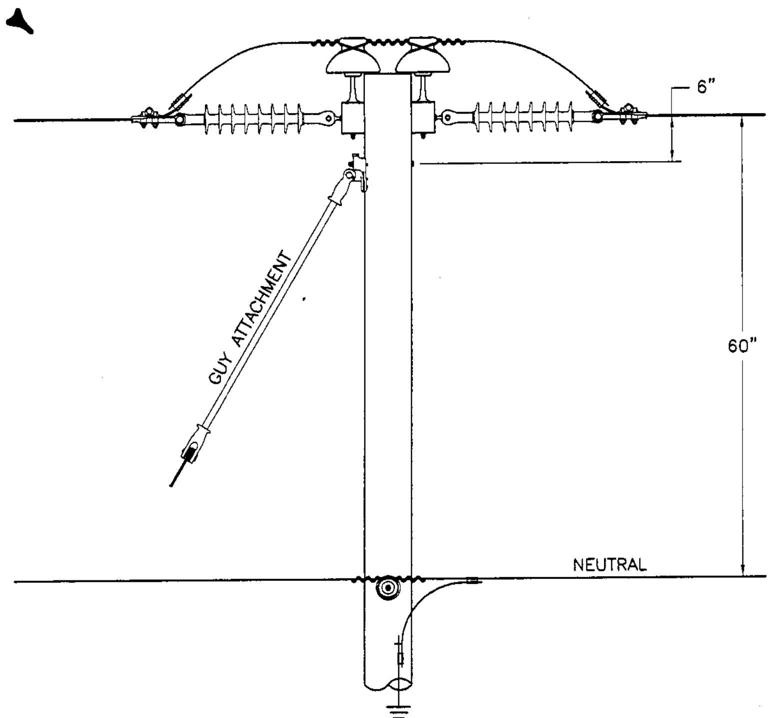
REVISED		BY	CK'D	APPR.
3				
2				
1	7/31/06	GUINN	GUINN	HOYT
0	7/7/03	YOUNTS	SIMPSON	WOOLSEY

Progress Energy

FLA DWG. 03.11–14



PLAN VIEW



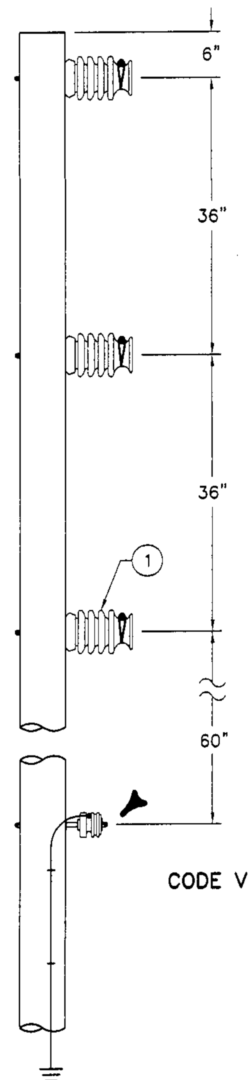
FRONT VIEW

3				
2				
1	7/31/06	GUINN	GUINN	HOYT
0	7/7/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

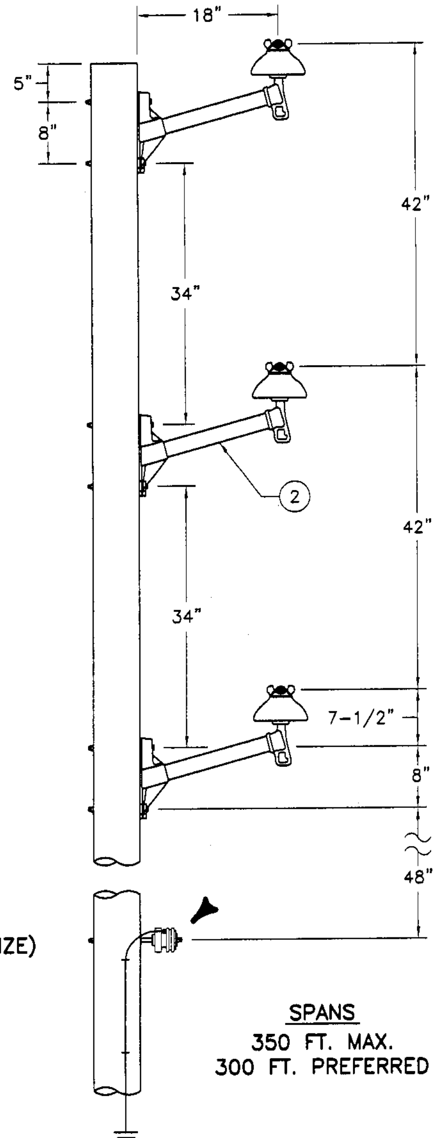
HORIZONTAL DEADEND
WITH HORIZONTAL DEADEND

Progress Energy

FLA DWG. 03.11–16



12 KV
(STANDARD FLORIDA CONSTRUCTION)



MACROS
CODE V (# OF PHASES) 0 (WIRE SIZE)

SPANS
350 FT. MAX.
300 FT. PREFERRED

23 KV
(STANDARD CAROLINAS CONSTRUCTION)

PROGRESS ENERGY BILL OF MATERIALS								
ITEM NO.	PEC COMP. UNIT	CAROLINAS CN	PEF COMP. UNIT	FLORIDA CN	QUANTITY 1ø	2ø	3ø	DESCRIPTION
1	–	–	IP	080212	1	2	3	INSULATOR, POST TIE 3/4 15 KV
		–		072366	1	2	3	STUD, 5/8" X 10", 3/4" HEAD
		–		013264	1	2	3	WASHER, SPRING COIL, 5/8"
2	OSB-FG23/2	10033512	IPFS18	152106	2	4	6	BOLT, MACH, 5/8" X 10"
		11221405		080304	1	2	3	INSULATOR, PIN, 23KV
		10043917		10043917	1	2	3	BKT, FBG, 18" STANDOFF

NOTES:

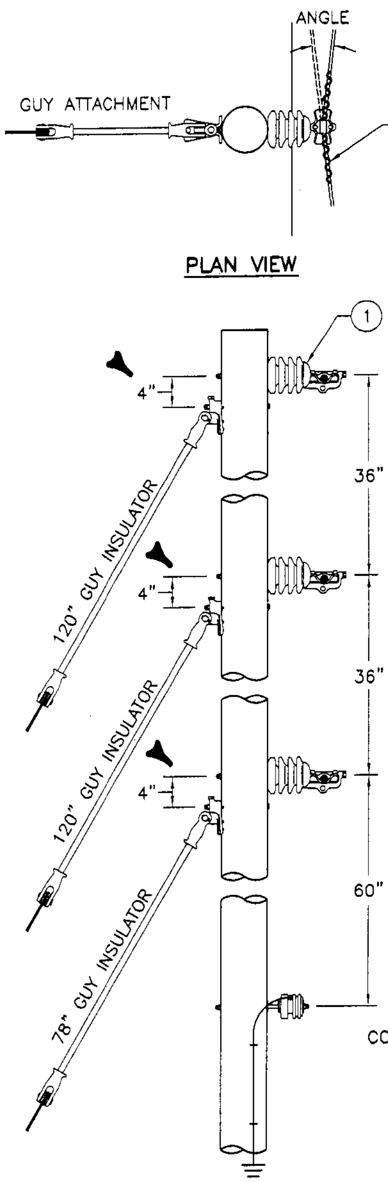
1. WHEN INSTALLING 795 KCM WIRE AT 4° & 5°, USE CODE V (#ø'S) 1 7. THIS WILL ISSUE A CLAMP TYPE POST INSULATOR.
2. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE SLAB GAINS (NEW POLES DO NOT HAVE SLAB GAINS) OR WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER. GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS (THIS INCLUDES SLACK SPANS).

3	1/27/06	BURLISON	GUINN	HOYT
2	3/27/06	CECCONI	GUINN	HOYT
1	6/30/04	NUNNERY	NUNNERY	WOOLSEY
0	3/30/04	NUNNERY	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

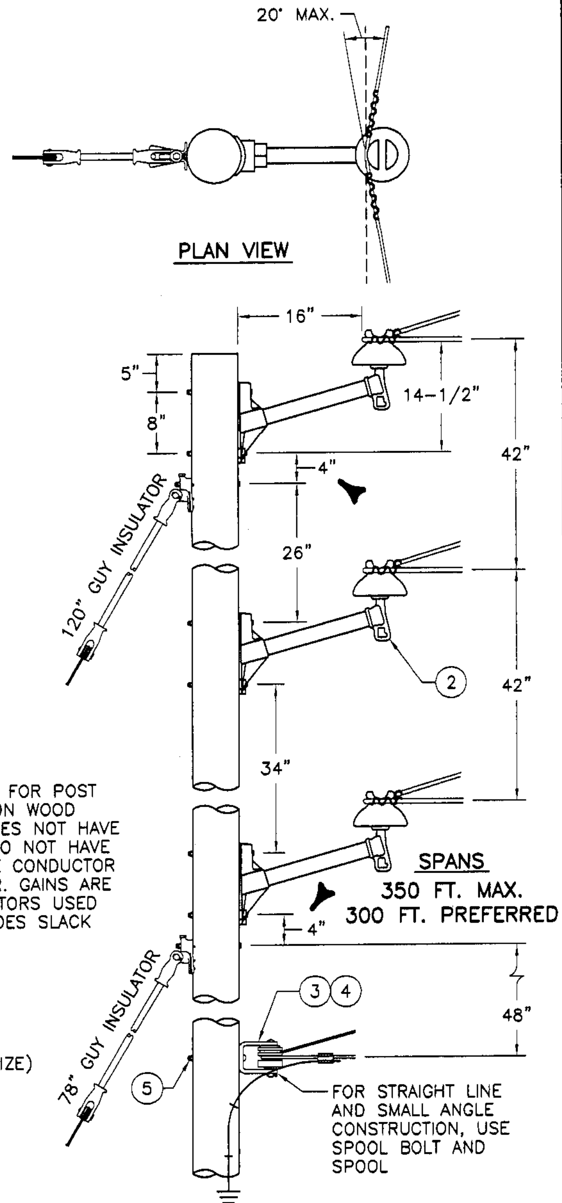
VERTICAL CONSTRUCTION – TANGENT
0 DEGREES TO 5 DEGREES

Progress Energy

PGN DWG. 03.12-02



6 – 15 DEGREES 12KV (STANDARD FLORIDA CONSTRUCTION)



6 – 20 DEGREES 23KV (STANDARD CAROLINAS CONSTRUCTION)

NOTES:

1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE SLAB GAINS (NEW POLES DO NOT HAVE SLAB GAINS) OR WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER. GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS (THIS INCLUDES SLACK SPANS).

MACROS

CODE V (# OF PHASES) 1 (WIRE SIZE)

PROGRESS ENERGY BILL OF MATERIALS

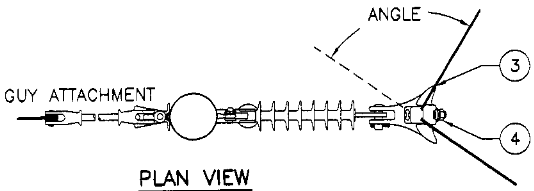
ITEM NO.	CAROLINAS COMP. UNIT	CAROLINAS CN	FLORIDA COMP. UNIT	FLORIDA CN	QUANTITY 1ø	2ø	3ø	DESCRIPTION
1	–	–	IPCS	080232	1	2	3	INSULATOR, LINE POST, HORIZ, CLAMP, 15 KV
	–	–		013264	1	2	3	WASHER, SPRING, 5/8"
	–	–		013308	1	2	3	WASHER, 2-1/4" SQ., FLAT, 13/16" HOLE
	–	–		014114	1	2	3	SCREW, LAG, 1/2" X 4"
	–	–		070424	1	2	3	BRACKET, POST, INSULATOR
	–	–		072361	1	2	3	STUD, LINE POST, 5/8" X 1-3/4"
	–	–		152107	1	2	3	BOLT, MACHINE, SQ, 5/8" X 12"
2	OSB-FG23/2	10043917	–	–	1	2	3	18" X 2" FIBERGLASS STANDOFF BKT.
		11221405	–	–	1	2	3	23KV PIN INSULATOR, CL55-5
		10033512	–	–	2	4	6	5/8" MACHINE BOLT
3	–	10510204	–	–	1	2	3	SPOOL INSULATOR CLEVIS, GALV.
4	–	10512002	–	–	1	2	3	SECONDARY SPOOL INSULATOR, 3"
5	–	10033512	–	–	1	2	3	5/8" MACHINE BOLT
6	–	11060100	–	–	AS REQ'D.			SOLID AL. TIE WIRE, 4 GA.

REVISED		BY	CK'D	APPR.
3				
2				
1	9/20/05	GUINN	GUINN	HOYT
0	6/30/04	NUNNERY	NUNNERY	WOOLSEY

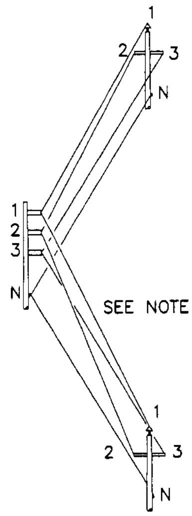
VERTICAL CONSTRUCTION – SMALL ANGLES

Progress Energy

PGN DWG. 03.12-04



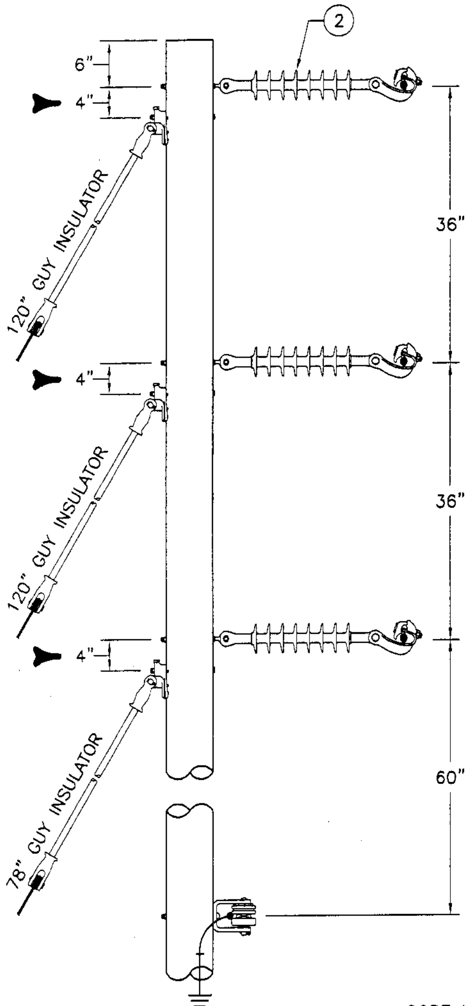
PLAN VIEW



CONDUCTOR ROLL DIAGRAM

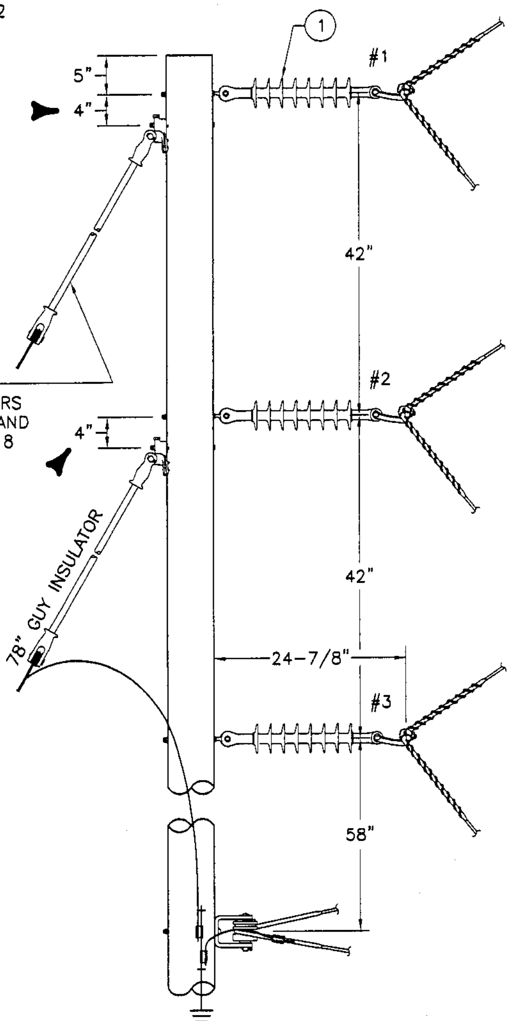
NOTES:

1. USE 2 OR 3 PRIMARY GUYS AS SPECIFIED ON WORK ORDER. IF 3 PRIMARY GUYS ARE SPECIFIED, INSTALL EACH GUY DIRECTLY BEHIND EACH PHASE ON A GUY HANGER, (CN 10310001).
2. FROM ARMLESS OR CROSSARM CONSTRUCTION WITH POLE TOP PIN, ROLL PHASES AS SHOWN IN THE DIAGRAM.



FRONT VIEW
16 – 60 DEGREES
(STANDARD FLORIDA CONSTRUCTION)

MACROS
CODE V (# OF PHASES) 2 (WIRE SIZE)



FRONT VIEW
20 – 60 DEGREES
(STANDARD CAROLINAS CONSTRUCTION)

PROGRESS ENERGY BILL OF MATERIALS

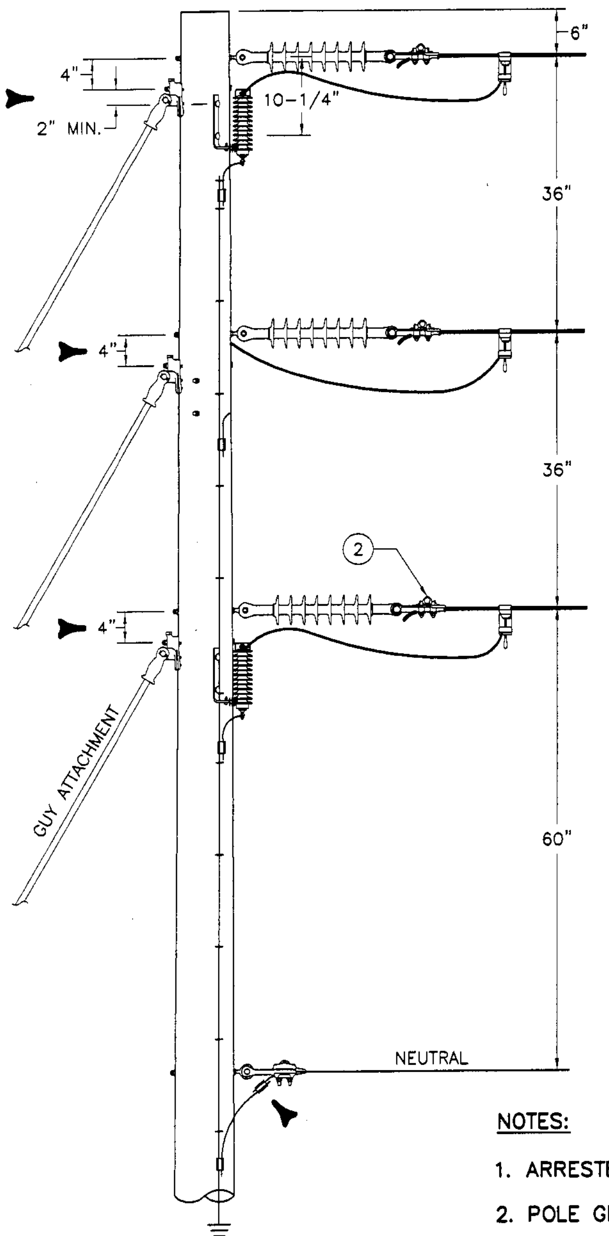
ITEM NO.	CAR. ASSEMBLY	CAROLINAS CN	FLORIDA ASSEMBLY	FLORIDA CN	QUANTITY 1ø	2ø	3ø	DESCRIPTION
1	AA-POLY23	10026011	–	–	1	2	3	BOLT, OVAL EYE, 5/8"
		11111028	–	–	1	2	3	CLAMP, SUSPENSION, ALL
		11225604	–	–	1	2	3	INSULATOR, POLYMER, 25KV, DE
2	–	–	ID	011708	1	2	3	BOLT, OVAL EYE, 5/8"
	–	–		013346	1	2	3	WASHER, 3" SQ., 13/16" HOLE
	–	–		080577	1	2	3	INSULATOR, POLYMER, 25KV, DE
3	–	–	–	–	1	2	3	ARMOR ROD (DET. BY WIRE SIZE, ONLY 336 & 795)
4	–	–	–	–	1	2	3	CLAMP, ANGLE (DETERMINED BY WIRE SIZE)

REVISED		BY	CK'D	APPR.
3				
2	8/16/06	GUINN	GUINN	HOYT
1	2/2/06	MCINTIRE	GUINN	HOYT
0	6/15/04	NUNNERY	NUNNERY	WOOLSEY

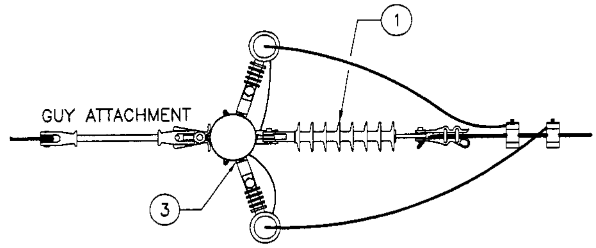
VERTICAL CONSTRUCTION – ANGLE ASSEMBLIES
ANGLES TO 60 DEGREES

Progress Energy

PGN DWG. 03.12-06



FRONT VIEW



PLAN VIEW

NOTES:

1. ARRESTERS ISSUED SEPARATELY, COMPATIBLE UNIT: AP_.
2. POLE GROUND ISSUED SEPARATELY, COMPATIBLE UNIT: GO.

MACROS
V (# OF PHASES) 4 (WIRE SIZE)

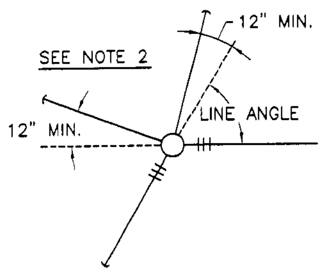
FLORIDA BILL OF MATERIALS						
ITEM NO.	ASSEMBLY	MATERIAL ITEM	QUANTITY			DESCRIPTION
			1ø	2ø	3ø	
1	ID	011708	1	2	3	BOLT, OVAL EYE, 5/8" X 10"
		013346	1	2	3	WASHER, 3" SQ., 13/16" HOLE
		080577	1	2	3	INSULATOR, POLYMER, 25KV, DEADEND
2	–	–	1	2	3	DEADEND, CLAMP (DETERMINED BY WIRE SIZE)
3	–	070101	1	2	3	BRACKET, ARRESTER
4	–	130205	1	2	3	ARRESTER, HLC, NO-LOAD, 556 ACSR MAX
		190404	1	2	3	#6 SD CU WIRE (FT)

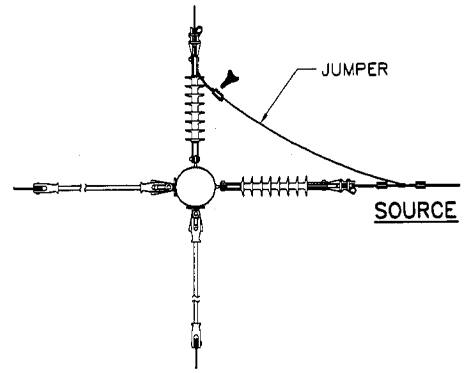
REVISED		BY	CK'D	APPR.
3				
2	7/3/06	GUINN	GUINN	HOYT
1	6/15/04	NUNNERY	NUNNERY	WOOLSEY
0	7/4/03	YOUNTS	SIMPSON	WOOLSEY

VERTICAL CONSTRUCTION – DEADEND

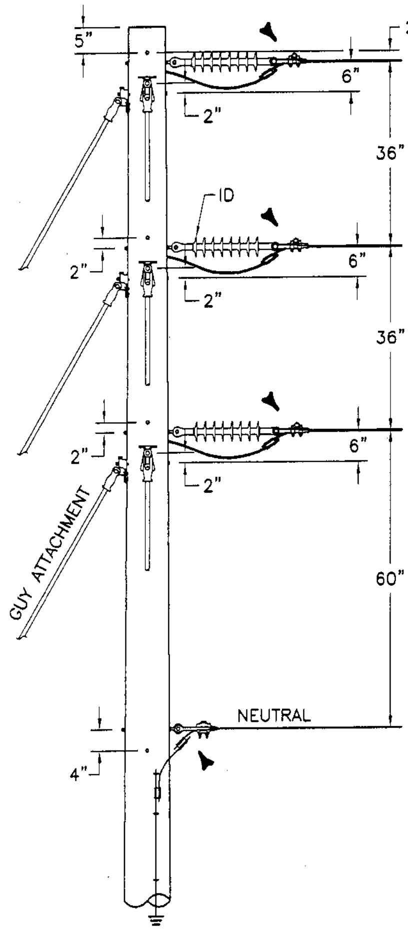
Progress Energy

FLA DWG. 03.12-10

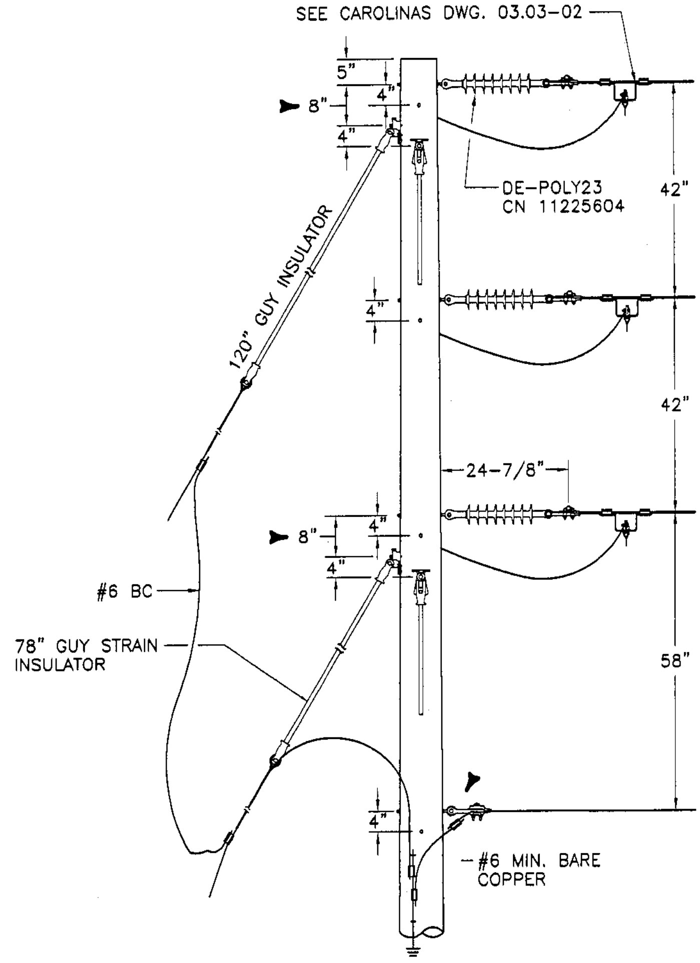




PLAN VIEW



FRONT VIEW
(STANDARD FLORIDA CONSTRUCTION)



FRONT VIEW
(STANDARD CAROLINAS CONSTRUCTION)

NOTES:

1. USED HOTLINE CLAMP AND STIRRUP FOR SMALL CONDUCTORS AND SOLID JUMPERS FOR LARGE CONDUCTORS (ABOVE 1/0).

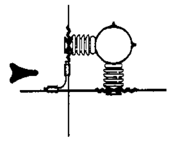
2. IF USED FOR LINE ANGLES LESS THAN 60°, OFFSET EACH ANCHOR 12" (SEE ABOVE) OR USE ONE ANCHOR IN THE ANGLE. ALSO, CONSIDER USING ANGLE ASSEMBLIES WHERE ANGLE PERMITS.

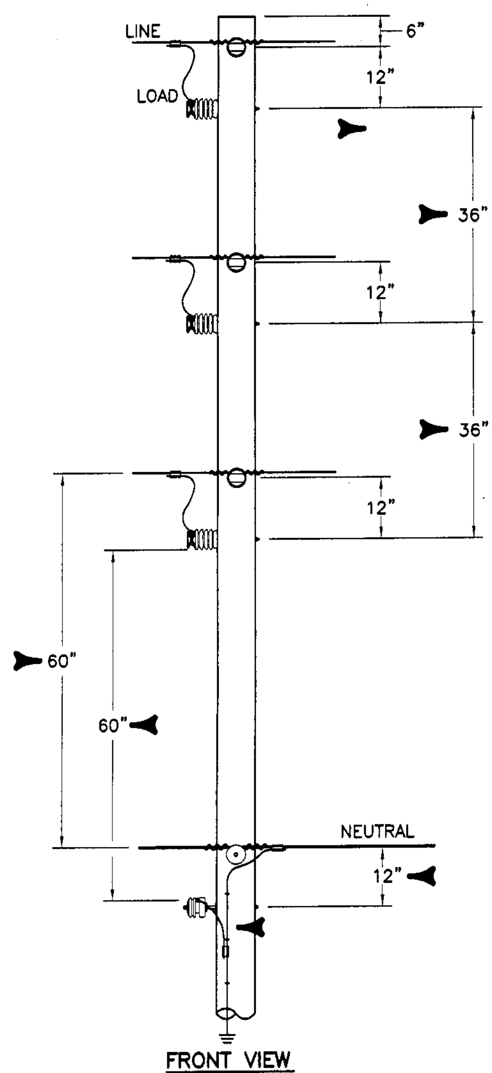
3				
2				
1	6/19/06	GUINN	GUINN	HOYT
0	6/16/04	NUNNERY	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

VERTICAL DOUBLE DEAD END CONSTRUCTION – THREE PHASE

Progress Energy

PGN DWG. 03.12–11





NOTES:

1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE SLAB GAINS (NEW POLES DO NOT HAVE SLAB GAINS) OR WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER. GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS (THIS INCLUDES SLACK SPANS).

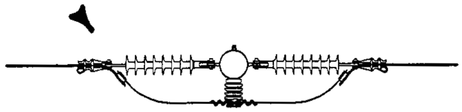
3				
2	6/4/04	NUNNERY	NUNNERY	WOOLSEY
1	12/3/03	ROBESON	NUNNERY	WOOLSEY
0	7/7/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

VERTICAL TANGENT CROSSING

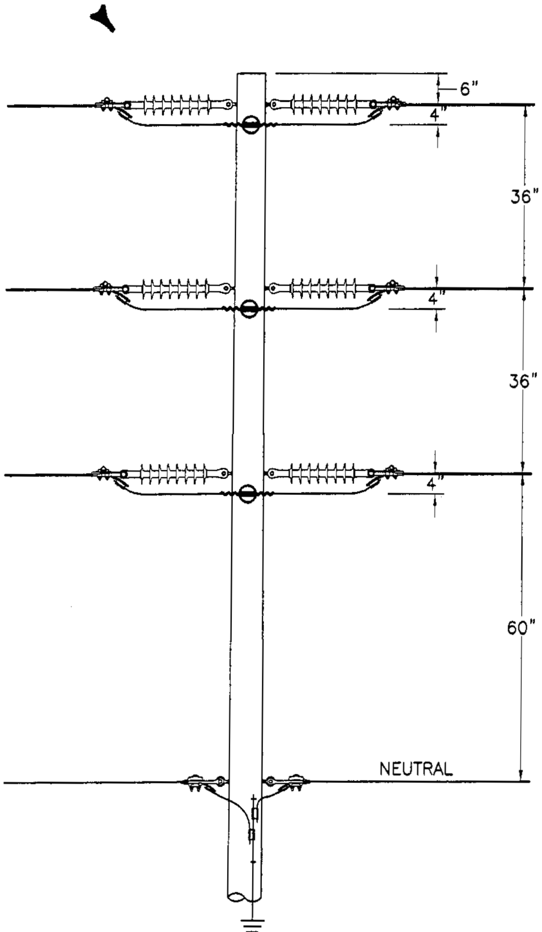
Progress Energy

FLA FLORIDA DWG. 03.12-12

VERTICAL DEADEND WITH VERTICAL DEADEND

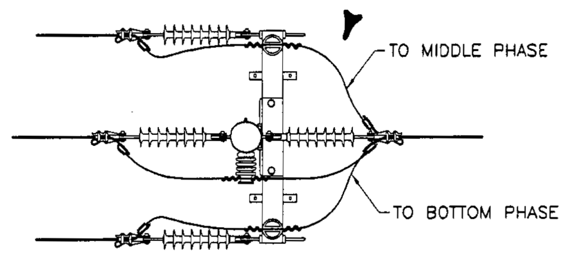


PLAN VIEW

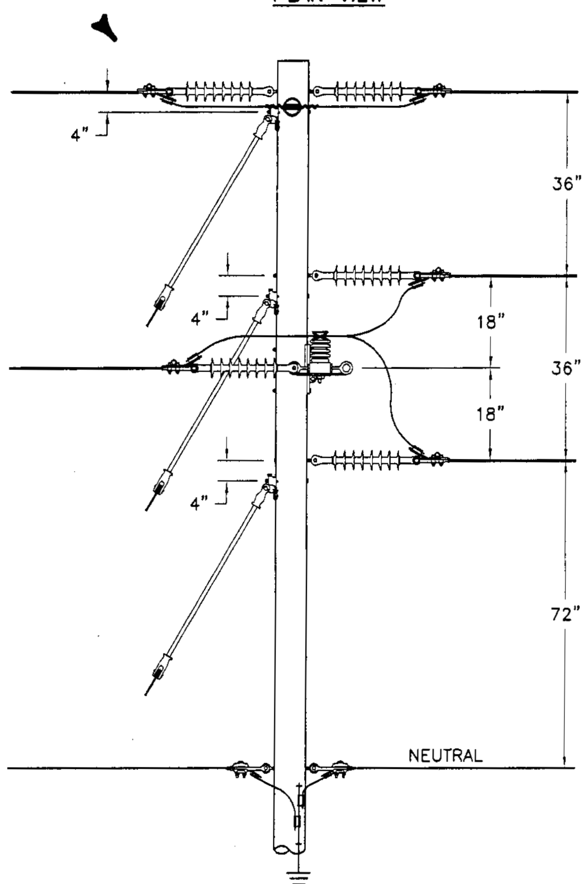


FRONT VIEW

VERTICAL CONSTRUCTION DEADEND (ALTERNATE) (DEADENDING LARGE & SMALL CONDUCTORS ON THE SAME POLE)



PLAN VIEW



FRONT VIEW

NOTES:

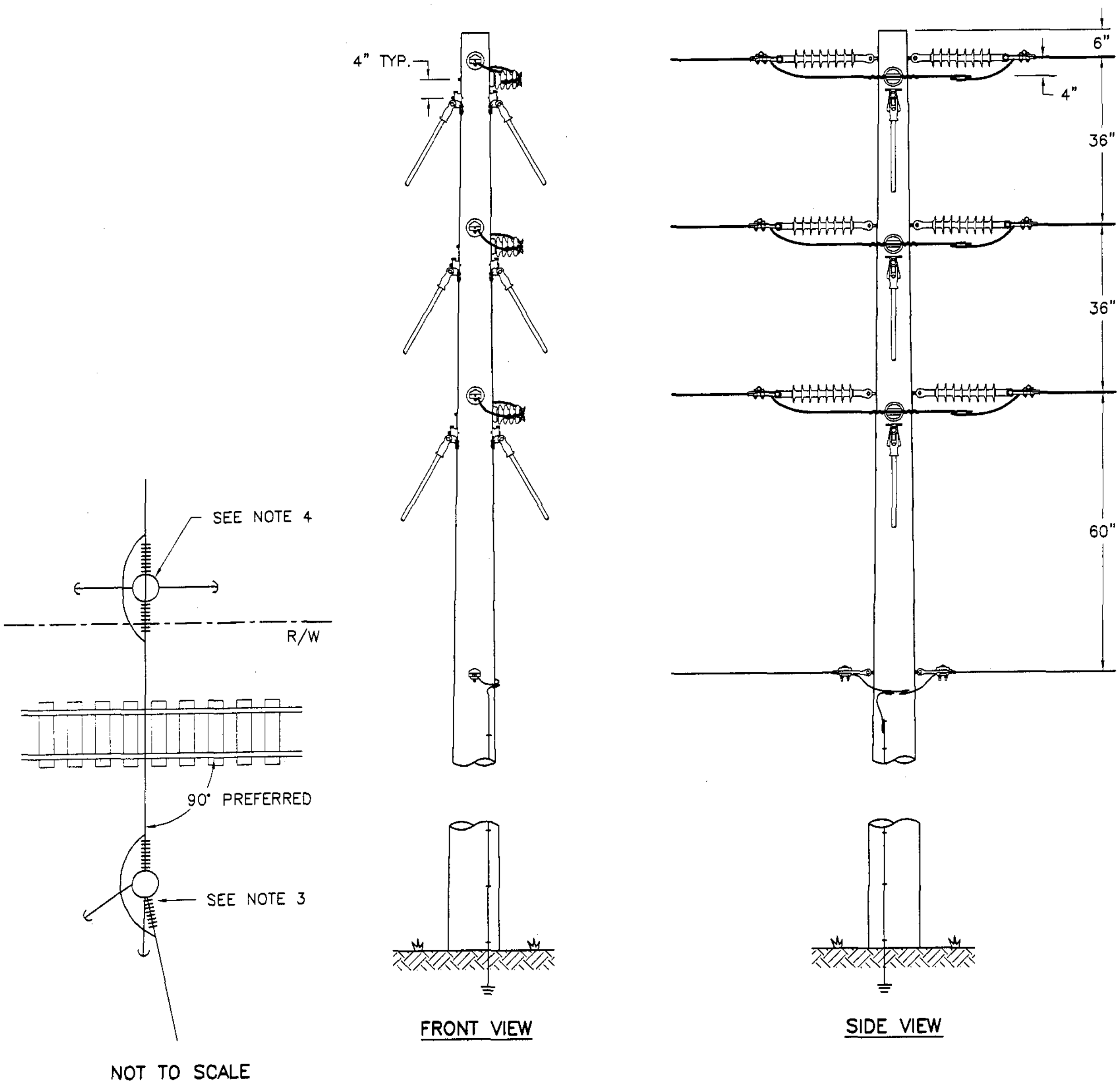
1. DEADEND SMALLER CONDUCTORS ON THE STEEL CROSSARM.
2. ATTACH ARM TO POLE WITH (2) 3/4" MACHINE BOLTS.
3. LOAD LIMITS FOR STEEL CROSSARM:
   A. MAXIMUM LOAD PER PHASE = 5,100 LBS.
   B. TOTAL MAXIMUM LOAD = 10,200 LBS.
4. USE 35KV POST INSULATOR ON STEEL ARM TO IMPROVE BIL.

REVISED		BY	CK'D	APPR.
3				
2	9/20/05	GUINN	GUINN	HOYT
1	6/4/04	NUNNERY	NUNNERY	WOOLSEY
0	7/4/03	YOUNTS	SIMPSON	WOOLSEY

VERTICAL DEADEND WITH VERTICAL DEADEND

Progress Energy

FLA DWG. 03.12-14



NOTES:

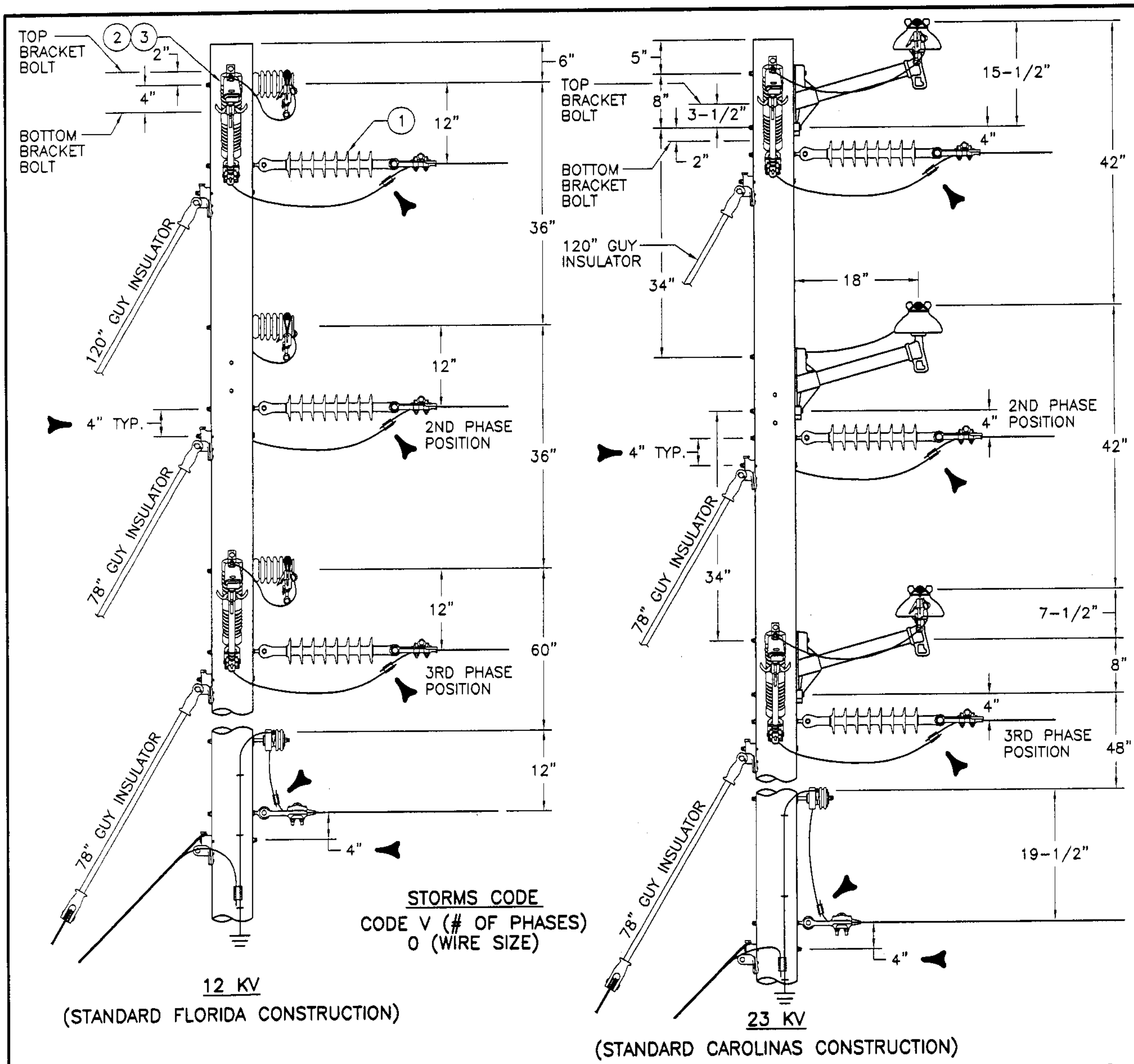
1. POLES SHOULD BE PLACED 1' OFF R/W AND CROSSING SHOULD BE AT 90° TO RAILS.
2. REFER TO NESC 231.C.1, EXCEPTION 1 FOR MINIMUM POLE DISTANCE TO RR RAILS.
3. USE 2 ANCHORS WHEN TURNING ANGLES GREATER THAN 5°.
4. USE 3 ANCHORS WHEN LINE IS TANGENT OR WHEN TURNING ANGLES UP TO 5°.
5. DO NOT INSTALL SPLICES IN CROSSING SPAN OR ADJACENT SPANS.

3				
2				
1				
0	4/5/06	MCINTIRE	GUINN	HOYT
REVISED		BY	CK'D	APPR.

VERTICAL CONSTRUCTION RAILROAD CROSSING
TANGENT AND ANGLES TO 10 DEGREES

Progress Energy

FLA DWG. 03.12-17



PROGRESS ENERGY BILL OF MATERIALS						
ITEM NO.	CAR. ASSEMBLY	CAROLINAS CN	FLORIDA ASSEMBLY	FLORIDA CN	QTY.	DESCRIPTION
1	DE-POLY23	10026011	ID	011708	1	BOLT, EYE, 5/8"
		1104213		013346	1	CLAMP, DE
		11225604		080577	1	INSUL, POLYMER, 15/25KV, DE
2	BKT-COLA	10033512	–	–	2	BOLT, MACH, 5/8"
		12912002		–	1	BRACKET, MTG, ARR, CUTOUT
		10544005		–	2	WASHER, DOUBLE COIL, 5/8"
		10543007		–	2	WASHER, SQUARE, 2-1/4"
3	CO15	11061108	–	–	9	WIRE, TIE, #4 SLD, SDW
		11106408	–	–	1	CLAMP, LINE, HOT
		11126018	–	–	1	SQUEEZON/CONN, ALL
		11211802	–	–	1	CUTOUT, FUSE, NLBK, 100A, 15/25KV
3	–	–	CP	013264	2	WASHER, SPRING COIL, 5/8"
	–	–		013308	2	WASHER, 2-1/4" SQUARE
	–	–		130102	1	CLAMP, HOTLINE
	–	–		311263	1	BRACKET, SINGLE MOUNT
	–	–		221112	1	CUTOUT, 15 KV 100A, 16KA ASYMMETRICAL

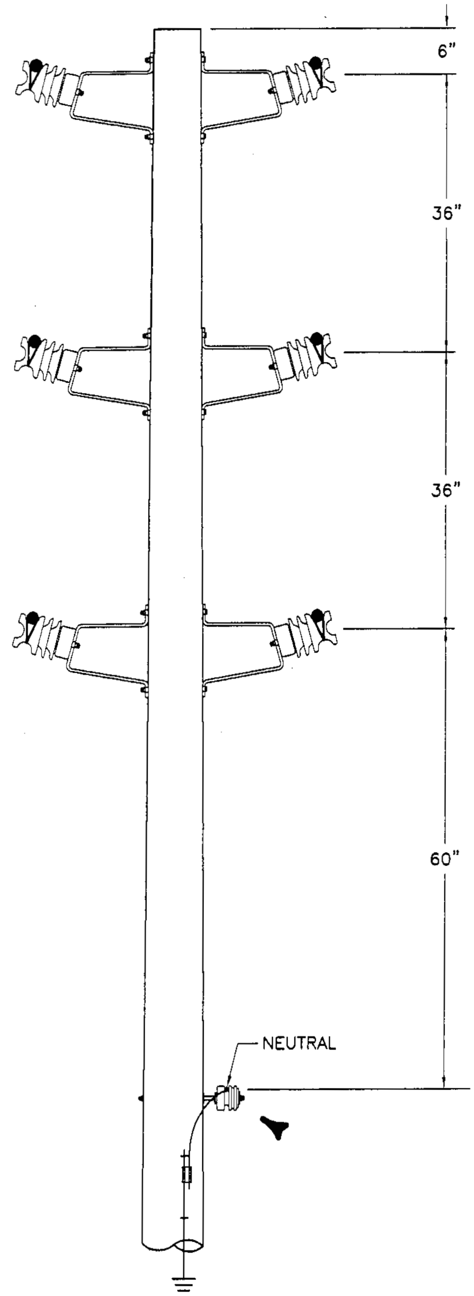
NOTES:
1. MIDDLE CUTOUT CAN BE PLACED ON SAME SIDE OF POLE AS OTHER CUTOUTS.
2. FOR FEEDER TAPS, THE CUTOUTS ARE OMITTED, BUT THE SPACING FOR THE TAP IS THE SAME.

REVISED	DATE	BY	CK'D	APPR.
3				
2	2/9/06	CECCONI	GUINN	HOYT
1	7/18/05	ROBESON	NUNNERY	HOYT
0	5/6/04	NUNNERY	NUNNERY	WOOLSEY

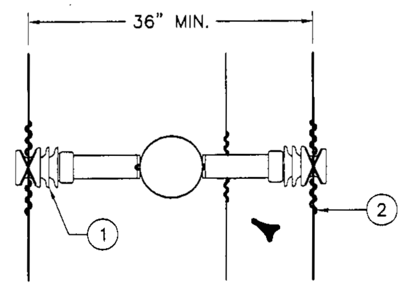
VERTICAL CONSTRUCTION – TANGENT FUSED TAP CONSTRUCTION

Progress Energy

PGN DWG. 03.12-20



FRONT VIEW



PLAN VIEW

FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	MATERIAL ITEM	QUANTITY	DESCRIPTION
1	IPS	013264	2	WASHER, SPRING, COIL, 5/8" BOLT
		070424	1	BRACKET, POST, INSULATOR
		072361	1	STUD, LINE POST, 5/8" X 1-3/4"
		080212	1	INSULATOR, POST, TIE TOP, 15KV
		152107	2	BOLT, MACHINE, 5/8" X 12"
2	–	–	6	TIES, SIDE (DETERMINED BY WIRE SIZE)

NOTES:

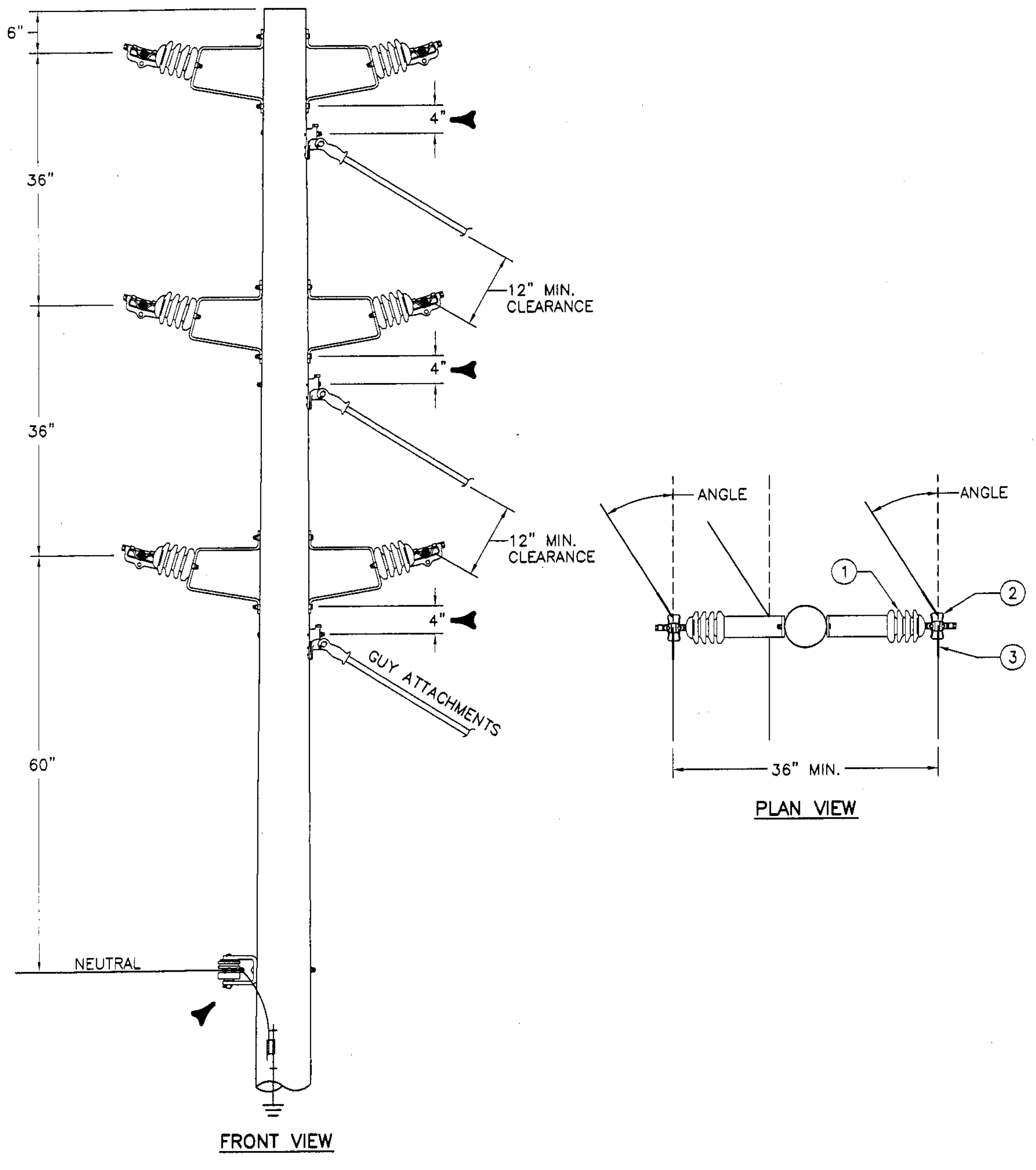
1. SEE DWG. 03.06-04 FOR POST TYPE INSULATORS.

3				
2				
1	6/30/06	CECCONI	GUINN	HOYT
0	6/11/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

VERTICAL CONSTRUCTION DOUBLE CIRCUIT, 3 PHASE, 0 DEGREES TO 5 DEGREES CODE D 3 0 (WIRE SIZE)

Progress Energy

FLA DWG. 03.14-02



FLORIDA BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	IPCS	013264	1	WASHER, SPRING, COIL, 5/8" BOLT
		013308	1	WASHER, 2-1/4" SQ, 13/16" HOLE
		014114	1	SCREW, LAG, 1/2" X 4"
		070424	1	BRACKET, POST, INSULATOR
		072361	1	STUD, LINE, POST, 5/8" X 1-3/4"
		080232	1	INSULATOR, POST, CLAMP
		152107	1	BOLT, MACHINE, 5/8" X 12"
2	–	–	6	CLAMP, ANGLE LINE POST (DETERMINED BY WIRE SIZE)
3	–	–	6	ARMOR ROD (DETERMINED BY WIRE SIZE ONLY 336 & 795)

NOTES:

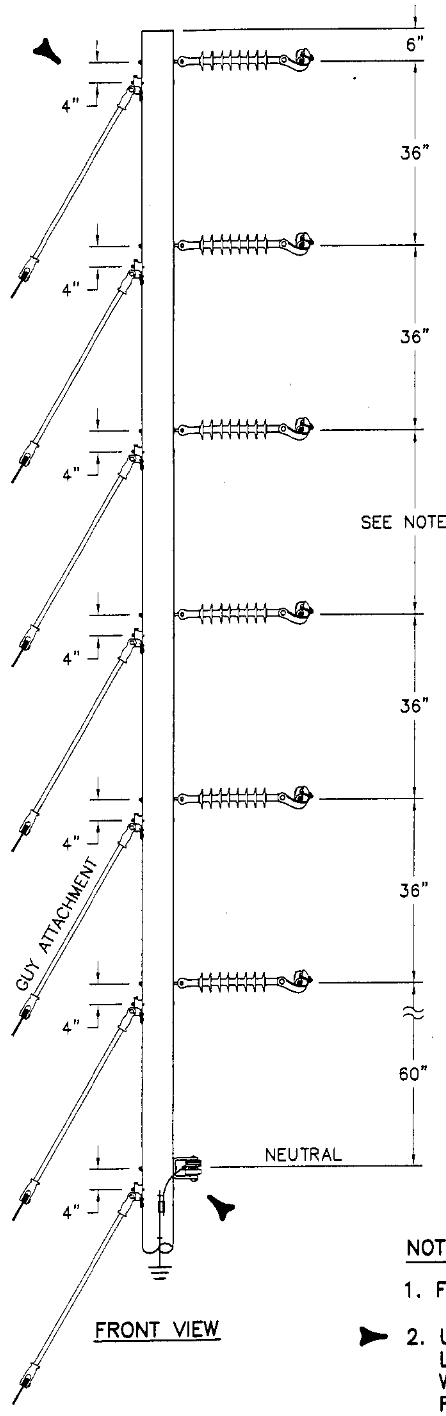
1. SEE DWG 03.06-06 FOR POST TYPE INSULATORS.

3				
2	10/6/06	GUINN	GUINN	HOYT
1	1/24/06	MCINTIRE	GUINN	HOYT
0	6/11/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

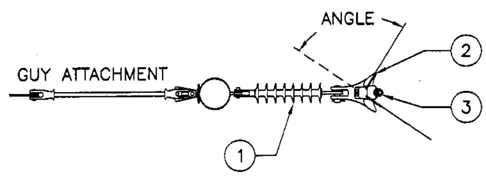
VERTICAL CONSTRUCTION DOUBLE CIRCUIT, 3 PHASE, 6 DEGREES TO 15 DEGREES CODE D 3 1 (WIRE SIZE)

Progress Energy

FLA DWG. 03.14-04



FRONT VIEW



PLAN VIEW

NOTES:

1. FOR 15KV CONDUCTORS USE 15KV POLYMERS, SEE DWG. 03.06-02.
2. USE 6'-0" MINIMUM CIRCUIT SPACING FOR SPANS 200 FT. OR LESS WITHIN A 150 FT. RULING SPAN AND 230 FT. OR LESS WITHIN A 200 FT. RULING SPAN. CONTACT DISTRIBUTION STANDARDS FOR OTHER SPANS.

FLORIDA BILL OF MATERIALS

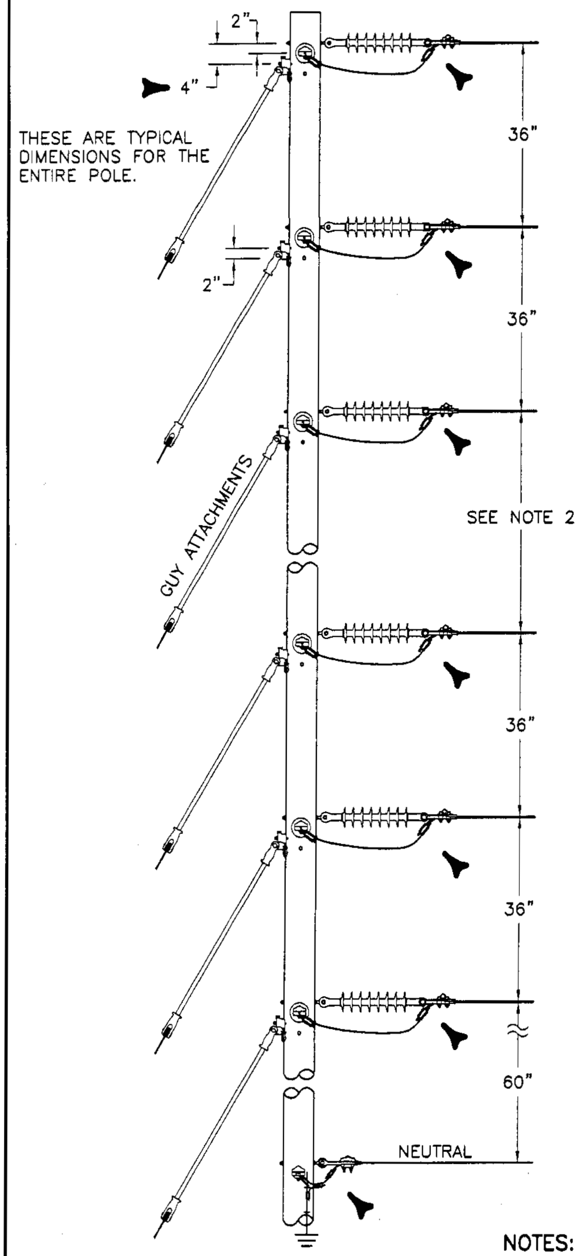
ITEM NO.	COMPATIBLE UNIT	MATERIAL ITEM	QUANTITY	DESCRIPTION
1	ID	011708	1	BOLT, OVAL EYE, 5/8" X 10"
		013346	1	WASHER, 3" SQ, 13/16" HOLE
		080577	1	INSULATOR, POLYMER, DEADEND, 25KV
2	–	–	6	GUARD, LINE (DETERMINED BY WIRE SIZE, ONLY 336 & 795)
3	–	–	6	CLAMP, ANGLE (DETERMINED BY WIRE SIZE)

3				
2				
1	11/29/06	GUINN	GUINN	HOYT
0	6/11/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

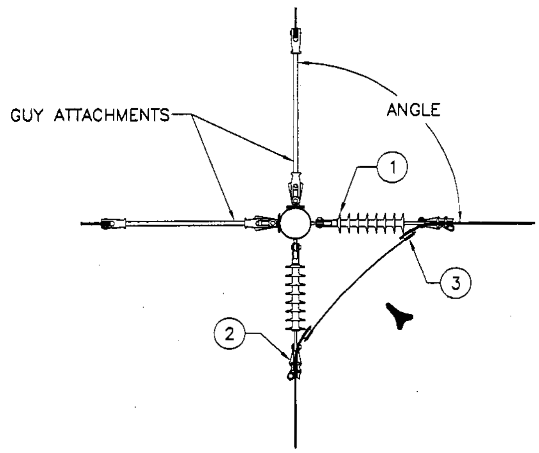
VERTICAL CONSTRUCTION DOUBLE CIRCUIT, THREE-PHASE, 16 DEGREES TO 59 DEGREES CODE D (# OF PHASES) 3 2 (WIRE SIZE)

Progress Energy

FLA DWG. 03.14-06



FRONT VIEW



PLAN VIEW

NOTES:

1. FOR 15KV CONDUCTORS USE 15KV POLYMERS, SEE DWG. 03.06-02.
2. USE 6'-0" MINIMUM CIRCUIT SPACING FOR SPANS 200 FT. OR LESS WITHIN A 150 FT. RULING SPAN AND 230 FT. OR LESS WITHIN A 200 FT. RULING SPAN. CONTACT DISTRIBUTION STANDARDS FOR OTHER SPANS.

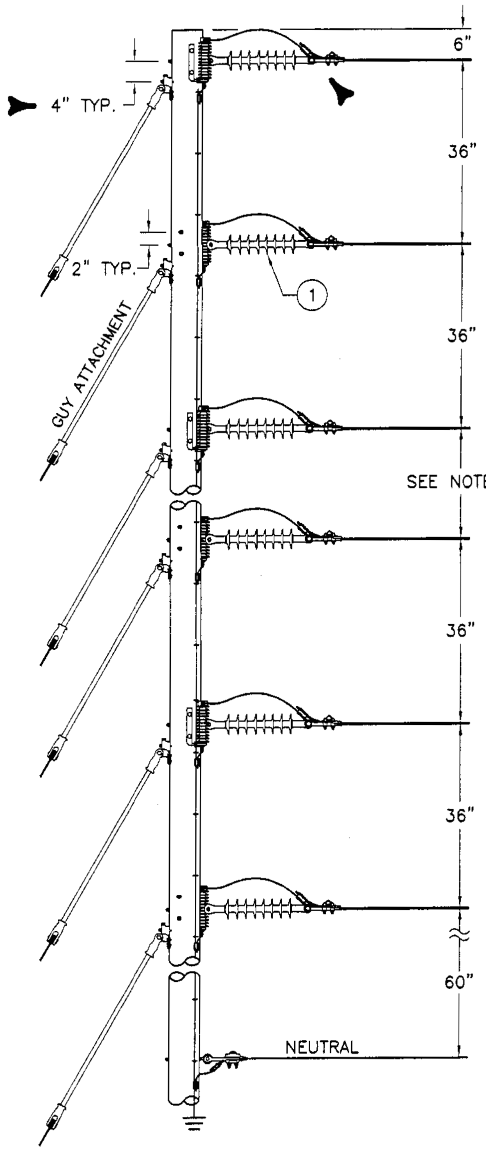
FLORIDA BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	ID	011708	1	BOLT, OVAL EYE, 5/8" X 10"
		013346	1	WASHER, 3" SQ., 13/16" HOLE
		080577	1	INSULATOR, POLYMER, DEADEND, 25KV
2	–	–	12	DEADEND, CLAMP (DETERMINED BY WIRE SIZE)
3	–	–	12	CONNECTOR, (DETERMINED BY WIRE SIZE)

3				
2				
1	11/29/06	GUINN	GUINN	HOYT
0	6/11/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

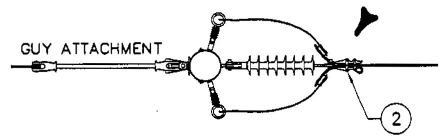
VERTICAL CONSTRUCTION DOUBLE CIRCUIT, THREE-PHASE, 60 DEGREES TO 90 DEGREES CODE D (# OF PHASES) 3 3 (WIRE SIZE)

Progress Energy

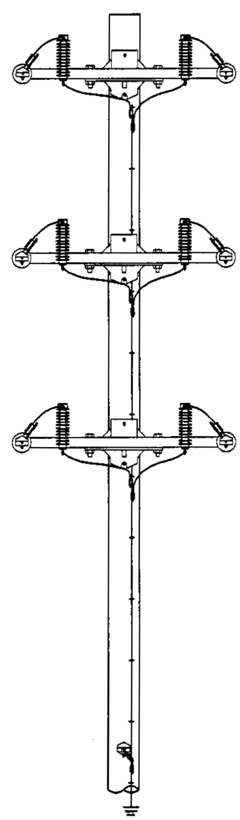
FLA DWG. 03.14-08



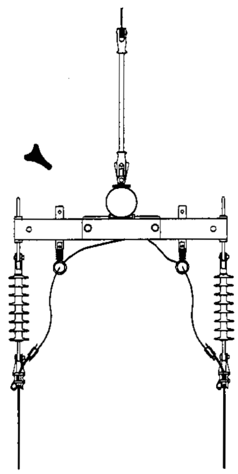
FRONT VIEW



PLAN VIEW



FRONT VIEW



PLAN VIEW

ALTERNATE THREE-PHASE DEADEND CONSTRUCTION

FLORIDA BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	ID	011708	1	BOLT, OVAL EYE, 5/8" X 10"
		013346	1	WASHER, 3" SQ., 13/16" HOLE
		080577	1	INSULATOR, POLYMER, DEADEND, 25KV
2	–	–	6	DEADEND, CLAMP (DETERMINED BY WIRE SIZE)

NOTES:

1. ARRESTERS ISSUED SEPARATELY, COMPATIBLE UNIT: AP_.
2. POLE GROUND ISSUED SEPARATELY, COMPATIBLE UNIT: GO.

NOTES: (FOR ALTERNATE CONSTRUCTION)

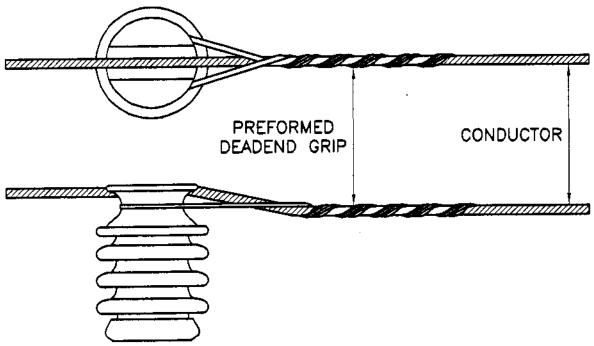
1. ALL CONDUCTORS SHALL BE THE SAME SIZE.
2. ATTACH ARM TO POLE WITH (2) 3/4" MACHINE BOLTS.
3. WHEN 2 GUYS PER PHASE ARE REQUIRED, ATTACH THE FIRST GUY TO THE ARM AND THE SECOND GUY TO THE POLE.
4. LOAD LIMITS FOR STEEL CROSSARM:
   A) MAXIMUM LOAD PER PHASE = 5,100 LBS.
   B) TOTAL MAXIMUM LOAD = 10,200 LBS.
5. USE 6'-0" MINIMUM CIRCUIT SPACING FOR SPANS 200 FT. OR LESS WITHIN A 150 FT. RULING SPAN AND 230 FT. OR LESS WITHIN A 200 FT. RULING SPAN. CONTACT DISTRIBUTION STANDARDS FOR OTHER SPANS.

3				
2				
1	11/29/06	GUINN	GUINN	HOYT
0	7/4/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

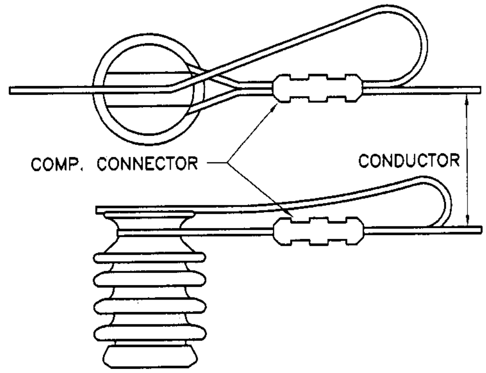
VERTICAL CONSTRUCTION DOUBLE CIRCUIT, DEAD END
CODE D (# OF PHASES) 3 4 (WIRE SIZE)

Progress Energy

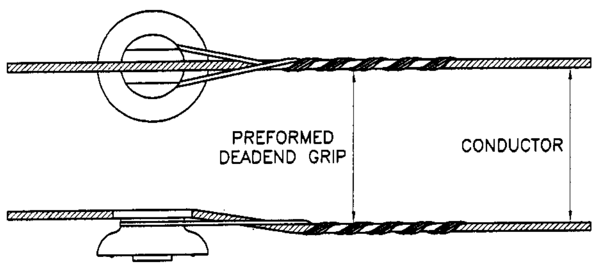
FLA DWG. 03.14-10



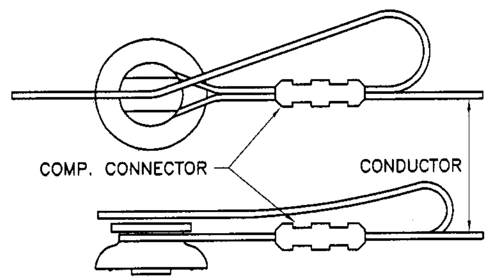
4–1/0 AL. DEADEND ON
POST INSULATOR



6 CU DEADEND ON
POST INSULATOR



4–1/0 AL. DEADEND ON
PIN TYPE INSULATOR



6 CU–2 CU DEADEND ON
PIN TYPE INSULATOR

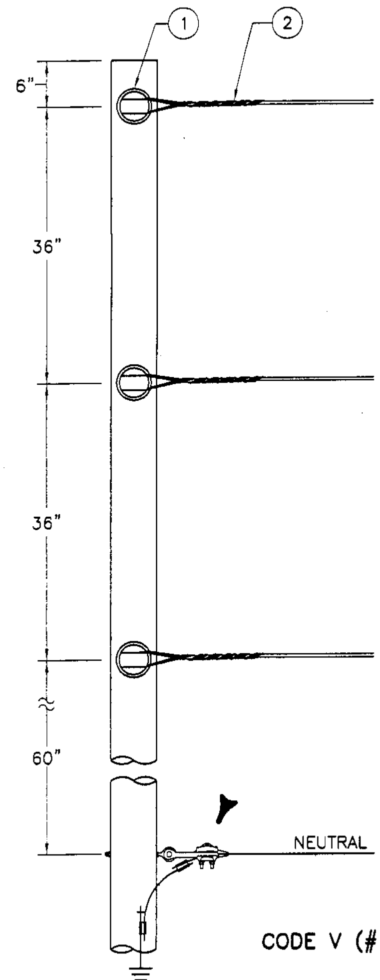
SLACK SPAN–PREFORMED DEADENDS FOR F NECK INSULATORS		
CONDUCTOR SIZE (ACSR, AAAC & AAC)	PGN CN	COLOR CODE
#2	9220118699	RED
1/0	9220118700	YELLOW

REVISED	BY	CK'D	APPR.
3				
2				
1 4/8/04	NUNNERY	NUNNERY	WOOLSEY
0 1/28/04	NUNNERY	NUNNERY	WOOLSEY

SLACK SPAN,
DETAILS FOR ATTACHMENT TO INSULATOR

Progress Energy

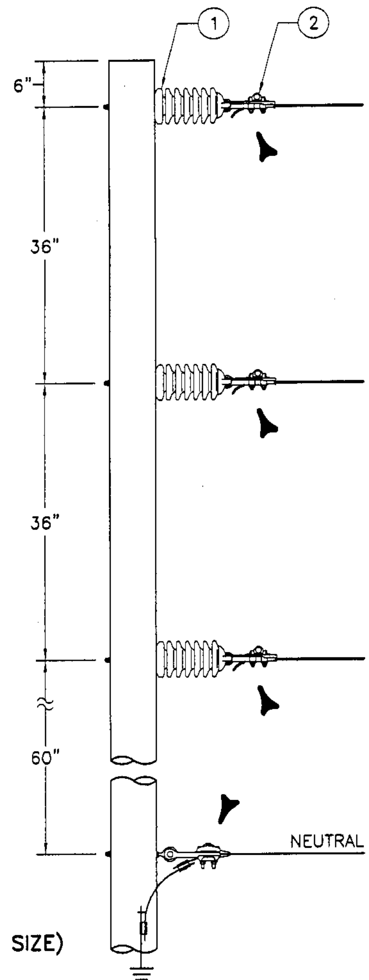
PGN DWG. 03.16–00



FOR #2 AND #1/0 CONDUCTORS

MACROS

CODE V (# OF PHASES) 5 (WIRE SIZE)



FOR #4/0 THROUGH 795

FLORIDA BILL OF MATERIALS – #2 AND #1/0						
ITEM NO.	ASSEMBLY	MATERIAL ITEM	QUANTITY			DESCRIPTION
			1Ø	2Ø	3Ø	
1	IP	013264	1	2	3	WASHER, SPRING COIL, 5/8"
		072366	1	2	3	STUD, LINE POST, 5/8" X 10"
		080212	1	2	3	INSULATOR, POST, 15 KV
2	–	9220118699	1	2	3	#2 AAAC GRIP
2	–	9220118700	1	2	3	#1/0 AAAC GRIP

FLORIDA BILL OF MATERIALS – #4/0 THROUGH 795						
ITEM NO.	ASSEMBLY	MATERIAL ITEM	QUANTITY			DESCRIPTION
			1Ø	2Ø	3Ø	
1	ICS	013264	1	2	3	WASHER, SPRING COIL, 5/8"
		072367	1	2	3	STUD, LINE POST, 5/8" X 12"
		074305	1	2	3	GAINGRID, 4" X 4", AL
		080375	1	2	3	INSULATOR, SLACK SPAN, POST
2	–	101397	1	2	3	DEADEND CLAMP, FOR 336.4 AND 795
2	–	101392	1	2	3	DEADEND CLAMP, FOR #4/0

NOTES:

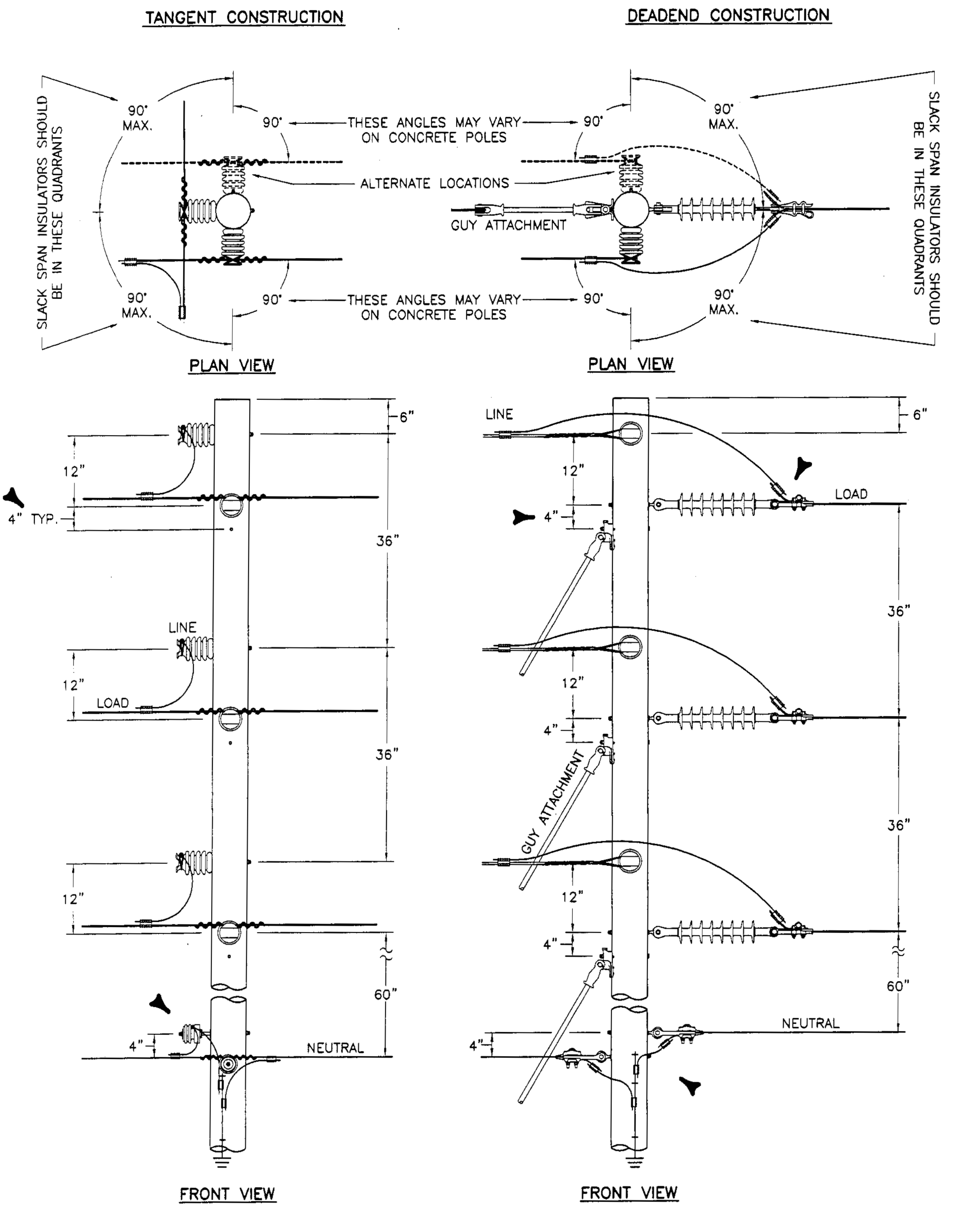
1. SEE DWG 03.06–04 FOR POST TYPE INSULATORS.
2. SEE DWG. 03.06–08 FOR PIN TYPE INSULATORS.

REVISED		BY	CK'D	APPR.
3	7/31/06	GUINN	GUINN	HOYT
2	8/26/05	ROBESON	GUINN	HOYT
1	6/30/04	NUNNERY	NUNNERY	WOOLSEY
0	6/11/03	YOUNTS	SIMPSON	WOOLSEY

VERTICAL CONSTRUCTION – SLACK SPAN

Progress Energy

FLA DWG. 03.16–02



NOTES:

1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE SLAB GAINS (NEW POLES DO NOT HAVE SLAB GAINS) OR WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER. GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS (THIS INCLUDES SLACK SPANS).

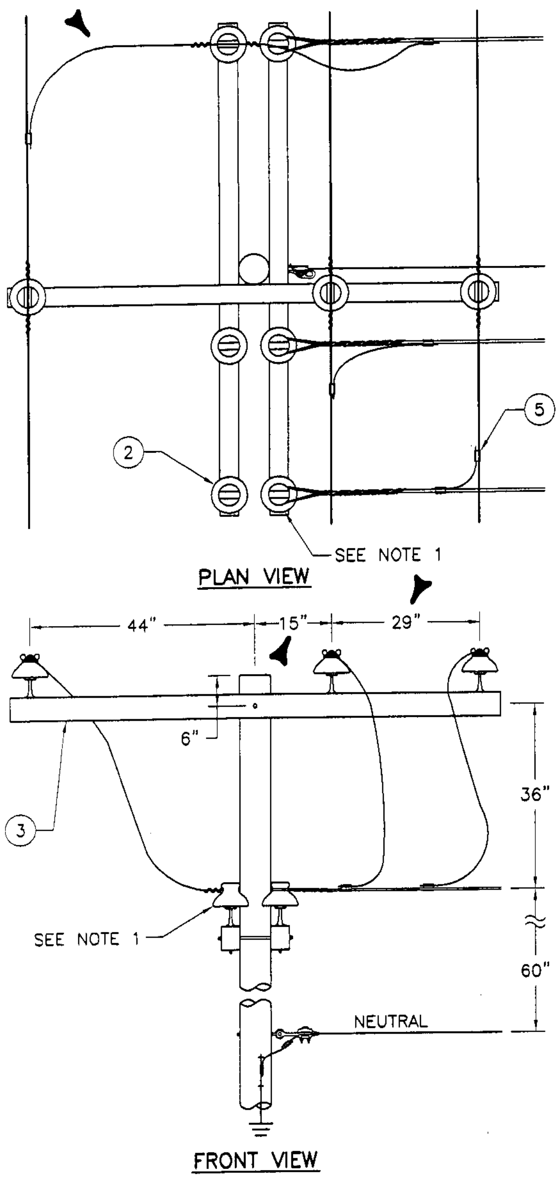
3	9/20/06	GUINN	GUINN	HOYT
2	6/30/04	NUNNERY	NUNNERY	WOOLSEY
1	12/3/03	ROBESON	NUNNERY	WOOLSEY
0	7/7/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

VERTICAL SLACK SPAN
WITH VERTICAL CONSTRUCTION

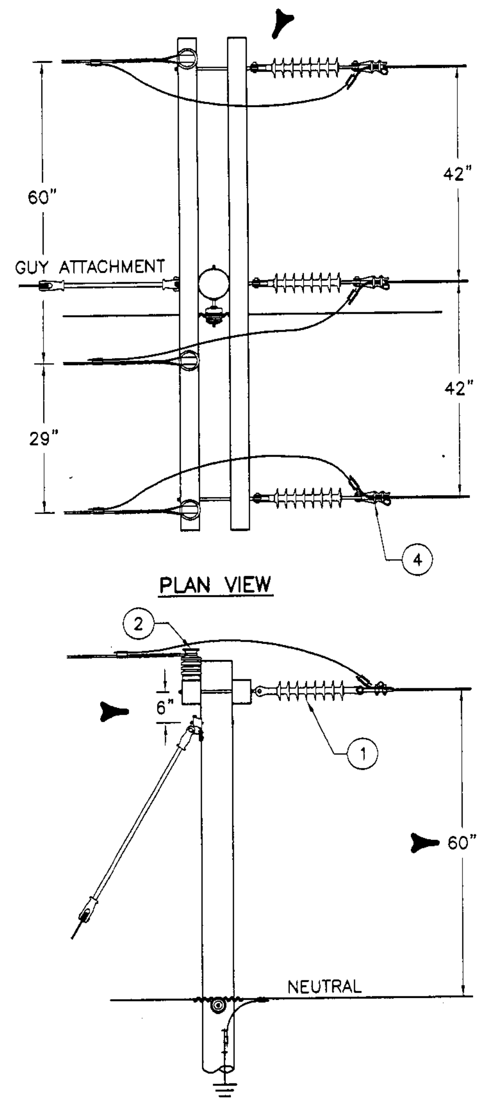
Progress Energy

FLA DWG. 03.16–04

DEADEND CONSTRUCTION



TANGENT CONSTRUCTION



*PIN INSULATORS USED ON 1/0 AL. CONDUCTORS

HORIZONTAL SLACK SPAN WITH HORIZONTAL CONSTRUCTION

FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	MATERIAL ITEM	QUANTITY	DESCRIPTION
1	ID	011708	1	BOLT, OVAL EYE, 5/8" X 10"
		013346	1	WASHER, 3" SQ., 13/16"
		080577	1	INSULATOR, POLYMER, DEADEND, 25KV
2	IX	072306	1	PIN, CROSSARM, CLASS A OR B
		080304	1	INSULATOR, PIN, CLASS B
		152108	1	BOLT, MACHINE, SQ, 5/8" X 16"
3	–	–	–	CROSSARM, DOUBLE, 8' (DETERMINED BY WIRE SIZE)
4	–	–	–	DEADEND, CLAMP (DETERMINED BY WIRE SIZE)
5	–	–	–	CONNECTOR, COMPRESSION (VARIES WITH WIRE SIZE)

NOTES:

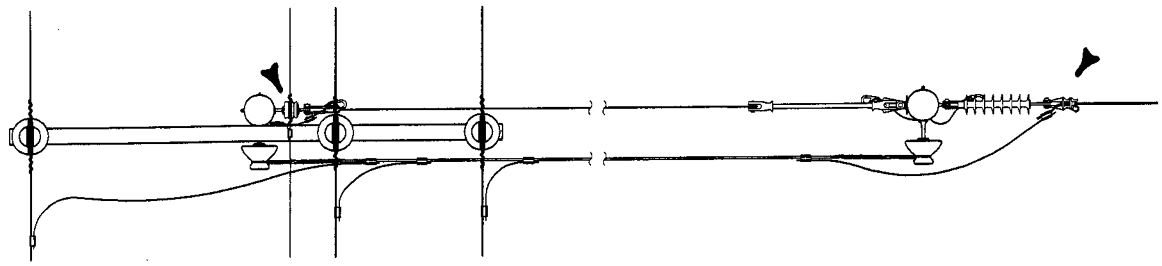
1. IF CONDUCTOR IS 1/0 AL OR SMALLER, THE PIN INSULATOR SHOULD BE IN THIS LOCATION AND ONLY ONE CROSSARM IS NECESSARY.

REVISED	BY	CK'D	APPR.
3			
2			
1 9/20/06	GUINN	GUINN	HOYT
0 7/7/03	YOUNTS	SIMPSON	WOOLSEY

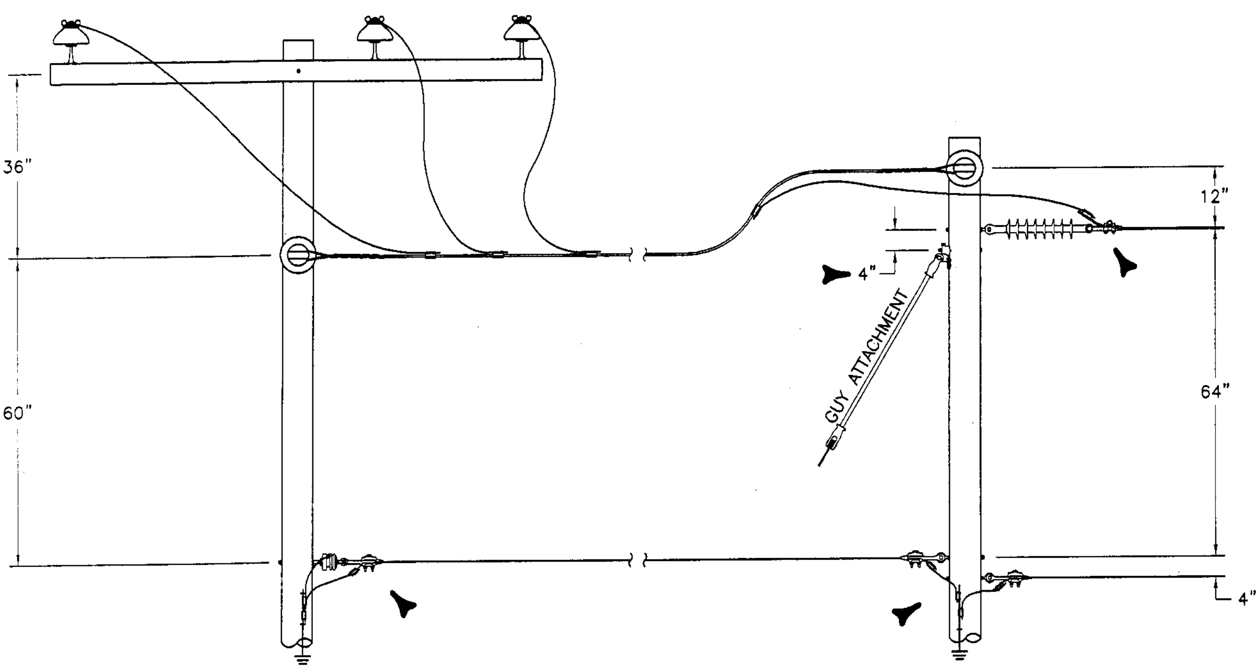
SLACK SPAN

Progress Energy

FLA DWG. 03.16–30A



PLAN VIEW



FRONT VIEW
1ø SLACK SPAN TAP FROM 3ø HORIZONTAL LINE

NOTES:

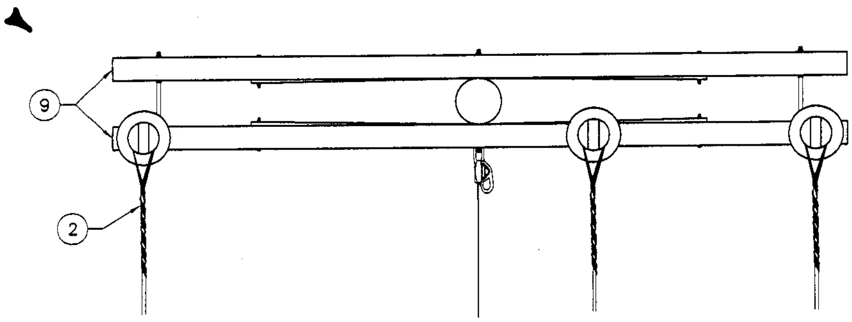
1. IF CONDUCTOR IS 1/0 AL OR SMALLER, THE PIN INSULATOR SHOULD BE IN THIS LOCATION AND ONLY ONE CROSSARM IS NECESSARY.

3				
2				
1	9/20/06	GUINN	GUINN	HOYT
0	7/28/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

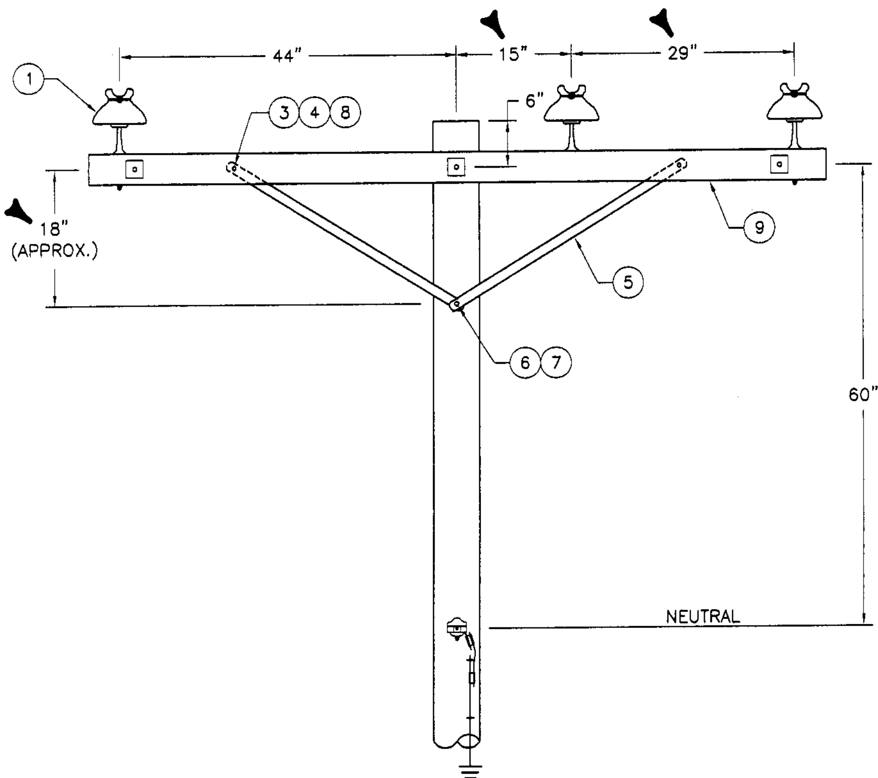
SLACK SPAN

Progress Energy

FLA DWG. 03.16-30B



PLAN VIEW



FRONT VIEW

NOTES:

1. FOR ALL WIRE SIZES EXCEPT 795 AAC.
2. USE SINGLE ARM WHEN CONDUCTOR IS 1/0 AND SMALLER AND THE ARM IS NOT HOLDING TENSION IN THE OPPOSITE DIRECTION. INSTALL SINGLE ARM ON OPPOSITE SIDE OF POLE FROM SLACK SPAN.
3. SEE DWG. 03.16-32B FOR BILL OF MATERIALS.

3				
2				
1	7/31/06	GUINN	GUINN	HOYT
0	7/31/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

HORIZONTAL CONSTRUCTION –
SLACK SPAN
CODE H (# OF PHASES) 5 (WIRE SIZE)

Progress Energy

FLA DWG. 03.16-32A

FLORIDA BILL OF MATERIALS					
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY 2Ø	QUANTITY 3Ø	DESCRIPTION
1	IX	072306	2	3	PIN, CROSSARM, CLASS A OR B
		080304	2	3	INSULATOR, PIN, CLASS B
		152108	2	3	BOLT, MACHINE, 5/8" X 16"
2	–	–	2	3	GRIPS, FORMED – AL (VARIES WITH WIRE SIZE)
3	–	011209	2	2	BOLT, CRG 3/8", X 4–1/2" (USE WITH FLAT BRACE–SINGLE ARM)
3	–	011209	4	4	BOLT, CRG 3/8", X 4–1/2" (USE WITH FLAT BRACE–DOUBLE ARM)
3	–	010326	2	2	BOLT, MACHINE, 1/2" X 7" (USE WITH BOW BRACE–SINGLE ARM)
3	–	010326	4	3	BOLT, MACHINE, 1/2" X 7" (USE WITH BOW BRACE–DOUBLE ARM)
4	–	013229	2	2	WASHER, ROUND (USE WITH BOW BRACE–SINGLE ARM)
4	–	013229	4	4	WASHER, ROUND (USE WITH BOW BRACE–DOUBLE ARM)
5	–	071306	2	2	BRACE, FLAT, 36" (USE WITH CONDUCTOR 1/0 AL & SMALLER – SINGLE ARM)
5	–	071306	4	4	BRACE, FLAT, 36" (USE WITH CONDUCTOR 1/0 AL & SMALLER – DOUBLE ARM)
5	–	071206	1	1	BRACE, BOW, 60" (USE WITH CONDUCTOR LARGER THAN 1/0 AL – SINGLE ARM)
5	–	071206	2	2	BRACE, BOW, 60" (USE WITH CONDUCTOR LARGER THAN 1/0 AL – DOUBLE ARM)
6	–	014114	1	1	SCREW, LAG, 1/2" X 4" (USE WITH FLAT BRACE – SINGLE ARM)
6	–	014114	2	2	SCREW, LAG, 1/2" X 4" (USE WITH FLAT BRACE – DOUBLE ARM)
6	–	010436	1	1	BOLT, MACHINE, 5/8" X 12" (USE WITH BOW BRACE)
7	–	011313	3	3	BOLT, DOUBLE ARM, 5/8" X 20" (USE WITH DOUBLE ARM)
7	–	152107	1	1	BOLT, MACHINE, 5/8" X 12" (USE WITH SINGLE ARM)
8	–	013308	10	10	WASHER, SQUARE FLAT, 5/8" (USE WITH DOUBLE ARM)
8	–	013308	1	1	WASHER, SQUARE FLAT, 5/8" (USE WITH SINGLE ARM)
9	–	031113	1	1	CROSSARM, 8' LIGHT (WIRE SIZE 2 CU AND 1/0 AL)
9	–	031113	2	2	CROSSARM, 8' LIGHT (WIRE SIZE 4/0 CU & 336 AL)

NOTES:

1. SEE DWG. 03.16–32A FOR DESIGN SPECIFICATIONS.
2. SEE DWG 03.06.08 FOR PIN TYPE INSULATORS.

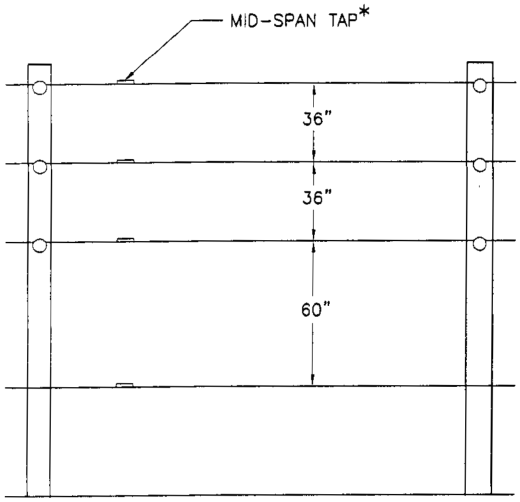
REVISED	DATE	BY	CK'D	APPR.
3				
2	11/27/06	BURLISON	GUINN	HOYT
1	7/3/06	CECCONI	GUINN	HOYT
0	7/31/03	YOUNTS	SIMPSON	WOOLSEY

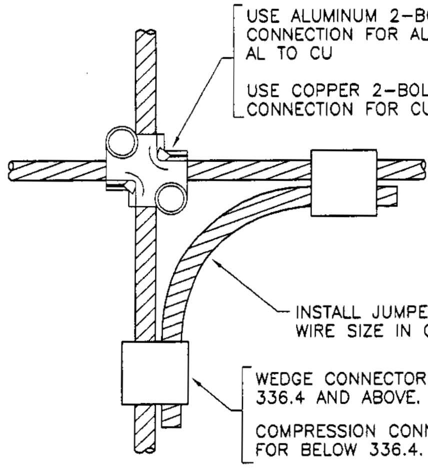
HORIZONTAL CONSTRUCTION –
SLACK SPAN
CODE H (# OF PHASES) 5 (WIRE SIZE)

Progress Energy

FLA DWG. 03.16–32B

MIDSPAN TAP CONNECTION





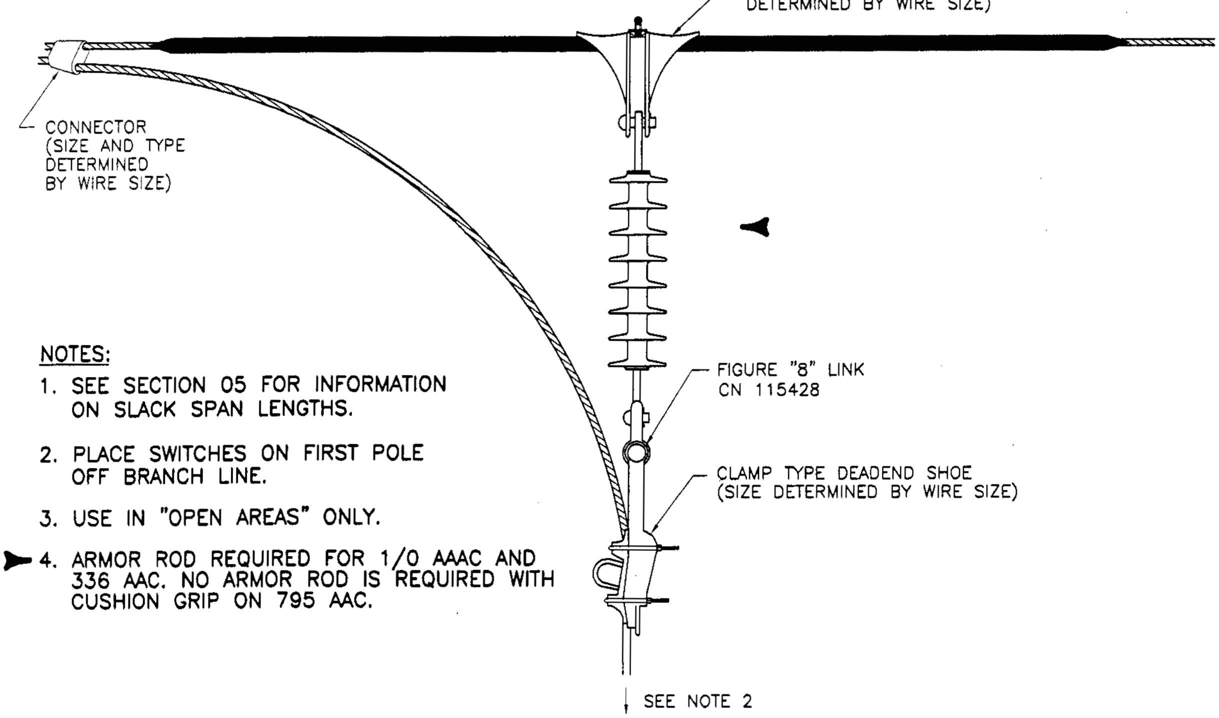
NOTES:

*1. CROSSING SPANS SHOULD BE OF APPROXIMATELY THE SAME LENGTH.

2. CONNECTED CONDUCTORS SHOULD BE OF THE SAME SIZE AND TYPE, OR SHOULD BE AS CLOSE AS POSSIBLE TO TWO NEAREST CROSSING POLES IF NOT OF SAME SIZE AND TYPE.

3. CONNECTING CONDUCTORS MUST ESSENTIALLY BE TOUCHING EACH OTHER. ONE CONDUCTOR IS NOT TO SUPPORT THE OTHER.

PRIMARY "T" TAP
(ALTERNATE SLACK SPAN CONSTRUCTION)



NOTES:

1. SEE SECTION 05 FOR INFORMATION ON SLACK SPAN LENGTHS.

2. PLACE SWITCHES ON FIRST POLE OFF BRANCH LINE.

3. USE IN "OPEN AREAS" ONLY.

4. ARMOR ROD REQUIRED FOR 1/0 AAAC AND 336 AAC. NO ARMOR ROD IS REQUIRED WITH CUSHION GRIP ON 795 AAC.

3				
2				
1	10/6/06	BURJSON	GUINN	HOYT
0	2/21/06	MCINTIRE	SIMPSON	HOYT
REVISED		BY	CK'D	APPR.

MIDSPAN TAP CONNECTION & PRIMARY "T" TAP (ALTERNATE SLACK SPAN CONSTRUCTION)

Progress Energy

FLA DWG. 03.18-03

5	10/26/06	BURLISON	QUINN	HOYT
4	8/19/05	CECCONI	SIMPSON	HOYT
3	7/18/03	CECCONI	SIMPSON	WOOLSEY
0	8/1/02	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

SECTION 12 - COASTAL AND CONTAMINATED AREAS
TABLE OF CONTENTS

Progress Energy

FLA DWG. 12.00-00B

SECTION 12

COASTAL AND CONTAMINATED AREA INSTALLATIONS

A COASTAL AREA GENERALLY IS ANY AREA IN CLOSE PROXIMITY TO THE OCEAN OR LARGE SALT WATER BODIES WHERE ADVERSE ATMOSPHERIC/WEATHER CONDITIONS (E.G., SALT SPRAY OR FOG) OVER TIME CAUSE EXCESSIVE MINERAL OR PARTICULATE COATING AND/OR CORROSION TO DISTRIBUTION EQUIPMENT TO THE POINT OF CREATING EXCESSIVE FAILURES, OUTAGES AND/OR BREAKER OPERATIONS. THIS INCLUDES AREAS WHERE THERE MIGHT BE CHEMICALLY ACTIVE SOILS, OR NEAR MANUFACTURING FACILITIES RELEASING PARTICULATE THAT MIGHT CORRODE HARDWARE OR PROMOTE TRACKING.

THE FOLLOWING SPECIFIES SPECIAL ANTI-CORROSIVE AND INSULATION MATERIALS AS WELL AS CONSTRUCTION METHODS DESIGNED TO COUNTER THESE EFFECTS. ALL OTHER CONSTRUCTION PRACTICES AND MATERIALS NOT SPECIFIED IN THIS SECTION SHALL BE NORMAL.

COASTAL AND CONTAMINATED SPECIFICATIONS SHOULD BE USED IN AREAS SUBJECT TO SEVERE SALT FOG, SEVERE CORROSION, EROSION FROM WIND-BLOWN SANDY SOILS, AND HIGH-VELOCTIY WINDS. IN GENERAL, THIS AREA IS DEFINED AS ANYTHING WITHIN 1000' OF ANY SALTWATER OR SALTWATER MARSH.

COASTAL AND CONTAMINATED SPECIFICATIONS SHOULD BE UTILIZED IN THE AREA SURROUNDING MANUFACTURING FACILITIES KNOW TO RELEASE AIRBORNE PARTICULATE AND IN THE AREA OF CHEMICALLY ACTIVE SOIL. THIS SHOULD BE DONE AT THE DISCRETION OF LOCAL ENGINEERING.

CLASS "C" CONSTRUCTION

- USE STORMS CODE ASSEMBLY PREFIX "C" FOR CONSTRUCTION IN COASTAL AND CONTAMINATED AREAS AS DEFINED BY DWG. 12.00-02. CLASS "C" CONSTRUCTION CONSISTS OF 25KV CUTOUTS, 25KV POLYMER DEADENDS AND 35KV POST INSULATORS. FOR RECLOSERS, CAPACITOR BANKS, SWITCHGEAR AND ALL OTHER EQUIPMENT INSTALLED IN A CORROSIVE ENVIRONMENT, CONTACT DISTRIBUTION STANDARDS FOR POSSIBLE ANTI-CORROSIVE OPTIONS. ALL OTHER CONSTRUCTION IS CONSIDERED CLASS "A". ALL OTHER ITEMS MUST BE CALLED FOR BY THEIR ASSOCIATED PART NUMBER.

PROTECTION AGAINST LOSS OF GROUND ROD IN CHEMICALLY ACTIVE SOILS

- STAINLESS STEEL GROUND RODS (FLORIDA CN 60124, COMPATIBLE UNITS CG, CGO AND CGU) SHOULD BE USED IN LOCATIONS WHERE THE SOIL IS VERY CHEMICALLY ACTIVE. SWAMPY AREAS AND AREAS THAT HAVE BEEN FILLED BY DREDGING ARE TYPICAL OF LOCATIONS WHERE THE SOIL IS LIKELY TO BE CHEMICALLY ACTIVE. ANYTIME THE SOIL HAS A SOUR ODOR OR THE SMELL OF ROTTEN EGGS (HYDROGEN SULFIDE GAS) IS NOTICED WHEN EXCAVATING, STAINLESS STEEL GROUND RODS SHOULD BE USED.

- AVAILABLE HARDWARE FOR EXTREME CONTAMINATION

- INSULATORS
  HORIZONTAL, TIE TOP 35KV – FLORIDA CN 80217
  HORIZONTAL, CLAMP TOP, 35KV – FLORIDA CN 80238
  DEADEND/SUSPENSION, 25KV POLYMER – FLORIDA CN 80577

- CUTOUTS
  25KV CUTOUT – FLORIDA CN 221139

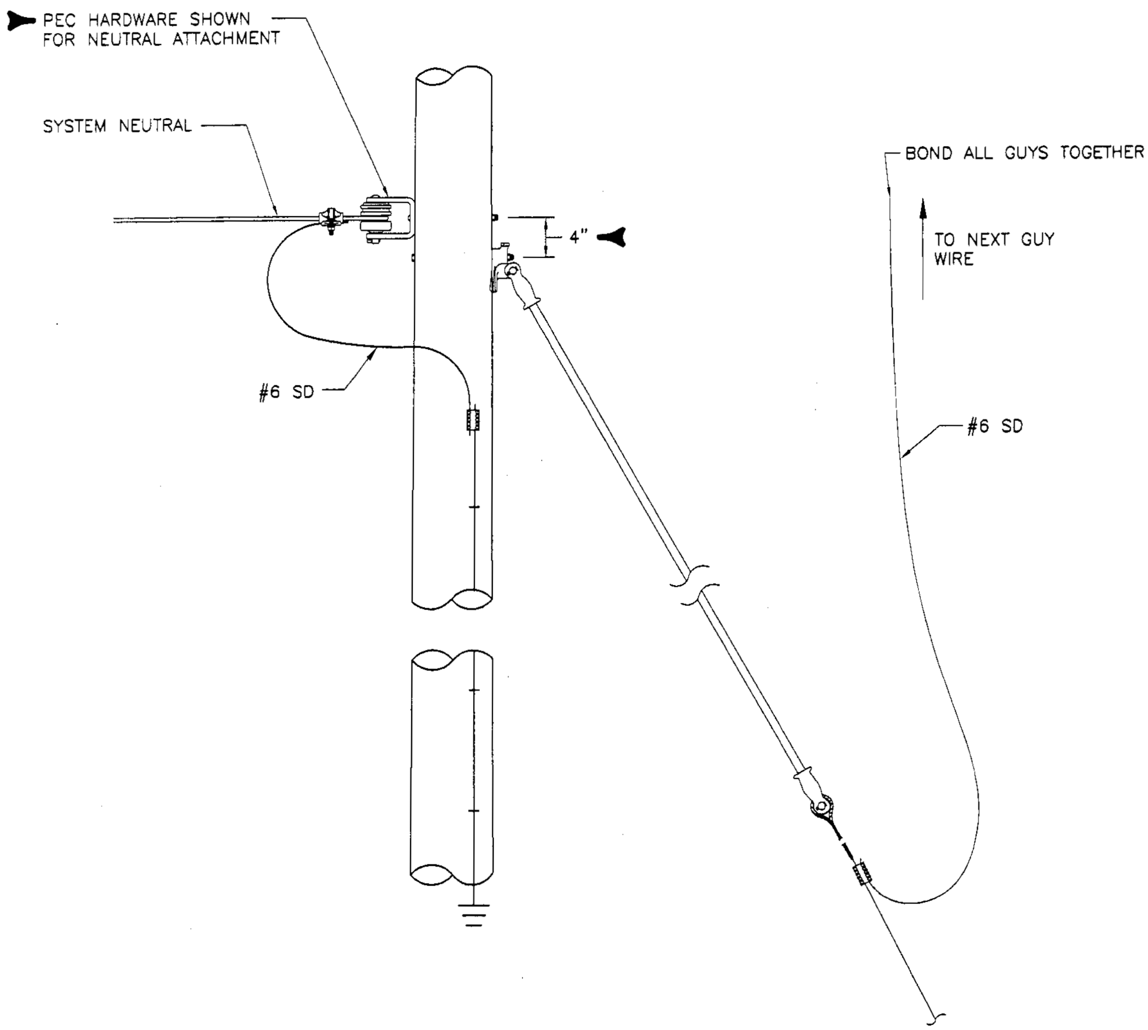
- CONTACT DISTRIBUTION STANDARDS FOR ANY COASTAL SPECIAL APPLICATIONS NOT LISTED HERE.

3	10/13/06	BURLISON	GUINN	HOYT
2	1/13/03	YOUNTS	SIMPSON	WOOLSEY
1	9/27/02	YOUNTS	SIMPSON	WOOLSEY
0	8/1/02	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

COASTAL AND CONTAMINATED AREA CONSTRUCTION

Progress Energy

FLA DWG. 12.04-04



NOTES:

IN LOCATIONS WHERE THE SOIL IS VERY ACTIVE CHEMICALLY, THE SOIL, ANCHOR AND SYSTEM GROUND (NEUTRAL) CAN ACT AS AN ELECTRIC CELL CAUSING CORROSION AND DETERIORATION OF THE ANCHOR. IN THESE LOCATIONS A FIBERGLASS GUY INSULATOR MUST BE INSTALLED IN <u>ALL</u> DOWN GUYS AND THE GUY <u>MUST NOT</u> BE BONDED TO THE NEUTRAL OR GROUND. THE FIBERGLASS LINK SHALL BE LONG ENOUGH TO REACH AT LEAST 24" BELOW ANY ENERGIZED CONDUCTOR OR EQUIPMENT.

3				
2	10/13/06	BURLISON	GUINN	HOYT
1	8/18/05	ROBESON	SIMPSON	HOYT
0	7/29/02	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

GUY GROUNDING –

COASTAL AND CONTAMINATED AREAS

Progress Energy

PGN DWG. 12.06–02

CONDUCTOR SPLICES AND CONNECTIONS

ALL CONDUCTOR CONNECTIONS MUST BE PROPERLY PREPARED BEFORE MAKING A CONNECTION REGARDLESS OF HOW NEW THE CONDUCTOR MAY BE. IT IS ESPECIALLY IMPORTANT IN CONTAMINATED AND COASTAL AREAS TO WIRE BRUSH AND APPLY INHIBITOR TO ALL CONNECTIONS.

FOR COPPER TO ALUMINUM CONNECTION, ALWAYS POSITION THE ALUMINUM CONDUCTOR ABOVE THE COPPER. PIN CONNECTORS WILL BE USED TO CONNECT ALUMINUM CONDUCTOR TO TRANSFORMER TERMINALS AND TO COPPER CONDUCTOR (SEE DWG. 12.06-06).

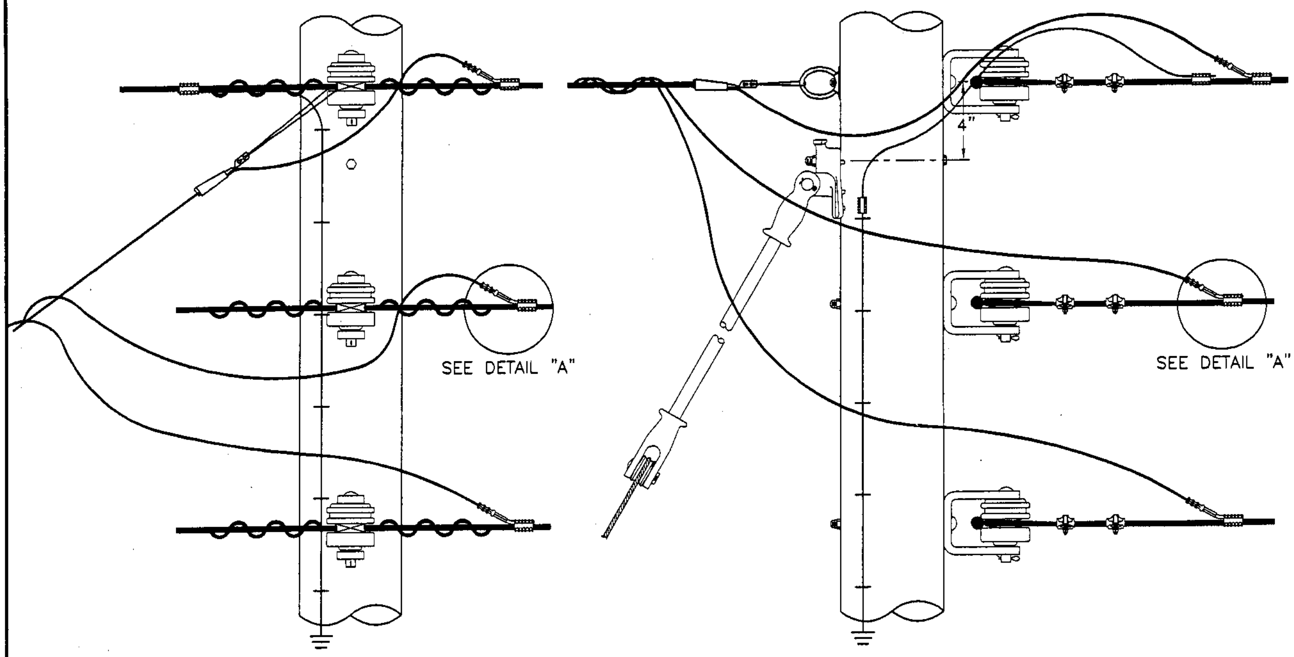
FOR ALUMINUM TO ALUMINUM CONNECTIONS, USE ALUMINUM SQUEEZONS WITH A LIBERAL AMOUNT OF INHIBITOR APPLIED.

3				
2	10/13/06	BURLSON	GUINN	HOYT
1	8/19/05	SIMPSON	SIMPSON	HOYT
0	7/29/02	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

CONDUCTOR SPLICES AND CONNECTIONS
COASTAL AND CONTAMINATED AREAS

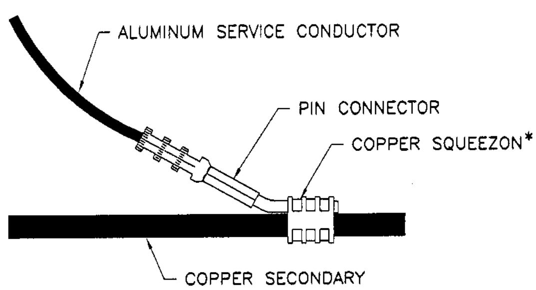
Progress Energy

PGN DWG. 12.06-04



FRONT VIEW

SIDE VIEW



*CAROLINAS METHOD SHOWN. FOR FLORIDA, USE STANDARD CLAMP

DETAIL "A"

NOTES:

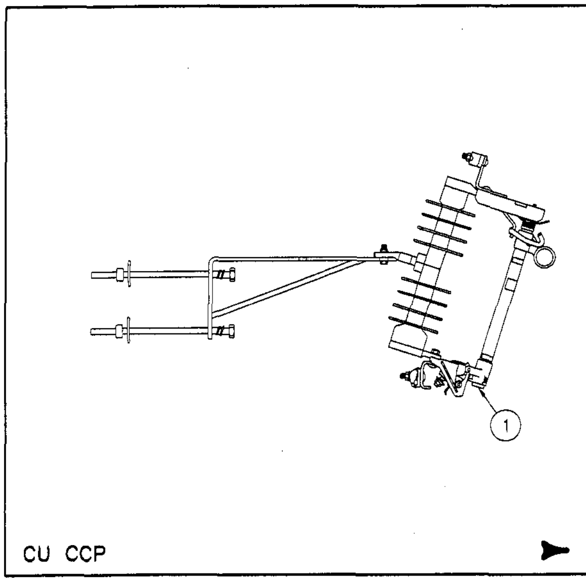
1. USE PIN CONNECTOR TO CONNECT ALUMINUM TRIPLEX DIRECTLY TO COPPER SECONDARY.
2. BEFORE MAKING CONNECTIONS, CLEAN ALL CONDUCTORS THOROUGHLY BY WIRE BRUSHING.
3. ALWAYS POSITION ALUMINUM CONDUCTOR ABOVE COPPER CONDUCTOR TO PREVENT COPPER SALT ACCUMULATION ON THE ALUMINUM CONNECTION.
4. TOOL AND DIE DATA FOR PIN CONNECTOR IS SHOWN ON DWG. 06.03-04.

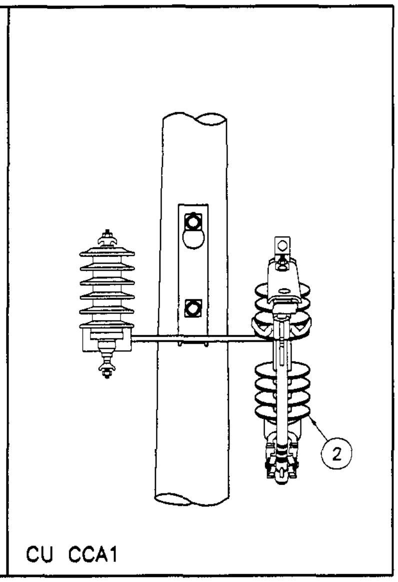
4	10/13/06	BURLISON	GUINN	HOYT
3	8/24/05	SIMPSON	SIMPSON	HOYT
2	8/18/05	ROBESON	SIMPSON	HOYT
0	7/30/02	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

➤ AL TO CU SECONDARY CONNECTIONS
COASTAL AND CONTAMINATED AREAS

Progress Energy

PGN DWG. 12.06-06





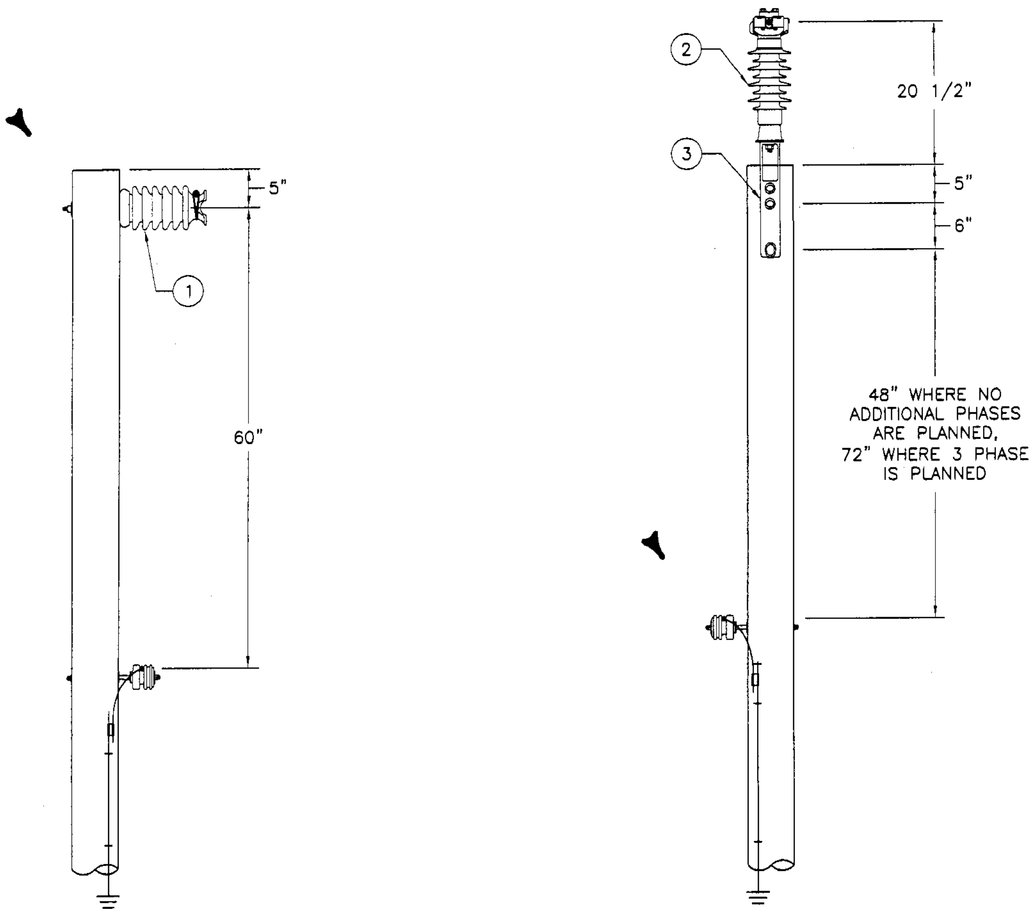
FLORIDA BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	CCP	221139	1	CUTOUT, 25KV
		9220094529	1	BRACKET, CUTOUT, COLA
		152106	2	BOLT, 5/8" X 10"
		013308	2	WASHER, 2-1/4" SQUARE, FLAT
		013264	2	WASHER SPRING, COIL
2	CCA1	221139	1	CUTOUT, 25KV
		220202	1	ARRESTER, LIGHTNING, 10KV HD MOV
		070106	1	BRACKET, CUTOUT AND ARRESTER
		152106	2	BOLT, 5/8" X 10"
		013308	2	WASHER, 2-1/4" SQUARE FLAT
		013264	2	WASHER SPRING, COIL

REVISED		BY	CK'D	APPR.
3				
2	10/13/06	BURLESON	QUINN	HOYT
1	12/20/02	YOUNTS	SIMPSON	WOOLSEY
0	9/27/02	YOUNTS	SIMPSON	WOOLSEY

CUTOUT AND ARRESTER ASSEMBLY – COASTAL AND CONTAMINATED AREAS

Progress Energy

FLA DWG. 12.06–12



0° – 5° ANGLE
12KV
(STANDARD FLORIDA CONSTRUCTION)

0° – 5° ANGLE
23KV
(STANDARD CAROLINAS CONSTRUCTION)

FLORIDA BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	CIP_	080217	1	INSULATOR, LINE POST, TIE TOP, 35KV
		072366	1	STUD, LP, 5/8" X 10"
		013264	1	WASHER, SPRING, COIL
		–	1	TIE (VARIES WITH WIRE SIZE)

CAROLINAS BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
2	INSRB-TPSI?	11224714	1	INS, RB, CLAMPTOP, VT-MT, SIL
		11110319	1	CLAMP, LP, ALL
		10332013	1	STUD, ALL
3	PT-BKT	10043008	1	BKT, INS, POST-TOP, GALV.
		10033512	2	5/8" MACHINE BOLT

NOTES:

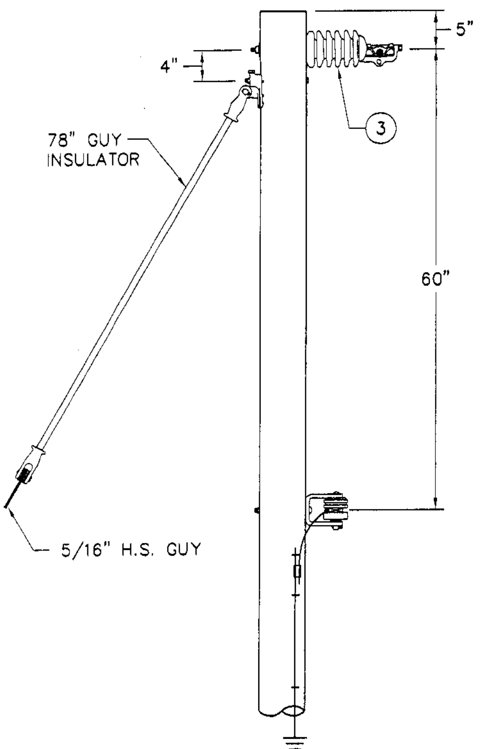
1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE SLAB GAINS (NEW POLES DO NOT HAVE SLAB GAINS) OR WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER. GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS (THIS INCLUDES SLACK SPANS).

REVISED		BY	CK'D	APPR.
5	10/13/06	BURLISON	GUINN	HOYT
4	8/18/05	ROBESON	SIMPSON	HOYT
3	4/3/03	YOUNTS	NUNNERY	WOOLSEY
0	7/30/02	YOUNTS	SIMPSON	WOOLSEY

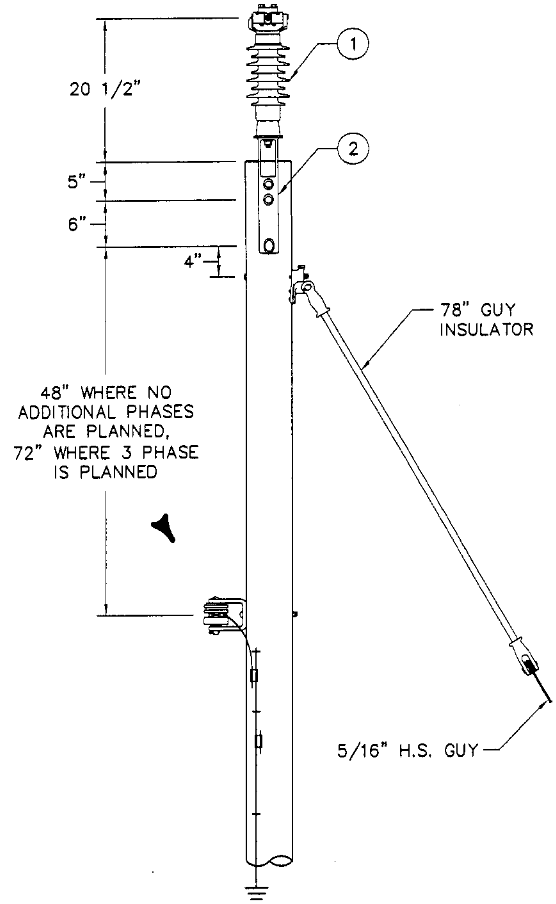
SINGLE-PHASE PRIMARY – TANGENT
COASTAL AND CONTAMINATED AREAS

Progress Energy

PGN DWG. 12.08-01



6° – 15° ANGLE
12KV
(STANDARD FLORIDA CONSTRUCTION)



10° – 15° ANGLE
10 DEGREES, 477 AAC
15 DEGREES, 1/0 AAAC
23KV
(STANDARD CAROLINAS CONSTRUCTION)

CAROLINAS BILL OF MATERIALS

ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	INSRB-TPSI?	11224714	1	INS, RB, CLAMPTOP, VT-MT, SIL
		11110319	1	CLAMP, LP, ALL
		10332013	1	STUD, ALL
2	PT-BKT	10043008	1	BKT, INS, POST-TOP, GALV.
		10033512	2	5/8" MACHINE BOLT

FLORIDA BILL OF MATERIALS

ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
3	CIC_	080238	1	INSULATOR, LINE POST, CLAMP, 35KV
		072367	1	STUD, LP, 5/8" X 12"
		013264	1	WASHER, SPRING COIL
		074317	1	GAIN GRID, 5 1/2"
		–	1	CLAMP (VARIES WITH WIRE SIZE)
		–	1	ARMOR ROD (VARIES WITH WIRE SIZE)

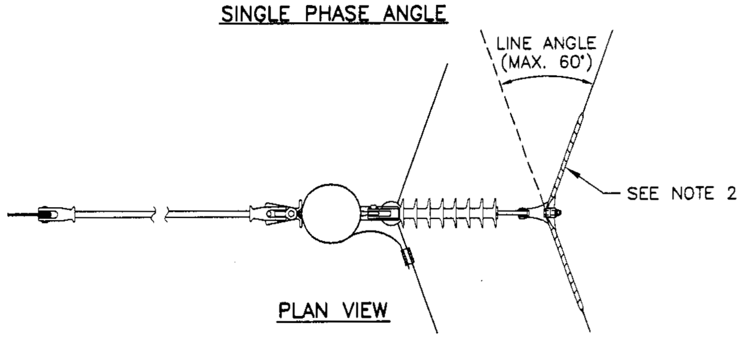
REVISED		BY	CK'D	APPR.
4	10/13/06	BURLISON	GUNN	HOYT
3	8/18/05	ROBESON	SIMPSON	HOYT
2	4/3/03	YOUNTS	NUNNERY	WOOLSEY
0	7/30/02	YOUNTS	SIMPSON	WOOLSEY

SINGLE-PHASE PRIMARY – SMALL ANGLE COASTAL AND CONTAMINATED AREAS

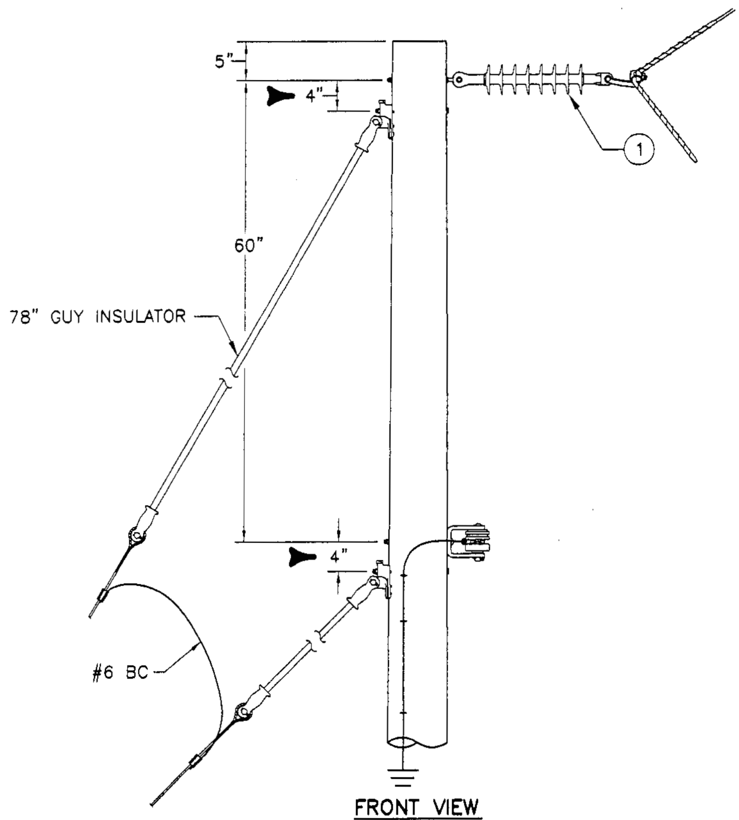
Progress Energy

PGN DWG. 12.08–02

SINGLE PHASE ANGLE



PLAN VIEW



FRONT VIEW

CAROLINAS BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	AA-SI45?	10033512	1	BOLT, EYE, 5/8, ALL
		11111028	1	CLAMP, SUSP, ALL
		11223914	1	INSULATOR, SUSP, 45KV, SIL
		–	1	ARMOR ROD (VARIES WITH WIRE SIZE)

FLORIDA BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	CV12_	080577	1	INSULATOR, 25KV POLYMER DEADEND
		013346	1	WASHER, CURVED, 3" X 3" X 13/16"
		011708	1	BOLT, OVAL EYE, 5/8" X 10"
		013264	1	SPRING COIL
		013308	1	WASHER, FLAT, 2-1/4" SQ.
		–	1	CLAMP (VARIES WITH WIRE SIZE)
		–	1	ARMOR ROD (VARIES WITH WIRE SIZE)

NOTES:

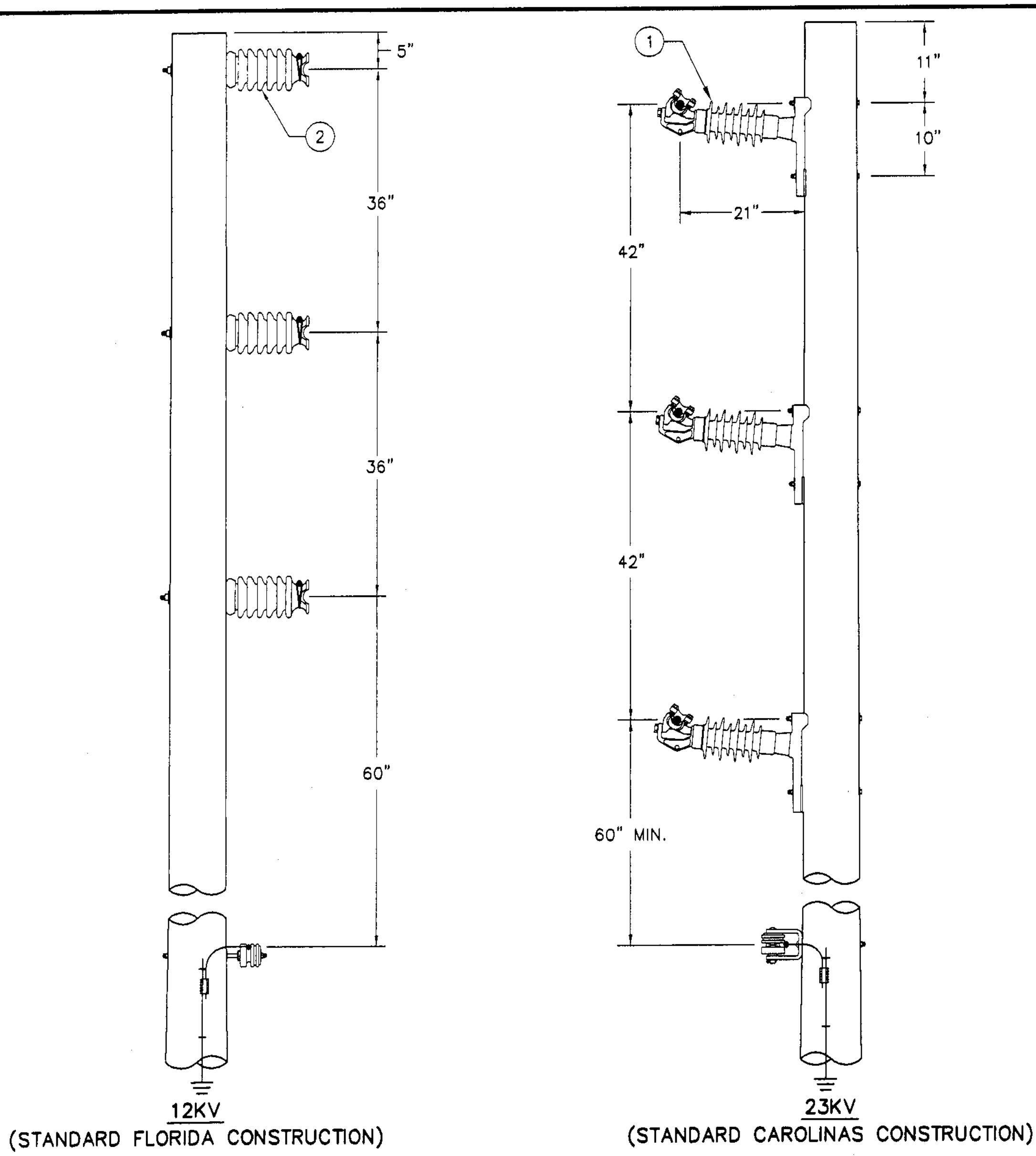
1. ALL GUYS MUST BE BONDED TO EACH OTHER. DO **NOT** BOND TO THE POLE GROUND.
2. ARMOR RODS REQUIRED FOR ANGLE ASSEMBLIES.

3				
2				
1	10/13/06	BURLESON	GUINN	HOYT
0	8/18/05	SIMPSON	SIMPSON	HOYT
REVISED		BY	CK'D	APPR.

SINGLE-PHASE PRIMARY-
ANGLES 20 TO 60 DEGREES MAXIMUM
COASTAL AND CONTAMINATED AREAS

Progress Energy

PGN DWG. 12.08-03



CAROLINAS BILL OF MATERIALS FOR 12, 23 AND 35KV CONSTRUCTION				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	INS-HLP45SI?	11222510	1	INSUL., HLP, 45KV, SILICONE
		11110319	1	LP CLAMP, ALL
		10033512	2	BOLT, MACH., 5/8", ALL

FLORIDA BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
2	CIP_	080217	1	INSULATOR, LINE POST, CLAMP 35KV
		072366	1	STUD, LP, 5/8" X 12"
		013264	1	WASHER, SPRING, COIL
		–	1	TIE (VARIES WITH WIRE SIZE)

NOTES:

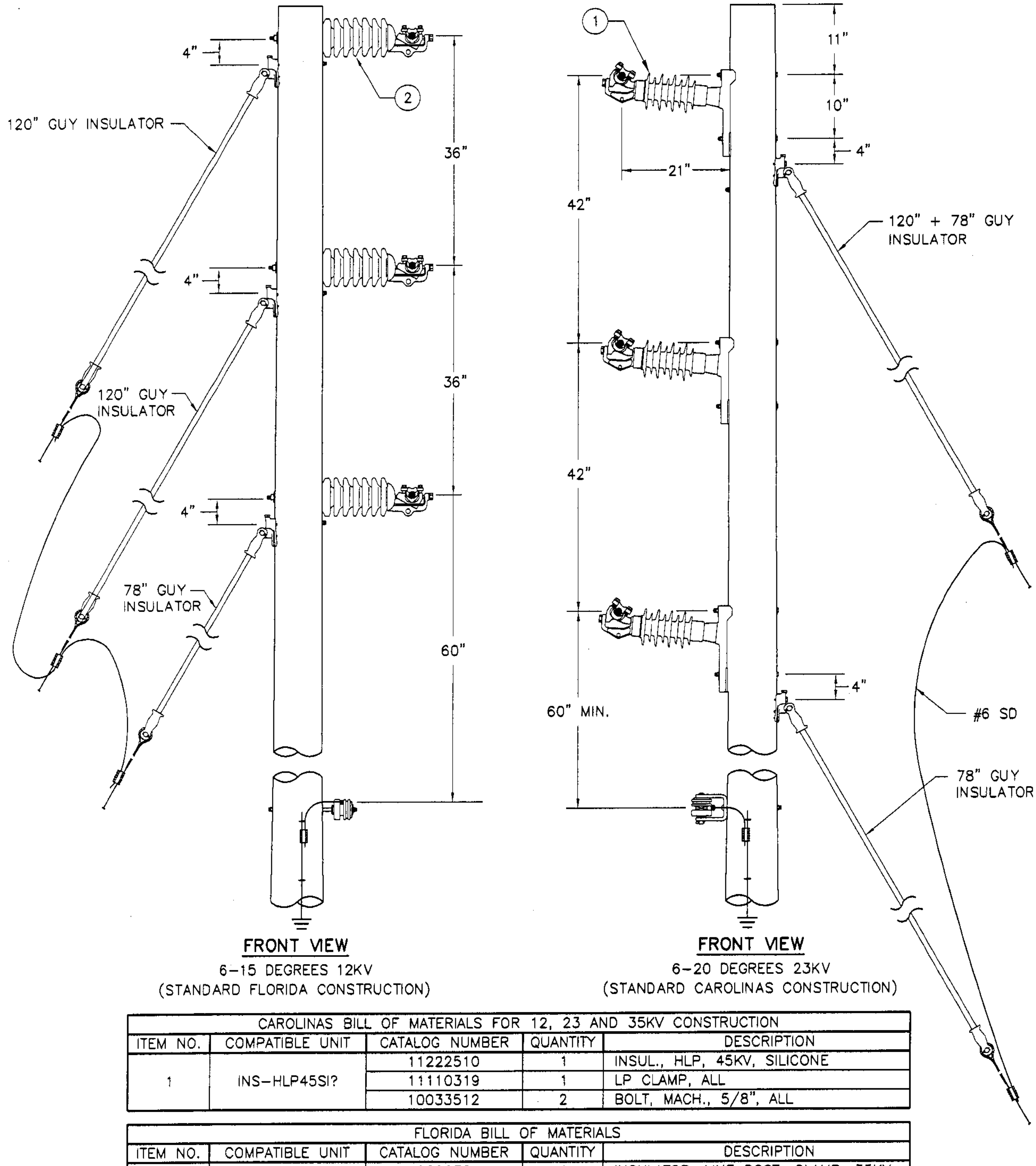
1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE SLAB GAINS (NEW POLES DO NOT HAVE SLAB GAINS) OR WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER. GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS (THIS INCLUDES SLACK SPANS).

REVISED	BY	CK'D	APPR.
3			
2			
1			
0 10/13/06	BURLISON	GUINN	HOYT

VERTICAL PRIMARY – TANGENT – COASTAL AND CONTAMINATED AREAS

Progress Energy

PGN DWG. 12.12–02



FRONT VIEW
6–15 DEGREES 12KV
(STANDARD FLORIDA CONSTRUCTION)

FRONT VIEW
6–20 DEGREES 23KV
(STANDARD CAROLINAS CONSTRUCTION)

CAROLINAS BILL OF MATERIALS FOR 12, 23 AND 35KV CONSTRUCTION				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	INS-HLP45SI?	11222510	1	INSUL., HLP, 45KV, SILICONE
		11110319	1	LP CLAMP, ALL
		10033512	2	BOLT, MACH., 5/8", ALL

FLORIDA BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
2	CIC_	080238	1	INSULATOR, LINE POST, CLAMP, 35KV
		072367	1	STUD, LP, 5/8" X 12"
		013264	1	WASHER, SPRING, COIL
		074317	1	GAIN GRID 5-1/2"
		–	1	CLAMP (VARIES WITH WIRE SIZE)
		–	1	ARMOR ROD (VARIES WITH WIRE SIZE)

NOTES:

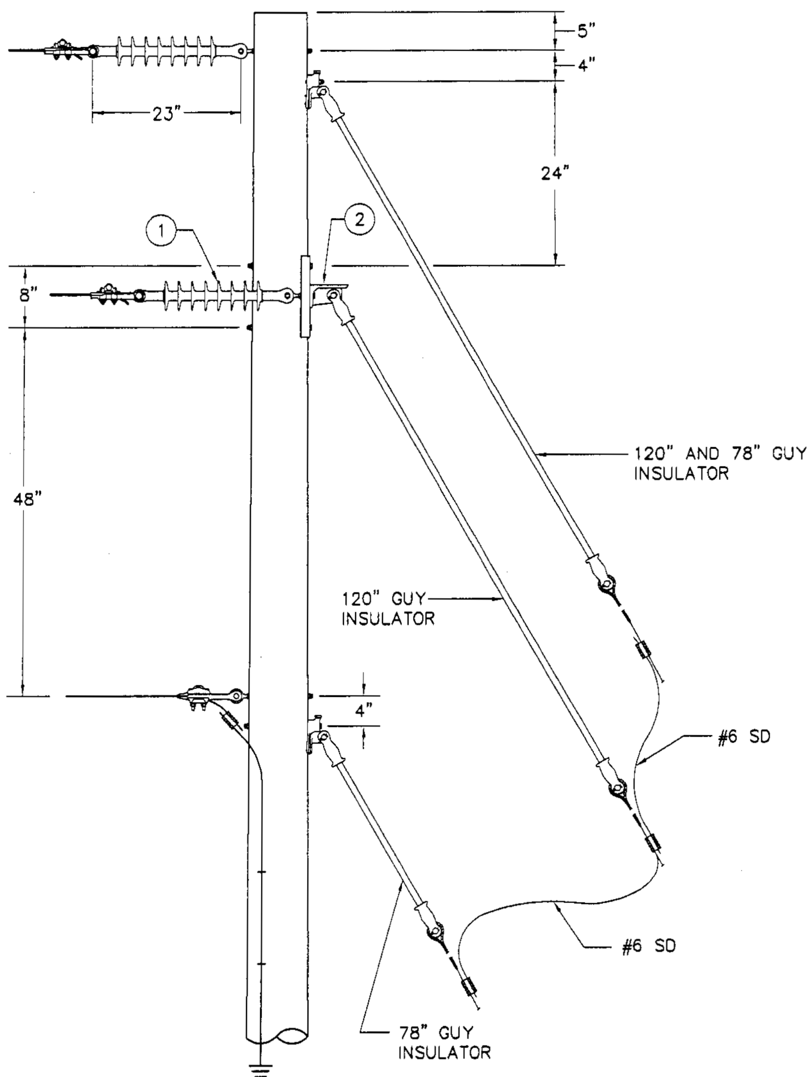
1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE SLAB GAINS (NEW POLES DO NOT HAVE SLAB GAINS) OR WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER. GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS (THIS INCLUDES SLACK SPANS).

REVISED		BY	CK'D	APPR.
3				
2				
1				
0	10/13/06	BURLISON	GUINN	HOYT

VERTICAL PRIMARY – SMALL ANGLE – COASTAL AND CONTAMINATED AREAS

Progress Energy

PGN DWG. 12.12–04



CAROLINAS BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	DE-SI45?	11223914	1	INSULATOR, SUSP, 45KV, SIL
		11104213	1	CLAMP, D.E., ALL
		10033512	1	BOLT, MACH., 5/8", ALL
2	ARM-ST60	10210607	1	CROSSARM, DE, 60", 5000#, S
		10033512	2	BOLT, MACH., 5/8", ALL
		11113511	1	CLEVIS, DE, ALL

FLORIDA BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	V34_	080577	1	INSULATOR, POLYMER, 25KV, DE
		011708	1	BOLT, OVAL EYE, 5/8" X 10"
		013346	1	WASHER, 3", SQ., 13/16" HOLE
		013308	1	WASHER, 2-1/4" SQ.
		-	1	CLAMP, D.E. (VARIES WITH WIRE SIZE)
2	XS	070164	1	CROSSARM, DE 40", 5000#

NOTES:

1. USE THIS DRAWING FOR 12KV, 23KV, OR 35KV CONSTRUCTION.

3				
2				
1				
0	10/26/06	BURLISON	GUINN	HOYT
REVISED		BY	CK'D	APPR.

DEADEND PRIMARY –
COASTAL AND CONTAMINATED AREAS

Progress Energy

PGN DWG. 12.12-14

Progress Energy

Distribution UG Construction Manual

3	8/6/04	CECCONI	SIMPSON	SPRINGER
2	7/28/03	CECCONI	SIMPSON	WOOLSEY
1	11/7/02	CECCONI	SIMPSON	WOOLSEY
0	2/27/01	HOYT	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

SECTION 20 – UNDERGROUND GENERAL
TABLE OF CONTENTS

Progress Energy

FLA FLORIDA DWG. 20.00-00B

GENERAL

UNDERGROUND DISTRIBUTION SHALL BE PROVIDED IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS, APPLICABLE COMPANY POLICIES AND APPLICABLE CODES

CLOSE COORDINATION SHOULD BE MAINTAINED WITH LOCAL AUTHORITIES, DEVELOPERS, CONTRACTORS, LOCATE AUTHORITIES AND OTHER UTILITIES, BEFORE AND DURING CONSTRUCTION OF AN UNDERGROUND SYSTEM, IN ORDER TO AVOID CONFLICTS WITH OTHER CONSTRUCTION AND OTHER UNDERGROUND FACILITIES.

ANYONE INVOLVED WITH THE LAYOUT, INSTALLATION, OPERATION, AND MAINTENANCE OF THESE SYSTEMS ARE URGED TO OFFER ANY SUGGESTIONS FOR CHANGES IN THESE SPECIFICATIONS WHICH MIGHT IMPROVE THE INSTALLATION OR OPERATION OF THE SYSTEMS.

LOCATION OF FACILITIES

SERVICE TO CUSTOMERS IN RESIDENTIAL SUBDIVISIONS IS TYPICALLY PROVIDED FROM THE FRONT PROPERTY LINE. ALL EQUIPMENT EXCEPT CABLE RUNS AND LIGHTING FACILITIES SHOULD BE LOCATED OFF THE STREET RIGHT OF WAY AS SHOWN IN THE VARIOUS SPECIFICATION DRAWINGS.

THE LOCATION OF FACILITIES FOR SERVICE TO APARTMENT BUILDINGS, COMMERCIAL PROJECTS, AND INDUSTRIAL PROJECTS SHALL BE DETERMINED BY THE ENGINEER, CONSIDERING THE ARRANGEMENT OF BUILDINGS, STREETS, ALLEYS, WALKWAYS, PARKING AREAS, ETC.

PADMOUNTED TRANSFORMERS SHALL BE LOCATED ACCORDING TO DWG. 27.06-05. ALL TRANSFORMER INSTALLATIONS SHALL HAVE SUFFICIENT ROOM FOR GOOD VENTILATION, MAINTENANCE, AND OPERATION. ACCESS ROUTES SHALL BE SUITABLE FOR THE EQUIPMENT USED DURING INSTALLATION, REMOVAL, AND MAINTENANCE.

UNDERGROUND PRIMARY MAY BE INSTALLED CROSS COUNTRY OR ALONG SIDE LOT LINES WHEN THE FOLLOWING CONDITIONS ARE MET.

- CROSS COUNTRY / SIDE LOT LINE CONSTRUCTION MAY BE USED WHEN THE TOTAL COST OF CONSTRUCTION IS REDUCED.
- CROSS COUNTRY / SIDE LOT LINE CONSTRUCTION SHALL BE LOOP FED.
- PROPERTY LINES MATCH WITHIN 5' FOR SIDE LOT LINE CONSTRUCTION.
- OFFSET SIDE LOT LINE CONSTRUCTION 3' FROM PROPERTY LINE.
- CABLE ROUTE MUST BE RELATIVELY LEVEL, 25° MAXIMUM SLOPE.
- A RIGHT OF WAY EASEMENT SHALL BE RECORDED.
- PREFERRED DESIGN IS TO HAVE BOTH TRANSFORMERS (DIP POLE, SWITCHGEAR, JUNCTION BOX, PULL BOX, ETC.) ON COMMON PROPERTY LINE.

RIGHT OF WAY

BEFORE CONSTRUCTION BEGINS, THE LAND OWNER SHALL SIGN A RIGHT OF WAY EASEMENT AND ESTABLISH ALL LOT LINES AND PROPERTY CORNERS. THE EASEMENT SHALL GRANT PROGRESS ENERGY A 10' WIDE PATH FOR THE ACCESS AND INSTALLATION OF PRIMARY, SECONDARY AND SERVICE CONDUCTORS. STREET RIGHTS OF WAY AND UNDERGROUND ROUTES SHALL BE GRADED TO FINAL GRADE AND CLEARED OF ALL OBSTRUCTIONS ABOVE AND BELOW GRADE. THE RIGHT OF WAY SHALL ALSO BE CLEARED OF ALL TREE STUMPS.

PRIMARY CIRCUITS

BOTH ENDS OF AN UNDERGROUND LOOP SHOULD BE:

- SERVED FROM THE SAME SUBSTATION BANK.
- SERVED FROM THE SAME FEEDER.
- IF THESE CONDITIONS ARE NOT MET, EACH TRANSFORMER IN THE LOOP SHALL BE LABELED TO ALERT THE OPERATOR. SEE CAROLINAS DWG. 27.00-05.

FOR NEW CONSTRUCTION, BOTH ENDS OF AN UNDERGROUND LOOP SHOULD BE ON THE SAME PHASE. EACH TRANSFORMER IN THE LOOP SHALL BE LABELLED WITH PHASE INFORMATION.

BOTH ENDS OF AN UNDERGROUND LOOP SHOULD NOT TERMINATE AT THE SAME STRUCTURE.

REVISED		BY	CK'D	APPR.
3				
2				
1	10/2/06	PICKLES	GUINN	HOYT
0	8/11/04	PICKLES	SIMPSON	SPRINGER

UNDERGROUND DISTRIBUTION SPECIFICATIONS

Progress Energy

PGN DWG. 20.00-01

PURPOSE OF SPECIFICATIONS:

THE PURPOSE OF THIS MANUAL IS TO PROMOTE ECONOMICAL AND UNIFORM UNDERGROUND CONSTRUCTION SPECIFICATIONS FOR DISTRIBUTION FACILITIES ON THE FLORIDA POWER SYSTEM.

SCOPE:

THE UNDERGROUND CONSTRUCTION SPECIFICATION MANUAL HAS BEEN DESIGNED BY DISTRIBUTION STANDARDS AND THE REGIONAL LINE FOREMEN TO MEET THE NEEDS OF THE LINE AND ENGINEERING DEPARTMENTS OF FLORIDA POWER.

THE SPECIFICATIONS IN THIS MANUAL ARE THE STANDARDS FOR CONSTRUCTION FOR ALL UNDERGROUND FACILITIES OF THE COMPANY. THESE SPECIFICATIONS SHALL BE FOLLOWED ON ALL SUCH CONSTRUCTION, UNLESS OTHERWISE INSTRUCTED BY ENGINEERING.

EXPLANATION OF THE SPECIFICATIONS OR ADDITIONAL INFORMATION MAY BE OBTAINED THROUGH DISTRIBUTION STANDARDS. REQUESTS AND SUGGESTIONS SHOULD ALSO BE MADE THROUGH THESE TWO DEPARTMENTS.

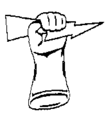
WORK OVERVIEW:

WHEN FIELD CONDITIONS MAKE IT IMPRACTICABLE TO USE STANDARD CONSTRUCTION SPECIFICATIONS OR WHEN THE DETAILS OF THE JOB ARE NOT FULLY COVERED IN THESE SPECIFICATIONS, THE ENGINEER SHALL ISSUE A SKETCH WITH INSTRUCTIONS TO THE FOREMAN SHOWING HOW THE JOB IS TO BE BUILT. SUCH VARIATIONS MUST CONFORM AS NEARLY AS POSSIBLE TO THESE SPECIFICATIONS AND SHALL NOT VIOLATE ANY SAFE WORK PRACTICES, NATIONAL ELECTRICAL SAFETY CODE AND THE FLORIDA PUBLIC COMMISSION ORDERS. IF THERE IS SOME DOUBT AS TO HOW A JOB SHOULD BE BUILT, THE DESIGN ENGINEER SHOULD BE CONTACTED.

MANUAL OVERVIEW:

THE NEW MANUAL HAS BEEN DIVIDED INTO TWELVE SECTIONS. IN EACH OF THESE SECTIONS THERE ARE TWO SYMBOLS THAT ARE UNIQUE TO THE UNDERGROUND CONSTRUCTION MANUAL.

THIS SYMBOL IS USED TO INFORM THE READER THAT THE MANUFACTURER'S INSTRUCTIONS AND OR SPECIFICATIONS FOR THAT PIECE OF MATERIAL SHOULD BE CONSULTED.



THIS SYMBOL IS USED TO ALERT THE READER OF POSSIBLE SAFETY CONCERNS THAT MAY WARRANT ADDITIONAL PRECAUTIONS.

IN ADDITION TO THESE SYMBOLS, AN APPLICATION BOX (3-DIMENSIONAL) HAS BEEN ADDED. TO CERTAIN PLATES. THIS IS USED TO DEMONSTRATE DIFFERENT TYPES OF APPLICATIONS THAT ARE ASSOCIATED WITH THE MATERIAL.

GENERAL

ALL SOIL THAT IS EXCAVATED BY FLORIDA POWER WILL BE CLASSIFIED AS TYPE C.

A COMPETENT PERSON SHALL BE ON SITE DURING ALL TRENCHING AND EXCAVATING. A COMPETENT PERSON IS DEFINED IN OSHA STANDARDS 1926.650 SUBPART P.

OSHA GUIDELINES

A. SITE EXCAVATION

ALL UNDERGROUND UTILITIES THAT MIGHT INTERFERE WITH THE EXCAVATION MUST BE LOCATED PRIOR TO EXCAVATION. CALL SUNSHINE ONE (1-800-432-4770) FOR UNDERGROUND UTILITY LOCATIONS.

PROTECT EXCAVATION THAT IS ADJACENT TO BUILDINGS, WALLS, SIDEWALKS OR SPOIL PILES TO AVOID STRUCTURAL COLLAPSE OR CAVE-IN.

REMOVE OR DIVERT SURFACE WATER THROUGH THE USE OF WELL POINTS OR PUMPS.

THE EXCAVATION CONDITIONS MUST BE REEVALUATED BY A COMPETENT PERSON AFTER OR DURING EACH WEATHER CHANGE.

THE EXCAVATION SITE MUST BE EVALUATED DAILY BY A COMPETENT PERSON PRIOR TO THE START OF WORK.

GUARD EXCAVATION NEAR MOVING AND VIBRATING TRAFFIC FROM COLLISIONS, FALLS OR CAVE-INS.

IF A HAZARDOUS ATMOSPHERE COULD REASONABLY BE EXPECTED TO EXIST (i.e., PROXIMITY TO LANDFILLS OR STORAGE AREA FOR HAZARDOUS MATERIALS, EXCAVATION GREATER THAN 4', ETC.), THEN THE SITE SHALL BE TESTED BEFORE ANY EMPLOYEES ENTER THE EXCAVATION AND BE RETESTED AS OFTEN AS NECESSARY.

B. EXCAVATION RULES

HARD HATS MUST BE WORN AT ALL TIMES WHILE WORKING IN AN EXCAVATION.

BARRIER PHYSICAL PROTECTION SHALL BE PROVIDED AT ALL UNATTENDED LOCATED EXCAVATIONS. ALL UNATTENDED WELLS, PITS, SHAFTS, ETC., SHALL BE BARRICADED OR COVERED.

WHILE EXCAVATION IS OPEN, UNDERGROUND INSTALLATIONS SHALL BE PROTECTED, SUPPORTED OR REMOVED AS NECESSARY TO SAFE GUARD EMPLOYEES.

A LADDER OR RAMP IS REQUIRED EVERY 25 FEET IN EXCAVATIONS MORE THAN 4 FEET DEEP.

EMPLOYEES SHALL WEAR A HIGH-VISIBILITY TRAFFIC VEST WHEN EXPOSED TO PUBLIC VEHICULAR TRAFFIC.

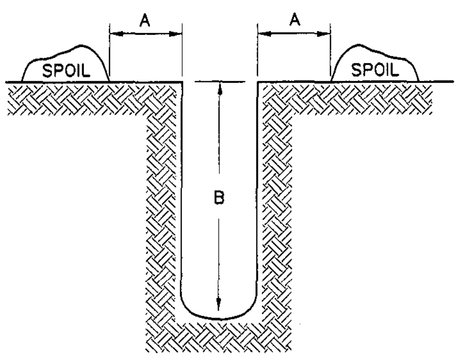
WHERE HAZARDOUS ATMOSPHERIC CONDITIONS EXISTS, EMERGENCY RESCUE EQUIPMENT, SUCH AS BREATHING APPARATUS, A SAFETY HARNESS AND LINE, OR A BASKET STRETCHER SHALL BE READILY AVAILABLE. THIS EQUIPMENT SHALL BE ATTENDED WHEN IN USE.

EMPLOYEES ENTERING MANHOLES SHALL WEAR A HARNESS WITH A LIFE-LINE SECURELY ATTACHED TO IT, SEPARATE FROM A "HAND-LINE," AND IT SHALL BE INDIVIDUALLY ATTENDED AT ALL TIMES.

EMPLOYEES SHALL NOT WORK IN EXCAVATIONS IN WHICH THERE IS ACCUMULATED WATER, OR WATER IS ACCUMULATING, UNLESS ADEQUATE PRECAUTIONS HAVE BEEN TAKEN TO PROTECT EMPLOYEES AGAINST THE HAZARDS POSED BY WATER REMOVAL EQUIPMENT, THE EQUIPMENT AND OPERATIONS SHALL BE MONITORED BY A "COMPETENT PERSON" TO ENSURE PROPER OPERATIONS.

SIDEWALKS, PAVEMENTS AND APARTMENT STRUCTURES SHALL NOT BE UNDERMINED UNLESS SUPPORTED TO PROTECT EMPLOYEES FROM POSSIBLE COLLAPSE OF SUCH STRUCTURES.

SPOIL AND OTHER MATERIALS OR EQUIPMENT SHALL BE PLACED A MINIMUM OF 2 FEET FROM THE EDGE OF AN EXCAVATION. USE OF RETAINING DEVICES TO PREVENT MATERIALS OR EQUIPMENT FROM FALLING OR ROLLING INTO EXCAVATION MAY BE NECESSARY.



TRENCHING CROSS SECTION

WHEN DIMENSION "A" IS 2 FEET OR GREATER AND DIMENSION "B" IS LESS THAN 5 FEET, SHORING WILL USUALLY NOT BE REQUIRED UNLESS THE ON-SITE COMPETENT PERSON DETERMINES THAT EXTENUATING CIRCUMSTANCES REQUIRES SHORING.

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REVISED		BY	CK'D	APPR.

TRENCHING AND EXCAVATION

Progress Energy

FLA FLORIDA DWG. 22.01-00A

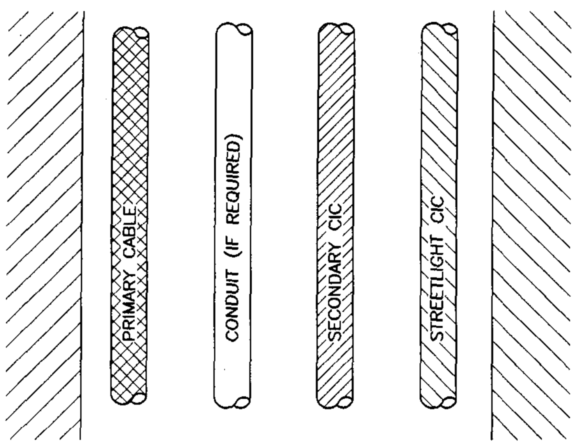
TRENCHING AND EXCAVATION GUIDELINES

1. THE BOTTOM OF THE TRENCH SHOULD BE SMOOTH EARTH OR SAND.
2. WHEN INSTALLING DIRECT BURIED CABLE IN ROCK OR ROCKY SOILS, THE CABLE SHOULD BE LAID ON A PROTECTIVE LAYER OF WELL-TAMPED BACKFILL.
3. BACKFILL WITHIN 4 INCHES OF THE CABLE SHOULD BE FREE OF MATERIALS THAT MAY DAMAGE THE CABLE/CONDUIT.
4. BACKFILL SHOULD BE ADEQUATELY COMPACTED.
5. MACHINE COMPACTION SHOULD NOT BE USED WITHIN 6 INCHES OF THE CABLE.
6. ALL PRIMARY AND SECONDARY CABLES MUST HAVE APPROPRIATE IDENTIFICATION TAGS.
7. COLOR WIRE TIES ON SECONDARY CABLES ARE NOT TO BE DUPLICATED AT A TRANSFORMER LOCATION.
8. CONSULT "ACCIDENT AND PREVENTION" MANUAL FOR TAGGING OF A PARALLEL SERVICE.
9. ALL CABLE ENDS MUST BE CAPPED WITH PROPER SIZE CAP. WRAPPING WITH TAPE DOES NOT PROVIDE ADEQUATE PROTECTION.
10. ALL CIC AND PVC ENDS MUST BE CAPPED.
11. ALL PVC DEADENDS BURIED WITHOUT ADJACENT CABLE (i.e. ROAD CROSSINGS) ARE TO BE MARKED WITH A POWER MARKER (WHOOPIE CUSHION). IN ADDITION, ALL BELOW GRADE PULL BOXES ARE TO BE MARKED WITH A POWER MARKER.

RECOMMENDED POSITION FOR CABLE AND CONDUIT IN TRENCH

JOINT USE TRENCH

1. NOTIFY SUNSHINE ONE LOCATING SERVICE (1-800-432-4770) PRIOR TO EXCAVATING.
2. COORDINATE WITH GAS TRANSMISSION COMPANIES PRIOR TO EXCAVATING IN VICINITY OF THEIR FACILITIES.
3. PRIMARY AND/OR SECONDARY CABLE AND CONDUIT SYSTEM MUST BE SEPARATED FROM COMMUNICATION CABLES AT LEAST 12 INCHES. NOTE: NO INTENTIONAL SEPARATION IS REQUIRED FROM COMMUNICATION CABLES IF BY MUTUAL CONSENT THE CABLES ARE BEING RANDOMLY LAYED.
4. EXTREME CARE SHOULD BE USED WHEN DIGGING AROUND FIBER OPTIC.
5. "VITAL" COMMUNICATION FIBER OPTIC LINE REQUIRES CLOSE COORDINATION WITH COMMUNICATION PROVIDER PRIOR TO EXCAVATION.



RAILROAD CROSSING

1. DIRECTIONAL BORE UNDER RAILROAD TRACKS. NESC REQUIRES MINIMUM OF 60 INCHES BELOW TOP OF RAILS.

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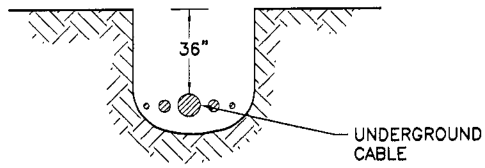
0 12/18/02	CECCONI	SIMPSON	WOOLSEY
REVISED	BY	CK'D	APPR.

TRENCHING AND EXCAVATION

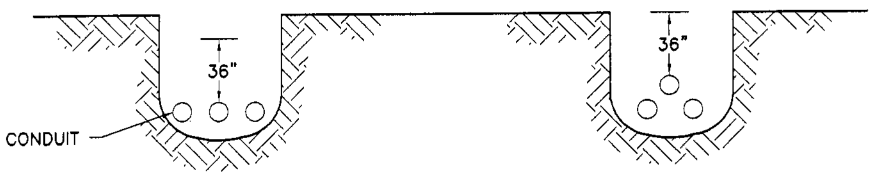
Progress Energy

FLA FLORIDA DWG. 22.01-00B

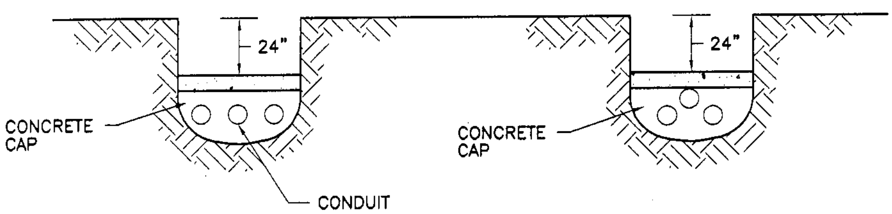
DIRECT BURIED CABLE



CONDUIT PLACEMENT



CONDUIT WITH CONCRETE CAP



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CABLE AND CONDUIT DEPTH GUIDELINES

Progress Energy

FLA FLORIDA DWG. 22.01–01

THE USE OF CONDUIT DEPENDS ON APPLICATION AND FIELD CONDITIONS. CONSULT THE FOLLOWING INFORMATION WHEN MAKING A DETERMINATION FOR A PARTICULAR SITUATION. CONSULT DISTRIBUTION STANDARDS FOR QUESTIONS NOT ADDRESSED BELOW.

DIRECT BURY

DIRECT BURY IS OUR STANDARD METHOD OF INSTALLATION FOR ALL SECONDARY, SERVICE AND PRIMARY CABLES.

IN CONDUIT

FIELD CONDITIONS MAY MAKE IT NECESSARY TO INSTALL OUR CABLES IN CONDUIT. THE FOLLOWING ARE EXAMPLES OF APPROVED CONDITIONS.

- SHALLOW INSTALLATIONS (DIMENSIONS ARE TO THE TOP OF THE CONDUIT)
  - PRIMARY (1000, 750, 500, 350, 1/0)
    - LESS THAN 30" TO 12" – SCHEDULE 40 PVC
    - LESS THAN 12" TO 6" – STEEL OR CONCRETE ENCASED PVC
  - SECONDARY, SERVICE, LIGHTING
    - LESS THAN 24" TO 12" = SCHEDULE 40 PVC
    - LESS THAN 12" TO 6" – STEEL OR CONCRETE ENCASED PVC
- CROSSING STREETS OR PARKING LOTS WHERE CONDUIT WAS INSTALLED BEFORE THE STREET WAS PAVED
- CROSSING OTHER UTILITIES WHEN CODE CLEARANCES CAN NOT BE MET (SEE DWG. 22.01–05)
- RETAINING WALLS (STEEP ELEVATION CHANGES)
- RAILROAD CROSSINGS (STEEL CONDUIT)
- SUBSTATION EXITS TO JUST OUTSIDE THE FENCE
- CONGESTED AREAS; DEFINED AS HAVING INADEQUATE WIDTH (SEE DWG. 22.01–05) FOR SEPARATION BETWEEN OUR FACILITIES AND FACILITIES OF OTHERS (CABLE, PHONE, GAS, ETC.) CONDUIT WOULD TYPICALLY BE STACKED IN DUCT BANK ARRANGEMENT

BACKFILL

THE NESC (SECTIONS 32 AND 35) REQUIRES CLEAN BACKFILL NEXT TO CONDUIT OR A DIRECT BURIED CABLE. THE LACK OF CLEAN BACKFILL IS NOT A REASON TO INSTALL CABLE IN CONDUIT.

FROM SUBSECTION 321 A AND B

A. "THE BOTTOM OF THE TRENCH SHOULD BE UNDISTURBED, TAMPED, OR RELATIVELY SMOOTH EARTH. WHERE THE EXCAVATION IS IN ROCK, THE CONDUIT SHOULD BE LAID ON A PROTECTIVE LAYER OF CLEAN TAMPED BACKFILL."

B. "BACKFILL WITHIN 150 MM (6 IN) OF THE CONDUIT SHOULD BE FREE OF SOLID MATERIAL GREATER THAN 100 MM (4 IN) IN MAXIMUM DIMENSION OR WITH SHARP EDGES LIKELY TO DAMAGE IT. THE BALANCE OF BACKFILL SHOULD BE FREE OF SOLID MATERIAL GREATER THAN 200 MM (6 IN) IN MAXIMUM DIMENSION. BACFKILL MATERIAL SHOULD BE ADEQUATELY COMPACTED."

FROM SUBSECTION 352 A

A. "THE BOTTOM OF THE TRENCH RECEIVING DIRECT–BURIED CABLE SHOULD BE RELATIVELY SMOOTH UNDISTURBED EARTH, WELL–TAMPED EARTH OR SAND. WHEN EXCAVATION IS IN ROCK OR ROCKY SOILS, THE CABLE SHOULD BE LAID ON A PROTECTIVE LAYER OF WELL–TAMPED BACKFILL. BACKFILL WITHIN 100 MM (4 IN) OF THE CABLE SHOULD BE FREE OF MATERIALS THAT MAY DAMAGE THE CABLE. BACKFILL SHOULD BE ADEQUATELY COMPACTED. MACHINE COMPACTION SHOULD NOT BE USED WITH 150 MM (6 IN) OF THE CABLE."

SPARE/EMPTY CONDUIT

- RADIAL FEED PRIMARY CABLE MAY BE INSTALLED WITH A SPARE CONDUIT. CONSIDERATION SHOULD BE GIVEN TO THE CRITICAL NATURE OF THE CUSTOMER TO MAKE THE DETERMINATION.
- WHEN CABLE IS INSTALLED UNDER FUTURE LARGE AREAS OF PAVEMENT OR CONCRETE (STREETS OR PARKING LOT CROSSINGS), CABLE MAY BE INSTALLED WITH A SPARE CONDUIT.

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USE OF CONDUIT

Progress Energy

PGN DWG. 22.01–02A

CONDUIT ENDS

- ENDS OF SPARE CONDUIT SHALL BE CAPPED UNTIL CABLE IS INSTALLED.
- WHEN CABLE IS INSTALLED, CABLE PROTECTORS SHALL BE INSTALLED IN THE ENDS OF CONDUIT
- WHEN CONDUIT IS TERMINATED AT A POLE, SWITCHGEAR, TRANSFORMER, OR OTHER ABOVE GROUND DEVICE, CONDUIT BENDS SHOULD BE INSTALLED TO EXTEND THE CONDUIT IN THE EQUIPMENT

ROAD CROSSINGS

- ROAD CROSSINGS SHOULD BE INSTALLED AT A PROPERTY LINE TO FACILITATE LOCATION. DIAGONAL CROSSINGS ARE PERMITTED BY SOME GOVERNING AUTHORITIES.

DIRECTIONAL BORES

- CONDUIT IS NOT NORMALLY REQUIRED FOR DIRECTIONAL BORING JOBS. CONDUIT SHOULD BE USED WHEN ROCK IS ENCOUNTERED (ROCK ADDER TO CONTRACT PRICE)
- CONDUIT SHOULD BE INSTALLED FOR THE STREET CROSSING WHEN CROSSING A DOT MAINTAINED STREET AND CONDUIT IS REQUIRED BY DOT.
- WHEN CROSSING OTHER UTILITIES WE CAN NORMALLY MAINTAIN ADEQUATE CLEARANCE BY GOING DEEPER THAN THE OTHER UTILITY FOR A SHORT DISTANCE BUT IF THIS IS NOT PRACTICAL WE SHOULD USE CONDUIT IN THE SHORT AREA WHERE WE CROSS
- PRIMARY CABLE SHOULD BE INSTALLED WITH A MINIMUM OF 30 INCHES OF COVER, 36 INCHES PREFERRED, AND 48 INCHES MAXIMUM.
- CONDUIT SHOULD BE USED WHEN THE INSTALLATION MUST BE INSTALLED SHALLOW, LESS THAN 30 INCHES FOR PRIMARY AND 24 INCHES FOR SECONDARY
- WHEN CONDUIT IS USED ON A DIRECTIONAL BORING JOB, THE CONTRACTOR SHALL USE A PROGRESS ENERGY APPROVED CONDUIT.

DUCT BANK

- IN HEAVILY CONGESTED URBAN AREAS, INSTALL CABLE IN DUCT BANK; DEFINED AS HAVING INADEQUATE WIDTH (SEE DWG. 22.01-05) FOR SEPARATION BETWEEN OUR FACILITIES AND FACILITIES OF OTHERS (CABLE, PHONE, GAS, ETC.). CONDUIT WOULD TYPICALLY BE STACKED IN DUCT BANK ARRANGEMENT.

PULL BOXES

PULL BOXES SHOULD BE INSTALLED AS NEEDED TO FACILITATE CABLE INSTALLATION IN SITUATIONS WHERE THE CABLE IS BURIED AT A SHALLOW DEPTH AND CODE CLEARANCE FOR THE SPLICE MUST BE MAINTAINED. OTHER SPLICES ARE TO BE DIRECT BURIED AND MARKED WITH A CABLE LOCATOR.

THE RE-REELING PROCESS

- PURCHASE 1000 OR 500 KCMIL 15 KV CABLE ON LARGE REEL.
- INSTALL CONDUIT.
- MEASURE CONDUIT.
- TRANSFER THE PROPER LENGTH OF ALL THREE PHASES FOR THE PULL TO A SEGMENTED REEL.
- INSTALL THE CABLE IN CONDUIT.

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0	11/1/06	GUINN	GUINN	HOYT
REVISED		BY	CK'D	APPR.

USE OF CONDUIT

Progress Energy

PGN DWG. 22.01-02B

I. RECOMMENDED MAXIMUM FILL OF CONDUIT AS % OF CROSS-SECTIONAL AREA

	NUMBER OF CABLES		
	1	2	3
NEW CONSTRUCTION (NATIONAL ELECTRIC CODE)	53%	31%	40%
EXISTING CONDUIT (MAXIMUM)	60%	40%	50%

II. CONDUIT DIMENSIONS

	RIGID STEEL		PVC SCHED 40		POLYETHYLENE		
SIZE (IN.)	MIN. INSIDE DIA. (IN.)	CROSS SECT. AREA (SQ. IN.)	MIN. INSIDE DIA. (IN.)	CROSS SECT. AREA (SQ. IN.)	MIN. INSIDE DIA. (IN.)	CROSS SECT. AREA (SQ. IN.)	TYPE
3/4"	–	–	–	–	0.772	0.468	SCHED 40
1"	1.05	0.86	1.004	0.792	–	–	–
1-1/2"	–	–	1.564	1.921	1.618	2.056	SCHED 40
2	2.07	3.36	2.021	3.208	2.023	3.214	SDR 13.5
2-1/2"	2.47	4.79	2.414	4.577	2.417	4.588	SCHED 40
3"	3.07	7.38	3.008	7.106	–	–	–
4"	4.03	12.72	3.961	12.323	3.840	11.581	SDR 13.5
5"	5.05	20.00	4.975	19.439	–	–	–
6"	6.07	28.89	5.986	28.143	–	–	–
7"	–	–	–	–	6.006	28.331	SDR 13.5

III. CONDUIT SIZE FOR PRIMARY

JACKETED CABLE	PVC OR STEEL			POLYETHYLENE		
	1 CABLE	2 CABLES	3 CABLES	1 CABLE	2 CABLES	3 CABLES
1000 KCMIL AL, 15 KV, 175 MIL	–	–	6"	4"	–	7"
750 KCMIL CU, 15 KV, 175 MIL	–	–	6"	–	–	7"
500 KCMIL AL, 15 KV, 175 MIL	–	–	6"	–	–	7"
#4/0 CU, 15 KV, 175 MIL	–	–	4"	–	–	7"
#1/0 AL, 15 KV, 175 MIL	2"	4"	4"	2"	4"	4"
#1/0 AL, 25 KV, 260 MIL (SEE NOTE 2)	2"	3"	4"	2"	4"	4"
350 KCMIL AL, 25 KV, 260 MIL	–	–	6"	–	–	–
750 KCMIL AL, 25 KV, 260 MIL	–	–	6"	–	–	–
1000 KCMIL AL, 25 KV, 260 MIL	–	–	6"	–	–	7"

IV. CONDUIT SIZE FOR SECONDARY, SERVICE AND LIGHTING

CABLE	PVC OR STEEL			POLYETHYLENE	
	1 CIRCUIT		2 CIRCUITS (PARALLEL SERVICES ONLY)	1 CIRCUIT	2 CIRCUITS (PARALLEL SERVICES ONLY)
	CAROLINAS	FLORIDA			
2 #10 CU LIGHTING CABLE (SEE NOTE 3)	2"	1-1/2"	–	2"	–
3 #10 CU LIGHTING CABLE (SEE NOTE 3)	2"	–	–	2"	–
2 #6 AL LIGHTING CABLE	–	1-1/2"	–	2"	–
3 #6 AL LIGHTING CABLE	2"	–	–	2"	–
#2 TPX	2"	1-1/2"	–	2"	–
#2/0 TPX	2"	2"	–	2"	–
#4/0 TPX	2"	2"	4"	2"	4"
350 TPX (SEE NOTE 4)	3"	2-1/2"	4"	4"	4"
500 TPX	4"	4"	–	4"	–
750 TPX	4"	4"	–	4"	–
#4/0 QPX	3"	4"	4"	4"	4"
350 QPX	4"	4"	–	4"	–
500 QPX	4"	4"	–	4"	–
750 QPX	4"	4"	–	7"	–

NOTES:

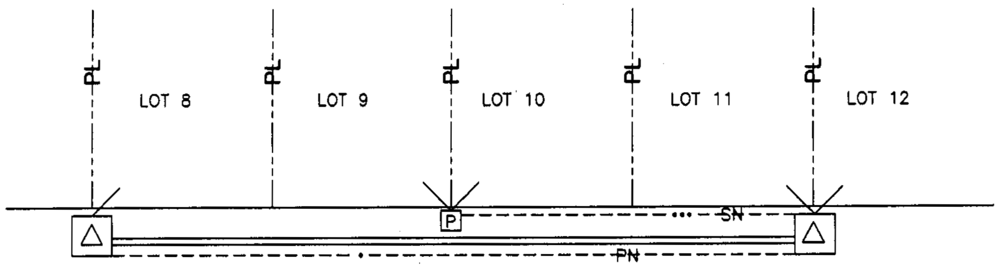
1. FOR THREE CABLES NOT TRIPLEXED (TWISTED TOGETHER BEFORE INSTALLATION), THE DIAMETER OF THE CONDUIT SHOULD NOT APPROXIMATE THREE TIMES THE SINGLE CABLE DIAMETER, AS THIS WOULD MAKE IT POSSIBLE FOR ONE CABLE TO BE FORCED BETWEEN THE OTHER TWO AND BECOME JAMMED IN THE CONDUIT.
2. IN FLORIDA, FOR TWO RUNS, USE 4" PVC RATHER THAN 3" PVC.
3. IN THE CAROLINAS, USE 1" CONDUIT FOR RISERS.
4. IN THE CAROLINAS, USE 2-1/2" BUILDING RISER IF METER BASE WILL NOT ACCEPT 3".
5. PVC DUCT IS TYPICALLY USED FOR TRENCHED INSTALLATIONS. POLYETHYLENE DUCT IS TYPICALLY USED FOR DIRECTIONAL DRILLING. USE 6" BORE-GARD® FOR DIRECTIONAL DRILLING THREE PHASE FEEDERS IN THE CAROLINAS.
6. FOR MULTIPLE PRIMARY CABLES SERVING SINGLE PHASE LOAD, USE A SEPARATE DUCT FOR EACH RUN OF CABLE.

REVISED	DATE	BY	CK'D	APPR.
3				
2	12/18/06	DANNA	GUINN	HOYT
1	8/25/05	PICKLES	GUINN	HOYT
0	1/31/05	PICKLES	NUNNERY	SPRINGER

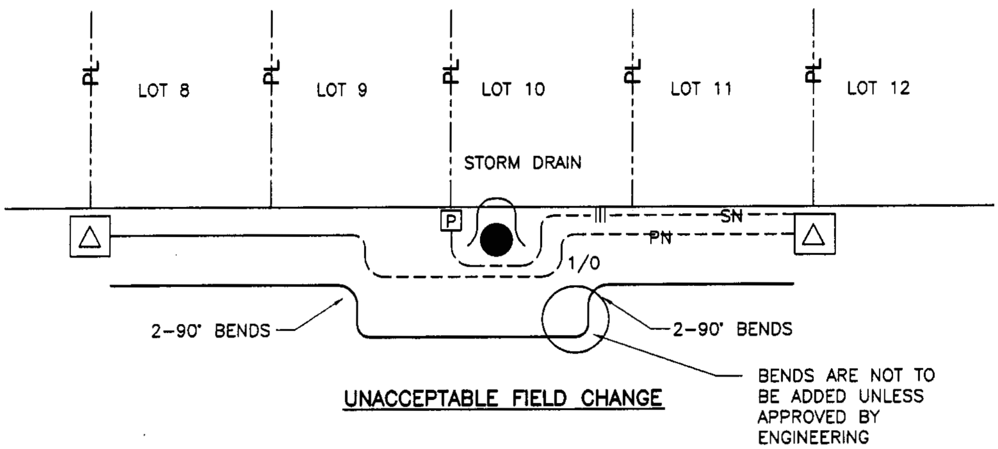
RECOMMENDED CONDUIT FILL

Progress Energy

PGN DWG. 22.01-03



WORK ORDER DRAWING



UNACCEPTABLE FIELD CHANGE

NOTES:

1. MAKING FIELD CHANGES FOR ROUTING CONDUIT AROUND PREVIOUSLY UNKNOWN OBSTACLES IS NOT AUTOMATICALLY APPROVED. THE ADDITION OF NON-APPROVED BENDS CAN INCREASE THE DIFFICULTY OF CABLE PULLING AND MAY EVEN MAKE THE PULL IMPOSSIBLE.

2. ANY DEVIATIONS FROM THE ORIGINAL DRAWINGS SHOULD BE ROUTED THROUGH ENGINEERING FOR APPROVAL PRIOR TO INSTALLATION OF FACILITIES.

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ROUTING CONDUITS AROUND OBSTACLES

Progress Energy

FLA FLORIDA DWG. 22.01-04

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0	12/1/06	CECCONI	GUINN	HOYT
REVISED		BY	CK'D	APPR.

SECTION 33 - FLOODING AND STORM SURGE REQUIREMENTS
TABLE OF CONTENTS

Progress Energy

FLA DWG. 33.00-00B

FLOODING AND STORM SURGE REQUIREMENTS FOR FLORIDA

- THE FLORIDA PSC HAS MANDATED WHERE PRUDENT AND COST EFFECTIVE, THAT UNDERGROUND FACILITIES ARE DESIGNED TO MITIGATE DAMAGE DUE TO FLOODING AND STORM SURGES.

IT IS ASSET MANAGEMENT'S RESPONSIBILITY TO DETERMINE APPLICABILITY OF FLOODING AND STORM SURGE STANDARDS ON ALL NEW CONSTRUCTION, MAJOR PLANNED WORK, INCLUDING EXPANSIONS, REBUILD OR RELOCATION OF EXISTING FACILITIES AND TARGETED CRITICAL INFRASTRUCTURE FACILITIES AND MAJOR THOROUGHFARES.

REVISED		BY	CK'D	APPR.
3				
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1	1/17/07	GUINN	GUINN	HOYT
0	11/29/06	DANNA	GUINN	HOYT

FLOODING AND STORM SURGE REQUIREMENTS FOR FLORIDA

Progress Energy

FLA DWG. 33.01-00

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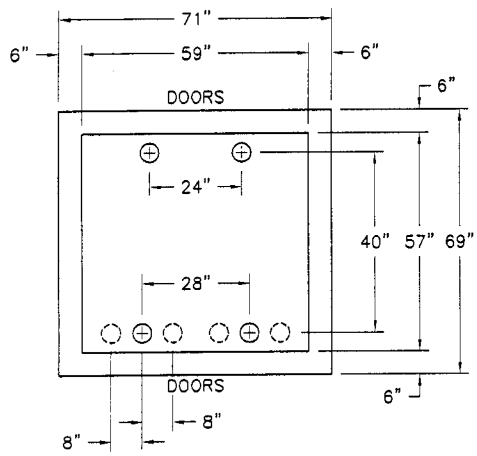

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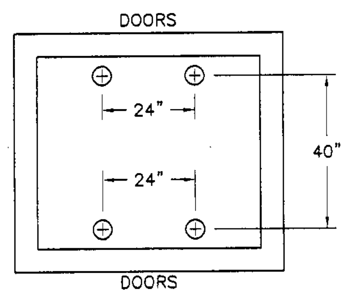

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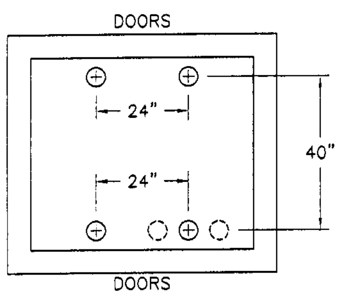

TRAYER SWITCHGEAR

NOTES:

1. SEE DWG. 33.02-03 FOR CONCRETE BAG PLACEMENT AND BUILDING CLEARANCES.
2. ALL CONDUIT DIMENSIONS ARE CENTER-TO-CENTER.
3. BOXES PURCHASED PRIOR TO 2004 WERE 70" X 62".
4. IF DIRECT BURIED CABLE, USE BØ FOR THREE-PHASE CABLE PLACEMENT.

3					CABLE AND CONDUIT PLACEMENT FOR TRAYER SWITCHGEAR	Progress Energy
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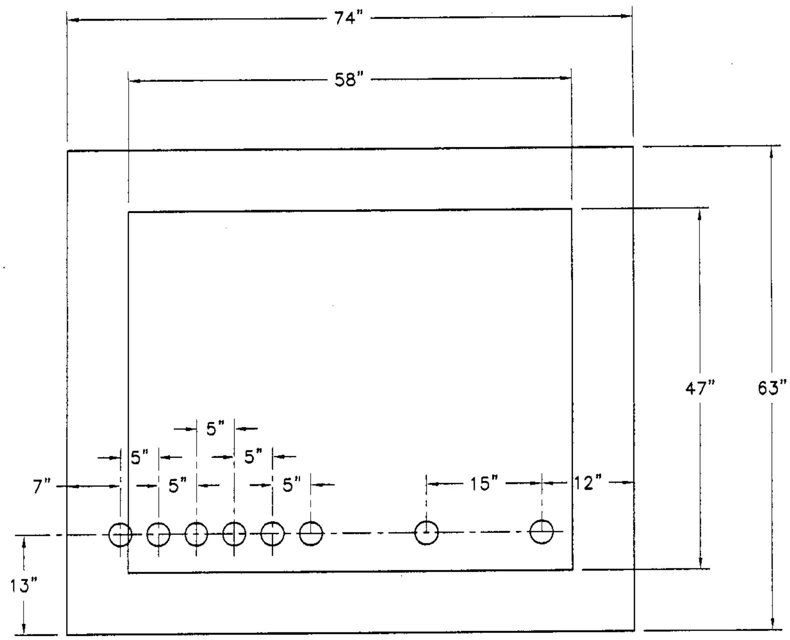
REVISED		BY	CK'D	APPR.		



S & C VISTA GEAR
12.5KA AND 25KA
15KV

NOTES:

1. SEE DWG. 33.02-03 FOR CONCRETE BAG PLACEMENT AND BUILDING CLEARANCES.
2. ALL CONDUIT DIMENSIONS ARE CENTER-TO-CENTER.
3. IF DIRECT BURIED CABLE, USE BØ FOR THREE-PHASE CABLE PLACEMENT.

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0	11/29/06	DANNA	GUINN	HOYT
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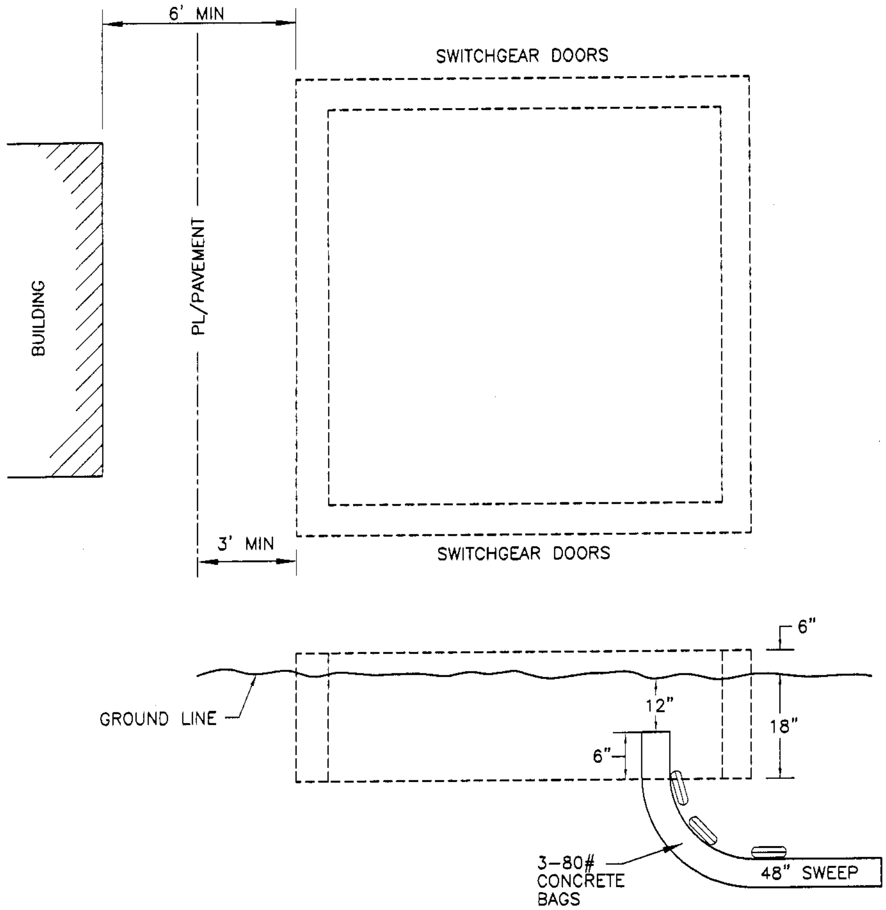
CABLE AND CONDUIT PLACEMENT FOR
S & C VISTA GEAR

Progress Energy

FLA DWG. 33.02-02



CAUTION:

REFER TO ACCIDENT PREVENTION MANUAL FOR PROPER LIFTING TECHNIQUES WHEN HANDLING CONCRETE BAGS.

NOTES:

1. ALL 90° SWEEPS MUST NOT BE CUT OFF.
2. CONCRETE MUST BE PLACED ON INSIDE OF BENDS.
3. THE MOUNTING BOX IS SHOWN AS A REFERENCE AND IS INSTALLED AFTER CABLE AND CONDUIT.

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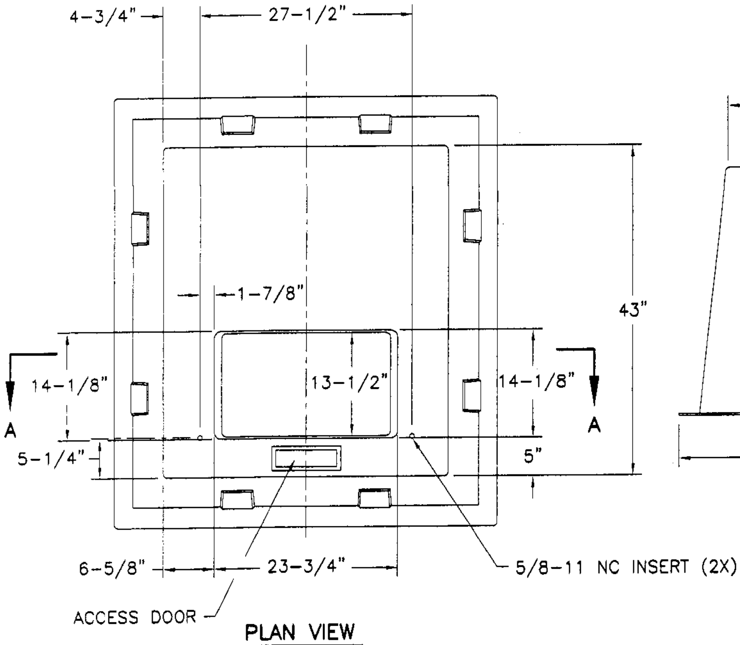
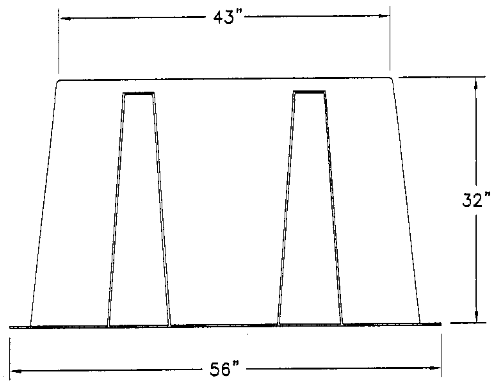
CABLE AND CONDUIT PLACEMENT FOR PADMOUNTED SWITCHGEAR

Progress Energy

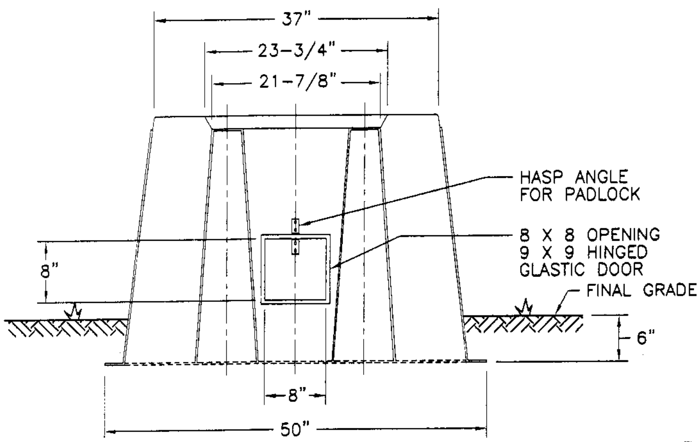
FLA DWG. 33.02-03



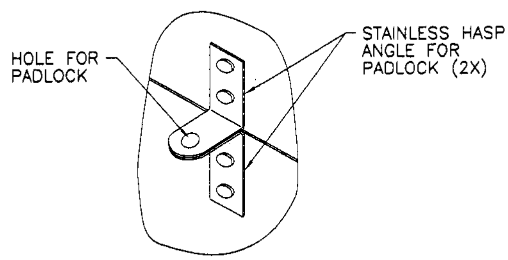
PLAN VIEW



SIDE VIEW



SECTION AA



PADLOCK HASP DETAIL

CN 9220148379

MATERIAL: FIBERGLSS REINFORCED POLYMER
WITH MUNSELL GREEN #7GY3.29/1.5

MAXIMUM EQUIPMENT WEIGHT: 2,000 LBS. (167KVA)

NOTES:

1. FOR USE AS TRANSFORMER MOUNTING BOX IN AREAS WHERE STANDING WATER DUE TO FLOODING AND STORM SURGE WILL BE PRESENT OVER AN EXTENDED PERIOD OF TIME.
2. THE GROUND SHALL BE LEVELED AND THOROUGHLY COMPACTED BEFORE BOX PAD IS INSTALLED.
3. USE GENEROUS AMOUNT OF FIRE ANT KILLER (CN 9220092158) UNDER ENTIRE BOX PAD.
4. MAINTAIN CLEARANCES PER DWG. 27.06-05.
5. SOD MAY BE REQUIRED AROUND BOX PAD TO PREVENT SOIL EROSION.

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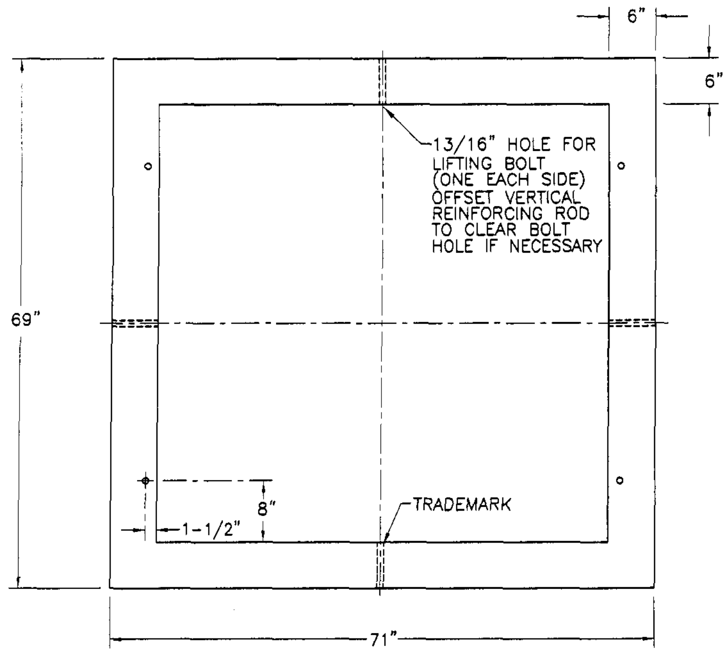
0	11/29/06	DANNA	CUINN	HOYT
REVISED		BY	CK'D	APPR.

SINGLE-PHASE TRANSFORMER
BOX PAD

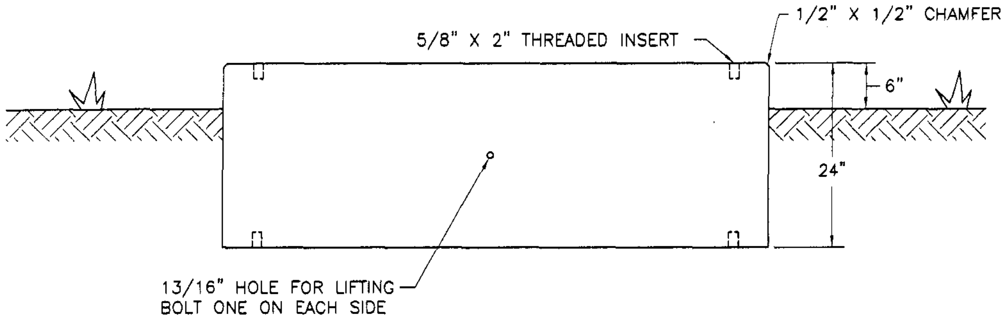
Progress Energy

FLA DWG. 33.03-01



PLAN VIEW

CN 152199



SIDE VIEW

NOTES:

1. THE GROUND SHALL BE LEVELED AND THOROUGHLY COMPACTED BEFORE PAD IS INSTALLED.
2. USE GENEROUS AMOUNT OF FIRE ANT KILLER UNDER ENTIRE BOX.
3. MAINTAIN 10' CLEARANCE FROM FRONT AND REAR DOORS AND 3' FROM SIDES.
4. CUT OFF ALL CONDUITS 6" ABOVE BOTTOM OF BOX AND CAP.
5. DO NOT FILL INTERIOR OF BOX WITH SOIL.
6. SOD MAY BE REQUIRED AROUND PAD TO PREVENT SOIL EROSION.
7. TO DEFER SWITCH INSTALLATION, USE LID (CN 327381).
8. OLD 70" X 62" PADS MAY BE USED.
9. APPROXIMATE WEIGHT IS 3150 LBS.

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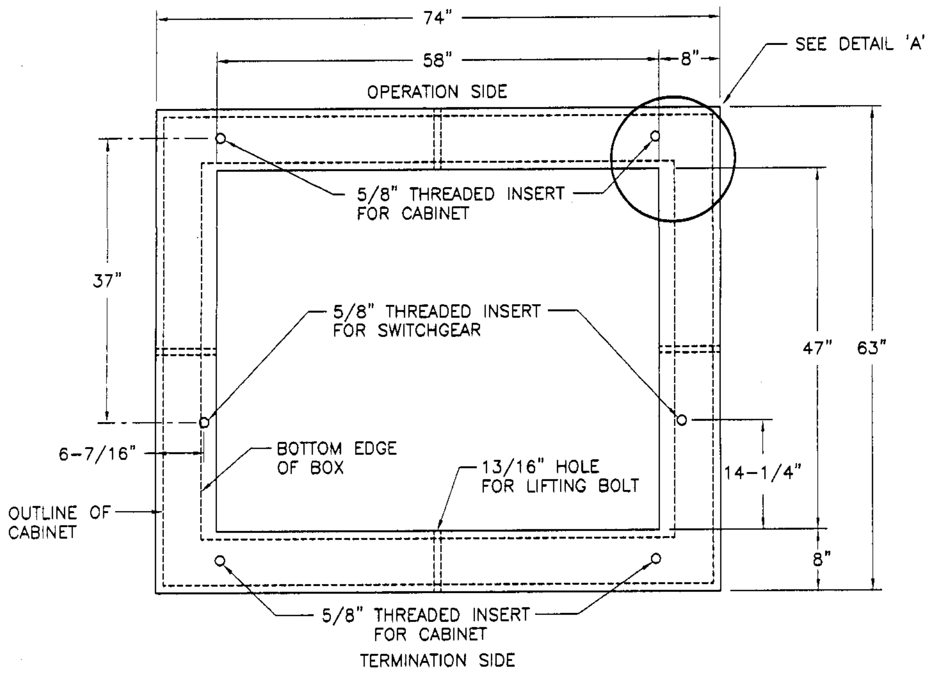
0 11/29/06	DANNA	GUINN	HOYT
REVISED	BY	CK'D	APPR.

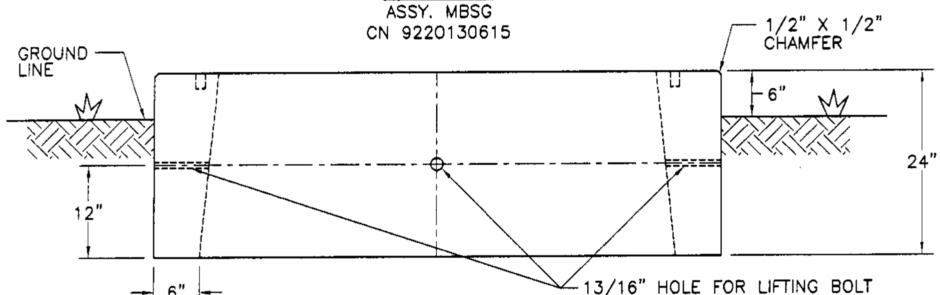
MOUNTING BOX PMH 9, 10 & 11,
AUTO TRANSFER & TRAYER 9, 10 & 11

Progress Energy

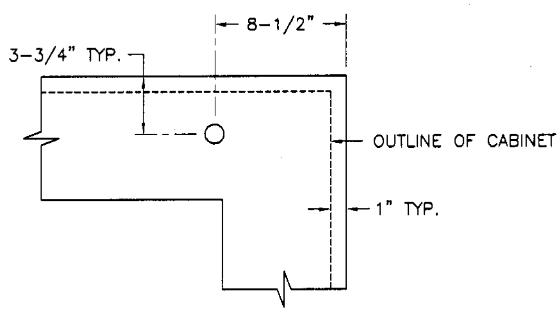
FLA DWG. 33.03-02



PLAN VIEW
ASSY. MBSG
CN 9220130615



SIDE VIEW



DETAIL 'A'

NOTES:

1. THE GROUND SHALL BE LEVELED AND THOROUGHLY COMPACTED BEFORE BOX IS INSTALLED.
2. USE GENEROUS AMOUNT OF FIRE ANT KILLER (CN 922092158) UNDER ENTIRE BOX.
3. MAINTAIN 10' CLEARANCE FROM FRONT AND REAR DOORS AND 3' FROM SIDES.
4. CUT OFF ALL CONDUITS 6" ABOVE BOTTOM OF BOX AND CAP.
5. DO NOT FILL INTERIOR OF BOX WITH SOIL.
6. SOD MAY BE REQUIRED AROUND PAD TO PREVENT SOIL EROSION.
7. WEIGHT IS APPROXIMATELY 3500 LBS.

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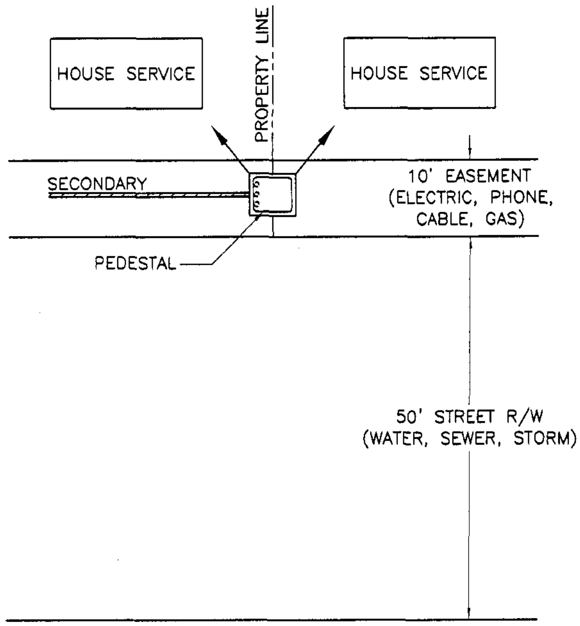
0	11/29/06	DANNA	GUINN	HOYT
REVISED		BY	CK'D	APPR.

MOUNTING BOX FOR 15 KV, 15.5 KA,
FOUR-WAY VISTA NEXT GENERATION

Progress Energy

FLA DWG. 33.03-03



PEDESTAL LOCATION

NOTES:

1. SOIL BENEATH PEDESTAL BASE SHALL BE COMPACTED TO THE FIRMNESS OF UNDISTURBED EARTH AND SHALL BE FREE OF ROOTS AND OTHER ORGANIC MATERIALS.
2. SECONDARY AND SERVICES SHALL ENTER AT THE CENTER OF THE BASE.
3. TRAIN CABLE TO FINAL ASSEMBLED POSITION.
4. PEDESTAL LOCKING MECHANISM SHALL BE INSTALLED A MINIMUM OF 2" ABOVE FINAL GRADE.
5. PEDESTAL BASE SHALL HAVE A MINIMUM OF 12" OF BACKFILL.
6. DO NOT FILL INSIDE OF PEDESTAL WITH BACKFILL.
7. FOR CABLE LOCATING PURPOSES, ATTACH A 3' PIECE OF #6 (SD) COPPER TO THE NEUTRAL CONNECTOR AND EXTEND OUTSIDE THE TEMPORARY SERVICE ACCESS DOOR. COIL EXCESS #6 THAT EXTENDS OUTSIDE OF TEMPORARY ACCESS DOOR BELOW GRADE.
8. REMOVE #6 WHEN THE FIRST SERVICE IS ESTABLISHED AT PEDESTAL.
9. TEMPORARY SERVICE ACCESS DOOR IS TO BE USED FOR TEMPORARY SERVICE CONSTRUCTION ONLY (EXCEPT #6 BC). REMOVE ALL TEMPORARY CONDUCTORS AND CLOSE ACCESS DOOR UPON CONNECTING PERMANENT SERVICE.
10. NO ABOVE GROUND OBSTRUCTION (EXCEPT TEMP BOARDS) SHALL BE PLACED WITHIN 3' OF PEDESTAL.
11. SEE DWG 25.02-03 FOR CONNECTOR APPLICATION.
12. SECURE PEDESTAL WITH PENTA-BOLT AND PADLOCK (CN 434337).
13. CONDUIT SHALL BE CUT OFF 6" BELOW FINAL GRADE PRIOR TO INSTALLING PEDESTAL.
14. CONDUIT SHALL BE CAPPED AFTER CUTTING TO LENGTH TO PREVENT FOREIGN MATTER FROM ENTERING DUCT. SEE DWG. 22.04-03.
15. INSTALL WARNING LABEL CENTERED 1" ABOVE LOCKING MECHANISM.
16. CONDUCTORS SHALL BE LABELED PER DWG. 23.04-03.

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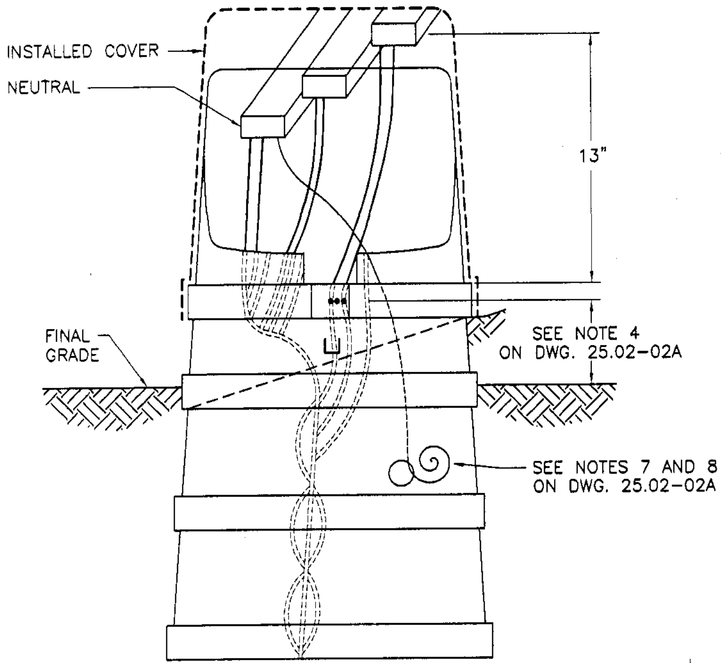
0	11/29/06	DANNA	GUINN	HOYT
REVISED		BY	CK'D	APPR.

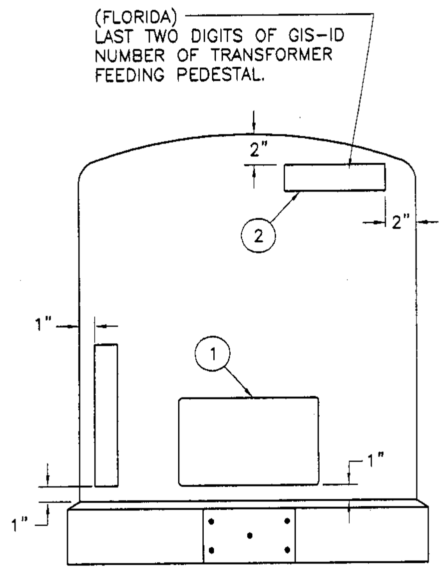
PEDESTAL INSTALLATION AND LOCATION

Progress Energy

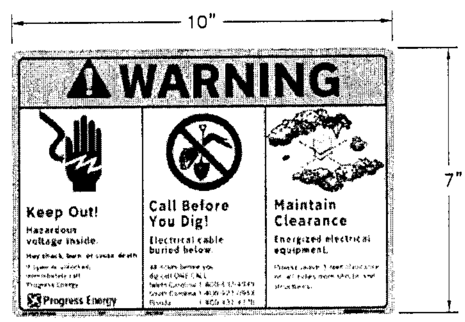
FLA DWG. 33.04-01



FRONT
(LONG DIMENSION)



COVER



WARNING LABEL
CN 9220118950

ABOVE GRADE SECONDARY PEDESTAL				
DESCRIPTION	FLORIDA		MAXIMUM CONDUCTORS	APPLICATION
	COMP. UNIT	CN		
6"x6"	PED6	325531	4 – 2 #6 AL	LIGHTING MAINTENANCE
10"x14"	PED4	325533	6 – 350 TPX OR 4 – 500 TPX	PREFERRED
12"x20"	PED0	325535	2 – 500 TPX & 4 – #4/0 TPX	
16"x28"	PED5	76331899	8 – 750 QPX	
20"x22"	PED2	325537	8 – 750 QPX	
① WARNING		9220118950		ALL PEDESTALS EXCEPT PED6
② GIS		44323_		ALL PEDESTALS

REVISED		BY	CK'D	APPR.
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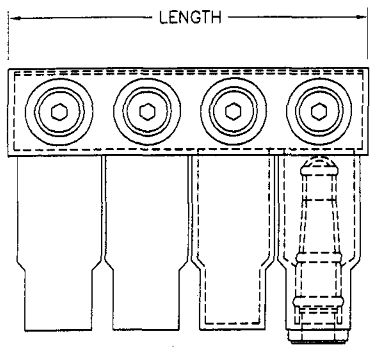
0	11/29/06	DANNA	GUINN	HOYT

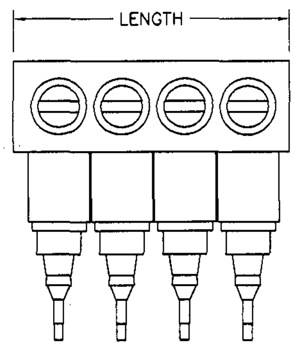
PEDESTAL INSTALLATION AND LOCATION

Progress Energy

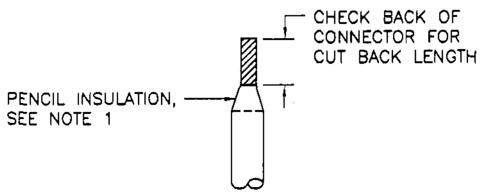
FLA DWG. 33.04-02



CMC ELASTIMOLD UTILCO



HOMAC



DETAIL 'A'

SUBMERSIBLE CONNECTORS				
COMPATIBLE UNIT	CATALOG NUMBER	RANGE	WAYS	MAXIMUM LENGTH
K034W	327844	#10CU – 350AL	3	4–13/16"
K044W	327845	#10CU – 350AL	4	6–3/16"
K060W	327850	#10CU – 350AL	6	9–5/16
K065W	327851	#10CU – 500AL	6	10–1/2"

NOTES:

1. INSTALL ONLY ONE CABLE PER POSITION.
2. CUT BACK CABLE INSULATION (STRIP GAUGE LOCATED ON BACK OF CONNECTOR). PENCIL, DO NOT RING INSULATION.
3. WIRE BRUSH CONDUCTORS. APPLY INHIBITOR (CN 403108) TO CONDUCTORS.
4. REMOVE CABLE ADAPTER.
5. REMOVE PLASTIC CAP.
6. CUT ADAPTER AT PROPER RING. ADAPTER IS NOT USED FOR LARGEST CABLE THAT WILL FIT IN CONNECTOR.
7. POSITION ADAPTER OVER INSULATED CABLE. (USE SILICONE LUBRICANT ON CABLE AND INSIDE OF ADAPTER.)
8. REMOVE SCREW PLUG CAP AND BACK–OFF SCREW WITH ALLEN WRENCH.
9. PUSH CABLE AND ADAPTER INTO CONNECTOR PORT UNTIL WIRE HITS BACKING PLATE INSIDE CONNECTOR.
10. TIGHTEN SET SCREW WITH 5/16" HEX WRENCH.
11. RE–INSERT SCREW PLUG CAP.
12. INSTALL IDENTIFYING TAG ON EACH SET OF CABLES.
13. ALUMINUM OR COPPER CAN BE USED IN CONNECTORS.
14. ALL SET SCREW PLUG CAPS MUST BE IN PLACE. IF A CAP IS MISSING, OBTAIN CAP FROM ANOTHER SUBMERSIBLE CONNECTOR BY THE SAME MANUFACTURER OR REPLACE THE ENTIRE CONNECTOR. VINYL PLASTIC SEAL AND ELECTRICAL TAPE MAY BE USED TEMPORARILY.
15. WHEN A CABLE IS REMOVED FROM CONNECTOR, A NEW CABLE ADAPTER SHOULD BE INSTALLED IN THE EMPTY POSITION. OBTAIN SAME SIZE ADAPTER FROM CONNECTOR OF THE SAME MANUFACTURER OR REPLACE ENTIRE CONNECTOR. VINYL PLASTIC SEAL AND ELECTRICAL TAPE MAY BE USED TEMPORARILY.

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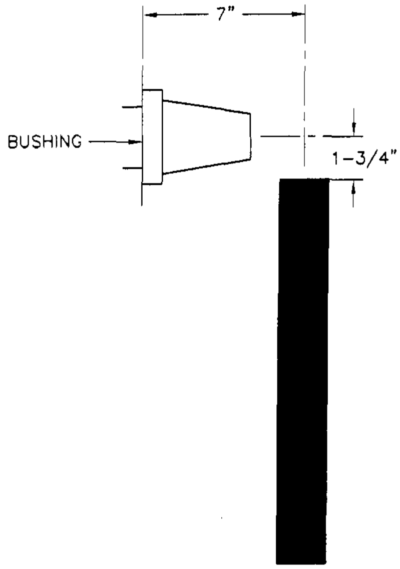
0	11/29/06	DANNA	GUINN	HOYT
REVISED		BY	CK'D	APPR.

SINGLE SET SCREW
SUBMERSIBLE CONNECTORS – 600 VOLTS

Progress Energy

FLA DWG. 33.04–03

STEP 1: TRAIN CABLE

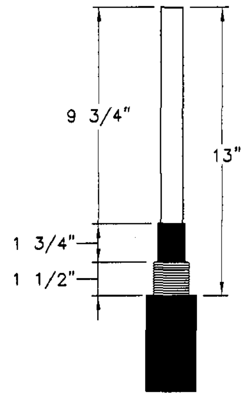


A. POSITION CABLE VERTICALLY SO THAT IT IS CENTERED BETWEEN APPARATUS BUSHING AND PARKING POCKET, PARALLEL TO AND 7" FROM APPARATUS FRONT PLATE.

B. PROVIDE ADEQUATE CABLE SLACK FOR CABLE MOVEMENT BETWEEN STANDOFF BUSHING AND APPARATUS BUSHING.

C. CUT CABLE 1-3/4" FROM CENTERLINE OF BUSHING.

STEP 2: PREPARE CABLE



A. PREPARE CABLE AS SHOWN IN THE VIEW ABOVE.

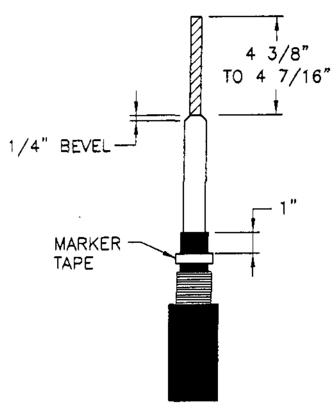
1. TO REMOVE LC SHIELD, TEMPORARILY PLACE A HOSE CLAMP OR THE CONSTANT FORCE SPRING AT THE CUTBACK POINT. USING NEEDLE NOSE PLIERS, PULL THE LC SHIELD DOWN ALONG THE EDGE. THIS WILL SEPARATE THE LC SHIELD. USING PLIERS, GRAB THE LC SHIELD NEAR CUT BACK POINT (TENSION SPRING) AND TEAR OFF SHIELD AROUND CABLE. THE SHIELD WILL RIP AWAY AT THE EDGE OF THE CLAMP.

IMPORTANT: DO NOT EXTEND SCORING BLADE THROUGH INSULATION SHIELD (SEMI-CON) INTO INSULATION.

NOTE: USE APPROVED PRE-SETTABLE DEPTH TOOLS TO REMOVE THE OUTER JACKET, INSULATION SHIELD (SEMI-CON) AND INSULATION.

LC SHIELD IS SHARP, WEAR WORK GLOVES

STEP 3: REMOVE INSULATION

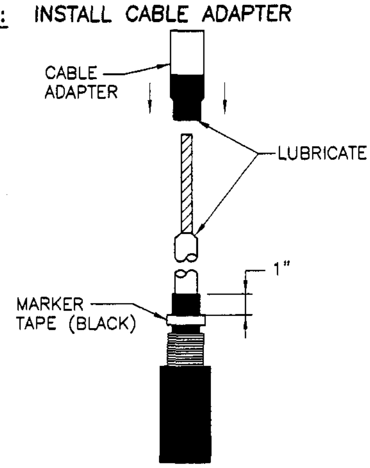


A. REMOVE INSULATOR 4 3/8" TO 4 7/16" FROM END OF CABLE.

B. PLACE MARKER TAPE 1" FROM END OF INSULATION SHIELD.

C. BEVEL INSULATION 45° FOR APPROXIMATELY 1/4"

STEP 4: INSTALL CABLE ADAPTER



A. WIPE EXPOSED INSULATION THOROUGHLY WITH CLEAN CLOTH MOISTENED WITH CABLE CLEANING FLUID. WIPE IN DIRECTION AWAY FROM SEMI-CONDUCTING SHIELD. DO NOT POUR CLEANING FLUID DIRECTLY ON CABLE. ALLOW CABLE TO DRY COMPLETELY BEFORE PROCEEDING.

IF NEEDED: REMOVE NICKS AND ALL TRACES OF BLACK, SEMI-CONDUCTING PARTICLES RESIDUE FROM EXPOSED INSULATION BY SANDING WITH NON-METALLIC SANDING CLOTH.

CABLE ADAPTER WITH SILICONE GREASE PROVIDED. SLIDE CABLE ADAPTER OVER CABLE UNTIL BACK END OF ADAPTER IS FLUSH WITH MARKING TAPE ON SEMI-CONDUCTING INSULATION SHIELD.

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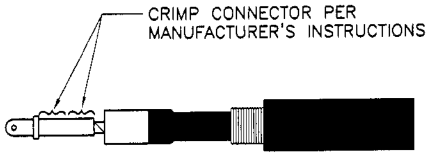
0	11/29/06	DANNA	GUINN	HOYT
REVISED		BY	CK'D	APPR.

600 AMP DEADBREAK ELBOW INSTALLATION INSTRUCTIONS
350, 750 & 1000 KCMIL 25KV (LC SHIELD)
500, 750 & 1000 KCMIL 15KV (LC SHIELD)

Progress Energy

FLA DWG. 33.05-01

STEP 5: INSTALL CONNECTOR

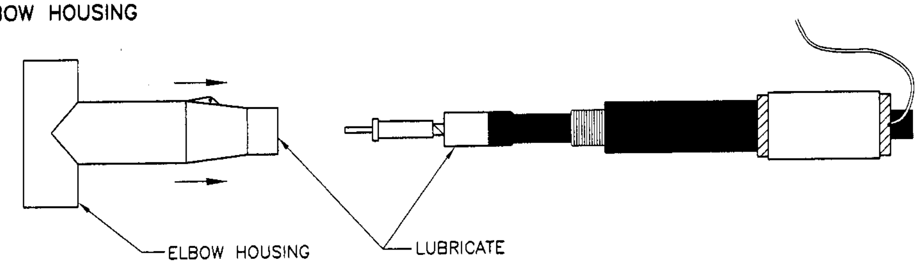


A. WIRE BRUSH BARE CONDUCTOR WITH LAY OF STRAND TOWARD END OF CABLE CLEANING ALL "STRAND SEAL" FROM THE OUTER SURFACE.

B. PLACE TERMINAL LUG ON CONDUCTOR. BEFORE MAKING FIRST CRIMP, ALIGN THE TERMINAL LUG SO THE HOLE IN THE LUG WILL ALIGN WITH THE THREADED STUD ON THE CONNECTOR PLUG OR APPARATUS BUSHING.

C. MAKE FIRST CRIMP AT SHOULDER ON TERMINAL LUG. BE SURE TO KEEP CABLE BOTTOMED IN THE TERMINAL LUG WHEN MAKING THE FIRST CRIMP. ROTATE SECOND CRIMP 90 DEGREES.

STEP 6: INSTALL ELBOW HOUSING

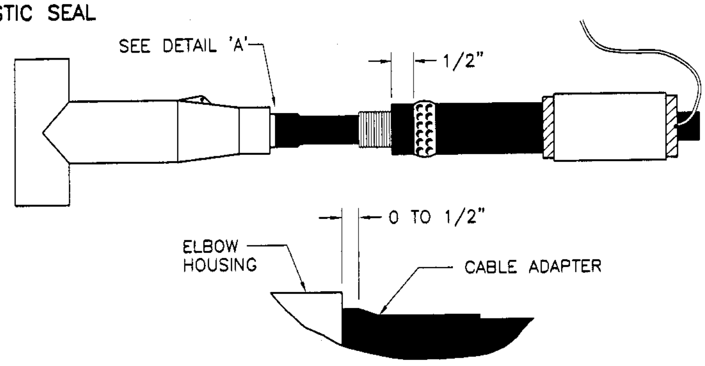


A. WIPE ALL EXCESS INHIBITOR FROM TERMINAL LUG AND ADAPTER SURFACE.

B. SLIDE COLD SHRINK SEALING TUBE (PGN CN 9220098623) OVER CABLE AND POSITION BACK OUT OF THE WAY.

C. REMOVE PROTECTIVE CAP FROM ELBOW HOUSING CABLE ENTRANCE. LUBRICATE CABLE ADAPTER AND INSIDE OF ELBOW HOUSING WITH SILICONE LUBRICANT PROVIDED. SLIDE THE CABLE INTO THE BODY OF ELBOW HOUSING UNTIL THE CABLE CANNOT ADVANCE FURTHER.

STEP 7: INSTALL MASTIC SEAL



DETAIL 'A'

A. VERIFY PROPER INSTALLATION OF ELBOW HOUSING IN ACCORDANCE WITH DETAIL 'A'.

B. SELECT ONE OF THREE-MASTIC STRIP FROM LC SHIELD GROUNDING KIT (PGN CN 9220098623). REMOVE LINER AND WRAP MASTIC AROUND CABLE JACKET 1/2 INCH FROM CUT EDGE. DISCARD ANY EXCESS.

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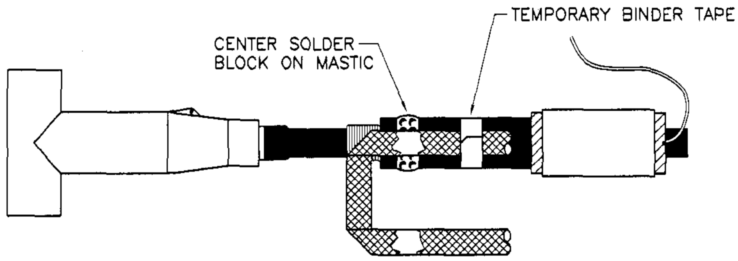
0	11/29/06	DANNA	GUINN	HOYT
REVISED		BY	CK'D	APPR.

600 AMP DEADBREAK ELBOW INSTALLATION INSTRUCTIONS
350, 750 & 1000 KCMIL 25KV (LC SHIELD)
500, 750 & 1000 KCMIL 15KV (LC SHIELD)

Progress Energy

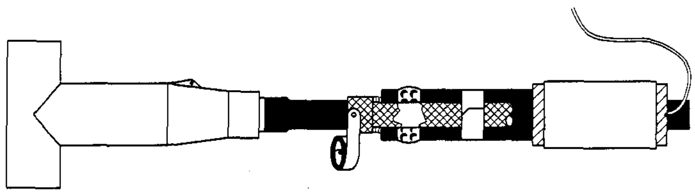
FLA DWG. 33.05-02

STEP 8: INSTALL GROUND BRAID/BLEEDER WIRE



A. POSITION TWIN PRE-FORMED GROUND BRAID WITH ONE TAIL ALONG CABLE JACKET AND SOLDER-BLOCK CENTERED ON MASTIC STRIP. A TEMPORARY BINDER OF VINYL TAPE WILL EASE STRAP INSTALLATION.

STEP 9: INSTALL CONSTANT FORCE SPRING



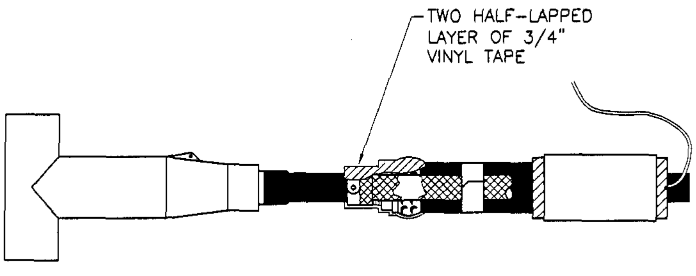
A. WRAP BRAID AROUND CABLE METALLIC SHIELD AND SECURE IN PLACE WITH CONSTANT FORCE SPRING. CLINCH (TIGHTEN) LAST LAP OF SPRING.

B. POSITION SECOND TAIL OF THE PRE-FORMED GROUND BRAID ALONG CABLE JACKET WITH SOLDER-BLOCK CENTERED ON MASTIC STRIP. (A SECOND TEMPORARY BINDER OF VINYL TAPE MAY EASE STRAP INSTALLATION).

C. APPLY A SECOND MASTIC STRIP LAYER OVER SOLDER BLOCKS OF GROUND BRAID.

NOTE: IF TAIL OF GROUND STRAP OVERLAPS AT MASTIC, BE SURE TO APPLY STRIP OF MASTIC BETWEEN SOLDER BLOCK OF GROUND STRAPS.

STEP 10: INSTALL VINYL 3/4" TAPE



A. STARTING ON THE CABLE LC SHIELD (AHEAD OF THE CONSTANT FORCE SPRING) WRAP TWO HALF-LAPPED LAYERS OF 3/4 INCH VINYL TAPE EXTENDING 1/4 INCH BEYOND MASTIC ONTO CABLE JACKET. RETURN TO STARTING POINT TO COMPLETE SECOND LAYER.

NOTE: APPLY 3/4" TAPE IN THE SAME DIRECTION OF CONSTANT FORCE SPRING. THIS WILL CINCH CONSTANT FORCE SPRING DOWN.

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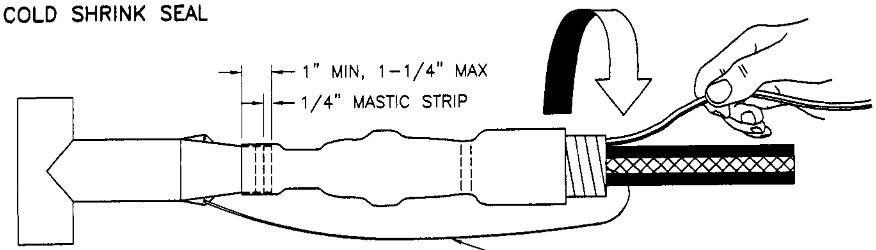
0	11/29/06	DANNA	GUINN	HOYT
REVISED		BY	CK'D	APPR.

600 AMP DEADBREAK ELBOW INSTALLATION INSTRUCTIONS
350, 750 & 1000 KCMIL 25KV (LC SHIELD)
500, 750 & 1000 KCMIL 15KV (LC SHIELD)

Progress Energy

FLA DWG. 33.05-03

STEP 11: INSTALL COLD SHRINK SEAL



A. APPLY A THIRD MASTIC STRIP TO SEAL AREA 1/4" ABOVE BOTTOM OF ELBOW HOUSING COVER WITH ONE LAYER OF VINYL TAPE.

B. POSITION COLD-SHRINK INSULATOR TO ALIGN WITH STEP IN THE T-BODY AS SHOWN (OVERLAP AT LEAST 1" MIN. TO 1-1/4" MAX).

C. REMOVE INSULATOR CORE BY PULLING WHILE UNWINDING (COUNTER-CLOCKWISE).

D. TRAIN LEAKAGE/DRAIN WIRE TO T-BODY. BE SURE NO PULLING STRESS IS AT COLD SHRINK LOCATION

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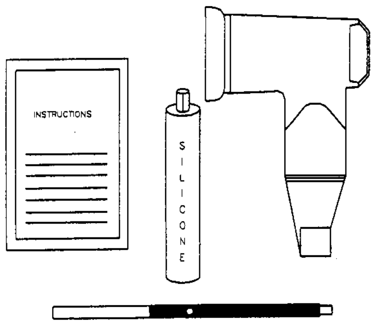
REVISED		BY	CK'D	APPR.

600 AMP DEADBREAK ELBOW INSTALLATION INSTRUCTIONS
350, 750 & 1000 KCMIL 25KV (LC SHIELD)
500, 750 & 1000 KCMIL 15KV (LC SHIELD)

Progress Energy

FLA DWG. 33.05-04

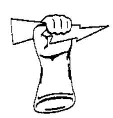
COMPATIBLE UNIT: TE (WIRE SIZE)



COMPATIBLE UNIT	APPLICATION	QTY.	CN	DESCRIPTION
TE0	1 PHASE	1	326422	ELBOW KIT 4/0
TE1	1 PHASE	1	326410	ELBOW KIT 1/0
TE2	1 PHASE	1	326410	ELBOW KIT #2 AL
#2 STR	–	1	326238	COPPERTOP CONNECTORS
1/0 SOL	–	1	326241	COPPERTOP CONNECTORS
1/0 STR	–	1	326240	COPPERTOP CONNECTORS
4/0 STR	–	1	326237	COPPERTOP CONNECTORS

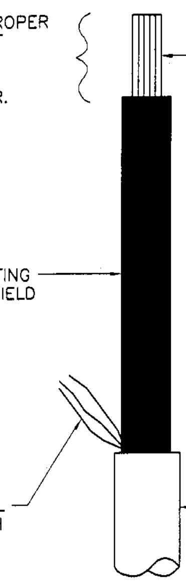
*EACH KIT CONTAINS INSTRUCTIONS, ELBOW, MALE CONTACT PROBE, AND SILICONE LUBRICANT.

NOTE: ELBOW (CN 326410) IS TO BE USED FOR 1/0 SOLID, 1/0 STR & #2 STR



THIS PROCEDURE IS FOR DE-ENERGIZED CONDITIONS. USE PROPER SAFETY PROCEDURES AS OUTLINED IN IN THE ACCIDENT PREVENTION MANUAL.

BEFORE WORKING ON CABLE, GROUND IT.



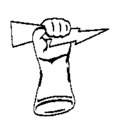
INSTALLATION GUIDELINES

TRAIN CABLE TO FINAL ASSEMBLED POSITION ALLOWING SLACK FOR LOADBREAK OPERATION.

CUT CABLE 18" PAST CENTERLINE OF BUSHING. THIS WILL LEAVE ENOUGH NEUTRAL CONDUCTOR FOR EASY MAKEUP.

REMOVE JACKET AND UNWRAP NEUTRAL WIRES TO A POINT 9" BELOW CENTERLINE OF BUSHING. (FOR UNJACKETED CABLE, SECURE THE NEUTRAL TO THE PRIMARY CABLE WITH AN EXTRA PIECE OF NEUTRAL WIRE. TWIST THE NEUTRAL WIRES TOGETHER INTO A SINGLE CONDUCTOR. DO NOT BIND THE PRIMARY CABLE WHEN TWISTING THE NEUTRALS.

CUT THE CABLE SQUARE AND EVEN AT THE CENTERLINE OF THE BUSHING. REMOVE THE INSULATION SO THAT THE CONNECTOR CAN BE INSTALLED. STRIP LENGTHS CAN VARY BY ELBOW. USE THE DIMENSIONS ON THE INSTRUCTION SHEET THAT CAME WITH THE ELBOW.



PROPER TOOLS MUST BE USED IN CABLE PREPARATION. AVOID THE USE OF KNIVES IN CABLE PREPARATION.

STRIP LENGTH VARIES BY MANUFACT– URER. CONSULT KIT INSTRUCTIONS FOR PROPER LENGTH.

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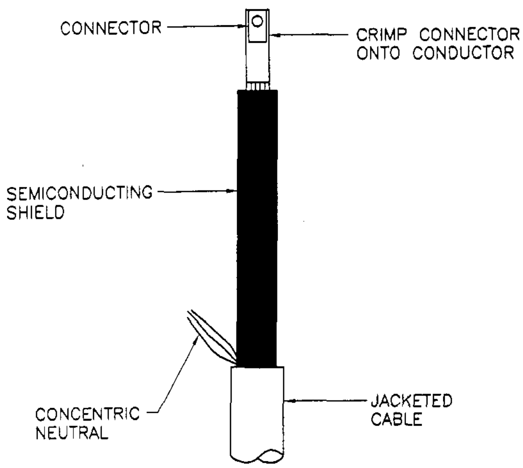
0	11/29/06	DANNA	GUINN	HOYT
REVISED		BY	CK'D	APPR.

200 AMP LOADBREAK ELBOW

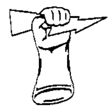
Progress Energy

FLA DWG. 33.05–05

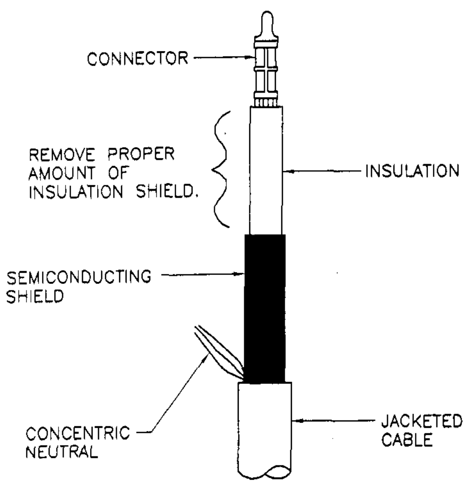
WIRE BRUSH THE CONDUCTOR, AND INSTALL THE CONNECTOR SO THAT THE THREADED HOLE LINES UP WITH THE HOLE IN THE BUSHING. CRIMP THE CONNECTOR. MAKE SURE THE CONNECTOR DOES NOT "BANANA", AND THERE ARE NO SHARP EDGES. FOR 1/0 SOL. WIRE, USE ONLY 5/8" NOSE DIE, CN 415101. **DO NOT** USE BURNDY OH25, CN 415109.



CRIMP THE CONNECTOR PER THE MANUFACTURER'S INSTRUCTIONS. CONSULT CRIMPING TABLE IN KIT INSTRUCTIONS.



PROPER TOOLS MUST BE USED IN CABLE PREPARATION. AVOID THE USE OF KNIVES IN CABLE PREPARATION.



CAREFULLY REMOVE THE PROPER AMOUNT OF INSULATION SHIELD USING A SEMICON STRIPPER. STRIP LENGTHS CAN VARY BY ELBOW. USE THE INSTRUCTION SHEET THAT CAME WITH THE ELBOW. DO NOT NICK OR SCORE INSULATION.

INSULATION LENGTH VARIES BY MANUFACTURER. CONSULT KIT INSTRUCTIONS FOR PROPER LENGTH.

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200 AMP LOADBREAK ELBOW

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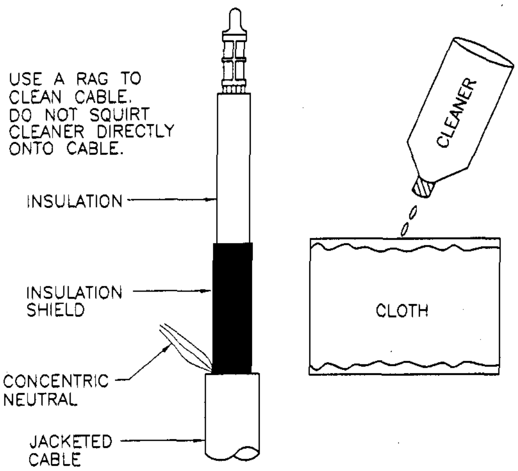
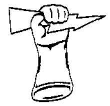
FLA | DWG. 33.05–06





CONSULT THE MSDS BOOK FOR THE PERSONAL PROTECTIVE EQUIPMENT NECESSARY TO USE THE CLEANING SOLVENT.

CLEAN THE CABLE BY WIPING WITH A CLEAN RAG THAT HAS CLEANING SOLVENT ON IT. DO NOT POUR CLEANING SOLVENT DIRECTLY ONTO THE CABLE. IMPORTANT – DO NOT ALLOW CLEANING SOLVENT TO CONTACT THE WHITE END OF THE CONTACT PROBE. IT CAN CAUSE THE MATERIAL TO SWELL AND JAM THE ELBOW IN THE BUSHING.

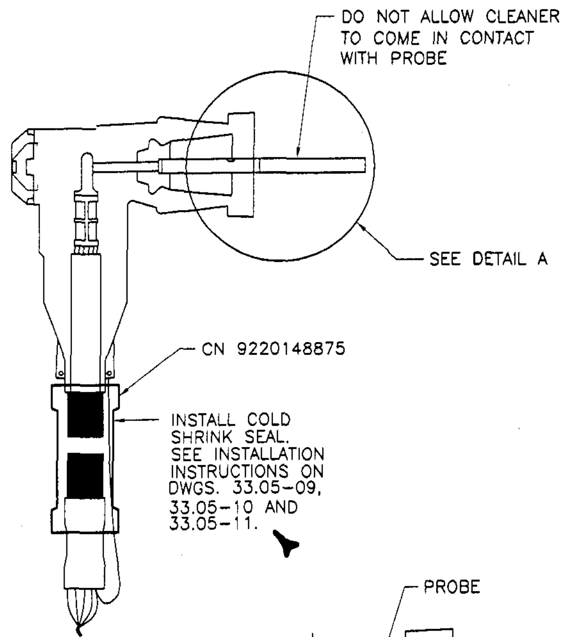
APPLY SILICONE LUBRICANT TO THE CLEAN INSULATION. KEEP THE ELBOW AND CABLE CLEAN. USING A DOWNWARD TWISTING MOTION, SLIDE THE ELBOW ONTO THE CABLE.

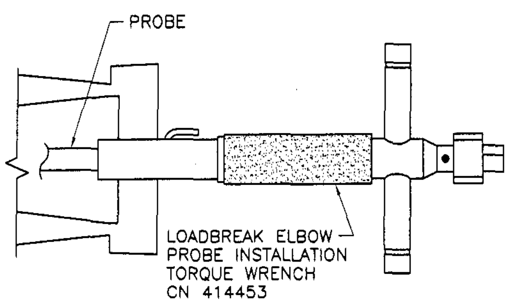
ALIGN THE HOLE IN THE CONNECTOR WITH THE HOLE IN THE ELBOW. INSERT THE CONTACT PROBE INTO THE THREADED HOLE AND TURN BY HAND SEVERAL TURNS. CHECK THAT THE PROBE HAS NOT CROSS-THREADED. TIGHTEN THE PROBE TO PROPER TORQUE USING THE PROBE INSTALLATION TORQUE WRENCH (CN 414453).

NOTE: MANY ELBOW FAILURES HAVE BEEN TRACED TO IMPROPER INSTALLATION OF THE PROBE. PROPER TORQUE IS CRITICAL TO ELBOW LIFE.

DO NOT USE SILICONE TO LUBRICATE THREADS ON CONNECTOR.

USING AN EXTRA PIECE OF NEUTRAL WIRE, ATTACH ONE END TO THE GROUNDING EYE ON THE ELBOW, AND TWIST THE OTHER END WITH THE OTHER NEUTRAL CONDUCTORS. CRIMP OR BOLT THE TWISTED NEUTRAL TO GROUND.





DETAIL A

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REVISED		BY	CK'D	APPR.

200 AMP LOADBREAK ELBOW

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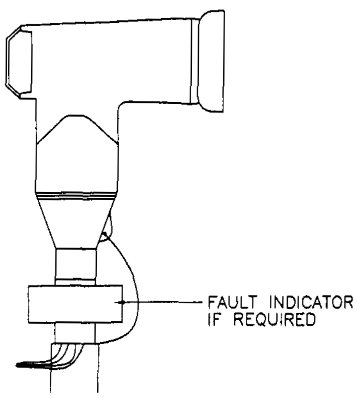
COMPATIBLE UNIT: TE (WIRE SIZE)

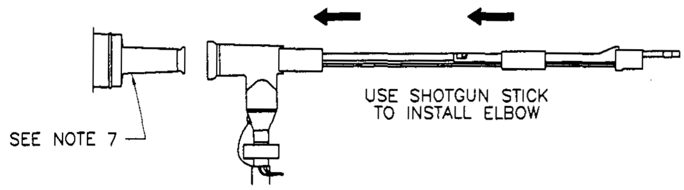
APPLICATION GUIDE

FAULT INDICATOR

PROPER PERSONAL PROTECTIVE EQUIPMENT MUST BE USED WHEN INSTALLING FAULT INDICATOR ON ENERGIZED CABLES.



INSTALL FAULT INDICATOR AS REQUIRED. INDICATOR MUST BE BELOW ELBOW AND ABOVE NEUTRAL BREAKOUT.



LOADMAKE

NOTES:

1. AREA MUST BE CLEAR OF OBSTRUCTIONS THAT WOULD INTERFERE WITH OPERATIONS OF THE ELBOW CONNECTOR.

2. GRASP ELBOW FIRMLY WITH SHOTGUN STICK. POSITION TIP OF PROBE INTO END OF LOADBREAK BUSHING.

3. SLOWLY INSERT ELBOW ONTO BUSHING UNTIL A SLIGHT BUMP IS FELT.

4. MAINTAINING A FIRM GRASP ON THE SHOTGUN STICK, THRUST THE ELBOW THE REST OF THE WAY ONTO THE BUSHING.

5. PUSH AGAIN ON THE ELBOW USING THE SHOTGUN STICK, AND THEN PULL GENTLY TO MAKE SURE THAT IT IS SECURE.

6. APPLY AN EVEN THIN LAYER OF HIGH VISCOSITY SILICONE GREASE TO INSERT BUSHING BEFORE INSTALLING ELBOW. DO NOT USE THIN SILICONE GREASES ON ELBOWS AND BUSHINGS. HIGH VISCOSITY GREASE PROMOTES FUTURE EASE OF REMOVAL.

7. EXTENDED BUSHING INSERT IS TO BE USED ONLY WHERE EXTRA LENGTH IS NEEDED TO CLEAR SECONDARY CONDUCTORS THAT INTERFERE WITH THE PROPER OPERATION OF THE ELBOW.

THE SHOTGUN STICK REQUIRED TO ASSURE PROPER SEATING OF THE ELBOW ONTO THE BUSHING. PUSHING ON BY HAND CANNOT ASSURE ALL GASSES ARE EXPELLED AND ELBOW IS FULLY SEATED. SEE SECTION 6.01 OF THE ACCIDENT PREVENTION MANUAL.

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200 AMP LOADBREAK ELBOW

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3M
COLD SHRINK
CABLE ACCESSORY SEALING KITS

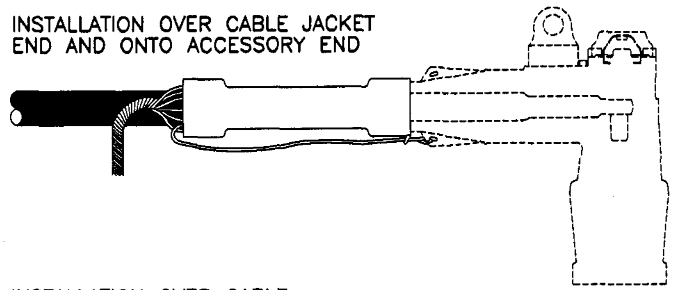
INSTRUCTION SHEET

ANSI C119.1

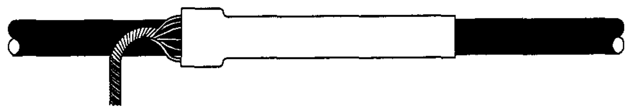
KIT CONTENTS:

1 COLD SHRINK™ SEALING TUBE
3 MASTIC SEALING STRIPS FOR 8452
3 MASTIC SEALING STRIPS FOR 8452L
4 MASTIC SEALING STRIPS FOR 8453
6 MASTIC SEALING STRIPS FOR 8454
1 INSTRUCTION SHEET

INSTALLATION OVER CABLE JACKET END AND ONTO ACCESSORY END

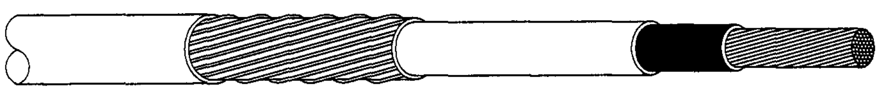


INSTALLATION OVER CABLE JACKET END ONLY



KIT SELECTION CHART

KIT NUMBER	MINIMUM SEAL DIAMETER	MAXIMUM INSTALLED DIAMETER	CABLE SIZE/KV CLASS		
			15KV	25KV	35KV
8452	0.95 IN. (24 mm)	1.94 IN. (49 mm)	2-4/0	2-2/0	1/0



JACKETED CONCENTRIC NEUTRAL (JCN)

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200 AMP LOADBREAK ELBOW – COLD SHRINK

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CABLE PREPARATION

STEP 1:

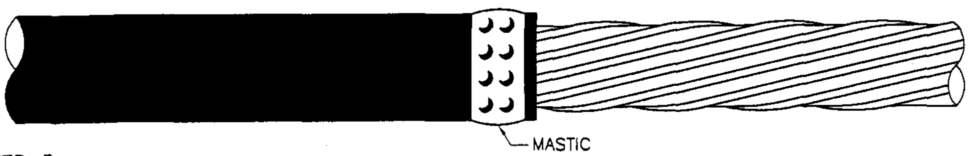
REMOVE CABLE JACKET.

NOTES:

1. WHEN SCALING ACCESSORY END AND CABLE JACKET END, THE DISTANCE THE JACKET IS REMOVED SHOULD BE IN AGREEMENT WITH "ELBOW" MANUFACTURER'S (OR OTHER ACCESSORY) INSTRUCTIONS. THE EXPOSED CABLE SEMI-CON BETWEEN THE CABLE JACKET END AND THE ACCESSORY END SHOULD BE NO MORE THAT 2 INCHES.
2. WHEN SEALING CABLE JACKET END ONLY, REMOVE JACKET FROM CABLE END FOR A DISTANCE TO ALLOW INSTALLATION OF ACCESSORY PLUS ADDITIONAL DISTANCE AS DESIRED.

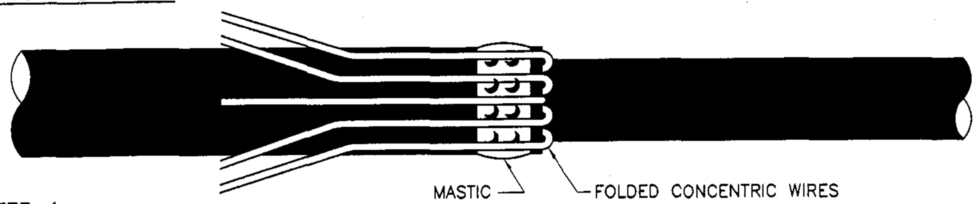
STEP 2:

ON THE CABLE JACKET, 1/2 INCH FORM THE JACKET END, WRAP 1 LAYER OF MASTIC AROUND THE CABLE. **DO NOT STRETCH MASTIC WHEN APPLYING**.



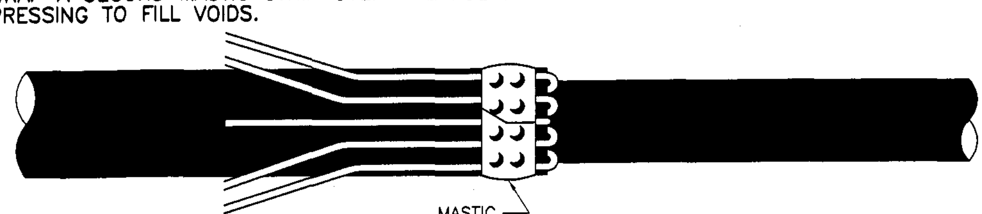
STEP 3:

BEND THE CONCENTRIC WIRES BACK OVER THE CABLE JACKET END AND INDIVIDUALLY PRESS THEM ONTO THE MASTIC. **CONCENTRIC WIRES SHOULD NOT TOUCH EACH OTHER WHEN PRESSED ONTO THE MASTIC**.



STEP 4:

WRAP A SECOND MASTIC STRIP OVER THE FOLDED WIRES AND PREVIOUSLY APPLIED MASTIC, PRESSING TO FILL VOIDS.



STEP 5:

TIGHTLY OVERWRAP THE MASTIC AND CONCENTRIC WIRES WITH 3/4 INCH WIDE VINYL TAPE FOR A DISTANCE OF APPROXIMATELY 1-1/2 INCHES.

STEP 6:

PREPARE THE CABLE AND INSTALL THE CONNECTOR PER MANUFACTURER'S INSTRUCTIONS PROVIDED WITH THE CABLE ACCESSORY.

STEP 7:

PROCEED TO INSTALLATION PROCEDURE B OR C DEPENDING ON WHAT TYPE OF INSTALLATION IS CHOSEN.

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200 AMP LOADBREAK ELBOW – COLD SHRINK

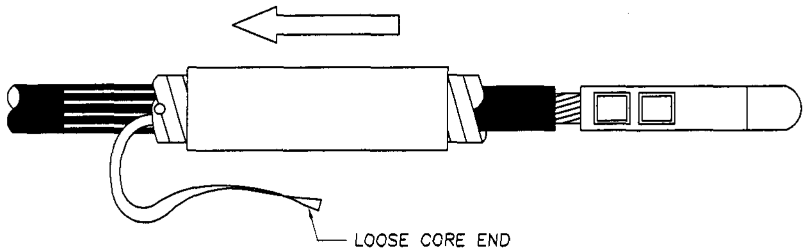
Progress Energy

FLA DWG. 33.05-10

B: INSTALLATION PROCEDURES TO SEAL BOTH ACCESSORY END AND CABLE JACKET END

STEP 1:

SLIDE THE 3M™ COLD SHRINK™ CABLE ACCESSORY SEALING TUBE ONTO THE CABLE. THE TUBE END WITH THE LOOSE CORE END SHOULD GO ON FIRST, AWAY FROM THE CONNECTOR.

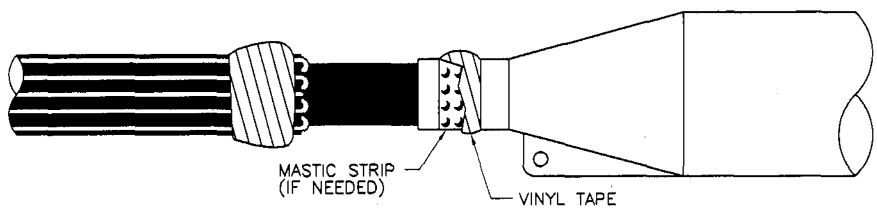


STEP 2:

INSTALL CABLE ACCESSORY PER MANUFACTURER'S INSTRUCTIONS.

STEP 3:

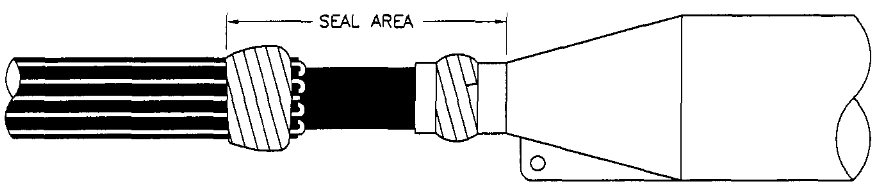
IF SURFACE IRREGULARITES EXIST IN THE SEAL AREA OF THE INSTALLED ACCESSORY, WRAP A MASTIC STRIP AROUND THE END OF THE INSTALLED ACCESSORY. OVER WRAP MASTIC WITH TWO LAPPED LAYERS OF VINYL TAPE.



STEP 4:

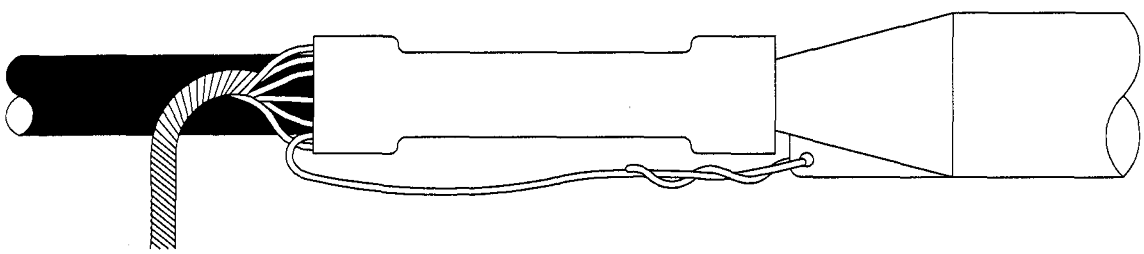
POSITION THE COLD SHRINK TUBE OVER THE SEAL AREA AND REMOVE THE CORE BY UNWINDING THE LOOSE CORE END COUNTER-CLOCKWISE.

AN OCCASIONAL TUG ON THE CORE END WILL AID IN ITS REMOVAL.



STEP 5:

CONNECT CONCENTRIC WIRE TO CABLE ACCESSORY PER ACCESSORY MANUFACTURER'S INSTRUCTIONS.



3					200 AMP LOADBREAK ELBOW – COLD SHRINK	Progress Energy
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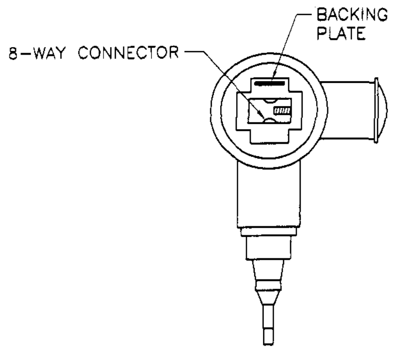
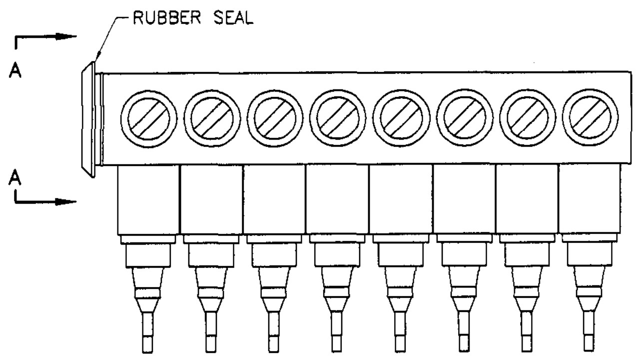
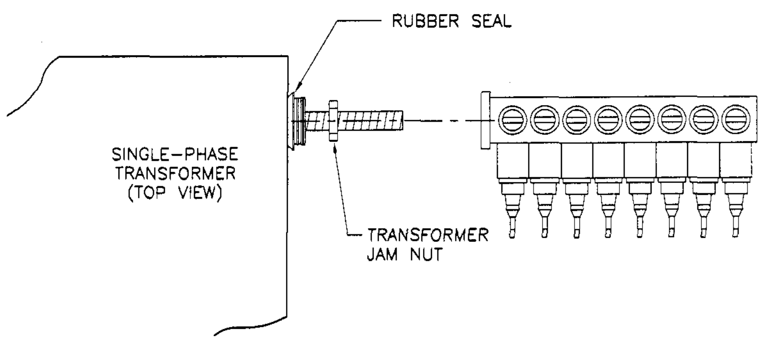
REVISED		BY	CK'D	APPR.		



SECTION 'A-A'



SUBMERSIBLE SECONDARY SET SCREW CONNECTOR



DETAIL

SUBMERSIBLE CONNECTORS				
CATALOG NUMBER	RANGE	WAY	AMPACITY	DESCRIPTION
6740	12 - 350	8	1000	5/8" HOLE, SINGLE SET SCREW
-	12 - 350	8	1600	1" HOLE, SINGLE SET SCREW

NOTES:

1. SEE DWG 33.06-02 FOR INSTALLATION NOTES.

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SUBMERSIBLE SECONDARY SET SCREW CONNECTORS
SINGLE-PHASE TRANSFORMERS

Progress Energy

FLA DWG. 33.06-01

NOTES:

1. INSTALL ONLY ONE CABLE PER POSITION.
2. CUT BACK CABLE INSULATION (STRIP GAUGE LOCATED ON BACK OF CONNECTOR). PENCIL, DO NOT RING INSULATION.
3. WIRE BRUSH CONDUCTORS. APPLY INHIBITOR (CN 403108) TO CONDUCTORS.
4. REMOVE CABLE ADAPTER.
5. REMOVE PLASTIC CAP.
6. CUT ADAPTER AT PROPER RING. ADAPTER IS NOT USED FOR LARGEST CABLE THAT WILL FIT IN CONNECTOR.
7. POSITION ADAPTER OVER INSULATED CABLE. (USE SILICONE LUBRICANT ON CABLE AND INSIDE OF ADAPTER.)
8. REMOVE SCREW PLUG CAP AND BACK-OFF SCREW WITH ALLEN WRENCH.
9. PUSH CABLE AND ADAPTER INTO CONNECTOR PORT UNTIL WIRE HITS BACKING PLATE INSIDE CONNECTOR.
10. TIGHTEN SET SCREW WITH 5/16" HEX WRENCH.
11. RE-INSERT SCREW PLUG CAP.
12. INSTALL IDENTIFYING TAG ON EACH SET OF CABLES.
13. ALUMINUM OR COPPER CAN BE USED IN CONNECTORS.
14. ALL SET SCREW PLUG CAPS MUST BE IN PLACE. IF A CAP IS MISSING, OBTAIN CAP FROM ANOTHER SUBMERSIBLE CONNECTOR BY THE SAME MANUFACTURER OR REPLACE THE ENTIRE CONNECTOR. VINYL PLASTIC SEAL AND ELECTRICAL TAPE MAY BE USED TEMPORARILY.
15. WHEN A CABLE IS REMOVED FROM CONNECTOR, A NEW CABLE ADAPTER SHOULD BE INSTALLED IN THE EMPTY POSITION. OBTAIN SAME SIZE ADAPTER FROM CONNECTOR OF THE SAME MANUFACTURER OR REPLACE ENTIRE CONNECTOR. VINYL PLASTIC SEAL AND ELECTRICAL TAPE MAY BE USED TEMPORARILY.

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SINGLE SET SCREW
SUBMERSIBLE CONNECTORS – NOTES
SINGLE-PHASE TRANSFORMERS

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STANDARD APPLICATION

FOR USE WITH FUSE COORDINATION SCHEME.

TRAYER MODEL 802

15KV OIL FILLED, FULLY SUBMERSIBLE, 600 AMP LOADBREAK, 200 AMP CURRENT LIMITING FUSE

2 - 600 AMP SWITCHES 2 200 AMP FUSES CN 266113

NOTE: TRAYER FOOTPRINT MATCHES S&C PMH GEAR FOR RETROFIT APPLICATIONS.

SPECIAL APPLICATION

FOR USE WHERE CUSTOM COORDINATION SCHEMES ARE REQUIRED.

S&C VISTA GEAR

NEXT GENERATION, FULLY SUBMERSIBLE, 600 AMP LOADBREAK, 200 AMP ARC SPINNER INTERRUPTER

2 - 600 AMP SWITCHES 2 - 200 AMP INTERRUPTERS CN 9220129406
3 - 600 AMP SWITCHES 1 - 200 AMP INTERRUPTER CN 9220129404

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SWITCHGEAR TYPE FOR
FLOODING AND STORM SURGE REQUIREMENTS

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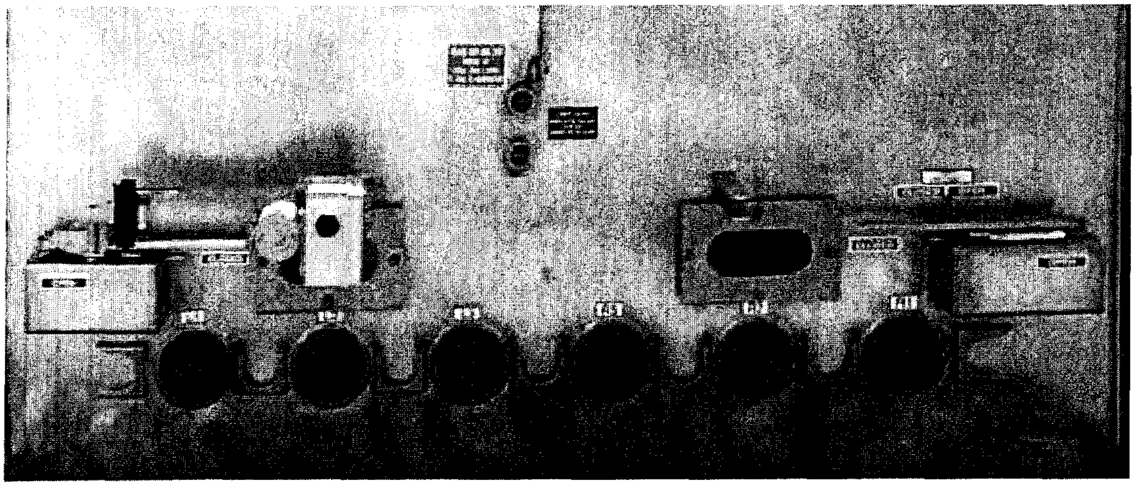
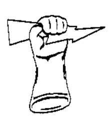


NOTES:

1. DEAD FRONT CONSTRUCTION 600A BOLTED ELBOW (T-BODY).
2. CAN BE ADAPTED TO MOTOR CONTROLLER.
3. FITS MOUNTING BOX (CN 152199).
4. VACUUM BOTTLE SWITCH IS IN SERIES WITH SOLID BLADE SWITCH.
5. THE SOLID BLADE SWITCH HAS TWO POSITIONS, OPEN AND CLOSED.
6. LOOK THROUGH WINDOW, ABOVE BØ FOR VISUAL POSITION OF SOLID BLADE SWITCH.
7. USE LARGE 3Ø FAULT INDICATOR (CN 323457).
8. DOOR WILL LIFT OFF FOR ADDED ROOM.
9. T-BODY IS NON LOADBREAK (NO VOLTAGE AND NO CURRENT).
10. CABLE CAN BE ENERGIZED WHEN SWITCH IS OPEN.



USE PROPER SAFETY PROCEDURES AS OUTLINED IN ACCIDENT PREVENTION MANUAL.
BEFORE WORKING ON SWITCHGEAR OR CABLE, GROUND IT.

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TRAYER PADMOUNTED SWITCHGEAR –
600A SWITCH SIDE

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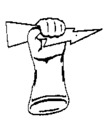
NOTES:

1. WILL ACCEPT LOADBREAK BUSHING INSERT (CN 326245).
2. USE 200A LOADBREAK ELBOW.
3. TAKES FULL RANGE CURRENT LIMITING FUSE:

FUSE SIZE	CATALOG NUMBER
80 AMP	CN 300552
150 AMP	CN 300554
200 AMP	CN 9220127433

4. 200 AMP FUSE MAY BE USED TO PROVIDE FAULT PROTECTION OF #4/0 CU PRIMARY. 200 AMP FUSE WILL NOT PROVIDE OVERLOAD PROTECTION OF LOADBREAK ELBOWS AND INSERTS. LOAD CURRENT SHOULD BE HELD TO 200 AMPS OR LESS.
5. KEEP H_2O OUT OF FUSE HOLDER WHILE REPLACING FUSE.
6. COVER CAP IS AVAILABLE TO KEEP H_2O OUT.
7. CAN BE STICK OPERATED.
8. ELBOW AND CABLE CAN BE ENERGIZED WHILE PARKED.



USE PROPER SAFETY PROCEDURES AS OUTLINED IN ACCIDENT PREVENTION MANUAL AND SAFETY MANUAL.
BEFORE WORKING ON SWITCHGEAR OR CABLE, GROUND IT.

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TRAYER PADMOUNTED SWITCHGEAR
CURRENT LIMITING FUSE SIDE

Progress Energy

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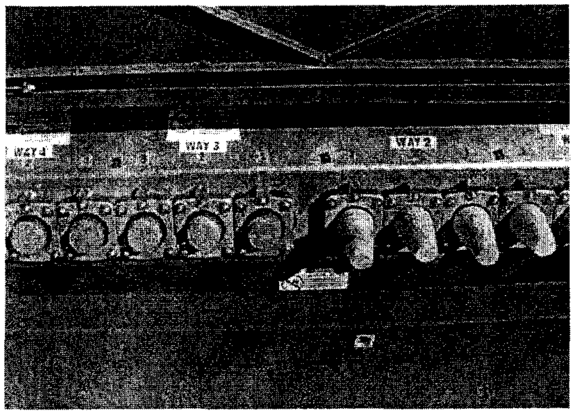
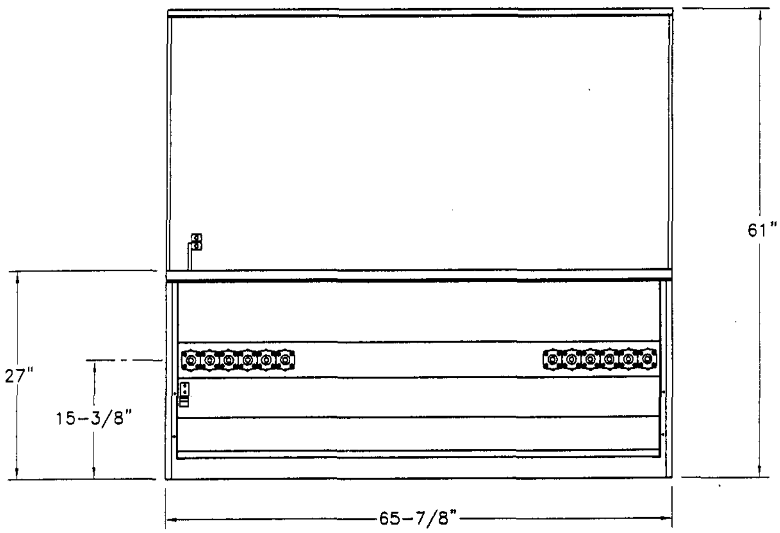


TERMINATION VIEW



TERMINATION VIEW
15.5KA (NEXT GEN)
200 AMP ARC SPINNER INTERRUPT
600 AMP LOADBREAK SWITCH

NOTES:

1. ON 600 SWITCHED WAY, USE 600A BOLTED ELBOW (T-BODY).
2. T-BODY IS NON-LOADBREAK: NO VOLTAGE AND NO CURRENT.
3. SWITCHGEAR CAN BE ADAPTED TO MOTOR CONTROLLER.
4. FITS MOUNTING BOX (CN 9220139615).
5. THE SOLID BLADE SWITCH HAS THREE POSITIONS: OPEN, CLOSED AND GROUND.
6. LOOK THROUGH WINDOW FOR VISUAL POSITIONS OF SWITCH LOCATED ON OPERATION SIDE OF SWITCHGEAR.
7. USE LARGE FAULT INDICATOR (CN 323457).
8. ON 200 AMP INTERRUPTER WAY, USE 200A BOLTED T-BODY.
9. TANK CONTAINS SF-6 GAS, CHECK GAUGE BEFORE OPERATION.

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S & C PADMOUNTED SWITCHGEAR

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FLA DWG. 33.07-04

Progress Energy

Distribution Engineering Manual

Document title

Distribution Engineering Manual: Overhead Design Guide

Document number

DST-EDGX-00027

Applies to: Energy Delivery Group – Florida

Keywords: distribution; distribution engineering manual

Table of Contents

Introduction

Overhead distribution design is an art as much as an engineering skill. The designer is required to balance the needs of the customer in a safe, reliable and economical manner. There are many safety requirements that must be met for both public safety and the safety of the linemen that maintain these lines. There are also many line hardware choices. It is the intent of this design guide that it be used in conjunction with the Progress Energy Distribution Construction Specifications to enable safe and economic designs.

The Distribution Construction Specifications Manuals contain a variety of detailed drawings on pole and line construction. Each of these drawings was designed to meet the detailed requirements of the NESC in an economical and reliable manner. These drawings are a toolbox of design choices available to the overhead designer. However, every situation encountered on our systems cannot be shown in detail. It is the goal of this design guide to help the designers understand the basis behind the drawings and enable them to make the best choice for each situation.

The Distribution Standards Unit staff is always available for consultation on any specific situation. A line can be custom designed if needed. This is sometimes necessary. Custom designs should only be used as a last resort. The standard "off the shelf" designs will always be more economical due to volume material purchases and more reliable due to spare part availability.

Primary Framing

<u>Voltages and Insulation Levels</u>

In Florida, the main distribution voltage throughout the service area is 12470GrdY/7200, commonly referred to as 12 kV. There are a few small exceptions to this. The Town of Sebring is 13200GrdY/7620 volts. The Town of Holopaw is 24940GrdY/14400 volts. The University of Florida at Gainesville has a 24940GrdY/14400 volt system.

Except for the few 25 kV areas, Florida wood pole lines are insulated for 12kV levels. There are some insulators and hardware where it was economical to use 25kV insulation due to volume purchases. These are shown on the applicable drawings. A concrete pole should be insulated with 35 kV insulation due to the grounding of the rebar inside the pole. Insulators on steel crossarms should also be insulated with 35 kV insulators.

For the Florida service area, coastal construction requires 35 kV insulation to mitigate salt water contamination. This is shown in Section 12 of the Distribution Construction Specifications.

<u>Construction Standards and Limitations</u>

In Florida, vertical phase-over-phase is the standard construction for three-phase circuits. For the 12 kV areas the vertical single circuit spacing is 36 inches. Double circuits and 25 kV feeders should be spaced at 42 inches. Due to hardware strength limitations, 795 AAC feeder spans are limited to no more than 250 feet. Horizontal construction using wood eight foot crossarms is an optional means of construction, mostly used in rural areas.

Distribution Feeder Definitions

There are different types of feeder circuits that can be designed. Below are the definitions of the types of feeders that are built at Progress Energy.

General Distribution Feeder: A standard feeder that serves a mixture of residential, commercial, and industrial load. The most economical route is usually used for this type of feeder. No attempts are made to limit the feeder loading below our load design limits.

Industrial Feeder: A feeder that serves predominately commercial and/or industrial load. The feeder is deliberately limited to this load mixture in order to maintain above average feeder reliability. If location dictates, a few residential customers could also happen to be on this feeder. Since cold load pickup is not a consideration, an Industrial Feeder can be loaded more heavily than a General Distribution Feeder.

Express Feeder: A feeder that is routed past existing customers (ie..expressed) to an area to serve a selected group of customers. The feeder is deliberately routed and limited to these customers in order to maintain above average feeder reliability. Progress Energy has the option of adding other customers to an express feeder and turning it into a general distribution feeder or an industrial feeder if we so desire.

Dedicated Feeder: A feeder that bypasses existing customers and is routed (ie...dedicated) to serve only one customer. If the feeder is reserved for one customer by contractual agreement, the customer must pay a monthly facilities charge and Progress Energy does not have the option of adding other customers to this feeder.

NESC (National Electrical Safety Code)

General

We are required by the Utilities Commission to construct lines according to the current edition of the National Electrical Safety Code. The latest edition is dated 2007. The code is now on a five-year revision cycle, with the next book due out in 2012. Prior to 2002 the NESC was on a three-year revision cycle. The dates are important because when the code is revised to incorporate new rules, existing lines are "grandfathered" as long as they are safe. To determine if a line has been constructed according to code, one must first determine the year it was constructed. For instance, 1977 and 1981 were years where significant updating was done to the NESC. So lines constructed before those years are legally only required to meet the pre-1977 codes.

It is essential to know that the NESC is a safety standard, not a design standard. Over the years it has commonly become the minimum design basis for utilities. The NESC is sometimes prescriptive (tells you exactly what to do), but for the most part the rules are performance-based (tells you the result to be achieved rather than the design parameters). They are also the minimum rules we must meet. It is extremely time-consuming to design the spacing, clearances and strengths of each structure from scratch. The Distribution Construction Specifications are developed to meet or exceed the NESC minimums. Utilizing the Distribution Construction Specification drawings will save the designers much effort, and also avoid spacing errors.

Description of NESC Sections

Below is a very brief listing of the contents of the more important sections of the NESC that are followed in our designs.

Sec 9 – Grounding Methods for Electric Supply and Communication Facilities
- Provides methods of grounding
- Substation fences required to be grounded to limit touch voltages
- Multi-grounded neutral systems required to have at least four grounds in each mile.

Part 1 - Rules for the Installation and Maintenance of Electric Supply Stations and Equipment

Sec 10 thru 18
- Substations fences of 7 feet or more in height
- Guarding of live parts by height

Part 2 – Safety Rules for the Installation and Maintenance of Overhead Electric Supply and Communication Lines

Sec 21 – General Requirements
- Line and equipment inspections, with records kept

Sec 22 – Relations between Various Classes of Lines and Equipment
- Supply conductors at a higher level than communication conductors
- Conductors of higher voltage above those of lower voltage
- Communication circuits in supply space installed and maintained only by authorized and qualified personnel

Sec 23 – Clearances
- Clearances measured from surface to surface
- Spacing measured from center to center
- Clearances of supporting structures from other objects (poles four feet minimum from a fire hydrant, poles six inches minimum behind curbs)
- Vertical clearances of conductors above ground, roadway, rail or water surfaces (measured under conditions which produce the greatest sag)
- Clearance between conductors carried on different supporting structures (use of conductor movement envelope)
- Clearance of conductors from buildings, bridges, swimming pools and other installations (use of horizontal clearance with wind displacement)
- Clearance for conductors carried on the same supporting structure
- Working space and climbing space
- Vertical clearance between communication and supply facilities on the same structure. The general rule is to maintain a 40-inch clearance zone on the pole between supply conductors and communication conductors.

Sec 24 – Grades of Construction
- Grade B (highest grade) required for railroad crossings and limited access highways

- Grade C (next highest grade) construction requirements (minimum grade used by Progress Energy)
- Grade N (lowest grade) construction requirements. This grade is not used by Progress Energy

Sec 25 – Loading for Grades B and C
- Heavy, medium and light loading districts defined. Florida is in the Light Loading district, which has a wind loading of 9 lbs/ft (about 60 mph). There is no ice loading.
- Extreme wind loading rules defined. Any pole more than 60 feet above ground is subject to the extreme wind loading rules.
- Vertical and transverse loads on line supports defined.
- Overload factors defined. Overload factors are different for each grade of construction and the type of item or hardware.

Sec 26 – Strength Requirements
- Application of strength factors. For certain hardware you can only use it to a portion of its rated strength. Strength factors are usually 1 or less.

Sec 27 – Line Insulation
- Specific strength requirements for various types of hardware are given. Insulators are limited to 50% of their rated ultimate strength in compression and tension and 40% in cantilever.
- Guy insulator use requirements are given.

Part 3 – Safety Rules for the Installation and Maintenance of Underground Electric Supply and Communication Lines

Sec 32 – Underground Conduit Systems
- Separation from other utilities
- Manhole dimensions and strength requirements

Sec 35 – Direct Buried Cable
- Identification symbols
- Burial depth
- Separation from other utilities

Sec 38 – Equipment
- Distance from fire hydrants (3 feet)
- ANSI safety signs

<u>Grade C Construction</u>

Grade C construction is the normal construction grade most commonly used on our system. It is used on lines that are located on private rights-of-way or public rights-of-way. For Grade C construction the overload factor for wind loading on a tangent wood pole structure is 2. Unless stated otherwise, the construction drawings in the Distribution Specifications Manuals will meet the requirements for Grade C.

In situations where a Grade C line crosses over another circuit, the NESC requires that slightly higher overload factors be used. This is referred to as a Grade C crossing structure. For wind loading on a tangent wood pole structure the overload factor is 2.67. Since these situations are rare, the Progress Energy specification drawings do not touch on this subject. The construction should be designed to the Grade B construction requirements below. This will meet the Grade C crossing requirements.

<u>Grade B Construction</u>

Grade B construction is encountered frequently on our system. Grade B construction is required for railroad crossings and limited access highway crossings. A limited access highway is defined in the NESC as follows:

Limited Access Highways: As used herein, limited access highways are fully controlled by a governmental authority for purposes of improving traffic flow and safety. Fully controlled highways have no grade crossings and have carefully designed access connections.

There is no intent in the NESC for ordinary highways and roadways to have Grade B construction.

Grade B construction is required to be more heavy duty than regular Grade C construction. The intent is to take additional steps and have additional safety factors that might prevent an energized conductor from being dropped across a limited access highway. The additional Grade B construction requirements are:

- Higher overload factors are required for poles, hardware, guys and anchors. This will usually necessitate both shorter spans and larger class poles. For wind loading on a tangent wood pole structure the overload factor is 4.

- Longitudinal strength requirements for the structures are in place to prevent conductors falling across the roadway. If the Grade C line behind the Grade B crossing breaks, the intent is that Grade B structure is capable of handling the unbalanced conductor pull. Back guying can be in place to provide this strength.

- Single pin construction is not allowed. Double pin construction is allowed, but it must be capable of holding the unbalanced conductor pulls. For this reason the Progress Energy Grade B specifications will show only dead ended or clamped construction.

Grounding

The Progress Energy distribution systems are multi-grounded wye systems. For a multi-grounded wye system the NESC requires that there be four grounds in each mile of overhead primary line. It also requires that each transformer location be grounded. The customer grounds are not counted toward the requirements. There is no specific NESC requirement for the resistance of each driven ground electrode on a multi-grounded system.

The standard Progress Energy ground rod is a 5/8 inch by eight foot copper-clad steel rod. The largest factor in getting a good ground connection is the electrical conductance of the soil. This is determined by the type of soil and the moisture content. Failure to reach moisture (the water table) will result in higher resistance levels. For the type of soils in the Progress Energy service areas, coupling ground rods together to form deep driven grounds is necessary if a low resistance ground is to be obtained. Installing a second ground rod six feet distance from the first rod is not nearly as effective as coupling the rods vertically together for a deep-driven ground rod.

On distribution lines that are under built below transmission lines, the same grounding system should be utilized whenever possible. In lines where there are two separate grounded neutrals, the two grounds should be bonded together to avoid any difference of potential.

In Florida, each equipment ground is tested and rods driven to achieve a desired value of ohms. Due to the lightning levels in Florida, this ensures each individual ground will perform well. See Specification Dwg 1.01-06.

Poles

Pole Sizing – Class

Determining the required strength and therefore the pole class can be a complicated matter. The height of the pole must be determined first (See Pole Sizing – Height section). The basic steps need the longitudinal, transverse and vertical loadings for each structure.

The class of an unguyed tangent pole is dependent upon the following factors:

- The breaking moment at the base of the pole caused by wind loading (see Fig. 4).

This includes the wind loading on the conductors, the pole and the equipment. The NESC states that the direction of wind loading in the critical direction must be considered. For instance, a wind blowing at an angle to a line has a lesser impact than a wind blowing exactly perpendicular to the line. You would need to include all conductors, such as primary, neutrals, secondary, joint use cables and TPX service cable taking off of the pole.

- The downward buckling moment created by attached equipment (see the bottom of Fig. 4).

Whether this force is in the same direction as the wind force depends on the side of the pole where the equipment is mounted. The critical direction of loading is the direction the wind is shown. If the transformer was mounted on the field side of the pole, then its weight would be in the same loading direction as the wind and contribute to the pole blowing over. If the transformer was mounted on the road side of the pole, then it's weight would offset some of the pull of the triplexed services.

- The side pulls of any services.

Again, only the force component that is in the critical direction of pole loading would contribute to the pole blowing over.

For overhead conductors and line equipment the wind forces can be divided into their load vector components. Multiply these components by the overload factors and shape factors (if applicable) to get the required design forces and then multiply these forces by the height they act on the pole above ground line to determine their bending moments. Sum these moments together with the wind moment on the pole (multiplied by its overload factor) to determine the total bending moment on the pole and then select the smallest class pole's maximum bending moment (see Fig 03) to resist this bending moment. Bending moment is measured in foot-pounds. The force in feet is multiplied by the lever arm, or the distance in feet, to arrive at the bending moment in ft-lbs. See Fig 2 for an example of how to calculate bending moment.

The class of a guyed pole is dependent upon different factors. The NESC requires a guyed structure to use the pole acting as a column or strut only, and all the horizontal forces must be resisted by the guy assembly. So only the downward buckling forces in the pole contribute to its class. The following factors contribute to the pole class determination:

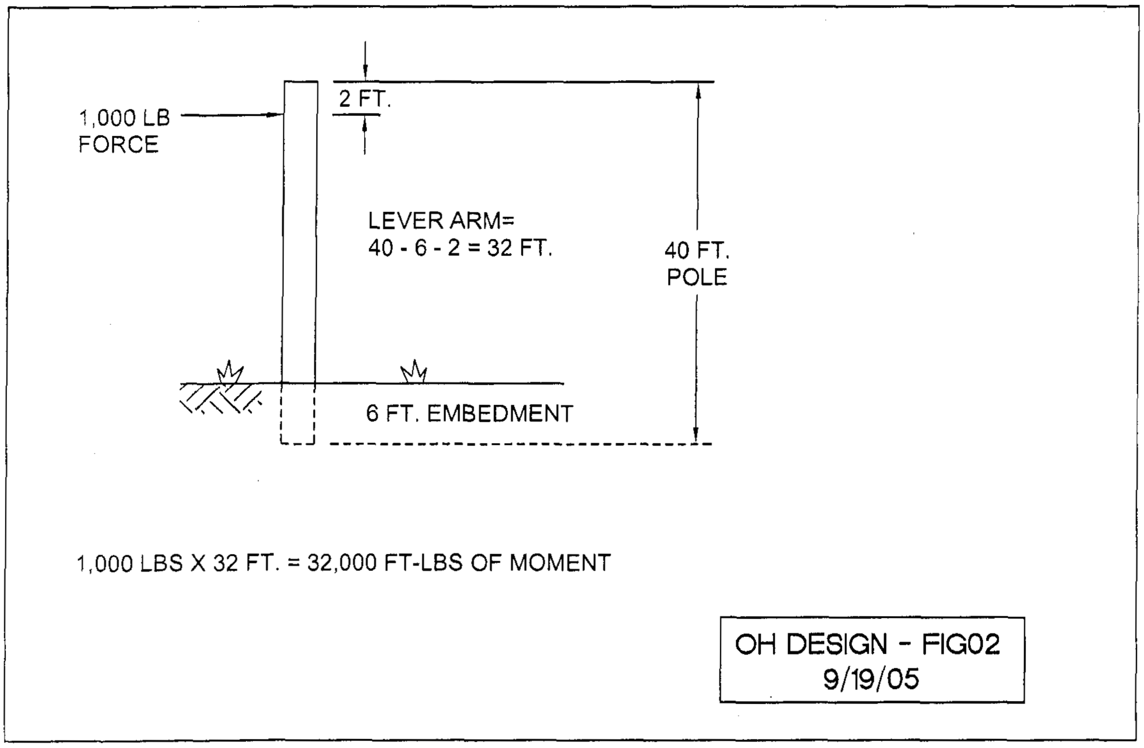
- The vertical downward axial loading in the pole caused by the guy lead. (See Fig 05). This is usually the major force. The horizontal force of wind and tension on the conductors is offset by the horizontal force component of the guy wire. So only the vertical component would contribute to the pole, which is acting as a strut, towards buckling.

- The weight of the equipment mounted on the pole is a factor. The actual weight in pounds is carried straight down the pole. In addition, the equipment is usually mounted to the side of the pole. This is known as eccentric loading and contributes a bending moment to the pole. This bending moment will cause the pole to carry less downward forces and buckle sooner.

- The vertical downward force in the pole caused by the weight of all conductors including the joint use facilities must be considered.

- Any downward force on the conductors caused by the adjacent span poles being lower than the structure being analyzed.

Once all of the downward forces and bending moments are known, the buckling stresses in the pole are determined by Mueller's Equations. Showing an example calculation is beyond the scope of this manual. The "Pole Foreman" program was used to determine the transformer bank loadings shown on Dwg 2.02-03. Other than the weight of large transformer banks and other heavy equipment, the pole class required for a normal deadend pole should be the same as that for a tangent pole of the same span lengths. When guy leads are of normal length, it is only on tall deadend poles where the buckling would be the controlling factor.



The resisting bending moment for each height and class of pole comes from ANSI 05.1. It is based on the maximum wood fiber stress that can be tolerated. This is a function of the applied forces and the geometry of the tapered wood pole. This standard is the basis for both dimensional data and strength data. See Figure 3 for the allowable bending moments on wood poles. The PGN dimensional wood pole data is shown on Dwg 02.02-08. From a stocking standpoint not every available pole size and class can be stocked. For each pole height a selected standard class is stocked. The stocked pole heights and classes are shown on Dwg 02.02-02 & 03.

Listed below are some various factors from the NESC used to calculate the bending moment forces on a pole.

Wind Loading:
Florida 9 lbs/sq ft force (60 mph)

Ice Loading:
Florida No ice

Overload Factors
Class C – Normal construction__________________________2
Class C – Crossing over other circuits___________________2.75
Class B – Railroad crossings & controlled access highways_4

Shape Factors for Wind Loading
Cylindrical components – poles, transformers 1.0
Flat surfaces – cap banks, reclosers 1.6

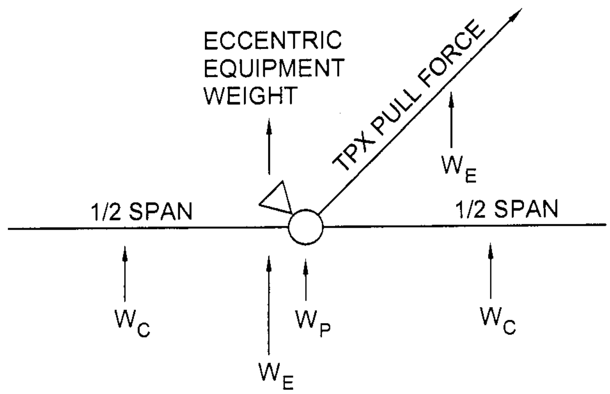
POLE BENDING MOMENTS - SOUTHERN YELLOW PINE						
POLE SIZE	CLASS	POLE DEPTH (FT)	CIR AT GROUND LINE (IN)	ANSI MAXIMUM MOMENT (FT-LBS)	WIND ON POLES	
					CAROLINAS	FLORIDA
30	4	5.0	29.85	56,173	739	1,787
30	6	5.0	25.33	34,234	656	1,475
35	3	5.5	34.19	84,410	1,234	2,777
35	4	5.5	31.68	67,151	1,134	2,551
35	5	5.5	29.17	54,421	1,033	2,326
40	2	5.5	38.70	122,413	1,867	4,201
40	3	5.5	36.19	100,106	1,730	3,893
40	4	5.5	33.68	80,688	1,593	3,584
40	5	5.5	31.18	64,021	1,456	3,276
45	1	6.0	43.00	167,919	2,608	5,870
45	2	6.0	40.50	140,300	2,434	5,477
45	3	6.0	37.50	111,375	2,245	5,053
45	4	6.0	35.00	90,552	2,071	4,660
45	5	6.0	32.50	72,501	1,896	4,267
50	1	6.5	44.80	189,901	3,305	7,439
50	2	6.5	41.81	154,360	3,072	6,913
50	3	6.5	38.82	123,555	2,838	6,386
50	4	6.5	36.32	101,189	2,620	5,897
55	1	7.0	46.10	206,917	4,078	9,177
55	2	7.0	43.12	167,329	3,793	8,537
55	3	7.0	40.14	136,592	3,509	7,897
55	4	7.0	37.65	112,717	3,245	7,302
60	1	7.5	47.42	225,205	4,942	11,123
60	2	7.5	44.44	185,360	4,602	10,357
60	3	7.5	41.47	150,625	4,262	9,593

POLE BENDING MOMENTS - PRESTRESSED CONCRETE POLES						
POLE SIZE	CLASS	POLE DEPTH (FT)	CIR AT GROUND LINE (IN)	ANSI MAXIMUM MOMENT (FT-LBS)	WIND ON POLES	
					CAROLINAS	FLORIDA
30	I	5.0	-	27,000	-	2,354
35	I	5.5	-	32,400	-	3,601
50	II	6.5	-	151,700	-	14,275
35	III	5.5	-	70,200	-	4,610
40	III	5.5	-	83,200	-	6,704
45	III	6.0	-	94,900	-	9,034
35	IV	5.5	-	121,500	-	5,416

OH DESIGN - FIG03
9/19/05

What are the factors involved in sizing the class of a wood tangent pole? Let's look at each contributing factor to understand where it comes from and its effect. (See Figure 04 for a diagram of these forces.)

TANGENT POLE STRENGTH CONSIDERATIONS



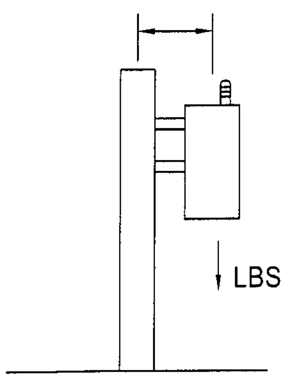
W_C = WIND FORCE ON CONDUCTORS = SPAN LENGTH X FORCE PER FOOT (W_F)

W_F = WIND FORCE / COND. FT = WIND FORCE (LB/FT) X $\dfrac{\text{CONDUCTOR DIAMETER (IN)}}{12}$

W_P = WIND FORCE ON POLE

W_E = WIND FORCE ON EQUIPMENT

W_S = SIDEPULL FORCE OF OVERHEAD SERVICES



DISTANCE FROM POLE FACE TO CENTER OF GRAVITY OF EQUIPMENT

ECCENTRIC EQUIPMENT WEIGHT (FT-LBS) = DISTANCE (FEET) X WEIGHT (LBS)

OH DESIGN - FIG04
9/19/05

Wind on conductors: The wind blowing on the conductors in the span is one of the largest contributors to the bending moment on the pole. All conductors, including communication conductors, contribute and must be taken into account. The NESC states the direction of critical loading shall be considered. The critical direction for a tangent pole is perpendicular to the line. The wind force blowing on each conductor times the conductors mounting height is calculated individually and then summed. This is often the main factor in determining the maximum span allowed for various conductor sizes.

The formula for calculating the wind force per foot of conductor is Wc=Wind Force (lbs/sq ft) [conductor diameter (in)/12]. For example, consider a 795 AAC conductor in Florida with a 250 foot span. The diameter of this conductor is 1.026 inches. Fc = (9 lbs/sq ft)[1.026/12] = .7695 lb/ft. The 250 ft span times .7695 lb/ft is a force of 192 lbs per conductor on the pole. 192 lbs at a height of 32 feet is 6,144 ft-lbs from this one conductor. Similarly, the force on the other two phase conductors and the neutral would also need to be calculated. Wind overload factors are then applied to these moments. The overload factor depends on the grade of construction and the type of pole. For Grade B construction (used for interstate highways and railroad crossings) it is 4. For normal Grade C construction it is 2.

Wind on poles and equipment: The wind blowing on the pole and any pole equipment must be considered. The NESC specifies that calculations for cylindrical objects use a shape factor of 1.0 and flat objects use a shape factor of 1.6. Figure 3 has a listing of the moment due to wind on poles.

Equipment weight: The heavy equipment such as transformers and regulators are usually bolted to the side of the pole. Since this load is eccentric it contributes to the bending moment of the pole. Its lever arm would be the distance between the center of gravity of the equipment and the center of the pole. This can be a considerable factor. For instance a 50 kva transformer weighs about 870 lbs and is about 28 inches around. This gives it a lever arm of around 1 ½ ft. This is a bending moment of 870 lbs times 1.5 ft, which is 1,305 ft-lbs. That's not so bad. But consider a 167 kva single-phase regulator. Weighing 2,770 lbs with about a 3-ft lever arm, this would add 8,310 ft-lbs of bending moment to the pole, plus the factor of wind on the regulator. As a result of these large bending moments, it is common practice to sideguy installations with large regulators to reduce pole leaning.

Service and tap sidepulls: The TPX services pulling off of the pole will add bending moment. The angle of the pull is a factor. The moment due to a service is the service tension (lbs) [sin of pull angle] [height of attachment]. The pull angle is the angle between the main line and the direction of the pull. So for two 100 ft TPX services pulling off at 45 degrees to two houses, the bending moment added by the pull is 2 wires times [142 lbs tension (Florida values from Specification Dwg 05-03-01)] times [sin 45 degrees] times [20 ft attachment height], which is 4,015 ft-lbs.

In addition to the looking at the above factors for the bending moment, another item to consider in sizing poles is the vertical loading. The vertical loading is caused by the weight of the conductors and equipment weight. Also, the guy tensions can add considerable axial loading to a pole. The usual result of too much axial pole loading is buckling.

There are several shortcuts to avoiding these tedious hand calculations. Specification Dwg. 02.02-03 contains a pole sizing table which shows our standard poles and some common situations where they are used. This table will generally help you to size the bulk of your poles. Also, there is a software available called Pole Foreman that has templates of our common conductor configurations already loaded. This does an exacting job of calculating vertical and horizontal pole loading for your exact situation. (See the Pole Foreman section below).

Pole Foreman

The recommended computer program for using to determine pole class is called Pole Foreman. This program is a module put out by Powerline Technology, Inc. Distribution Standards supports this program and also a related program for wire sag called Sagline. These modules have templates and files populated with Progress Energy data. This data includes our conductors, line hardware and its related strength ratings, guying ratings and our primary construction configurations.

Pole Forman is able to show you a solid model of the structure being analyzed. This view enables the designer to verify they are modeling the correct structure configuration. The program can also model transformer banks on the pole. It contains joint use cable data for analysis of lines with multiple joint use cables. Pole Forman is a single structure program. Only one pole structure at a time is modeled. It is easy to change from Grade C to Grade B code rules or to change from the regular medium/light loading rules to the extreme wind rules.

The printout of the analysis gives a clear stop/go indication on whether or not the structure meets the NESC requirements. Both horizontal and vertical loading are calculated. The detail on all hardware strengths and loadings is also available.

The link below gives a quick overview of some of the program capabilities and its ease of operation.

http://www.powerlinetech.com/userfiles/pltech/video/softwareoverview.html

Anchors & Guying

Guyed structures are used at line angles, dead ends, locations where there is a significant conductor change and situations where the pole by itself is not capable of supporting the horizontal loads. The guy assembly must be designed to withstand all forces acting in the direction of the guy assembly. Each force acting on the structure must be broken down into its vector components in the direction of the guy assembly. It is critical to line safety and reliability that guyed structures be properly designed. Failure of a guyed structure in a storm is more time consuming to replace than a tangent structure, and can also lead to failure of adjacent tangent structures.

Dead End Structure Guys

Let's look first at the simple case of a dead-ended primary conductor to understand how these forces are acting on the guy assembly. See Figure 1. Since the critical direction of wind loading would be perpendicular to the line and the guy, the wind force blowing on the conductors is not a factor. The significant force involved with a dead-end structure is the tension in the conductors.

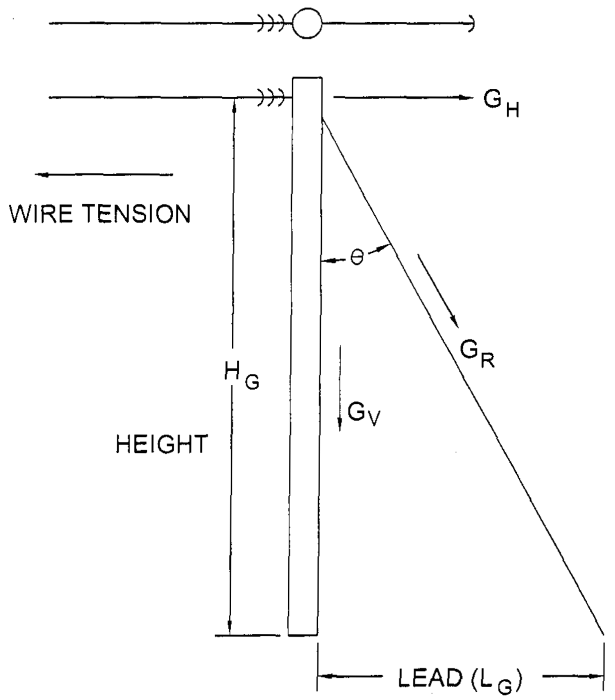
The maximum loading tensions with appropriate NESC overload factors must be used for the conductor tensions.

As shown in Figure 1, the horizontal force in the guy assembly is equal to the wire tension forces. This assumes the height of the conductor attachments and the height of the guy attachments are essentially equal. Even with a one to one attachment height to guy lead ratio, the guy wire tensions are much higher than the conductor tensions. For a one-to-one lead ratio the guy tension is 1.4 times the conductor tension. As the guy lead is shortened the guy wire tension increases. Short guy leads could not only cause the guy wire to be over-tensioned, but the guy attachment hardware itself could be used beyond its rating. In addition, the vertical bearing of the hardware on the pole would become excessive and could split the top of the pole.

The downward force of the guy wire generates a downward vertical force (or axial load) through the pole. This vertical force is equal to the conductor tension multiplied by the guy height/guy lead ratio. As the guy lead is shortened and the guy wire tension increases, the downward force in the pole also increases. The axial pole loading will not normally be a problem. Another component of axial pole loading is the weight of ice on the conductors and the equipment weight. By far the most important factor in causing high axial pole loading is the use of a short or reduced length guy lead.

A guyed pole acts like a column to sustain the downward axial loads. When the axial load becomes large enough, the pole acting as a column becomes unstable and lateral deflections will cause the pole to buckle. The critical area of pole buckling will usually be the section of the pole that is one third the distance from the point of guy attachment to the ground line. Poles that are observed to be bending in this location should either have the guy lead extended or be increased in class.

In areas with poor soil (marsh, soft fill dirt) the downward axial force will sometimes be more pressure than the soil can bear. In this case, a bearing plate can be used on the bottom of the pole as shown on Specification Dwg 02.02-14. Another solution is to use bog shoes as shown on specification Dwg 02.02-16.



G_H = GUY HORIZONTAL FORCE = WIRE TENSION FORCE

$$\mathrm{SIN}\,\theta = \frac{L_G}{\sqrt{H_G^2 + L_G^2}} \qquad \mathrm{COS}\,\theta = \frac{H_G}{\sqrt{H_G^2 + L_G^2}}$$

G_R = GUY RESISTIVE FORCE

$$G_R = \frac{G_H}{\mathrm{SIN}\,\theta} \quad \underline{\text{OR}} \quad G_H\left[\frac{\sqrt{H_G^2 + L_G^2}}{L_G}\right]$$

G_V = GUY VERTICAL FORCE

$$G_V = G_R\left[\frac{H_G}{\sqrt{H_G^2 + L_G^2}}\right] = G_H\left[\frac{H_G}{L_G}\right]$$

OH DESIGN - FIG05
9/19/05

Angle or Bisector Guys

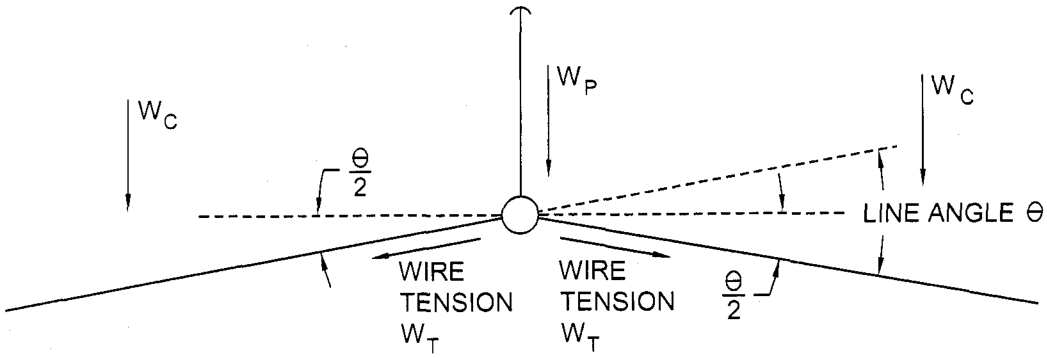
An angle or bisector guyed structure is treated differently by the NESC. A tangent pole has the transverse wind loading on the conductors and pole resisted by the bending moment of the pole. A guyed structure is required to use the pole acting as a column or strut only, and all the forces must be resisted by the guy assembly. So the guy assembly must resist the tension in the conductors, the wind loading on the conductors and the wind loading on the pole and any equipment on the pole. These forces are shown in Figure 6.

It is very important to mention that care should be taken to stake the guy location in the exact center of the line angle. Any off-center position of the angle guy will allow the pole to bear some of the horizontal forces rather than the entire horizontal forces being borne by the guy strand. The result is even a small distance off-center can be dramatic. For example, one long span single phase line with a 60-degree angle was looked at by Pole Foreman. With the guy lead placed at only 10 degree from center, the pole went from passing code requirements to being over 150% overstressed.

The wind loading is determined by which NESC loading district you are in. Florida is in the Light Loading district, which has a wind loading of 9 lbs/ft (about 60 mph). There is no ice loading.

Above turning angles greater than 60 degrees, the line conductors should be double deadened and each line section treated as individual dead end structures. Here again, note the criticality of avoiding short guy leads, since each dead end guy is adding axial loading to the pole.

There are guying charts developed in the specification manual which have had all these calculations done for various angles and span lengths. These are Specification Dwgs 02-04-32 thru 37. Let's look at them for a moment. The preferred guy lead lengths are indicated. Look at any chart in the span guy area. Look at the difference between the dead end tension and the 60 degree tension for any conductor. Without any wind loading, the 60 degree angle tension would equal the deadend tension (Sin 60/2=0.5, times two conductors = 1). The difference in the deadend tension and the 60-degree angle tension is the contribution of the wind loading on the conductors and the pole.



W_T = WIRE TENSION FORCE = 2 X TENSION PER CONDUCTOR X SIN $\frac{\theta}{2}$

W_C = WIND FORCE ON CONDUCTORS = SPAN LENGTH X FORCE PER FT (W_F) X COS $\frac{\theta}{2}$

W_F = WIND FORCE/COND FT = WIND FORCE (LB/FT) X $\frac{\text{CONDUCTOR DIAMETER (IN)}}{12}$

W_P = WIND FORCE ON POLE

G_H = GUY HORIZONTAL FORCE = $W_T + W_C + W_P$

CAROLINAS: MEDIUM LOADING - HORIZONTAL WIND FORCE = 4 LB/FT (≈40 MPH)
FLORIDA: LIGHT LOADING - HORIZONTAL WIND FORCE = 9 LB/FT (≈60 MPH)

OH DESIGN - FIG06
9/19/05

Procedure for Sizing the Guys

Step 1: From your field layout determine your conductor size and configuration, grade of construction, span lengths, line angle and guy lead to height ratios. For angle guys with unequal span lengths, one half of the span lengths on either side of the pole should be added together to get the span length.

Step 2: Find the correct guying tables in Section 2 of the specification manual. Use Specification Dwgs 02.04-33, 35 and 37. There are three tables. One is for short spans, one for medium spans and one for long spans.

Step 3: Find the wire size on the top row. Go down to the correct guy lead to height ratio section. For your line angle, this is the tension in the guy wire for a single conductor. (FYI: These are the actual guy wire tensions. No overload factor has yet been applied to these loads.)

Step 4: From your conductor configuration, determine how many conductors the guy wire will be supporting. This is usually one conductor, one and ½ conductors (for cases where two guys back up three primary conductors) or two conductors (for one guy backing up two conductors on a steel arm). Multiply the tension in the single conductor by the number of conductors the guy is supporting. This is the required guy wire tension capacity.

Step 5: Go to the Specification Dwg 02.04-10 and select a guy wire size that is above the required guy wire tension capacity. (FYI: Overload and strength factors have been applied to the guy strand rating values to meet the NESC requirements.)

High Wind Coastal Areas - Storm Guying

In our service areas there are some distribution lines that are exposed to much higher winds than a normal distribution line. These lines are directly along a beach road or in an exposed coastal marsh area. While these lines are not subject to the extreme wind rules when they are less than 60 feet in height, it is important to design them for their environment. Obviously, one design method you can use to add strength to the line is to avoid the maximum span lengths. Keeping span lengths reasonable and shorter than normal will enable the line to better resist high winds without leaning or breaking poles.

Even with reasonable span lengths, these distribution lines are subject to be rocked by the high winds. The rocking action of the gusty winds, combined with water saturated soils, will cause the poles to lean. Under some conditions, winds can rock the lines and cause the poles to literally walk out of their holes.

Storm guys are usually added on every fourth structure for best effect. Adding the minimum size guy wires and anchors can have a huge favorable impact. Two guys are added at neutral level on each side of the poles. These guys provide resistance to the poles from leaning, and also provide downward force to keep the poles from walking out of their holes.

Anchors

The selection and design of anchors for guyed structures are the least precise elements in the design or an overhead distribution line. First, soil conditions vary greatly. The best a designer can do is to make an educated guess at the soil types. Also, the manufacturers' data and ratings are based on controlled test conditions and anchors being installed with proper torque exactly as specified. As a result of these items, a large factor of safety should be used in determining the anchor ratings and the anchor selection. It is relatively economical to over design the anchoring system rather than risk failure.

There are two factors Distribution Standards has looked at in determining the anchor ratings. First is the mechanical strength of the anchor assembly. This rating must allow for the fact that over time some corrosion and loss of material will occur. The other rating is the resistance of the anchor assembly to pullout in a particular class of soil. The resulting ratings that are listed in the specification manual have also had the required NESC overload factors applied.

For the designer the anchor selection is relatively simple. Using Specification Dwgs 02.06-02, the anchor rating should be matched up with the guy wire tensions it will be supporting.

Guy Insulator Clearances

NESC Rule 215 C 5 has a performance requirement related to the use of guy insulators.

(1) All insulators shall be located at a position that maintains the bottom of the insulator not less than 8 ft above the ground if the guy is broken below the insulator.
(2) Insulators shall be so placed that, in case any guy contacts, or is contacted by, an energized conductor or part, the voltage will not be transferred to other facilities on the structure(s).
(3) Insulators shall be so placed that in case any guy sags down upon another, the insulators will not become ineffective.

In addition, Progress Energy guys are grounded below the guy insulator to the system neutral providing an additional safety factor, should a guy break.

These are pretty stringent installation requirements, all designed to maintain public safety from a broken or loose guy wire. These requirements are in the Progress Energy construction specifications and are shown on Specification Dwg 02.04-18.

It is important that the designer understand the guy insulator rules and know how to apply them. The Distribution Standards web site has a detailed presentation on guy insulator clearances and usage.

Progress Energy

Transmission – Extreme Wind Loading Design Criteria Guideline for Overhead Transmission Line Structures

Extreme Wind Loading Design Guideline for Overhead Transmission Line Structures

Standards Position Statement

Applies to: Transmission Department - Carolinas and Florida

Table of Contents

Extreme Wind Loading Design Guideline for Overhead Transmission Line Structures

Standards Position Statement

Applies to: Transmission Department - Carolinas and Florida

1.0 Introduction

The purpose of this guideline is to document the Transmission Department's new extreme wind loading philosophy for designing and analyzing overhead transmission line structures. This guideline is to be used in the design of all new transmission line structures and in the analysis of all existing transmission line structures originally designed per the 2002 National Electric Safety Code. This guideline is also to be used in the design of all replacement structures when the structure or structures being replaced were originally designed per the 2002 National Electric Safety Code. Use of this new guideline is applicable to the following types of transmission line projects:

- New overhead transmission line projects
- Line upgrade projects (i.e. Re-conductoring to increase line ampacity; replacement of overhead static or OPT-GW with larger cable)
- Line relocation projects
- Non-maintenance structure replacement projects
- All requests to add new non-standard equipment or devices to transmission line structures where local regulatory design codes, if applicable, do not govern the extreme wind design criteria.

The extreme wind loading criteria to be used to design new structures for or analyze structures on existing transmission lines for replacement is also addressed in this guideline. The design or analysis of structures associated with the following projects are subject to either the National Electric Safety Code requirements in place at the time the transmission line in question was originally constructed, or if a previous Code design requirements are not known, to this new guideline:

- Routine maintenance pole replacement projects
- Conductor, static wire, or OPT-GW replacement projects (like-for-like change outs or replacement)

2.0 General

All transmission line structures are adversely affected by extreme wind. As a result, they must be designed to resist the loads induced by this phenomenon. Extreme weather-related events can be characterized by their intensity, spatial extent, and rate of occurrence. For example, extreme or hurricane winds may affect with full intensity a large number of transmission line structures during a single occurrence. Or, a localized summer down-draft or tornado might only affect a single structure. It is therefore critical that the effects of an extreme weather-related event such as extreme wind be considered in the design or analysis of all transmission line structures.

Determining the magnitude of extreme wind loads and how they are to be applied in the design or analysis of overhead transmission line structures involve the application of a basic wind force formula that includes several wind-related and structure and line characteristics. Included among the wind-related characteristics are wind speed, terrain roughness, and air density. Among the structure and line characteristics are force coefficients, gust response factors, and the projected surface area of the structure. All of these characteristics are accounted for in the wind force formula to be used in the determination of the wind force acting on the surface of transmission line components.

The basic wind force formula presented in the 2002 National Electric Safety Code and the American Society of Civil Engineer's Manual 74 (ASCE 74) will be used to determine the extreme wind loading design criteria for transmission line structures in Florida and the Carolinas. Determination of wind loads or pressures using the wind force formula involves several variables or parameters. These parameters can generally be divided into four categories: air density, wind climate, localized wind characteristics, and wind-structure interaction.

Air Density Factor

The air density factor converts the kinetic energy of moving air into the potential energy of pressure. This factor is based on the specific weight of air at 60^0 F at sea level. In cases where both the ambient temperature and elevation above mean sea level varies significantly, modifications to the air density factor value will need to be considered.

Wind Climate

- Basic Wind Speed
  In the United States, the basic wind speed is the fastest-mile wind speed 33 feet (10m) above ground in flat and open country terrain and generally associated with a 50-year return period. The fastest-mile wind speed is defined as the average speed of one mile of air passing a wind measuring instrument (anemometer). The U.S. Weather Service and most of the U.S. standards and codes use the fastest-mile wind speed. The 2002 National Electric Safety Code specifies wind speed values based on a nominal 3-second gust at a location 33 feet (10m) above ground.

Transmission Line Importance or Reliability

- A transmission lines importance or reliability is governed by several factors. One is the integrity of the line's structural support system. A transmission line consists of two separate structural systems; the structural support system consisting of towers, poles, and foundations and the wire system including insulators and hardware. Another factor governing the importance or reliability of a transmission line is whether or not the line is defined as a "critical source". A critical source or Reliability Class 1 (RC1) transmission line includes lines connected directly to a generation plant, used as grid interties with other electric utilities, serving critical industrial or commercial customers, and all 500kV transmission lines. RC1 lines have a nominal line rating of 475 MVA or greater. Reliability Class 2 (RC2) transmission lines are all lines not classified by definition as Reliability Class 1 and have a nominal line rating less than 475 MVA.

Localized Wind Characteristics

- Velocity Pressure Exposure Coefficient
  The velocity pressure exposure coefficient reflects the change in wind speed due to both the terrain, commonly called the terrain factor, and the height of the structure or wire above the ground line. Wind is basically the movement of air. This airflow across the surface of the ground is retarded due to the friction of the ground. The wind speeds are slower close to the

ground and are reduced even more depending on the nature of the ground surface. ASCE 7-98 (2000) defines four exposure categories.

Exposure Category A: Defined as large city areas.
Exposure Category B: Defined as urban, suburban, and wooded areas.
Exposure Category C: Defined as flat, open country, farms, and grasslands.
Exposure Category D: Defined as unobstructed coastal areas directly exposed to large bodies of water.

The wind speed values provided on the wind speed map given in NESC 2000, Figure 250-2(b) are based on Exposure Category C and are for a nominal design 3-second gust at 33 feet above the ground.

The velocity pressure coefficient for a structure is based on the total structure height above the ground line. The velocity pressure coefficient for the wire is based on the height of the wire at the structure.

<u>Wind-Structure Interaction</u>

- Gust Response Factor
  The gust response factor accounts for the response of a structure or wires to turbulence in the wind. It accounts for the dynamic effects of gusts on the wind response of transmission line components. Wind gusts do not generally envelop the entire span of wire between transmission structures and some wind gust speed reduction reflecting the spatial extent of gusts should be included when factoring wind speeds or pressures in the design and analysis of both structures and wires.

  Because the gust response factor for the structure is considered to be equal to two-thirds the total height of the structure, the structure gust response factor is determined using the total structure height, not the total or effective height above ground line. The wire gust response factor is determined using the height of the wire at the structure along with the design wind span.

- Force Coefficient
  The force coefficient in the wind force formula accounts for the effects of a member's characteristics such as member shape, size, orientation with respect to the wind, solidity, shielding, and surface roughness on the resultant force. The force coefficient is also referred to as a drag coefficient, pressure coefficient, or shape factor.

The current practice in both Florida and the Carolinas to determine the extreme wind loading design criteria in the design or analysis of transmission line structures is derived from the 2002 NESC wind load formula as defined in Rule 250C and the Basic Wind Speed contour map (Figure 250-2(b)). There are, however, differences in the philosophy or design criteria on how to correlate basic design extreme wind speeds with a transmission line's importance or reliability classification and the integrity of the transmission infrastructure. The current design criteria or philosophy for each geographic area is explained below.

3.0 Philosophy

Transmission Standard's position is to implement a common extreme wind loading guideline for the design and analysis of the Transmission Department's overhead transmission line structures. This common guideline will define the reliability class of a transmission line, associate 3-second gust wind speeds with each line reliability class, and define each wind region where the 3-second gust wind speeds are to be applied.

The new extreme wind loading design guideline will group all transmission lines in Florida and the Carolinas into either Reliability 1 or 2 lines based on specific line rating criteria and critical or non-critical power source definitions.

A new Transmission Department extreme wind speed and pressure design criteria matrix has been developed and is attached with this document as Addendum A. Also attached with this document are extreme wind speed and pressure maps for both the Carolinas and Florida identified as Addendum B and C respectively.

This guideline is to be used in the design of all new transmission line structures and in the analysis of all transmission line structures installed per this guideline and the 2002 National Electric Safety Code. The design and/or analysis of transmission line structures associated with the following project types and previously installed or modified per the 2002 National Electric Safety Code are subject to this new criterion:

- New overhead transmission line projects
- Line upgrade projects (i.e. Re-conductoring to increase line ampacity; replacement of overhead static or OPT-GW with larger cable)
- Line relocation projects
- Non-maintenance structure replacement projects
- All requests to add new equipment or devices to transmission line structures where local regulatory design codes, if applicable, do not govern the extreme wind design criteria.

Rule 013B of the 2002 National Electric Safety Code (NESC) addresses the application of extreme wind loads to "Existing Installations" or, in this case, existing transmission line structures designed and installed according to previous Code or in-house extreme wind loading criteria. Rule 013B states:

1. Where an existing installation meets, or is altered to meet, these rules, such installation is considered to be in compliance with this edition and is not required to comply with any previous edition.
2. Existing installations, including maintenance replacements, that currently comply with prior editions of the Code, need not be modified to comply with these rules except as may be required for safety reasons by the administrative authority.
3. Where conductors or equipment are added, altered, or replaced on an existing structure, the structure or the facilities on the structure need not be modified or replaced if the resulting installation will be in compliance with either (a) the rules that were in effect at the time of the original installation, or (b) the rules in effect in a subsequent edition to which the installation has been previously brought into compliance, or (c) the rules of this edition in accordance with Rule 013B1.

Existing transmission line structures needing to be replaced as part of routine maintenance or requiring modification due to the addition, alteration, or replacement of conductors or static wires should be analyzed using the Code extreme wind loading criteria in effect at the time the transmission line, including the structures, was originally constructed except for extenuating safety reasons or legislative requirements. If the Code extreme wind loading criteria at the time the line was constructed is unknown, then the criterion of this guideline is to be adhered to when analyzing a structure or structures.

The extreme wind loading design criteria to be used to design new structures for or analyze structures on existing transmission lines for replacement is also addressed in this guideline. The design or analysis of structures associated with the following projects are subject to either the Code requirements in place at the time the transmission line in question was originally constructed, or if a previous Code design requirements is not known, to this new guideline:

- Routine maintenance pole replacement projects
- Conductor, static wire, or OPT-GW replacement projects (like-for-like change outs or replacement)

4.0 Practice/Design Criteria

The 2002 edition of the National Electric Safety Code addresses extreme wind loading for Grade B overhead transmission line construction in Rule 250C. Quoting Rule 250C:

"If no portion of a structure or its supported facilities exceeds 18 m (60 ft) above ground or water level, the provisions of this rule are not required, except as specified in Rule 216A1c or Rule 261 A2f. Where a structure or its supported facilities exceeds 18 m (60 ft) above ground or water level, the structure and its supported facilities shall be designed to withstand the extreme wind load associated with the Basic Wind Speed, as specified by Figure 250-2. The wind pressures calculated shall be applied to the entire structure and supported facilities without ice. The following formula shall be used to calculate extreme wind load."

Load (psf) = $(0.00256) \cdot (V_{mi/h})^2 \cdot k_z \cdot G_{rf} \cdot I \cdot C_d$

where:

0.00256	Air Density Factor based on the specific weight of air at 60^0 F at sea level
V	Basic Wind Speed, 3-second gust wind speed at 33 feet above ground line per new extreme wind pressure design criteria guideline (Addendum A) in miles per hour
k_z	Velocity Pressure Exposure Coefficient, as defined in NESC Rule 250C1, Table 250-2
G_{rf}	Gust Response Factor, as defined in NESC Rule 250C2
I	Importance Factor, 1.0 for utility structures and their supported facilities
C_d	Shape Factor, as defined in NESC Rule 252B2a

The wind pressure parameters (k_z, V, and G_{rf}) are based on open Exposure Category C as defined in ASCE 7-98 and is the basis of the NESC extreme wind criteria.

With the 2002 National Electric Safety Code defining the value of the Importance Factor, I, as 1.0 for utility structures and the facilities they support, the formula for the extreme wind load is:

Load (psf) = $(0.00256) \cdot (V_{mi/h})^2 \cdot k_z \cdot G_{rf} \cdot C_d$

Velocity Pressure Exposure Coefficient, k_z (NESC Rule 250C1)

The velocity pressure exposure coefficient variable, k_z, is a variable that applies to both the transmission structure and conductors/static wires (hereafter referred to as wires). The velocity pressure exposure coefficient for the structure is based on the total structure height above ground. The velocity pressure exposure coefficient for the wires is based on the height of the wires at the structure. The values for k_z for both the structure and the wires are provided in NESC Table 250-2.

The velocity pressure exposure coefficient variable, k_z, value in the wind load formula above and in NESC Table 250-2 is accounted for in the Transmission Line Design software module Pls-Cadd when NESC 2002 is selected as the legislative Code in the criteria file related to wire and structure loading under extreme wind loading conditions.

<u>Gust Response Factor, G_{rf} (NESC Rule 250C2)</u>

The gust response factor, G_{rf}, for a structure is determined using the total structure height. The gust response factor for the wires is determined using the height of the wires at the structure and the design wind span between structures. The values for G_{rf} for both the structure and the wires are provided in NESC Table 250-3.

The gust response variable, G_{rf}, value in the wind load formula above and in NESC Table 250-3 is accounted for in the Transmission Line Design software module Pls-Cadd when NESC 2002 is selected as the legislative Code in the criteria file related to wire and structure loading under extreme wind loading conditions.

<u>Shape Factor, C_d, (NESC Rule 252B2a)</u>

The transverse load on structures shall be computed by applying, at right angles to the direction of the line, the appropriate horizontal wind pressure determined under NESC Rule 250. This load shall be calculated using the projected surface areas of the structures without ice covering.

The following shape factors, C_d, shall be used:

Wind loads on straight or tapered structures that are cylindrical or composed of numerous relatively flat panels: $C_d = 1.0$

Wind loads on flat surfaced structures having solid or enclosed flat sides and an overall cross section that is square or rectangular: $C_d = 1.6$

Wind loads on square or rectangular lattice structures with flat surfaces: $C_d = 3.2$

Wind loads on square or rectangular lattice structures with cylindrical surfaces: $C_d = 2.0$

For most transmission line structures, 12-sided tubular steel and round or cylindrical concrete, a shape factor, C_d, of 1.0 is acceptable.

With both the Velocity Pressure Exposure Coefficient, k_z, and the Gust Response Factor, G_{rf}, being automatically applied to both the structure and wires when NESC 2002 is selected as the legislative Code in Pls-Cadd's criteria file under extreme wind conditions and the Shape Factor, C_d, being 1.0 for 12-sided steel and concrete poles, the extreme wind load value shown in the extreme wind load criteria matrix (Addendum A) and used as input in Pls-Cadd is:

$$\text{Load (psf)} = (0.00256) \cdot (V_{mi/h})^2$$

with the wind speed, $V_{mi/h}$, interpolated from the NESC Basic Wind Speed Map in Figure 250-2(b).

<u>Examples:</u>

Following are examples to better explain how the design engineer is to use the extreme wind load guideline matrix (Addendum A) along with the extreme wind pressure maps (Addendum B or C) to determine the wind load pressure value to apply when designing a transmission structure or structures.

Reference: Extreme Wind Pressure Design Criteria Guideline Matrix, Addendum A and Extreme Wind Pressure Maps, Addendums B and C.

Example 1: Project Scope - Florida Scenario

A new 20 mile, 230kV transmission line is planned to be constructed from an existing generation plant switchyard located approximately 10 miles inland from Florida's Gulf Coast and terminate at a new 230/115kV Transmission Substation located approximately 40 miles inland from the Gulf Coast. The planned or required line rating is 850 MVA.

When setting up the parameters for this new line in Pls-Cadd, what design wind speed and consequent design wind pressure would the design engineer use in designing the transmission support structures?

There are two parameters the design engineer must determine before deciding on the appropriate design wind pressure to use:

1. The new lines Reliability Class
2. The specific Wind Region of interest

1. The line project originates from an existing generation plant and is considered a critical source and the new line is expected to have a line rating of 850 MVA.
2. The line project will originate within 30 miles of the Gulf Coast and terminate at a new substation located 40 miles inland from the Gulf Coast.

From the Extreme Wind Pressure Design Criteria Guideline matrix (Addendum A) and Extreme Wind Pressure Map (Addendum C), the design engineer would categorize the new line as being a Reliability Class 1 line. Part of the new line will be located within 30 miles of the Gulf Coast and part of the line will be located beyond 30 miles of the Gulf Coast. Being conservative, the design engineer would select the Wind Region within 30 miles of the Gulf Coast. So, for a Reliability Class 1 line located within Wind Region 1 (within 30 miles of the Gulf Coast), the design engineer would select a wind speed of 145 mph or a wind pressure of 53.7 psf to design the new structures.

Example 2: Project Scope - Carolinas Scenario

A new 30 mile, 230kV transmission line is planned to be constructed from the Brunswick Nuclear Plant switchyard located approximately 2.0 miles inland from the coast of North Carolina and terminate at a new 230/115kV Transmission Substation located approximately 25 miles from the coast of North Carolina. The planned or required line rating for this new line is 750MVA.

What extreme wind speed should the design engineer apply to the support structures of this new line?

As with the Florida example, there are two specific parameters the design engineer should examine when deciding on the correct wind speed to use to design the support structures:

1. The Reliability Class of the new line
2. The specific wind region or "zone of interest"

Two important pieces of information from the project scope identify the new lines reliability class. The new line originates from a generation plant switchyard and the planned line rating is 750MVA. This helps the design engineer define the new line as a Reliability Class 1 or RC-1 transmission line.

The topographical location of the origination and termination points of the line from the project scope help identify the specific wind region or "zone of interest". The line originates approximately 2.0 miles from the coast of North Carolina and terminates approximately 25 miles from the coast. Looking at the extreme wind pressure map for the Carolinas, it appears the design engineer can use either a Region 1 or Region 2 wind speed. However, for this application, the design engineer concludes that the majority of the new line will be located within Wind Region 1.

So, using Wind Region 1 and a Reliability Class of 1, the design engineer correctly determines that the correct extreme wind pressure to use in designing the support structures is 57.7 psf.

5.0 References

[1] IEEE's 2002 National Electric Safety Code (NESC), Rule 013B, 250C, and Rule 252B, Pages 2, 250, and 252 respectively, Copyright © 2001.

[2] American Society of Civil Engineers (ASCE) Manual and Report on Engineering Practice No. 74 "Guidelines for Electrical Transmission Line Structural Loading", Section 2 "Weather-Related Loads Pages 14-32, Copyright © 1991.

[3] American Society of Civil Engineers (ASCE) and the Structural Engineering Institutes (SEI) "Electrical Transmission in a New Age", Edited by Dan E. Jackman, Copyright © 2002.

6.0 Revisions

Rev #	Revision Date	Revised By	Reviewed By	Description
0	07/31/2006	E.L. Taylor		Initial Release

Progress Energy Transmission Department's Extreme Wind Pressure Design Criteria Guideline

Extreme Wind Design Criteria and Line Reliability Classes

Reliability Class	Design Codes	Critical Source	Critical Load	Line Rating (MVA) [6]
1[2]	NESC 2002 & ASCE 74	Yes	Yes	> 475
2[3]	NESC 2002 & ASCE 74	No	No	< 475

Carolinas

NESC Extreme Wind Regions & Corresponding Design Wind Speeds (mph)

Reliability Class	2002 NESC Wind Region					
	1	2	3	4	5	6
1[2]	150	140	130	120	110	100
2[3]	140	130	120	110	100	90

Carolinas

NESC Extreme Wind Regions & Corresponding Design Wind Pressures (psf)

Reliability Class	2002 NESC Wind Region					
	1	2	3	4	5	6
1[2]	57.7	49.8	42.4	35.6	29.4	23.8
2[3]	50.2	43.3	36.9	31.0	25.6	20.7

Florida

NESC Extreme Wind Regions & Corresponding Design Wind Speeds (mph)

Reliability Class	2002 NESC Wind Region	
	1[4]	2[5]
1[2]	145	130
2[3]	135	120

Florida

NESC Extreme Wind Regions & Corresponding Design Wind Pressures (psf)

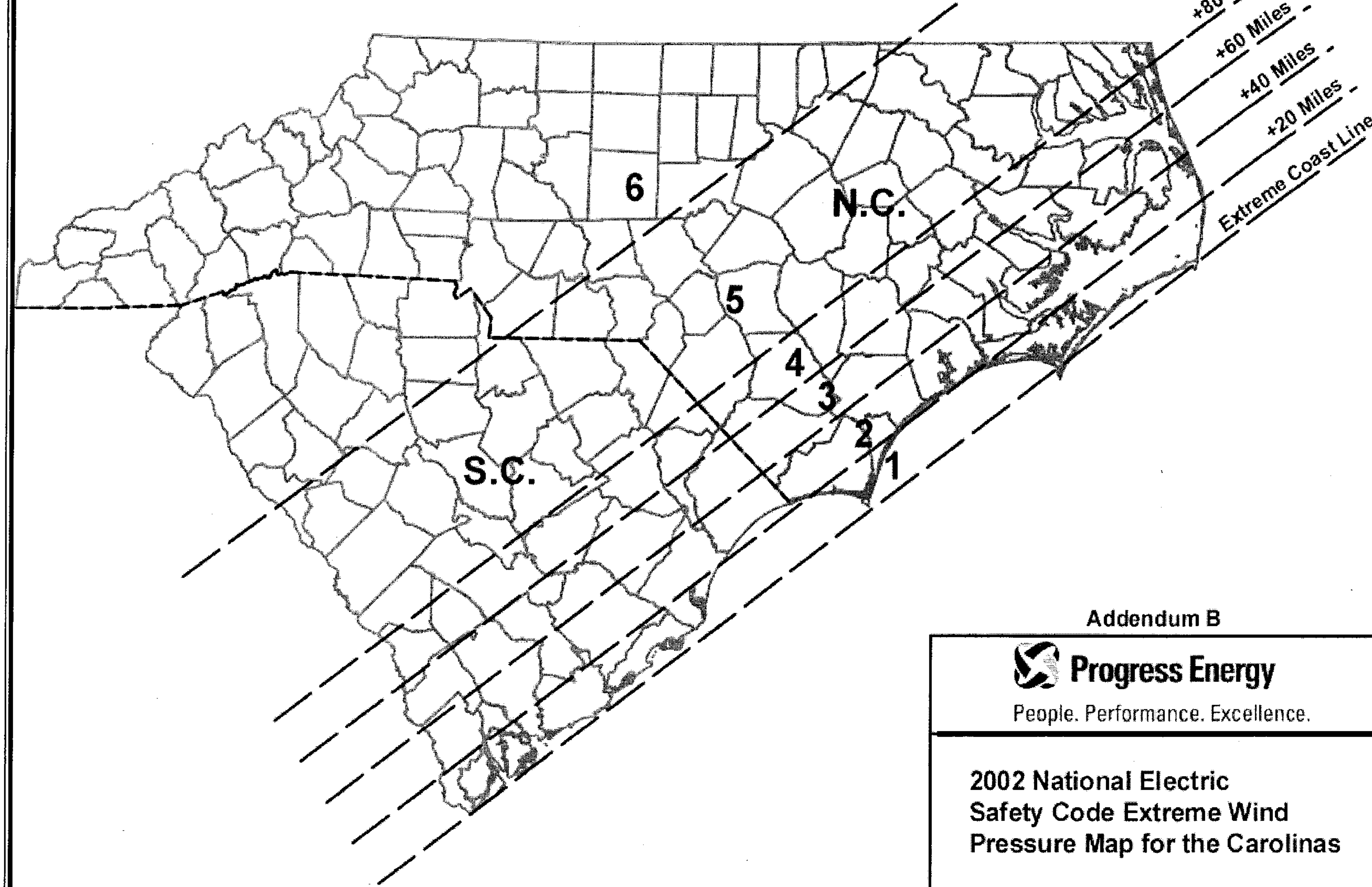
Reliability Class	2002 NESC Wind Region	
	1[4]	2[5]
1[2]	53.7	42.4
2[3]	46.7	36.9

1. Wind speed values based on nominal design 3-second gust wind speed in mph/psf.
2. Line Reliability Class I used for critical sources including generation plant lines, interties, critical customers, and all 500kV lines.
3. Line Reliability Class 2 design wind speeds based on NESC 2002 Basic Wind Speed Map per Figure 250-2(b)
4. 3-second gust wind @ 60^0, Initial **within** 30 miles of the coast
5. 3-second gust wind @ 60^0, Initial **beyond** 30 miles of the coast
6. The MVA reliability class determination criteria is based on the "maximum normal" line rating.

Revision No.	Revision Date	Revision	Revised By	Approved By
0	7/14/06	Initial Release	ELT	ELT

Addendum A

Reliability	2002 NESC Wind Region						
	1	2	3	4	5	6	
1	57.7	49.8	42.4	35.6	29.4	23.8	PSF
2	50.2	43.3	36.9	31.0	25.6	20.7	



Addendum B

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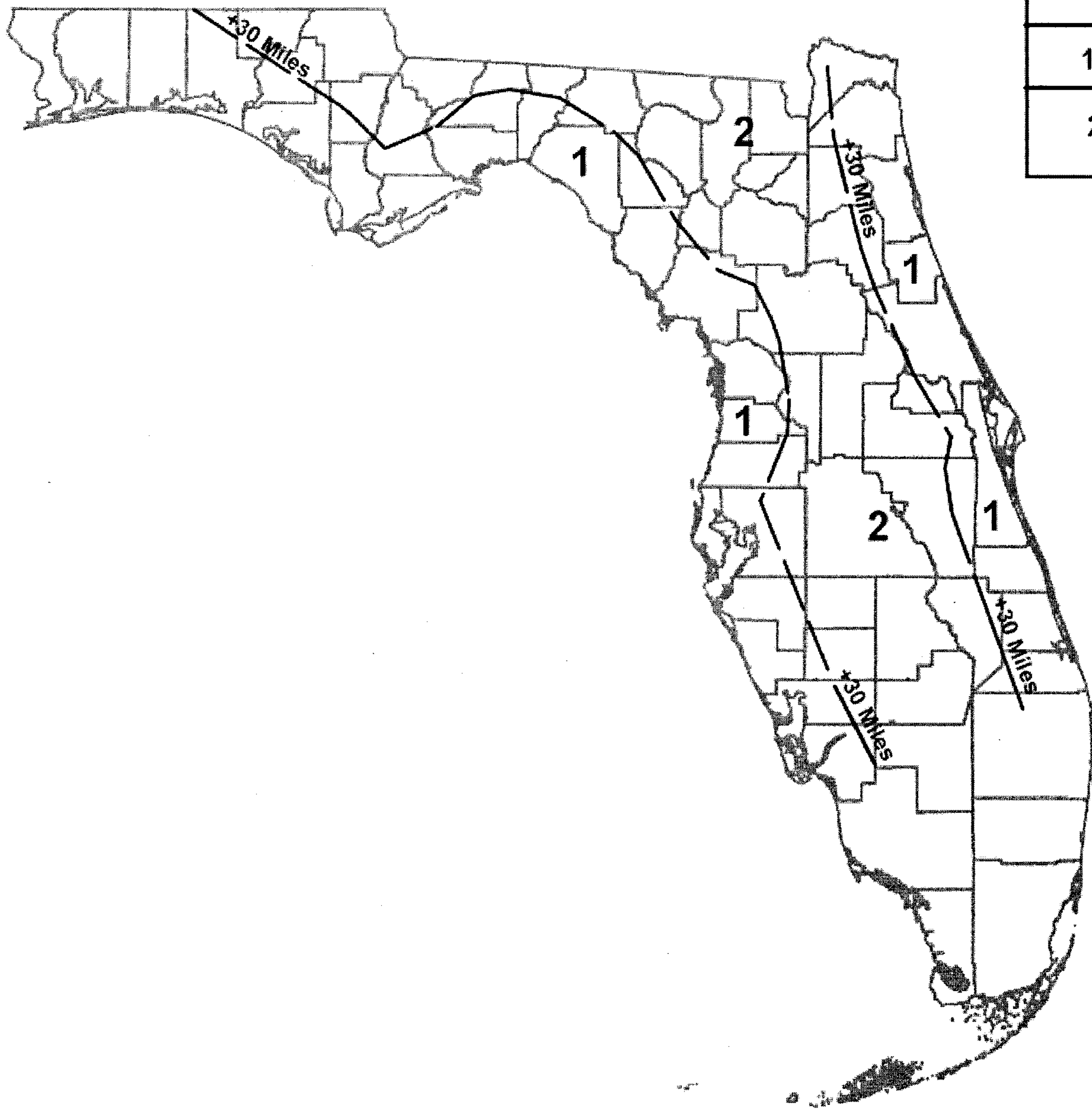
2002 National Electric Safety Code Extreme Wind Pressure Map for the Carolinas



Reliability	2002 NESC Wind Region		
	1	2	
1	53.7	42.4	PSF
2	46.7	36.9	

Addendum C

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2002 National Electric Safety Code Extreme Wind Pressure Map for Florida

Former Florida and Carolina Design Practice
Industry Design Practice
Addendum D

Florida's Current Design Criteria

Florida's interpretation of the 2002 NESC basic wind speed contour map (2002 NESC Figure 250-2(b)) results in the delineation of their service territory into two wind regions: A coastal region encompassing areas located within 30 miles of the gulf coast and an inland region encompassing areas beyond 30 miles of the gulf coast. The coastal region design 3-second gust wind speed is 135 mph at a design ambient temperature of 60^0 F under initial loading conditions. The inland region design 3-second gust wind speed is 120 mph at a design ambient temperature of 60^0 F under initial loading conditions.

Florida utilizes wind reliability or importance factors to provide a higher reliability to the extreme wind load case. The application of importance or load factors is actually a function of a transmission line's relative reliability and the projected return period for a specific extreme wind-related event. The use of importance or load factors is actually a function of ASCE's Manual 74 Load and Resistance Factor Design (LRFD) concept. Importance or load factors are strength factors applied to wind region wind speeds that takes into account variabilities in material, dimensions, workmanship, and the uncertainty inherent in the nominal strength of the component.

In Florida's "Importance Factor Matrix", importance or load factors are applied to regional wind speeds based on a transmission line's voltage, summer normal MVA rating, and number of circuits supported. These load factors range from 1.00 with a load return period of 50 years up to 1.40 with a load return period of 333 years.

Load Case	Load Condition	Overload/Importance Factor
Extreme Wind Coastal - Within 30 miles of the coast Inland - Beyond 30 miles from the coast	135 mph 3-second gust wind, 60 Deg., Initial Conditions 120 mph 3-second gust wind, 60 Deg., Initial Conditions	1.0 – 1.4 for ALL Loads **-See Importance Factor Matrix**

PROGRESS ENERGY FLORIDA IMPORTANCE FACTOR MATRIX

VOLTAGE	SUMMER NORMAL MVA (CONDUCTOR)	IMPORTANCE FACTOR		RETURN PERIOD (YRS)	
		SINGLE CKT	DOUBLE CKT	SINGLE CKT	DOUBLE CKT
69 KV	LESS THAN 100 MVA (336 ACSR and Smaller)	1.00	1.10	50	83
69 KV	100 - 200 MVA (795 AAC TO 954 ACSS/TW)	1.05	1.15	67	100
115 KV	LESS THAN 100 MVA (4/0 ACSR and Smaller)	1.00	1.10	50	83
115 KV	BETWEEN 100 & 200 MVA (336 ACSR AND BUNDLED 4/0 ACSR)	1.05	1.15	67	100
115 KV	GREATER THAN 200 MVA (795 AAC TO 954 ACSS/TW)	1.10	1.20	83	133
230 KV	LESS THAN 600 MVA (SINGLE 954 ACSR)	1.15	1.20	100	133
230 KV	BETWEEN 600 & 1200 MVA (SINGLE GREATER THAN 954 ACSR OR BUNDLED 954 ACSR)	1.20	1.30	133	200
230 KV	GREATER THAN 1200 MVA (BUNDLED 954 ACSS/TW OR GREATER)	1.30	1.40	200	333

Carolinas Current Design Criteria

Carolina's interpretation of the 2002 NESC basic wind speed contour map (2002 NESC Figure 250-2(b)) results in the delineation of their service territory into six wind regions with wind speeds increasing from the extreme coastal region west to the mountain region. The Carolinas defines or delineates all transmission lines as either Reliability Class 1 or Reliability Class 2 and applies extreme wind speeds accordingly. A Reliability Class 1 transmission line is defined as any line termed a "critical source". A critical source transmission line is defined as originating from a Generation Plant, used as a grid intertie, defined as serving a critical customer, and all 500kV transmission lines. The tap or transfer load of a Reliability Class 1 line 200 MVA or greater. A Reliability Class 2 transmission line is defined as any line not meeting the definition of a Reliability Class 1 line and with a tap or transfer load less than 200 MVA. Reliability Class 2 transmission line wind speeds are based on the 2002 NESC basic wind speed contour map (2002 NESC Figure 250-2(b)). Reliability Class I transmission lines wind speeds are increased from 5-8% above the wind speeds for Reliability Class 2 transmission lines. The chart below correlates the six region extreme wind speeds with the reliability class of a transmission line.

Extreme Wind Design Criteria and Reliability Classes

Reliability Class	Design Codes	Critical Source[1]	Critical Load	Tap Load (MVA)	Transfer Load (MVA)
I	NESC 2002 & ASCE 74	Yes	Yes	> 200	> 200
II	NESC 2002 & ASCE 74	No	No	0-200	0-200
1. Critical Sources include Generation Plant Lines, Grid Interties, and all 500 kV Lines					

NESC Extreme Wind Regions and Corresponding Design Speeds (mph)						
Reliability Class	NESC Wind Region					
	1	2	3	4	5	6
1	150	140	125	115	105	95
2	140	130	120	110	100	90

The design wind speeds for each region are applied at a 60^0 F, no ice, final loading condition. The Carolinas does not apply importance or load factors to any design wind speeds.

Industry Practice

As part of an extreme wind study conducted by Carolina Power and Light Company in the mid-90's, a survey was conducted of various electric utilities asking the practice they followed in determining transmission structural loading and the extreme wind pressure used in calculating structure loads due to hurricane winds on transmission lines located within 50 miles of the coast with wind gust, structure height, and overload factors included.

Based on responses to the survey, applicable utilities that responded indicated the use of the National Electric Safety Code, ASCE's Manual 74, a combination of the National Electric Safety Code and in-house design criteria, or a combination of ASCE's Manual 74 and in-house design criteria. To the question of the magnitude of extreme wind pressure used, the responses ranged from a minimum of 21-30 psf (90mph-108mph) to a maximum exceeding 50 psf (140mph).

Progress Energy

Transmission – Line Engineering Design Philosophy

Progress Energy Florida
Transmission Department

Line Engineering
DESIGN PHILOSOPHY

Version 1.6
April 2007

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Progress Energy Florida Transmission Line Design Philosophy

This Design Philosophy is an outline of practices currently in place in the Progress Energy Florida Transmission Line Engineering Unit. It provides the guidelines for the typical structures, framings, material, construction methods and easements used in the design of transmission lines. It is not intended to address every possible situation that may arise. Deviations from this Design Philosophy, where necessary, are permitted with the approval of the Line Engineering Manager. The design philosophy contained in this document is intended to meet or exceed the requirements in the latest edition of the National Electric Safety Code. If there is a conflict, the NESC shall take precedence.

1 Structures

1.1 Typical 69/115kV Construction

1.1.1 Philosophy

All new 69kV lines shall be designed, framed and insulated to 115kV Standards. The primary single circuit tangent framing shall be vertical framing standards 21244 for steel and 21444i (using inserts) for concrete. Framing standards 21240 and 21440i (using inserts) for delta configurations are also allowed where practical. Typically, a vertical configuration is utilized along road rights-of-way and a delta configuration is utilized cross country.

Where a transmission line is proposed to parallel a road right-of-way, the single pole structures will generally be located three feet outside of the road right-of-way in a fifteen foot wide private easement with the OHG and conductors facing the road. Lines may be designed in road rights of way if acquisition costs and / or schedules require design adjustments. Project specifics will dictate alignment criteria.

PEF typically uses concrete poles along roads. Galvanized steel poles may also be used should the site specific conditions warrant. Weathering steel is a third option but typically is not suitable for urban or suburban environments. Rock backfill or natural dirt (when utilizing maintenance equivalent poles) should be utilized where ever possible along roads due to the possibility of future road widening projects. Concrete backfill should be avoided if at all possible for the same reason. Economic and constructability considerations will govern which pole type and backfill should be utilized.

Where the transmission line traverses cross country, generally, the single pole structures are offset such that the centerline of the conductors are situated on the easement centerline for vertically framed structures. For delta or double circuit configurations, the pole centerline shall be situated on the easement centerline. PEF typically uses concrete poles and / or galvanized steel poles for cross country designs. Weathering steel is a third option. There are no backfill restrictions for cross country applications. Economic and constructability considerations will govern which pole type and backfill should be utilized.

When phase over phase (GOABs) switches are required on a project, 69kV installations will be installed with 69kV switches (not 115kV switches) due to cost / design considerations unless otherwise approved. GOAB phase spacing will be suited for full monorupter installation.

1.1.2 Configuration

# of circuits	Structure type	Standards	Pole type
Single	Tangent, vertical	21244, 21444i	Steel / Concrete
Single	Tangent, Delta	21240, 21440i	Steel / Concrete
Single	Angle, vertical (non dead-end)	21244, 21210, 21230, 21444i, 21410i, 21430i	Steel / Concrete
Single	Deadend, vertical	21260, 21271, 21280, 21460i, 21471i, 21480i	Steel / Concrete
Double	Tangent, vertical	22244, 22444i	Steel / Concrete

Note: Concrete pole standards with "i" are standards with inserts for bolts

1.1.3 Material

- Concrete
- Steel

1.1.4 Material Finish

- Concrete - none
- Steel – Galvanized
- Steel - Weathering

1.1.5 Typical Structure Height

- 90 – 95 feet above grade provides height for distribution (with top phase typically located at 38' AG) and cable attachments along roads and longer span construction for cross country designs, since distribution is typically not a factor.
- Maintenance (wood pole equivalents), including LD4 – LD6 light duty steel and type II and type III concrete poles are typically 95' overall and can be utilized for rebuild projects (where feasible)

1.1.6 Typical Ruling Span

- 400 – 500 feet along roads and 500 – 700 feet cross country.
- 275 – 350 feet for typical rebuild applications (project specific)

1.2 Typical 230kV Construction

1.2.1 Philosophy

Where a transmission line is proposed to parallel a road right-of-way, generally, the single pole structures will be located five feet outside of the road right-of-way in a fifteen foot wide private easement with the OHG and conductors facing the road. If the structure is double circuit the easement width will vary. 230kV lines may be designed in road rights-of-way with the approval of the Line Engineering Manager.

Where the transmission line traverses rural areas, the single pole structures are generally offset such that the centerline of the conductors are situated on the right-of-way centerline for single circuit designs and the centerline of the single pole is situated on the right-of-way centerline for double circuit designs.

The structures are to be concrete or steel poles designed, framed, and insulated to PEF's 230kV Standards. Concrete poles are the most cost efficient option where site specific conditions favor concrete pole installation. PEF typically uses galvanized steel poles for 230kV designs when site specific conditions require steel. Weathering steel is a third option. Use of concrete versus steel as well as types of backfill shall take into consideration costs, access, system constraints, constructability, and other project related issues.

1.2.2 Configuration

# of circuits	Structure type	Standards	Pole types
Single	Tangent, vertical	31206, 31406i	Steel / Concrete
Single	Angle, vertical (non deadend)	31206, 31210, 31230, 31406i, 31410i, 31430i	Steel / Concrete
Single	Deadend, vertical	31260, 31271, 31280, 31460i, 31471i, 31480i	Steel / Concrete
Double	Tangent, vertical	32206	Steel

Note: Concrete pole standards with "i" are standards with inserts for bolts

1.2.3 Material

- Steel
- Concrete

1.2.4 Material Finish

- Concrete - none
- Steel – Galvanized
- Steel – Weathering

1.2.5 Typical Structure Height

- 110 – 140 feet above grade provides height for distribution and cable attachments along roads and longer span construction cross country

1.2.6 .Typical Ruling Span

- 500 – 600 feet along roads and 600 – 900 feet cross country.

2 Conductors

2.1 Philosophy

PEF uses conductors referenced below because they have proven to be the most economical when considering initial construction cost and the cost of losses. Also, the majority of lines on the PEF system were constructed using these conductors. Warehouse inventories are more efficiently managed to ensure adequate conductor and associated hardware materials are on hand for new construction as well as for emergency and routine maintenance repairs if the number of conductor sizes are held to a minimum.

2.2 Wire Controls

Design tensions are selected to meet or exceed NESC requirements by utilizing the following wire controls:

<u>All Conductors including ACSS/TW after 2/16/05 (New Construction)</u>
18% Rated Breaking Strength at 30 degrees F, no wind, final condition

*ACSS/TW used to replace 1590 ACSR may be installed up to 26% RBS

Where re-utilizing existing structures and / or addressing clearance issues, other wire controls can be utilized with prior approval of the Line Engineering Manager.

2.3 Usage

Conductor selection is typically determined by collaboration between Transmission Planning and Line Engineering units using the tables below as a guideline for selection.

PEF Line Engineering Standard Conductors to used for Projects (as of April 2007)

Part #	Code Word	Description	Typical Voltage	Comments
200114	Raven	1/0 ACSR 6/1 str	69kV	Should not be used in 115kv lines
200112	Penguin	4/0 ACSR 6/1 str	69 & 115kV	
200133	Linnet	336.4 ACSR 26/7 str	69 & 115kV	
200239	Arbutus	795 AAC 37 str	69 & 115kV	All new lines and rebuilds will require 795 ACSR or ACSS TW in lieu of AAC. If utilized where transferring existing conductor, ruling spans should not exceed 500'
200180	Drake	795 ACSS/TW 20/7 str		used in lieu of Redbird, 954 ACSR 24/7 STR
200195	Cardinal	954 ACSS/TW 20/7 str	69, 115 & 230kV	
200196	Pheasant	1272 ACSS/TW 39/19 str	69, 115 & 230kV	used in lieu of Falcon, 1590 ACSR 54/19 STR
200199	Pecos	1622 ACSS/TW 39/19 str	69, 115 & 230kV	used in lieu of Falcon, 1590 ACSR 54/19 STR
200194	Redbird	2 - 954 ACSR 24/7 str	230kV	Bundling of 954 if Line Capacity Requirements exceed 1622 ACSS/TW

2.4 1200 / 1600 / 2000 / 3000 amp preferred conductors

The following ampacities are for summer normal ratings (104 deg F).

Ampacity	Part #	Conductor	Typical Voltage
1200	200180 200194	795 ACSS/TW 20/7 str 954 ACSR 24/7 st	69 & 115kV
1600	200195	954 ACSS/TW 20/7 str	69, 115, & 230kV
2000	200196 200199	1272 ACSS/TW 39/19 str 1622 ACSS/TW 39/19 str	69, 115, & 230kV
3000	Varies	Bundled 954 ACSS/TW 20/7 str or Bundled 795 ACSS/TW 20/7 str (rated at 2982 amps)	115kV & 230kV

2.5 Conductor Temperatures

	CONDUCTOR TEMPERATURES	
	MCR1	EMR1
	DEG C / DEG F	DEG C / DEG F
AAC / AAAC	100 / 212	130 / 266
ACSR	105 / 221	140/ 284
ACSR (500kv)	71 / 160	NA
HDB COPPER	70 / 158	80 / 176
HYT COPPER	115 / 239	135 / 275
CU / CWLD	70 / 158	80 / 176
ALWLD	100 / 212	105 / 221
ACAR	105 / 221	130 / 266
ACAR (500kv)	90 / 154	NA
ACSS/TW	180 / 356 *	200 / 392 *

See EGR-TRMF-00001 rev 2 for Transmission Conductor and Equipment Ampacity Methodology for Florida

* Note: In 2007, ACSS TW MCR1/EMR1 conductor temperatures increased from 140 / 180 to 180 / 200 respectively after close coordination with the manufacturer. The old conductor temperatures of 140 / 180 will be retained for lines previously designed with these conductor temperatures.

3 Overhead Ground Wire (OHGW)

3.1 Philosophy

Overhead Ground Wire designs shall incorporate a fiber optic design basis unless otherwise instructed. If fiber is not chosen, a 3/8" HS steel OHGW shall be utilized.

The fiber design basis shall incorporate a 24 count fiber OPGW in all applications unless otherwise directed to do so through coordination with IT for third parties. Design shall be to support the 24/36/48 CentraCore fiber. This fiber has the same mechanical characteristics for 24/36/48 count fiber. Design shall include this fiber basis even if it is decided to install 3/8" HS steel.

3.2 OPGW wire controls

0.465" 24 / 36 / 48 CentraCore fiber at 16% Rated Breaking Strength at 30 degrees F, no wind, final condition

3.3 3/8" HS steel wire controls

3/8-inch High Strength (HS) Steel at 15% Rated Breaking Strength @ 30 degrees F, no wind, final condition

3.4 Shield Angle

Maximum shield angle requirements as measured from a vertical line through the OHGW to the phase conductor are as follows:

Structure Height Above Ground	Maximum Shield Angle
Up to 100 ft.	30 degrees
Over 100 feet	20 degrees

Note: some standard PEF structures are designed with lightning shield angles between 25 to 30 degrees. The single pole framings of choice, 21244, 21444i, 31206 and 31406i provide a shield angle of less than 5 degrees regardless of height.

3.5 Ground Resistance

The ground resistance at each structure location shall attain 10 ohms or less to be acceptable. Should a particular location exceed 10 ohms, it will be acceptable if the average of it and the adjacent structures does not exceed 15 ohms. Phase over phase switch locations shall be grounded to 5 Ohms or less. Details of PEF's grounding standards can be found in section 9 of the Standards manual.

3.6 Lightning Arresters

Lightning arresters are not normally used on PEF transmission lines. Should the use of arresters be required, the line engineer shall select the appropriate assembly for its application.

For 69kV lines designed as 115kV lines, a 69kV surge arrestor may need to be installed at the terminal span to protect the 69kVsubstation equipment due to the higher BIL of the line insulation directing the fault towards the substation. This will require the deadends on substation terminal locations to utilize 69kV deadends. Deciding if a line arrestor is required at the terminal shall be closely coordinated with Substation Engineering.

4 Insulators

4.1 Philosophy

Polymer insulators offer the same insulation value as porcelain. In addition, polymer insulators are lighter and less likely to be damaged by vandals. The mechanical strength of polymer insulators is equivalent or better than porcelain and will not limit structure designs. For 69/115kV single pole construction, an unsupported 115kV polymer post is used. For 230kv single pole construction, a polymer braced post is used which utilizes a suspension unit to diagonally support the conductor end of the post insulator. Polymer suspension units shall not exceed 50% of their Specified Mechanical Load (SML) and polymer post and braced post units shall not exceed the values in its application curve.

4.2 Usage

Polymer insulators are typically used for all new construction for 69, 115, and 230kV voltages.

4.3 Application curves

Application curves of utilized as PEF insulators are available upon request.

5 Foundations

5.1 Philosophy:

Designs for foundations will typically include a 2 degree rotation and / or 6" deflection at ground line (which ever controls). Other rotational and deflection criteria can be established with the permission of the Line Engineering Manager. In addition, foundation designs will include design provisions for axial loading. Rock and concrete backfill are the preferred foundations where soil conditions are favorable. Where constructing in road rights-of-way, rock backfill shall be utilized where ever possible and concrete foundation should be utilized only when absolutely required due to future road widening projects.

5.2 Usage

5.2.1 Direct Embedded – Maintenance Poles / rebuild projects

PEF's light duty concrete and steel poles (wood pole equivalents) may be direct embedded using suitable natural spoil as the backfill material. The standard setting depth for concrete Type II and steel H3 (LD4) poles is 10% of the pole length plus three feet. The standard setting depth for concrete Type III and steel H5 (LD6) poles is 10% of the pole length plus five feet.

5.2.2 Direct Embedment – New Lines

Soil borings shall be taken in accordance to PEF's soil boring policy. Foundations shall be designed based on soil boring information utilizing industry based foundation program or PEF's FD6 program. Crushed stone or concrete will be utilized for backfill depending on soil and loading conditions.

5.2.3 Anchor Bolts

Full Length Anchor Bolts or Standard Anchor Bolt Cages are typically not used at PEF, but are available for special applications.

5.2.4 Vibratory Caissons

Bottom section of steel pole is vibrated into place using a vibratory hammer. These types of foundations are typically used in wet, loose sands.

5.3 Soil Borings

For 69/115kV lines sample borings are obtained at major angles and at every third or fourth tangent structure location. For 230kV Lines, a soil boring shall be taken at every structure location. In areas where rock is likely to be encountered, additional soil borings or probes may be justified. For access roads thru wetlands, muck probes along the route of the access road will be required.

6 Guying

6.1 Philosophy

The main philosophy behind the use of these guys and anchors is to economically meet or exceed minimum design requirements while standardizing materials as much as possible. The use of guys greater than 3/4" inch diameter should be avoided because of the difficulty involved with installation. Where right of way can not be acquired for guys, self supporting structures shall be used.

6.2 Capacity Ratings

Below are charts showing standard PEF guys/anchors and their respective capacity ratings.

Guy Ratings

Guy Size	Ultimate Guy Tension	NESC Grade B Light Loading Tension (90%)	PEF Extreme Wind Tension (67%)
3/8" H.S.	10,800#	9,720#	7236#
7/16" U.G.	18,000#	16,200#	12,060#
1/2" E.H.S.	26,900#	24,210#	18,023#
9/16" E.H.S.	33,700#	30,330#	22,579#
5/8" E.H.S.	40,200#	36,180#	26,934#
3/4" E.H.S.	58,300#	52,470#	39,061#

Anchor Ratings

Class 5 Soil	2-Helix	3-Helix	4-Helix
Max Design Holding Capacity (lbs.)	27,000	41,000	49,000

When utilizing guy insulator links, reference strength percentages in NESC Rule 277.

7 Switches

7.1 Philosophy

All line segments are to be between substation switches / breakers and / or line switches. Hard taps are not acceptable unless approved prior to construction. Line segments are to be capable of being switched out of service within the safe operational limitations of the equipment. Monorupters may be required. Line ampacity ratings must be included in the proper selection of switches.

7.2 Methodology

Reference procedure OPS-SUBS-00101- Guide for Operating Transmission Line Switches

8 Design Criteria

8.1 Philosophy

Meet or exceed NESC 2002

8.2 Load Cases

Load Case	**Load Condition**	**Overload/Importance Factor**
NESC Light Loading, Grade B	9 PSF @ 30 Deg., Initial Conditions	2.5 (Transverse Wind) 1.65 (Tension/Longitudinal Wire Loads) 1.5 (Vertical Loads)
NESC Wind & Ice	2.3 psf @ 15 Deg., Initial	1.0 (all loads)
Extreme Wind	Reference 7.3	Not applicable
Maintenance (for arms and supports to support one OHG and one Phase Conductor)	60 Deg., No Wind, Initial Loading	1.0 –(Transverse Wind and Tension Wire Loads.) 1.5 – (Vertical Loads)
Stringing (Special Design Structures Only)	60 Deg., No Wind, Initial Loading	1.5 (Longitudinal and Vertical Wire Loads)
Camber(Steel Structures Only)	60 Deg., No Wind, Initial Loading	1.0 (Longitudinal and Vertical Wire Loads)

8.3 Extreme Wind Guidelines

Progress Energy Transmission Department's Extreme Wind Pressure Design Criteria Guideline

Extreme Wind Design Criteria and Line Reliability Classes						
Reliability Class	Design Codes	Critical Source	Critical Load	Line Rating (MVA) [6]		
1[2]	NESC 2002 & ASCE 74	Yes	Yes	> 475		
2[3]	NESC 2002 & ASCE 74	No	No	< 475		
Carolinas						
NESC Extreme Wind Regions & Corresponding Design Wind Speeds (mph)						
Reliability Class	2002 NESC Wind Region					
	1	2	3	4	5	6
1[2]	150	140	130	120	110	100
2[3]	140	130	120	110	100	90
Carolinas						
NESC Extreme Wind Regions & Corresponding Design Wind Pressures (psf)						
Reliability Class	2002 NESC Wind Region					
	1	2	3	4	5	6
1[2]	57.7	49.8	42.4	35.6	29.4	23.8
2[3]	50.2	43.3	36.9	31.0	25.6	20.7
Florida						
NESC Extreme Wind Regions & Corresponding Design Wind Speeds (mph)						
Reliability Class	2002 NESC Wind Region					
	1[4]			2[5]		
1[2]	145			130		
2[3]	135			120		
Florida						
NESC Extreme Wind Regions & Corresponding Design Wind Pressures (psf)						
Reliability Class	2002 NESC Wind Region					
	1[4]			2[5]		
1[2]	53.7			42.4		
2[3]	46.7			36.9		
1. Wind speed values based on nominal design 3-second gust wind speed in mph/psf.						
2. Line Reliability Class I used for critical sources including generation plant lines, interties, critical customers, and all 500kV lines.						
3. Line Reliability Class 2 design wind speeds based on NESC 2002 Basic Wind Speed Map per Figure 250-2(b)						
4. 3-second gust wind @ 60', Initial within 30 miles of the coast						
5. 3-second gust wind @ 60', Initial beyond 30 miles of the coast						
6. The MVA reliability class determination criteria is based on the "maximum normal" line rating.						

Revision No.	Revision Date	Revision	Revised By	Approved By

Addendum A

8.4 Structural Percent Utilization

All NESC and internal PEF design criteria requirements will be met. It is incumbent on the engineer to develop the most economic design of the transmission facility while satisfying all NESC and PEF design criteria. Overly conservative design margins that exceed the NESC and PEF minimums introduce costly designs and will require prior approval before implementing.

Design efforts should strive to obtain a minimum percent utilization of 95% or greater for ultimate design. All designs shall not exceed 100% on the governing load case.

8.5 Wire Clearances

8.5.1 Philosophy

PEF clearances exceed NESC requirements to account for construction, existing design considerations picked up during surveying (wire crossings, billboards, roads, etc), and terrain variables.

8.5.2 Guidelines

All wire clearances shall conform to the respective clearances per standards 10-1020 and 10-1021. All vertical clearances in these two standards include a three foot buffer adder to the NESC required clearance to allow for sagging, pole setting, and steel pole jacking tolerances as well as ground alterations and intermediate pole setting variances. All horizontal clearances in these two standards include a one foot buffer adder to the NESC required clearance to allow for sagging tolerances. These additional clearances provide additional safety margins without a significant increase in construction cost.

8.5.3 Structure Deflection

Foundation rotation and structure deflection shall be taken into consideration when designing clearance requirements for extreme wind conditions.

9 Standard Right of Way Width

9.1 Philosophy

The standard widths referenced below are intended to provide the following:

1. Electrical clearances under adverse wind conditions to all obstructions that could be located at the edge of right-of-way at mid-span.
2. Acceptable EMF levels at edges of right-of-way at low points of sag.
3. Adequate width to reduce the number of danger trees that must be cut.

9.2 Preferred widths

Preferred width is 70 feet for 69/115kV lines and 100 feet for 230kV lines. Additional real estate rights for guying outside of these dimensions may be required

10 Clearing

10.1 Philosophy

Clearing and maintaining the right-of-way will provide greater line reliability by minimizing the possibility of a tree coming into contact with the line and also will provide better access for line crews. Using the clearing methods as defined in the specifications minimizes erosion and complies with existing environmental laws and regulations.

10.2 Methods

Reference PEF Specification 15000, Clearing and Right of Way for details.

11 Environmental

11.1 Philosophy

Project design and construction will comply with all Federal, State, and Local environmental regulations associated with forested wetlands, herbaceous wetlands, parks / recreational / conservation areas, historical / archeological areas, threatened / endangered species, and eagles nests. Design shall also conform to state requirements for EMF.

11.2 Methodology

When environmental sensitive areas are present on a line project, the PEF environmental department will be contacted to initiate assessments for the project to target appropriate responses to environmental permit requirements. Permitting criteria and design changes that may be required due to environmental permitting will be closely coordinated with PEF environmental staff.

12 Constructability

12.1 Philosophy

Ease of construction is a strong consideration for completion of a qualitative, economic, and acceptable line design.

12.2 Methodology

12.2.1 Underground conflicts

Structure locations are to be investigated for underground conflicts. Conflicts are to be identified and rectified prior to construction

12.2.2 Wetlands

Line design in wetlands is to take "BMP" (Best Management Practices) into consideration when designing. BMP requires that low pressure equipment and matting be utilized in wetlands so that the root mass is not disturbed. Where possible, wetlands should be spanned. If spanning a wetland is not possible, installation of steel poles with track equipment is a strong consideration for wetland environments. Heavy concrete poles requiring large capacity, heavy cranes should be avoided unless permanent access roads and structure pads are to be installed. When rebuilding a line in a "like for like" manner (structure for structure), proposed structures must be within 10' of the existing facility to assure compliance to environmental provisions for replacing existing facilities in place.

12.2.3 Overhead conflicts

Existing overhead facilities are to be identified and discussed with Construction prior to completion of line design activities. Temporary relocations, laying out of circuits, hot work, etc are to be discussed with Construction during preliminary design activities. If required, designs may need to be modified to accommodate construction activities for overhead conflicts.

12.2.4 Major crossings

Where line design / build activities include major crossings of limited access highways, rivers, lakes, and other special considerations, efforts will be made to reduce risks during stringing activities. Options include installing deadends at both sides of major crossings. This may require in-line deadends if major crossing is between major angles normally utilized for dead ends. If temporary guys are not practical during stringing efforts, self supporting structures may be required for stringing purposes. Efforts will be closely coordinated with Construction during preliminary design prior to pole orders and during preliminary / final walkthrus.

12.2.5 System Constraints

All designs must take system constraints into consideration. Close coordination with Construction and PEF's Energy Control Center (ECC) is required to discuss the likelihood of securing extended outages for construction purposes. Where extended outages are not possible, additional design options must be explored with Construction and designs may need to be modified to accommodate system constraints. Options could include other alignments, re-routes, temporary lines, taller structures, and other measures to assure designs accommodate system constraints.

Progress Energy

Joint Use – Pole Attachment Guidelines and Clearances

3				
2				
1	11/15/06	CECCONI	GUINN	HOYT
0	8/26/05	CECCONI	GUINN	HOYT
REVISED		BY	CK'D	APPR.

SECTION 9 – CLEARANCES AND JOINT USE
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Progress Energy

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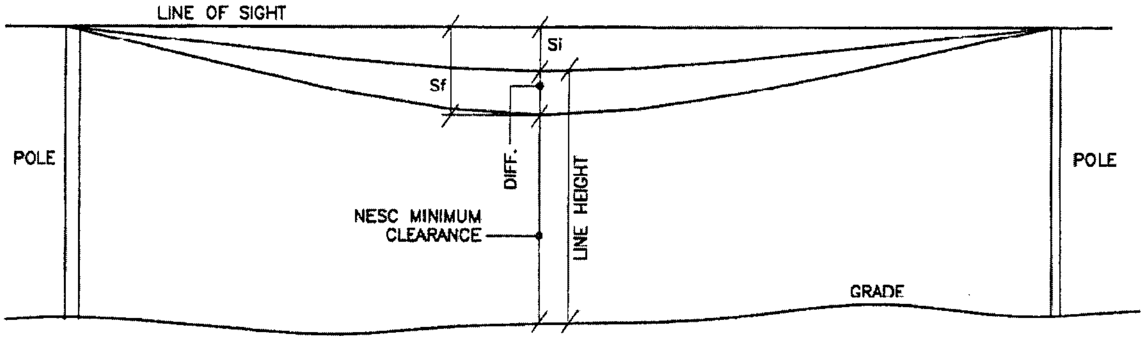

KEY		
KEY	Si	INITIAL SAG @ 60°F, NO WIND (FROM SAG TABLES)
	Sf	THE GREATER OF FINAL SAG @ 120°F (180° FOR FP), NO WIND, OR 32°F W/ 1/4" ICE (CP&L ONLY)
	DIFF.	Sf – Si

NOTES:

1. USE THIS METHOD WITH THE TABLE ON DWG. 09.02-01 WHEN DETERMINING MINIMUM LINE HEIGHTS ABOVE GROUND, RAILS, ETC.
2. LINE HEIGHT (AT MID SPAN) = REQUIRED MINIMUM CLEARANCE (SEE DWG. 09.02-01) PLUS (Sf – Si).
3. ROUND UP "DIFF." (Sf–Si) VALUES TO NEAREST 1/2 FT. (E.G., 32" WOULD BECOME 3'-0".)

EXAMPLE OF USE OF INITIAL AND FINAL SAG:

1. 3-Ø 477 SAC PRIMARY WITH 1/0 ACSR NEUTRAL LINE CROSSING ROAD, 300 FT. SPAN –

REQUIRED NESC MINIMUM NEUTRAL CLEARANCE ABOVE ROAD: (120°F, NO WIND)	15.5 FT.	(DWG. 09.02-01)
DIFFERENCE BETWEEN INITIAL AND FINAL SAGS, FOR 1/0 ACSR, 300 FT. SPAN:	+ 3.0 FT.	
REQUIRED NESC HEIGHT OF NEUTRAL ABOVE ROAD SURFACE, AT INSTALLATION (INITIAL SAG, 60°F):	18.5 FT.	

** (CHECK MINIMUM DOT ROAD CLEARANCES FOR LOCAL CONDITIONS)

2. 3-Ø 477 SAC PRIMARY WITH 1/0 ACSR NEUTRAL LINE CROSSING ROAD, 150 FT. SPAN –

REQUIRED NESC MINIMUM NEUTRAL CLEARANCE ABOVE ROAD: (120°F, NO WIND)	15.5 FT.	(DWG. 09.02-01)
DIFFERENCE BETWEEN INITIAL AND FINAL SAGS, FOR 1/0 ACSR, 150 FT. SPAN:	+ 1.5 FT.	
REQUIRED NESC HEIGHT OF NEUTRAL ABOVE ROAD SURFACE, AT INSTALLATION (INITIAL SAG, 60°F):	17.0 FT.	

** (CHECK MINIMUM DOT ROAD CLEARANCES FOR LOCAL CONDITIONS)

3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

MINIMUM LINE HEIGHTS USING CONDUCTOR SAG TABLES

Progress Energy

PGN DWG. 09.00-01

EQUIPMENT AND CIRCUITS NEAR NATURAL GAS OR GASOLINE FACILITIES

THE FOLLOWING PROCEDURE SHALL BE FOLLOWED WHEN LOCATING OVERHEAD OR UNDERGROUND ELECTRICAL FACILITIES NEAR GASOLINE PUMPS AND RELATED FACILITIES.

DO NOT INSTALL TRANSFORMERS, CAPACITORS, CUTOUTS, SWITCHES, FUSES, RELAYS, OR ANY EQUIPMENT THAT MAY PRODUCE ARCS UNDER NORMAL OPERATING CONDITIONS WITHIN OR ABOVE THE FOLLOWING LOCATIONS;

(1) ANY AREA WITHIN 20 FEET HORIZONTALLY FROM A GASOLINE DISPENSING PUMP

(2) ANY AREA WITHIN 10 FEET HORIZONTALLY FROM A GASOLINE TANK FILL-PIPE

(3) ANY POINT WITHIN A 5 FOOT RADIUS FROM THE POINT OF DISCHARGE OF A GASOLINE VENT-PIPE

(4) ANY POINT WITHIN 15 FEET IN ALL DIRECTIONS OF ABOVE GROUND NATURAL GAS CONNECTIONS, VALVES, OR GAUGES.

DO NOT LOCATE ELECTRIC METERS WITHIN 3 FEET OF NATURAL GAS METERS, LIQUID PETROLEUM GAS TANKS, OR LIQUID PETROLEUM GAS FILL POINTS.

AVOID LOCATING ANY PORTION OF AN ELECTRICAL CIRCUIT OVER THE LOCATIONS SPECIFIED ABOVE. IF THESE LOCATIONS CANNOT BE AVOIDED, CONTACT THE ENGINEERING SUPERVISOR. IF THE ENGINEERING SUPERVISOR APPROVES THE LOCATION, THE MINIMUM CONDUCTOR CLEARANCES FOR OVERHEAD ON DWG 09.01-01A APPLY. GREATER CLEARANCES MAY BE REQUIRED FOR SPECIAL CONDITIONS OR DURING CONSTRUCTION OR REPAIR NEAR EXISTING LINES. DETERMINATION OF SUFFICIENT CLEARANCES OR OTHER ACTION FOR THE SAFETY OF CONSTRUCTION PERSONNEL MUST BE MADE ON AN INDIVIDUAL BASIS.

COMMUNITY WELL CLEARANCES

THE N.C. ADMINISTRATIVE CODE FOR DRINKING WATER STATES THAT NO POTENTIAL SOURCE OF CONTAMINATION CAN BE LOCATED WITHIN 100 FEET OF A COMMUNITY WELL. TRANSFORMERS (POLE MOUNTED, PADMOUNTED OR GROUND LEVEL), CAPACITOR BANKS, D-D SUBS AND ANY OIL FILLED EQUIPMENT ARE CLASSIFIED AS POTENTIAL SOURCES OF CONTAMINANTS AND MAY NOT BE LOCATED WITHIN 100 FEET OF A COMMUNITY WELL. COMMUNITY WELLS ARE DEFINED AS WELLS WHICH SERVES 25 OR MORE PERSONS. A SINGLE FAMILY RESIDENTIAL WELL IS NOT CLASSIFIED AS A COMMUNITY WELL. THIS REGULATION IS FOR NEW INSTALLATIONS ONLY. EXISTING COMMUNITY WELLS WHICH HAVE OIL FILLED EQUIPMENT LOCATED WITHIN 100 FEET ARE GRANDFATHERED.

THESE SAME REQUIREMENTS SHALL APPLY IN SOUTH CAROLINA AND FLORIDA.

REVISED		BY	CK'D	APPR.	
3					
2					EQUIPMENT AND CIRCUITS NEAR NATURAL GAS OR
1					GASOLINE FACILITIES AND COMMUNITY WELL CLEARANCES
0	7/24/02	HOYT	ROBESON	WOOLSEY	

Progress Energy

PGN DWG. 09.00-02

MINIMUM CLEARANCES (IN FEET) OF UNGUARDED WIRES FROM INSTALLATIONS TO WHICH THEY ARE NOT ATTACHED

CONDUCTOR TYPE / CLEARANCE OF:	EFFECTIVELY GROUNDED NEUTRALS; SPAN & LIGHTNING PROTECTION WIRES; GUYS & MESSENGERS CABLED PRIMARY	INSULATED SUPPLY CABLES 0 – 750V (TRIPLEX & QUADRUPLEX)	0 – 750 V OPEN WIRE SECONDARY & SERVICES;	OPEN WIRE PRIMARY 750 V – 22 kV (PHASE TO GROUND)
1. LIGHTING AND TRAFFIC SIGNAL SUPPORTS; POLES & SUPPORTS OF ANOTHER LINE:				
A. HORIZONTAL	3'	3'	5' (3.5')**	5' (4.5')**
B. VERTICAL	2'	2'	4.5'	4.5'
2. BUILDINGS: A. HORIZONTAL				
1. TO WALLS, PROJECTIONS & GUARDED WINDOWS	4.5'	5'	5.5' (3.5')	7.5' (4.5')
2. TO UNGUARDED WINDOWS	4.5'	5'	5.5' (3.5')	7.5' (4.5')
3. TO BALCONIES AND AREAS ACCESSIBLE TO PEDESTRIANS	4.5'	5'	5.5' (3.5')	7.5' (4.5')
B. VERTICAL 1. OVER & UNDER ROOFS OR PROJECTIONS NOT ACCESSIBLE TO PEDESTRIANS	3'	3.5'	10.5'	12.5'
2. OVER & UNDER ROOFS OR PROJECTIONS ACCESSIBLE TO PEDESTRIANS	10.5'	11'	11.5'	13.5'
3. OVER ROOFS ACCESSIBLE TO VEHICLES BUT NOT SUBJECT TO TRUCK TRAFFIC	10.5'	11'	11.5'	13.5'
4. OVER ROOFS ACCESSIBLE TO TRUCK TRAFFIC	15.5'	16'	16.5'	18.5'
3. SIGNS, CHIMNEYS, BILLBOARDS, RADIO & TV ANTENNAS, AND OTHER INSTALLATIONS NOT CLASSIFIED AS BRIDGES: A. HORIZONTAL (PG. 105 A1, A2)	3'	3.5'	5.5' (3.5')	7.5' (4.5')
B. VERTICAL (PG. 105 B1, B2)	3'	3.5'	6'	8'
4. BRIDGES:* A. CLEARANCES OVER BRIDGES 1. ATTACHED	N/A	3'	3.5'	5.5'
2. NOT ATTACHED	N/A	10'	10.5'	12.5'
B. BESIDE, UNDER, OR WITHIN STRUCTURE				
1. READILY ACCESSIBLE PARTS (A) ATTACHED	N/A	3'	3.5'	5.5' (4.5')
(B) NOT ATTACHED	N/A	5'	5.5' (3.5')	7.5' (4.5')
2. INACCESSIBLE PARTS (A) ATTACHED	N/A	3'	3.5'	5.5' (4.5')
(B) NOT ATTACHED	N/A	4'	4.5' (3.5')	6.5' (4.5')
5. SWIMMING POOLS (INCLUDING SWIMMING BEACHES WHERE RESCUE POLES ARE USED):	SEE DWG. 09.01-05			

*BRIDGES MAY SERVE AS SUPPORTING STRUCTURES FOR ELECTRICAL LINES, AND THEREFORE THE LINES MAY BE ATTACHED TO THE BRIDGES.

**WIND SWING

3				
2				
1	8/5/05	CECCONI	NUNNERY	HOYT
0	7/24/02	HOYT	ROBESON	WOOLSEY
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MINIMUM FINAL SAG CLEARANCES TO BUILDINGS, ETC.

Progress Energy

PGN DWG. 09.01-01A

MINIMUM CLEARANCES (IN FEET) OF UNGUARDED WIRES FROM INSTALLATIONS TO WHICH THEY ARE NOT ATTACHED

CLEARANCE OF: \ CONDUCTOR TYPE	EFFECTIVELY GROUNDED NEUTRALS; SPAN & LIGHTNING PROTECTION WIRES; GUYS & MESSENGERS CABLED PRIMARY	INSULATED SUPPLY CABLES 0 – 750 V (TRIPLEX & QUADRUPLEX)	0 – 750 V OPEN WIRE SECONDARY & SERVICES; CABLED PRIMARY	OPEN WIRE PRIMARY 750 V – 22 kV (PHASE TO GROUND)
6. RAILROADS (WHERE WIRES RUN ALONG TRACKS): A HORIZONTAL (FROM NEAREST RAIL)	8.5'	9'	9.5'	11.5'
B. VERTICAL (FROM TOP OF RAILS)	23.5'	24'	24.5'	26.5'
7. GRAIN BINS:			SEE NESC RULE 234.F.	

NOTES:

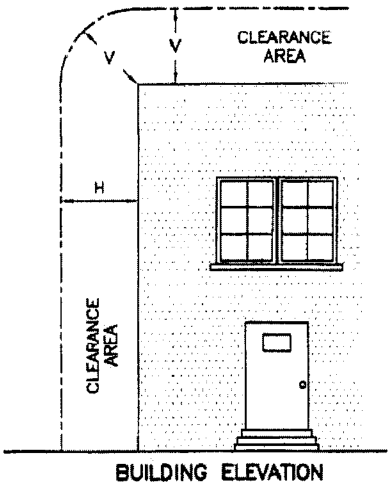
1. THESE CLEARANCES APPLY UNDER WHICHEVER OF THE FOLLOWING CONDUCTOR TEMPERATURE AND LOADING CONDITIONS PRODUCES THE CLOSEST APPROACH:
   A. 120°F FOR CP&L, 180°F FOR FLORIDA POWER, NO WIND DISPLACEMENT, FINAL SAG.
   B. 32°F, NO WIND DISPLACEMENT, FINAL SAG, 1/4" RADIAL ICE THICKNESS.
2. WIND DISPLACEMENT CONSIDERATIONS (HORIZONTAL):
   A. FIGURES SHOWN IN PARENTHESIS ARE MINIMUM CLEARANCES WHERE CONSIDERATION OF HORIZONTAL DISPLACEMENT UNDER WIND CONDITIONS IS REQUIRED. IN APPLYING THESE CLEARANCES, THE CONDUCTOR IS DISPLACED FROM REST TOWARDS THE INSTALLATION BY A 6 PSF WIND AT FINAL SAG AT 60°F.
   B. PERPENDICULAR HORIZONTAL DISTANCE REQUIRED BETWEEN THE LINE AND THE STRUCTURE (BUILDING, ETC.) IS THE GREATER OF THE HORIZONTAL CLEARANCE OR THE SUM OF WIND CLEARANCE PLUS WIND SWING.
   C. SEE CAROLINAS SECTION 05.01 AND FLORIDA SECTION 05.01 FOR CONDUCTOR WIND SWINGS.
3. THIS TABLE DOES NOT APPLY TO BUILDINGS OR INSTALLATIONS IN TRANSIT.
4. THIS TABLE DOES NOT APPLY TO CLEARANCE BETWEEN A SERVICE AND THE BUILDING TO WHICH IT ATTACHES (REFER TO DWG. 09.02-05), BUT DOES APPLY TO CLEARANCE BETWEEN SERVICES AND ADJACENT BUILDINGS.
5. FOR BUILDINGS UNDER CONSTRUCTION, THESE CLEARANCES MUST BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION.
6. REFER TO NATIONAL ELECTRICAL SAFETY CODE RULE 234 FOR EXCEPTIONS AND REFINEMENTS.

REVISED		BY	CK'D	APPR.
3				
2				
1	8/8/05	CECCON	NUNNERY	HOYT
0	7/24/02	HOYT	ROBESON	WOOLSEY

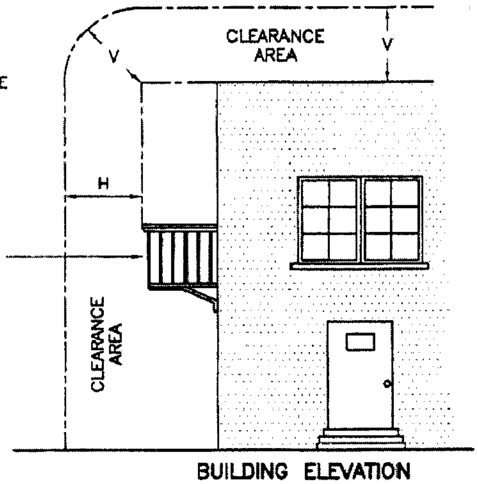
MINIMUM FINAL SAG CLEARANCES TO BUILDINGS, ETC.

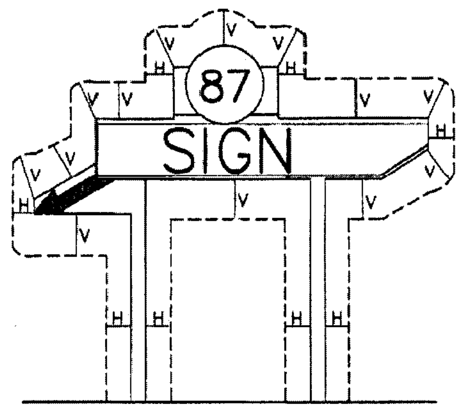
Progress Energy

PGN DWG. 09.01-01B



H = HORIZONTAL CLEARANCE
V = VERTICAL CLEARANCE





*VERTICAL	HORIZONTAL
10.5' (0 TO 750V ø–N)	5.5' (0 TO 750V ø–N)
12.5' (750 TO 22,000V ø–N)	7.5' (750 TO 22,000V ø–N)

NOTES:

1. CONDUCTORS SHALL BE PROPERLY GUARDED WHERE SUCH SUPPLY CONDUCTORS ARE PLACED NEAR ENOUGH TO WINDOWS, FIRE ESCAPES, ETC. TO BE EXPOSED TO CONTACT BY PERSONS.

2. WHERE BUILDINGS EXCEED THREE STORIES (OR 50 FEET) IN HEIGHT, A ZONE AT LEAST 6 FT. WIDE SHOULD EXIST EITHER ADJACENT TO THE BUILDING OR BEGINNING NOT OVER 8 FT. FROM THE BUILDING TO FACILITATE THE RAISING OF LADDERS WHERE NECESSARY FOR FIRE FIGHTING.

   * VERTICAL CLEARANCE ABOVE OR BELOW ROOF ACCESSIBLE TO PEDESTRIANS ADD 1 FT. TO ABOVE VALUES. VERTICAL CLEARANCE ABOVE OR BELOW ROOF ACCESSIBLE TO VEHICLES INCLUDING TRUCKS ADD 6 FT. TO ABOVE VALUES.

   SEE NESC RULE 234.

3. WIND DISPLACEMENT MUST BE CONSIDERED WHEN CHECKING HORIZONTAL CLEARANCES. SEE DWG. 09.01-01B.

REVISED		BY	CK'D	APPR.
3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY

MINIMUM FINAL SAG BUILDING CLEARANCE

Progress Energy

PGN DWG. 09.01-02

OSHA

1910.333(c)(3)(i)(a)

(I) "UNQUALIFIED PERSONS." (A) WHEN AN UNQUALIFIED PERSON IS WORKING IN AN ELEVATED POSITION NEAR OVERHEAD LINES, THE LOCATION SHALL BE SUCH THAT THE PERSON AND THE LONGEST CONDUCTIVE OBJECT HE OR SHE MAY CONTACT CANNOT COME CLOSER TO ANY UNGUARDED, ENERGIZED OVERHEAD LINE THAN THE FOLLOWING DISTANCES:

1910.333(c)(3)(i)(A) {1}

{1} FOR VOLTAGES TO GROUND 50kV OR BELOW – 10 FEET (305 CM);

1910.333(c)(3)(i)(A) {2}

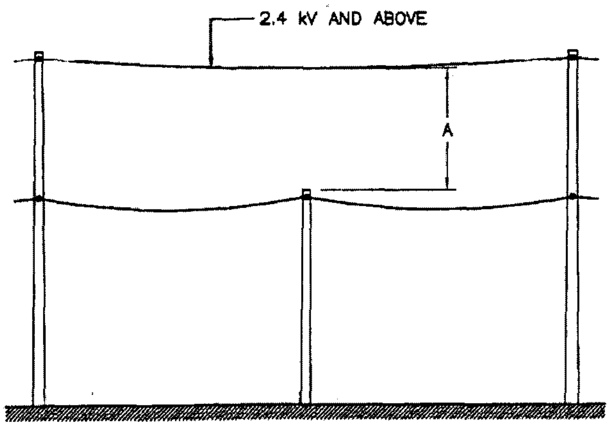
{2} FOR VOLTAGES TO GROUND OVER 50kV – 10 FEET (305 CM) PLUS 4 INCHES (10 CM) FOR EVERY 10kV OVER 50kV.

1910.333(c)(3)(i)(B)

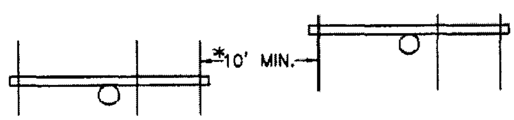
(B) WHEN AN UNQUALIFIED PERSON IS WORKING ON THE GROUND IN THE VICINITY OF OVERHEAD LINES, THE PERSON MAY NOT BRING ANY CONDUCTIVE OBJECT CLOSER TO UNGUARDED, ENERGIZED OVERHEAD LINES THAN THE DISTANCES GIVEN IN PARAGRAPH (c)(3)(i)(A) OF THIS SECTION.

NOTE: FOR VOLTAGES NORMALLY ENCOUNTERED WITH OVERHEAD POWER LINE, OBJECTS WHICH DO NOT HAVE AN INSULATING RATING FOR THE VOLTAGE INVOLVED ARE CONSIDERED TO BE CONDUCTIVE.

MINIMUM CLEARANCE BETWEEN OVERHEAD PRIMARY CIRCUITS AND UNDERBUILT POLES



HORIZONTAL CLEARANCE FOR PARALLEL LINES UP TO 25kV
* PREFERRED DISTANCE



"A" = 4.5 FEET FOR VOLTAGES 0 TO 22 kV ø–G
= 5.5 FEET FOR VOLTAGES 22 TO 50 kV ø–G (69 kV)
= 7 FEET FOR VOLTAGES 70 kV ø–G (115 kV)
= 9 FEET FOR 140 kV ø–G (230 kV)

A MINIMUM VERTICAL CLEARANCE "A" SHALL BE MAINTAINED BETWEEN UNINSULATED PRIMARY CONDUCTORS OF ONE LINE AND ANY PART OF CLIMBABLE SUPPORTING STRUCTURES OF ANOTHER LINE INSTALLED BELOW THE PRIMARY. THIS MINIMUM CLEARANCE SHALL BE MAINTAINED FOR CONDUCTOR SAG AT MAXIMUM OPERATING TEMPERATURE, NO WIND.

YOU MAY SUBTRACT 2 FT. FROM DIMENSION "A" IF THE FOLLOWING 2 CONDITIONS ARE MET:

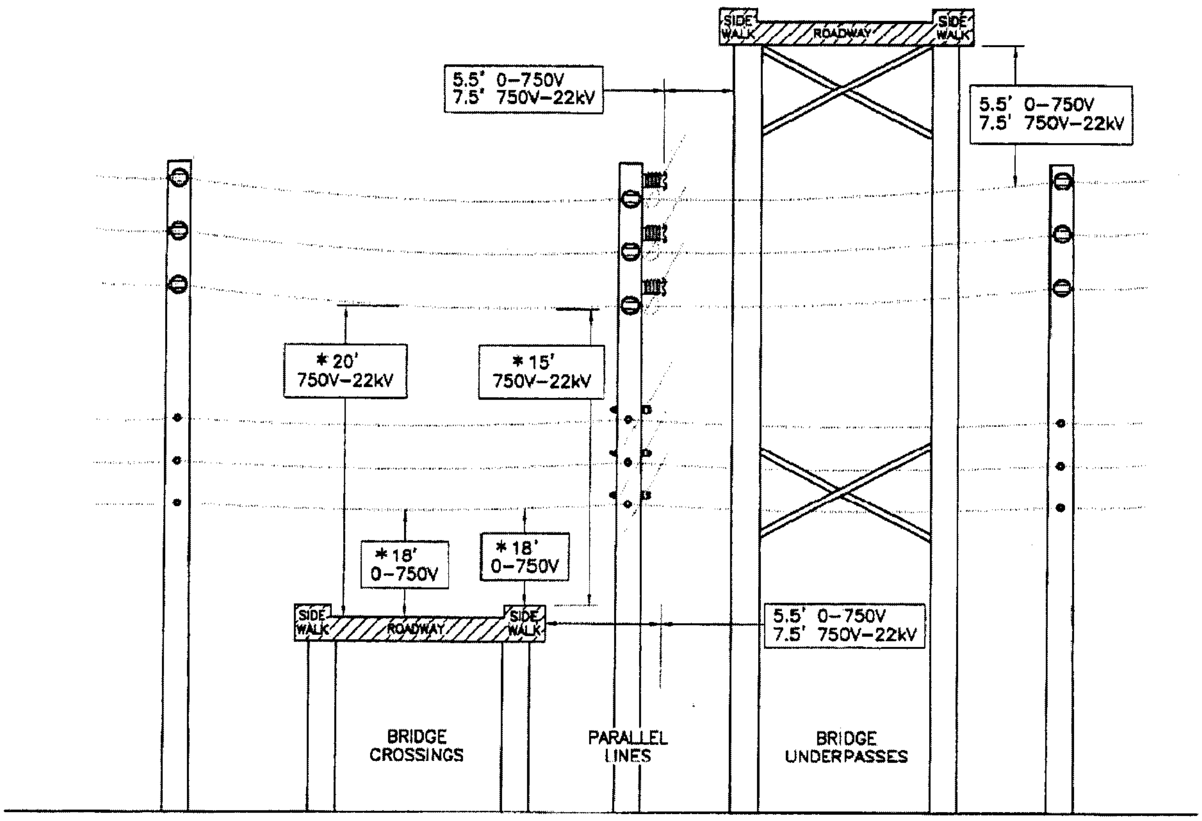
1. BOTH TOP AND BOTTOM CIRCUITS ARE OPERATED AND MAINTAINED BY THE SAME COMPANY.
2. EMPLOYEES WILL NOT BE WORKING ABOVE THE INTERMEDIATE POLE WHILE THE UPPER LINE IS ENERGIZED.

REVISED		BY	CK'D	APPR.
3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY

FINAL SAG CLEARANCE DIAGRAM FOR OTHER STRUCTURES

Progress Energy

PGN DWG. 09.01–03



NOTE: ALL VOLTAGES ARE ø–G.

IF WIRE CROSSINGS ARE INVOLVED, SEE "MINIMUM WIRE CROSSING CLEARANCES" IN THIS SECTION. DIMENSIONS GIVEN ARE MINIMUMS. ADDITIONAL CLEARANCE SHOULD BE PROVIDED IF POSSIBLE. BRIDGE CROSSINGS HERE ARE NOT OVER NAVIGABLE WATERWAYS.

DOT OR HIGHWAY PERMITS MAY DICTATE CLEARANCE HEIGHTS.

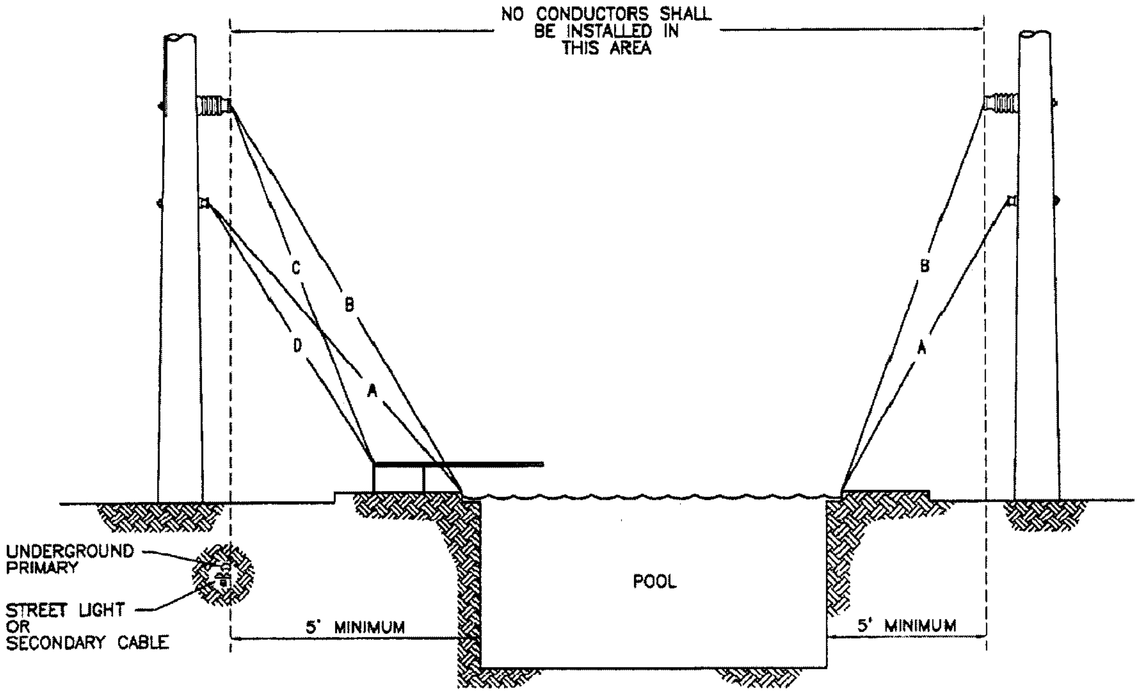
*THESE CLEARANCES ARE TO THE ROADWAY SURFACE OF THE BRIDGE.

REVISED		BY	CK'D	APPR.
3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY

MINIMUM FINAL SAG CLEARANCES FROM BRIDGES

Progress Energy

PGN DWG. 09.01–04



ANGLE	CABLE SECONDARY AND NEUTRAL CONDUCTORS 0-750 VOLTS TO GROUND	ALL OTHER CONDUCTORS 0-22 kV TO GROUND
A	22.5 FT.	25 FT.
B		25 FT.
C		17 FT.
D	14.5 FT.	17 FT.

POOL CONTRACTORS MUST MEET THE GREATER OF THE FOLLOWING CODES:

1. PROGRESS ENERGY POOL CLEARANCE POLICY.
2. CITY AND/OR COUNTY ELECTRICAL CODES.
3. STATE ELECTRICAL CODES.

NOTES:

1. FIVE (5) FEET MINIMUM MUST ALSO BE MAINTAINED FOR UNDERGROUND PRIMARY AND SECONDARY CABLES.
2. SEE DWG. 09.01-01A, "MINIMUM FINAL SAG CLEARANCE TO BUILDINGS, ETC." IN THIS SECTION FOR POOLS FULLY ENCLOSED BY A SOLID OR SCREENED STRUCTURE.
3. SECONDARY AND SERVICE CABLES LOCATED 10' OR MORE HORIZONTALLY FROM THE POOL EDGE, DIVING PLATFORM OR TOWER ARE EXEMPT FROM SWIMMING POOL CLEARANCE REQUIREMENTS. SEE DWG. 09.01-01A, "MINIMUM FINAL SAG CLEARANCES TO BUILDINGS, ETC." FOR ACTUAL CLEARANCE REQUIREMENTS.

REVISED		BY	CK'D	APPR.
3				
2	7/28/03	ROBESON	HUNNERY	WOOLSEY
1	8/19/02	HOYT	ROBESON	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY

FINAL SAG CLEARANCE OF ENERGIZED CONDUCTORS NEAR SWIMMING POOL AREAS

Progress Energy

PGN DWG. 09.01-05

NATURE OF SURFACE UNDERNEATH WIRES CONDUCTORS, OR CABLES	INSULATED COMMUNICATION CONDUCTORS AND CABLES; MESSENGERS; GROUNDED GUYS; NEUTRAL CONDUCTORS, (FT.) NESC MINIMUM REQUIRED	SERVICE & SECONDARY CABLE, NON-INSULATED COMMUNICATION CONDUCTORS, 0 TO 750 V (FT.) NESC MINIMUM REQUIRED	OPEN WIRE SERVICE / SECONDARY CONDUCTORS, 0 TO 750 V (FT.) NESC MINIMUM REQUIRED	OVERHEAD PRIMARY CONDUCTORS, OVER 750V TO 22kV (FT.) NESC MINIMUM REQUIRED
1. ROADS, STREETS, AND OTHER AREAS SUBJECT TO TRUCK TRAFFIC	15.5 (SEE NOTE 6)	16 (SEE NOTE 6)	16.5 (SEE NOTE 6)	18.5 (SEE NOTE 6)
2. DRIVEWAYS, PARKING LOTS, AND ALLEYS	15.5	16	16.5	18.5
3. OTHER LAND TRAVERSED BY VEHICLES, SUCH AS CULTIVATED, GRAZING, FOREST, ORCHARD, ETC.	15.5	16	16.5	18.5
4. SPACES AND WAYS SUBJECT TO PEDESTRIANS OR RESTRICTED TRAFFIC ONLY	9.5	12.0	12.5	14.5
5. WATER AREAS NOT SUITABLE FOR SAILBOATING OR WHERE SAILBOATING IS PROHIBITED	14.0	14.5	15.0	17.0
6. WATER AREAS SUITABLE FOR SAILBOATING INCLUDING LAKES, PONDS, RESERVOIRS, TIDAL WATERS, RIVERS, STREAMS, AND CANALS WITH AN UNOBSTRUCTED SURFACE AREA OF:				
A. LESS THAN 20 ACRES	17.5	18.0	18.5	20.5
B. OVER 20 TO 200 ACRES	25.5	26.0	26.5	28.5
C. OVER 200 TO 2000 ACRES	31.5	32.0	32.5	34.5
D. OVER 2000 ACRES	37.5	38.0	38.5	40.5
7. PUBLIC OR PRIVATE LAND AND WATER AREAS POSTED FOR RIGGING OR LAUNCHING SAILBOATS	CLEARANCE ABOVE GROUND SHALL BE 5 FT. GREATER THAN IN 6 ABOVE, FOR THE TYPE OF WATE AREAS SERVED BY THE LAUNCHING SITE.			
WHERE WIRES, CONDUCTORS, OR CABLES RUN ALONG AND WITHIN THE LIMITS OF HIGHWAYS OR OTHER ROAD RIGHT-OF-WAY BUT DO NOT OVERHANG THE ROADWAY				
8. ROADS, STREETS, OR ALLEYS	15.5	16.0	16.5	18.5
9. ROADS IN RURAL DISTRICTS WHERE IT IS UNLIKELY THAT VEHICLES WILL BE CROSSING UNDER THE LINE	13.5	14.0	14.5	16.5

NOTES:

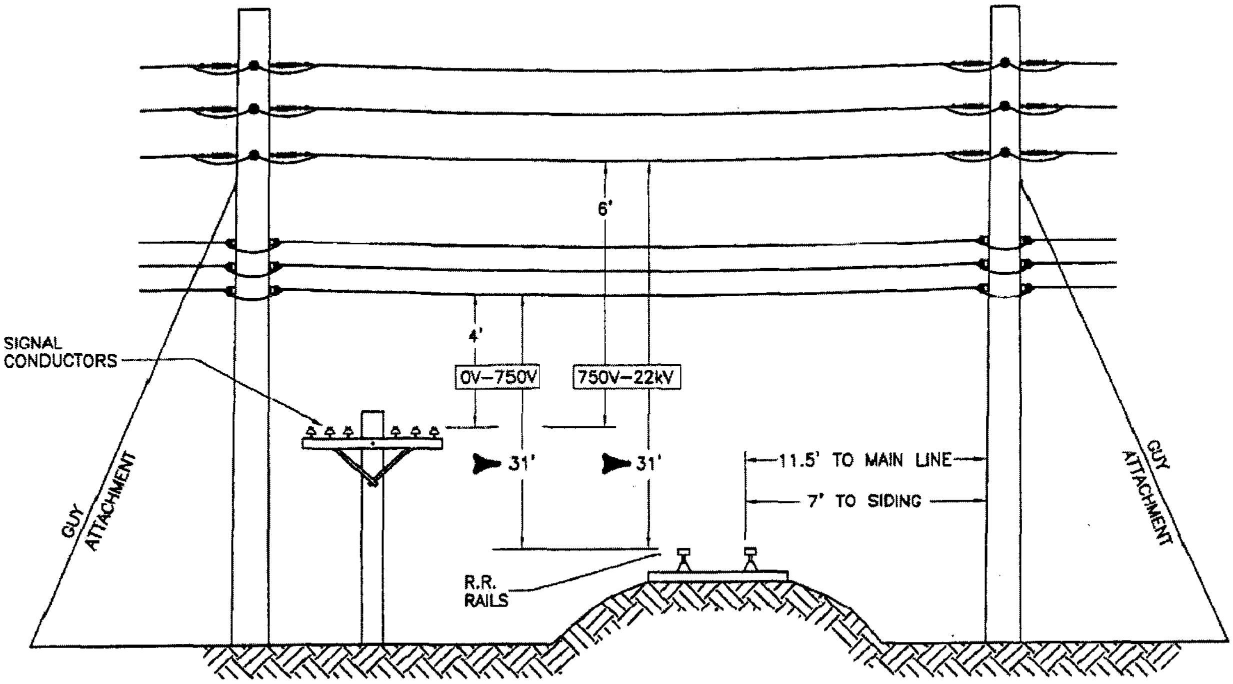
1. THE ABOVE MINIMUM CLEARANCES IN THE TABLE MUST BE MET USING THE FOLLOWING ICE AND WIND CONDUCTOR LOADING. THE VALUES CAN BE FOUND IN THE SAG AND TENSION TABLES FOR EACH COMPANY:
   FLORIDA: CONDUCTOR TEMPERATURE 170°F, NO WIND DISPLACEMENT
   CAROLINAS: USE THE FOLLOWING LOADING CONDITION THAT PRODUCES THE GREATEST SAG.
   –CONDUCTOR TEMPERATURE 120°F AND NO WIND DISPLACEMENT, OR
   –32°F WITH 1/4" ONCE, NO WIND DISPLACEMENT.
2. 8 FT. FOR DOWN GUYS OVER PATHWAYS, 10 FT. OR MORE PREFERRED.
3. SEE NESC RULE 234.I WHERE CONDUCTORS RUN ALONG OR ARE CLOSER THAN 20 FT. HORIZONTALLY TO TRACK RAILS. CONSIDER SWING DUE TO WIND (NESC RULE 234.A.2). ALSO, RAILROADS REQUIRE 50 FT. MINIMUM VERTICAL CLEARANCE WHEN LINE CROSSES RAILS WITHIN 1000 FT. OF RAILROAD, BRIDGE OR TRESTLE.
4. REFER TO NATIONAL ELECTRICAL SAFETY CODE (NESC) RULE 232 FOR MINOR EXCEPTIONS AND REFINEMENTS. ALSO REFER TO SERVICE CLEARANCE DWGS. 09.02-04 & 09.02-05 FOR MORE DETAILS ON SERVICE CLEARANCES.
5. WHERE HEIGHT OF ATTACHMENT TO BUILDING DOES NOT PERMIT TRIPLEX SERVICE DROPS TO MEET THIS VALUE, THE CLEARANCE MAY BE REDUCED TO 12 FT.
6. THE MINIMUM VERTICAL CLEARANCE OF ALL CONDUCTORS, CABLES, GUYS, ETC. MUST BE MAINTAINED AT 18 FEET FOR DOT MAINTAINED HIGHWAYS IN THE CAROLINAS AND FLORIDA. A 24 FOOT CLEARANCE IS REQUIRED ON ALL LIMITED ACCESS HIGHWAYS IN FLORIDA.
7. FOR BRIDGES, THE MINIMUM VERTICAL CLEARANCE (ABOVE BRIDGE CLEARANCE AS ESTABLISHED BY THE U.S. COAST GUARD) FOR CABLES WITH A NOMINAL SYSTEM VOLTAGE OF 115 KV AND BELOW IS 20 FEET.

REVISED		BY	CK'D	APPR.
4	10/7/05	NUNNERY	GUINN	HOYT
3	11/5/03	ROBESON	NUNNERY	WOOLSEY
2	4/4/03	ROBESON	SIMPSON	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY

STANDARD FINAL SAG CLEARANCES

Progress Energy

PGN DWG. 09.02-01



NOTES:

1. ABOVE 22,000 VOLTS, CLEARANCE SHALL BE INCREASED BY 0.4 INCH FOR EACH 1,000 VOLTS IN EXCESS.
2. LOCAL RAILROAD(S) MUST BE CONTACTED FOR VERIFICATION OF HORIZONTAL CLEARANCES.

3				
2				
1	4/3/03	ROBESON	SIMPSON	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY
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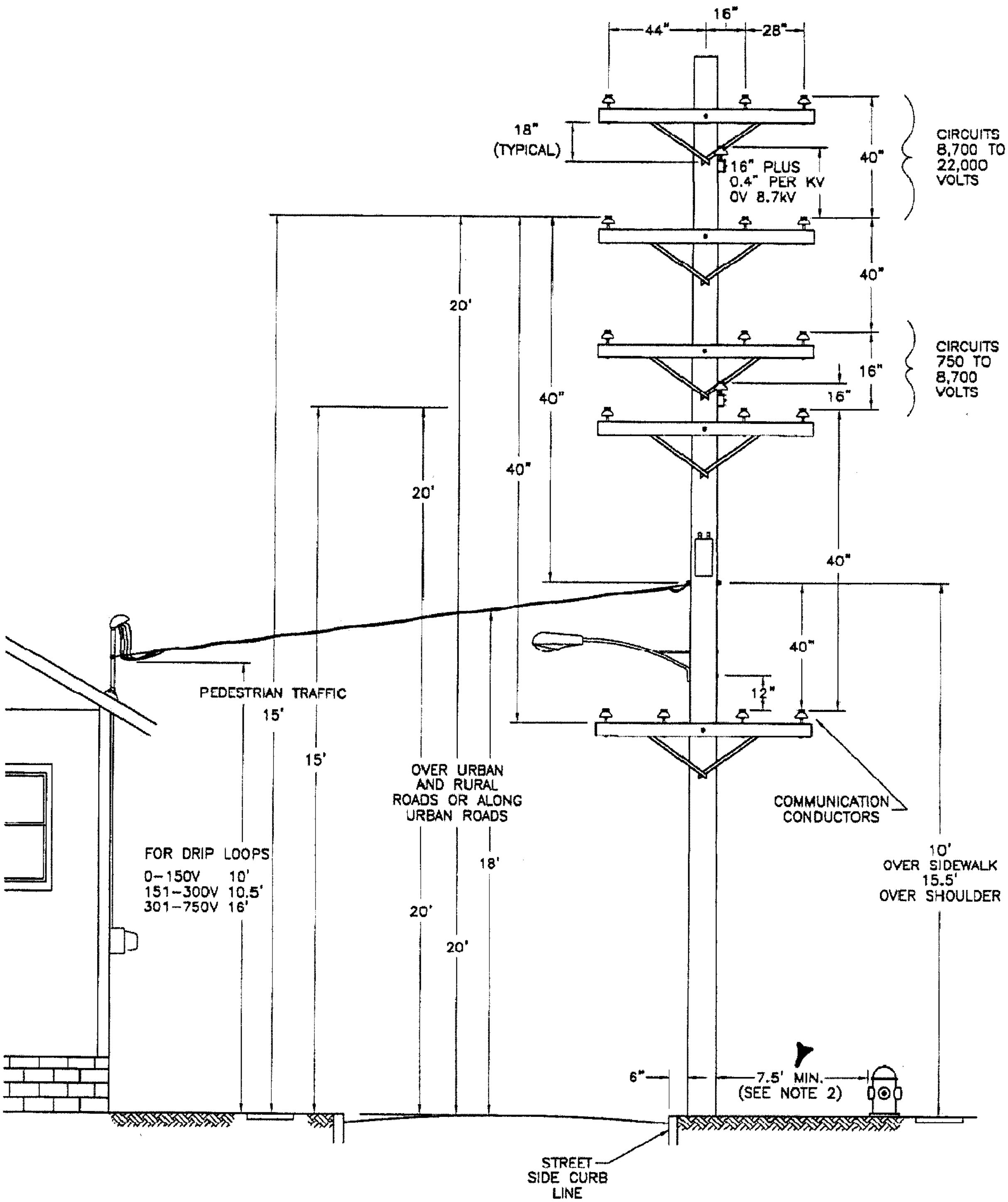
MINIMUM FINAL SAG CLEARANCES
RAILROAD AND SIGNAL CROSSINGS

Progress Energy

PGN DWG. 09.02–02



NOTES:

1. ALL VOLTAGES ARE MAXIMUM TO GROUND ON GROUNDED SYSTEMS, AND PHASE TO PHASE ON DELTA SYSTEMS.

2. IN CAROLINAS, THIS CLEARANCE CAN BE REDUCED TO 3' WHERE CONDITIONS DO NOT PERMIT 7.5'. IN FLORIDA, THIS CLEARANCE CAN ONLY BE REDUCED BELOW 7.5' WITH APPROVAL OF LOCAL FIRE AUTHORITY.

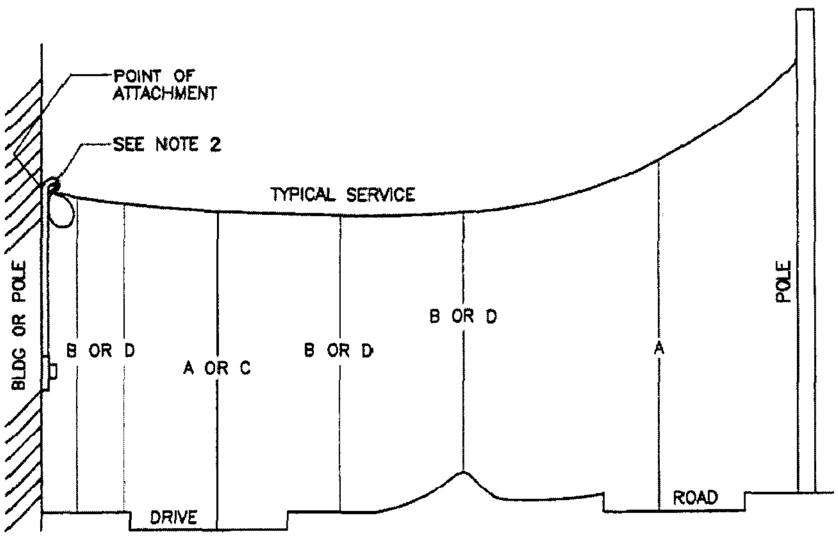
3				
2	8/18/06	GUINN	GUINN	HOYT
1	6/6/06	GUINN	GUINN	HOYT
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

MINIMUM FINAL SAG CLEARANCES FOR CONDUCTOR

Progress Energy

PGN DWG. 09.02–03

MINIMUM REQUIRED HEIGHTS FOR NEW SERVICES



CONDITION	MINIMUM REQUIRED HEIGHT
A. OVER STREETS, ROADS, NON-RESIDENTIAL DRIVES, COMMERCIAL AREAS, AND PARKING LOTS SUBJECT TO TRUCK TRAFFIC.	18.0'
B. OVER OTHER LAND TRAVERSED BY VEHICLES SUCH AS FARM, GRAZING, FOREST, ETC.	18.0'
C. OVER RESIDENTIAL DRIVEWAYS. (SEE NOTES 4 AND 6)	16.0'
D. OVER FINISHED GRADE, PLATFORMS, AND/OR OTHER SPACES IF NOT NORMALLY TRAVERSED BY VEHICLES.	12.0'

NOTES:

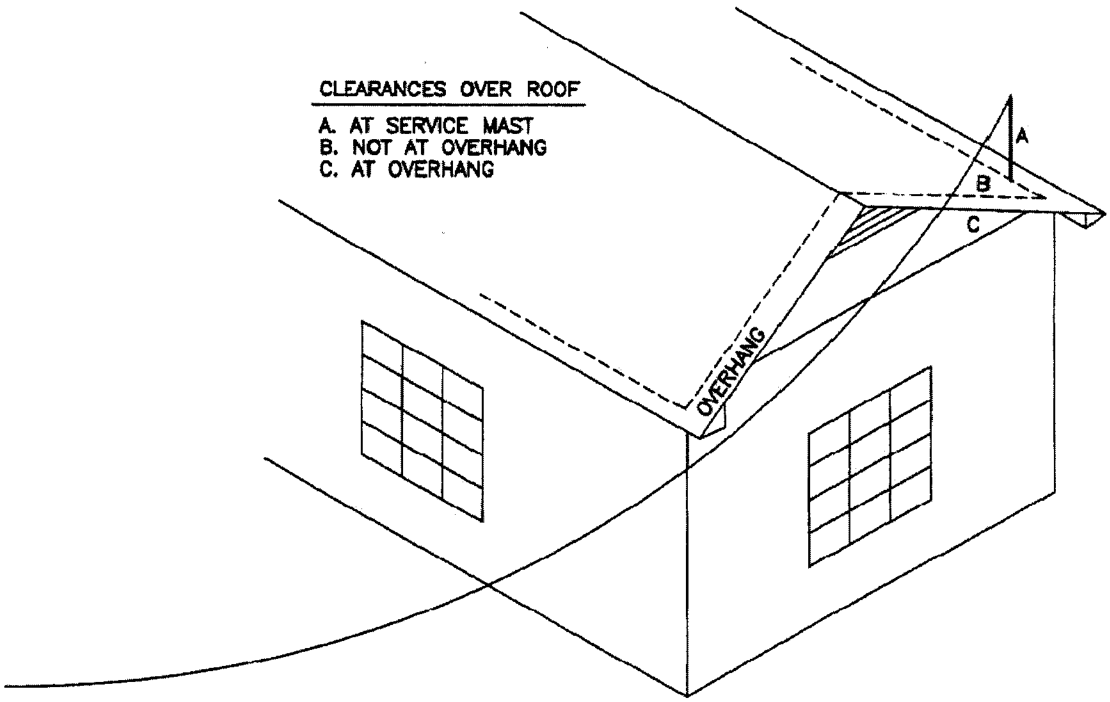
1. THE ABOVE TABLE GIVES REQUIRED MINIMUM INSTALLATION HEIGHTS. THESE INSTALLATION HEIGHTS ARE APPLICABLE TO SERVICE DROP MULTIPLEX CABLES INSTALLED USING THE STANDARD SAGS FOR NORMAL STRINGING TEMPERATURES.
2. POINT OF ATTACHMENT OF SERVICE DROP AT BOTH BUILDING AND POLE MUST BE AT A HEIGHT SUFFICIENT TO ACHIEVE NESC REQUIRED MINIMUM CLEARANCES. REFER TO NESC RULE 232 FOR MINOR EXCEPTIONS AND REFINEMENTS.
3. SERVICE HEAD SHALL BE LOCATED ABOVE THE POINT OF ATTACHMENT OF THE SERVICE DROP CONDUCTORS TO THE STRUCTURE. EXCEPTION: WHEN THIS IS NOT PRACTICABLE, IT MAY BE LOCATED NOT OVER 24" FROM POINT OF ATTACHMENT (SEE NEC 230-54C AND F).
4. REQUIRED GROUND CLEARANCE FOR INSULATED DRIP LOOPS IS 10 FT. FOR UP TO 150V SERVICES, AND 10.5 FT. FOR UP TO 300V SERVICES AND 16' FOR SERVICES 301-750V.
5. THIS TABLE IS FOR MULTIPLEX (TRIPLEX AND QUADRUPLEX - I.E. "CABLED") SERVICE DROPS. FOR "OPEN WIRE" (UNINSULATED) SERVICE CONDUCTOR CLEARANCES, REFER TO DWG. 09.02-01.
6. WHERE HEIGHT OF ATTACHMENT TO BUILDING WILL NOT PERMIT THIS HEIGHT FOR TRIPLEX SERVICES, THIS HEIGHT MAY BE REDUCED TO 12.5 FT.

REVISED		BY	CK'D	APPR.
3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY

SERVICE DROP MINIMUM
FINAL SAG CLEARANCES
ABOVE GROUND

Progress Energy

PGN DWG. 09.02-04



1. VERTICAL CLEARANCES OF NEW SERVICES TO BUILDINGS AT LOCATIONS A, B, AND C AS SHOWN ABOVE MUST MEET THE FOLLOWING MINIMUM CLEARANCES FOR THE HIGHEST VOLTAGE BETWEEN ANY TWO CONDUCTORS.

CLEARANCES	LOCATION	MIN. AT 60° FINAL SAG	
		0–300V	300–600V
A OR B	OVER FLAT OR READILY ACCESSIBLE ROOF	8'	8'
A OR B	OVER SLOPED ROOF WHICH IS NOT READILY ACCESSIBLE	36"	8'
C	OVER OVERHANG PORTION OF ROOF (NO MORE THAN 4' OF CABLE)	18"	8'

2. A ROOF IS CONSIDERED READILY ACCESSIBLE WHEN ACCESS IS THRU A DOORWAY, RAMP, STAIRWAY, OR PERMANENTLY MOUNTED LADDER. A SLOPED ROOF IS ONE WHERE ROOF RISES 4" OR MORE IN 12" OF HORIZONTAL DISTANCE.

3. SERVICES MUST NOT BE INSTALLED WITHOUT SPECIFICATION CLEARANCES. FOR INSTALLATIONS SIMILAR TO SKETCH, SERVICE MAST SHOULD BE TALLER AND STRONGER, OR LOCATED NEAR CORNER. IF PRACTICAL, SERVICE SHOULD BE ATTACHED ON SIDE OF BUILDING WHERE IT DOES NOT CROSS THE ROOF. METER MAY BE ON SIDE OF BUILDING OR MAY BE PUT JUST AROUND THE CORNER BY CUSTOMER EXTENDING CONDUIT AROUND THE CORNER. SERVICES OF ALL VOLTAGES MAY BE ATTACHED TO THE SIDE OF BUILDINGS.

4. SERVICES SHALL ALSO HAVE 3' CLEARANCE IN ANY DIRECTION FROM WINDOWS, DOORS, PORCHES, OR SIMILAR LOCATIONS, EXCEPT THIS DOES NOT APPLY TO MULTIPLEX CONDUCTORS ABOVE THE TOP LEVEL OF A WINDOW OR TO WINDOWS NOT DESIGNED TO OPEN. PER NESC 234C4c(2)

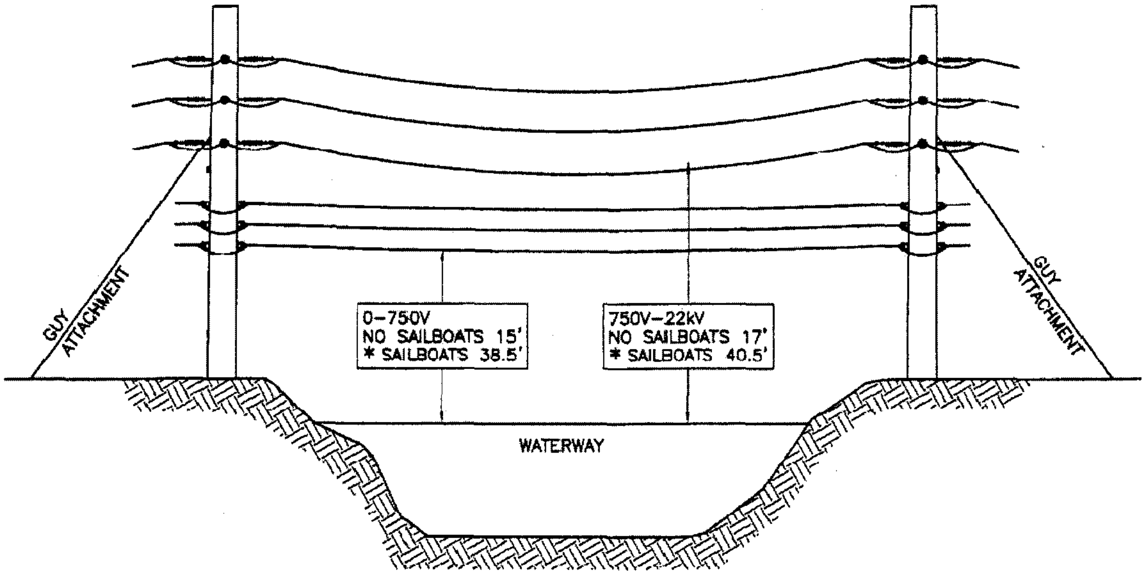
5. POINT OF ATTACHMENT OF SERVICE TO BUILDING SHALL BE HIGH ENOUGH TO PROVIDE THE GROUND CLEARANCES OF DWG. 09.02–04, BUT SHALL NOT EXCEED 25' ABOVE GRADE AT TIME OF INSTALLATION AND SHALL NOT REQUIRE THE USE OF A LADDER ON CARPORT OR OTHER ROOF.

3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

DETAILS OF SERVICE FINAL SAG CLEARANCES

Progress Energy

PGN DWG. 09.02–05



DOUBLE DEADENDS ARE REQUIRED FOR ANY WATERWAY CROSSING.

SPECIAL CROSSING PERMIT CLEARANCES SHALL TAKE PRECEDENCE OVER THESE CLEARANCES.

* WHERE THE US ARMY CORPS OF ENGINEERS, OR THE STATE, OR SURROGATE THEREOF HAS ISSUED A CROSSING PERMIT, CLEARANCES OF THAT PERMIT SHALL GOVERN.

* THESE SAILBOAT CLEARANCES OVER NAVIGABLE WATERS PROVIDED NO BRIDGE CROSSINGS ARE ALSO INVOLVED. WHERE THERE IS ALSO A BRIDGE CROSSING, THESE CORPS OF ENGINEERS' CLEARANCES MUST BE MAINTAINED OVER THE BRIDGE RATHER THAN WATER.

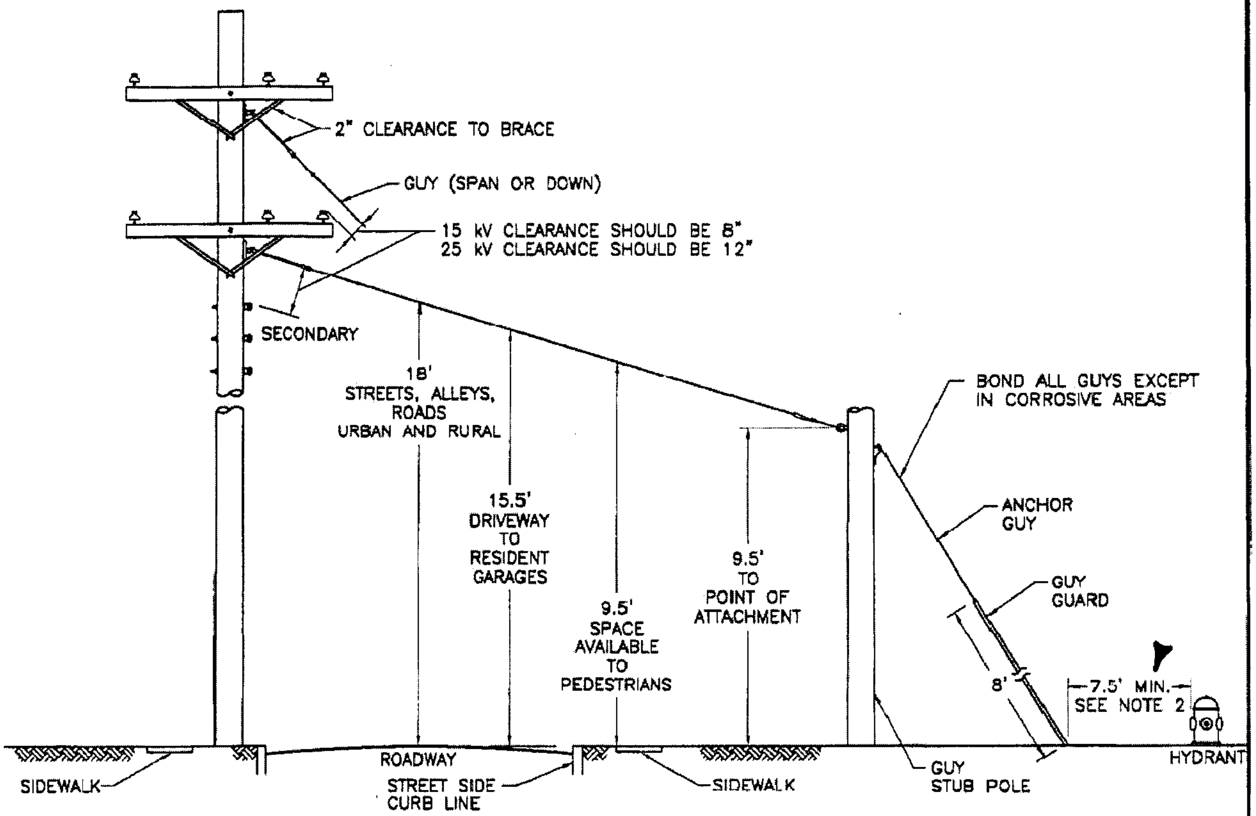
<u>NOTE:</u> CONSULT ENGINEERING FOR MANUAL GUYING REQUIREMENTS.

REVISED		BY	CK'D	APPR.
3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY

MINIMUM FINAL SAG CLEARANCES OVER WATERWAYS

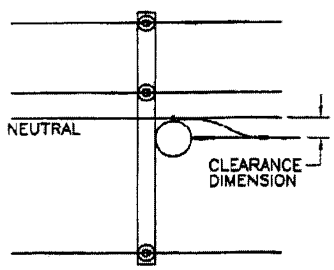
Progress Energy

PGN DWG. 09.02-06



MINIMUM CLEARANCE SPECIFICATION FOR THE INSTALLATION
OF GUYS ON THE COMPANY'S DISTRIBUTION SYSTEM

1. GUY CLEARANCES FROM SUPPLY CONDUCTORS ATTACHED TO THE SAME STRUCTURE



TYPE OF GUY	** MINIMUM CLEARANCES IN ALL DIRECTIONS TO CONDUCTORS		
	TO SECONDARY	15 kV	25 kV
SPAN GUY PARALLEL TO SUPPLY CONDUCTORS	12"	15"	18"
ANCHOR GUYS PARALLEL TO SUPPLY CONDUCTORS	6"***	8"	12"
OTHER GUYS (i.e. SPAN GUY NOT PARALLEL)	6"	9"	12"

** USE OF A GUY INSULATOR DOES NOT REDUCE THIS MINIMUM CLEARANCE REQUIREMENT EXCEPT WHERE DOWN GUYS ARE INSULATED FROM SECONDARIES USING SECONDARY SPOOLS.

*** 6" CLEARANCE FROM MULTIPLEX TO ANCHOR GUYS IF PRACTICAL. IN NO CASE SHALL IT BE LESS THAN 3".

NOTE: THE ABOVE CLEARANCES ARE BETWEEN THE CONDUCTOR AND THE GUY. DOWN GUYS ATTACHED DIRECTLY TO THRU BOLTS ON OPPOSITE SIDE OF POLE FROM DEAD END OR VERTICAL ANGLE ASSEMBLIES WILL MEET THE ABOVE CLEARANCE REQUIREMENTS.

2. GUY CLEARANCES TO BUILDINGS AND OTHER STRUCTURES, VERTICAL GROUND CLEARANCES, CROSSING CLEARANCES, AND CLEARANCES TO CONDUCTORS ON DIFFERENT SUPPORTS ARE COVERED IN CAROLINAS **SECTION 02** OR FLORIDA **SECTION 02.**

3. FOR MINOR EXCEPTIONS, SEE TABLES 232-1, 235-6, AND 239-2 OF THE NESC.

NOTES:

1. THE USE OF GUY INSULATORS DOES NOT NEGATE OR REDUCE ANY OF THE DIMENSIONS ON THIS PAGE.

2. IN CAROLINAS, THIS CLEARANCE CAN BE REDUCED TO 3' WHERE CONDITIONS DO NOT PERMIT 7.5'. IN FLORIDA, THIS CLEARANCE CAN ONLY BE REDUCED BELOW 7.5' WITH APPROVAL OF LOCAL FIRE AUTHORITY.

3				
2	8/18/08	CECCONI	GUINN	HOYT
1	3/4/04	ROBESON	NUNNERY	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

MINIMUM GUY CLEARANCE

Progress Energy

PGN DWG. 09.02-07

LOWER LEVEL	UPPER LEVEL				
	COMMUNICATION GUYS, SPAN WIRES AND MESSENGERS, COMMUNICATION CONDUCTORS AND CABLES (FT.)	EFFECTIVELY GROUNDED GUYS, SPAN WIRES, NEUTRAL CONDUCTORS AND LIGHTNING PROTECTION WIRES (FT.)	MULTIPLEX SECONDARY AND ALL SERVICES	OPEN WIRE SECONDARY, 0-750V	OPEN SUPPLY CONDUCTORS OVER 750V TO 22 kV (FT.)
EFFECTIVELY GROUNDED GUYS, SPAN WIRES, NEUTRAL CONDUCTORS AND LIGHTNING PROTECTION WIRES	2	2	2	2	4 SEE NOTE 5
COMMUNICATION GUYS, SPAN WIRES AND MESSENGERS; COMMUNICATION CONDUCTORS AND CABLES	2	2	2	4	5 SEE NOTE 3
MULTIPLEX SECONDARY AND ALL SERVICES	2	2	2	4 SEE NOTE 5	4 SEE NOTE 5
OPEN WIRE SECONDARY, 0-750 V	4	2	2	2	4 SEE NOTE 5
OPEN SUPPLY CONDUCTORS, 750 V TO 22 kV	6 SEE NOTE 3, 6	2	4 SEE NOTE 6	4 SEE NOTE 5	4 SEE NOTE 5

NOTES:

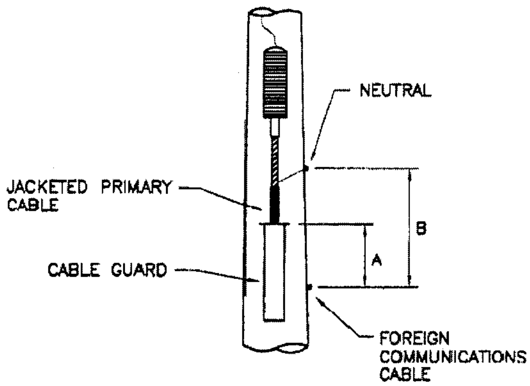
1. NO VERTICAL CLEARANCE IS REQUIRED BETWEEN WIRES ELECTRICALLY INTERCONNECTED AT THE CROSSING.
2. THE ABOVE CLEARANCES ARE FOR ANY LOCATION WHERE THE SUBJECT WIRES CROSS OR COULD BE CLOSEST TOGETHER, REGARDLESS OF SPAN LENGTHS. REFER TO NESC RULE 233.A.1 FOR APPLICABLE WIRE LOADING CONDITIONS TO USE IN DETERMINING WIRE POSITIONS AT CROSSING OR CLOSEST POINT.
3. MAY BE 4 FT. WHERE CROSSING IS MORE THAN 6 FT. HORIZONTALLY FROM A COMMUNICATION STRUCTURE AND VOLTAGE IS LESS THAN 8.7 kV PHASE-TO-GROUND.
4. VOLTAGES ARE PHASE-TO-GROUND FOR EFFECTIVELY GROUNDED WYE AND SINGLE-PHASE SYSTEMS, AND PHASE-TO-PHASE FOR ALL OTHER SYSTEMS.
5. PROGRESS ENERGY PREFERRED CLEARANCES ARE SHOWN.
6. IN GENERAL, CROSSINGS OF LOWER VOLTAGE WIRES ABOVE HIGHER VOLTAGE WIRES IS NOT RECOMMENDED. HIGHER VOLTAGE WIRES SHOULD BE POSITIONED ABOVE LOWER VOLTAGE WIRES WHENEVER POSSIBLE.
7. WHEN CONTEMPLATING UNDERBUILDING BENEATH PROGRESS ENERGY TRANSMISSION LINES, CONTACT THE TRANSMISSION LINE ENGINEERING UNIT.
8. FOR EXCEPTIONS AND REFINEMENTS, REFER TO NATIONAL ELECTRICAL SAFETY CODE RULE 233.
9. THE AREA BETWEEN THE NEUTRAL AND PRIMARY ON THE POLE AND IN THE SPAN IS NOT TO BE VIOLATED BY FOREIGN CONDUCTORS OR CABLES.

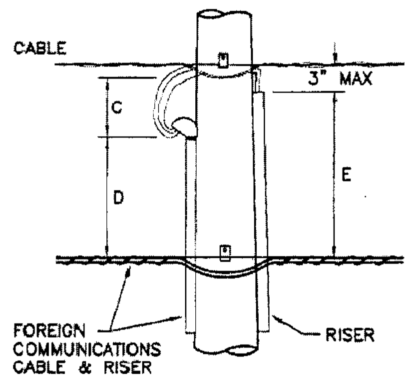
REVISED		BY	CK'D	APPR.
3				
2				
1	12/1/03	NUNNERY	NUNNERY	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY

MINIMUM FINAL SAG WIRE CROSSING CLEARANCES, VERTICAL

Progress Energy

PGN DWG. 09.03-01





DIMENSION (LETTER)	PREFERRED MINIMUM
A	*40 INCHES
B	40 INCHES
C	16 INCHES
D	40 INCHES
E	40 INCHES

*40 INCH CLEARANCE REQUIRED. ONLY FOR METALLIC CONDUCTOR OR U–GUARD NOT BONDED TO COMMUNICATIONS MESSENGER. SEE OH–UG TRANSITION SECTION FOR NON–METALLIC CONDUIT OR U–GUARD CLEARANCE.

REVISED		BY	CK'D	APPR.
3				
2				
1	9/12/02	HOYT	ROBESON	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY

SEPARATION AT POLE
UNDERGROUND RISERS

Progress Energy

PGN DWG. 09.03–02

GENERAL

1. ANYONE REQUESTING AUTHORIZATION TO INSTALL AND MAINTAIN ATTACHMENTS ON PROGRESS ENERGY POLES SHALL SUBMIT THE APPROPRIATE EXHIBIT (PERMIT) AND/OR WRITTEN NOTIFICATION TO THE JOINT USE UNIT BEFORE ANY FACILITIES CHANGES ARE MADE. A PERMIT IS REQUIRED IN ORDER TO MAINTAIN ACCURATE ATTACHMENT INVENTORIES AND TO OBTAIN TECHNICAL DATA NECESSARY TO REVIEW THE ADEQUACY OF EXISTING DISTRIBUTION AND/OR TRANSMISSION SYSTEM FACILITIES. POLE UTILIZATION REQUIRING PERMITS INCLUDE: INSTALLATION OF NEW ATTACHMENTS, REMOVAL OF EXISTING ATTACHMENTS, UPGRADE TO LARGER CABLE, LASHING OF NEW CABLES TO EXISTING MESSENGERS, REBUILDS OF CABLE SYSTEMS, LARGE SCALE RELOCATIONS FOR ROAD WIDENING, ETC. AND INSTALLATION OF SERVICE DROPS ON LIFT POLES. SERVICE DROPS MAY BE PERMITTED MONTHLY ON ONE "AFTER THE FACT" PERMIT. MODIFICATIONS TO EXISTING FACILITIES WHICH REQUIRE ONLY NOTIFICATION IN WRITING INCLUDE: RELOCATION/REARRANGEMENT OF CABLES ON EXISTING POLES.

2. ALL PERMITTED ATTACHMENTS SHALL BE ON THE SAME SIDE OF THE POLE AS THE SECONDARY OR NEUTRAL, EXCEPT WHEN APPROVED IN WRITING BY PROGRESS ENERGY. PROGRESS ENERGY SHALL MAKE EVERY ATTEMPT TO INSTALL REPLACEMENT POLES ON THE FIELD SIDE OF EXISTING FOREIGN ATTACHMENTS.

3. NO PERMANENT CLIMBING AIDS ARE ALLOWED ON PROGRESS ENERGY POLES.

4. MESSENGER CABLE(S) SHALL BE BONDED WITH APPROPRIATE ELECTRICALLY RATED CONNECTORS TO THE ELECTRIC COMPANY'S VERTICAL GROUND WIRE, WHERE ONE EXISTS. PROTECTIVE MOLDING IF IN PLACE MAY BE CUT TO FACILITATE BONDING; HOWEVER, UNDER <u>NO</u> CIRCUMSTANCE, SHALL THE VERTICAL GROUND WIRE BE CUT. RUBBER GLOVES THAT ARE RATED FOR THE EXISTING PRIMARY VOLTAGE SHOULD BE USED WHEN MAKING THE BONDING CONNECTION.

5. ALL POWER SUPPLY INSTALLATIONS MUST HAVE APPROPRIATE DISCONNECT DEVICES. NEW STRAND MOUNTED POWER SUPPLIES WILL BE BILLED ON A METERED ACCOUNT BASIS. ALL NEW POWER SUPPLIES AND NEW METERING EQUIPMENT SHALL BE MOUNTED ONLY ON CUSTOMER OWNED FACILITIES.

6. AIR DRYERS, NITROGEN BOTTLES, CABINETS, LOAD COILS, ETC. SHALL NOT BE ATTACHED TO PROGRESS ENERGY POLES.

7. GENERALLY, ATTACHMENTS AND/OR SUPPORTS SHALL NOT EXTEND MORE THAN 4" FROM THE CLOSEST SURFACE OF THE POLE, UNLESS PRIOR APPROVAL IS OBTAINED FROM THE LOCAL PROGRESS ENERGY ENGINEERING DEPARTMENT.

8. CLEARANCES FROM GROUND AND OTHER FACILITIES SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE NESC, OR THE REQUIREMENTS SHOWN IN THIS MANUAL, WHICHEVER IS GREATER. EXISTING INSTALLATIONS WHICH WERE IN COMPLIANCE WITH THE NESC AT THE TIME OF THEIR ORIGINAL CONSTRUCTION NEED NOT BE MODIFIED UNLESS SPECIFIED BY LATEST EDITION OF NESC CODE HANDBOOK OR PROGRESS ENERGY SPECIFICATIONS.

9. ATTACHMENT LOCATIONS MAY BE ASSIGNED BY PROGRESS ENERGY AT SPECIFIC HEIGHTS. UNDER NO CIRCUMSTANCES WILL PROPER CLEARANCES FROM PROGRESS ENERGY FACILITIES BE VIOLATED.

10. ALL ATTACHMENTS ON PROGRESS ENERGY POLES SHALL BE TAGGED IN ACCORDANCE WITH THE LATEST PROGRESS ENERGY REQUIREMENTS.

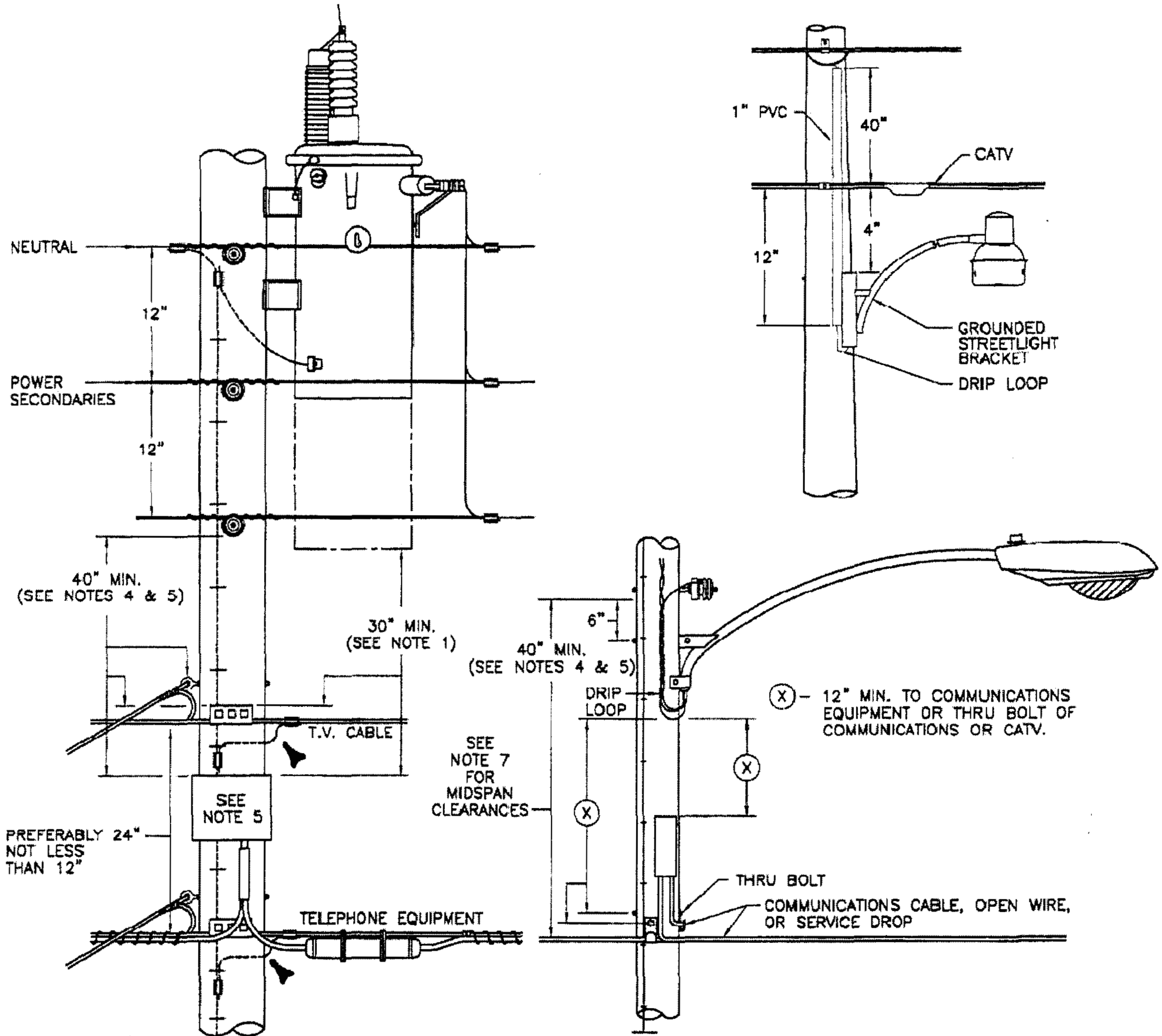
11. REQUESTS FOR EXCEPTIONS TO THIS DESIGN GUIDE SHALL BE REFERRED TO THE JOINT USE UNIT. ANY EXCEPTIONS APPROVED WILL BE DISTRIBUTED TO THE REGIONS FOR UNIFORM APPLICATION ON A SYSTEM-WIDE BASIS.

REVISED		BY	CK'D	APPR.
3				
2				
1	8/12/04	ROBESON	NUNNERY	SPRINGER
0	7/24/02	HOYT	ROBESON	WOOLSEY

FOREIGN ATTACHMENTS & CLEARANCES

Progress Energy

PGN DWG. 09.04-01



NOTES:

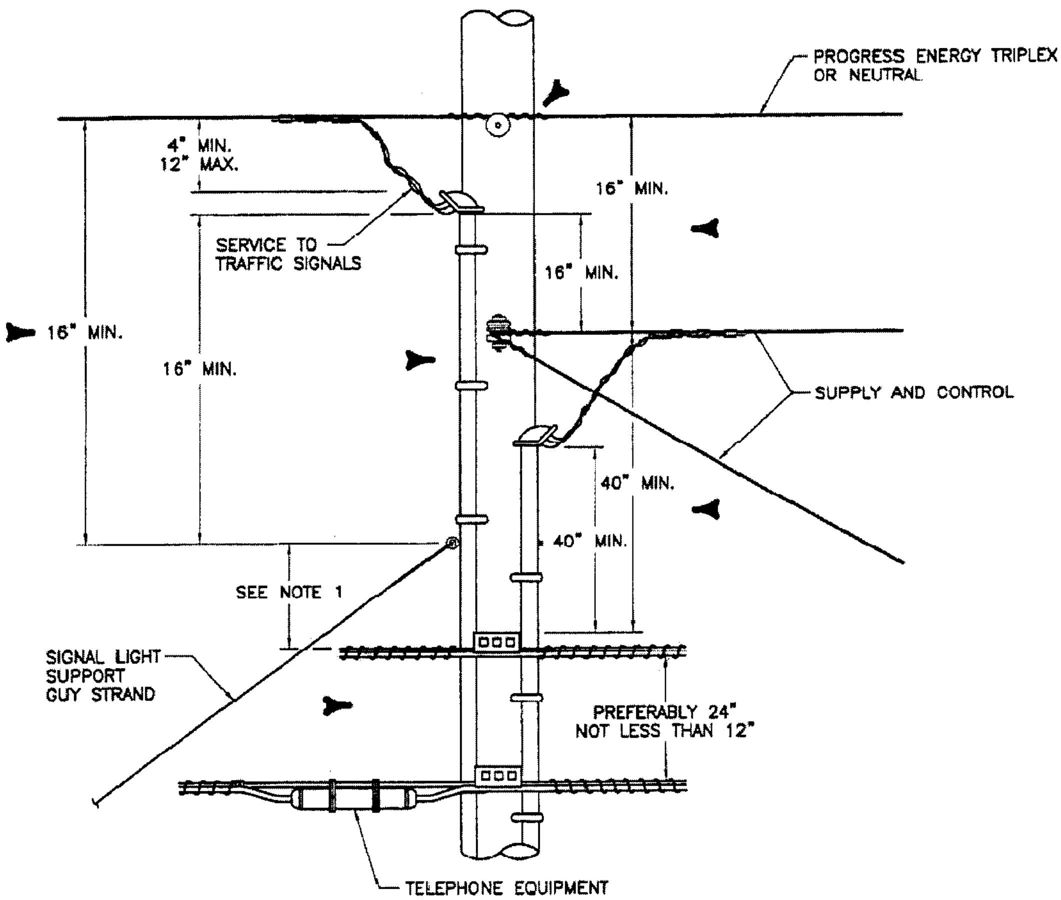
1. THIS DIMENSION OF NOT LESS THAN 30" APPLIES BETWEEN CONDUCTORS AND NON–CURRENT CARRYING PARTS OF EQUIPMENT THAT ARE EFFECTIVELY GROUNDED.
2. WHERE T.V. CABLE DOES NOT EXIST, MINIMUM DIMENSIONS APPLY TO TELEPHONE EQUIPMENT.
3. WHERE POWER AND COMMUNICATION LINES ARE BETWEEN THE SAME POLES, THESE CLEARANCES MAY BE INCREASED IF THE COMMUNICATION CONDUCTOR HAS LESS SAG THAN THE POWER CONDUCTORS SO AS TO PROVIDE A MINIMUM OF 30" SEPARATION IN THE SPAN. SEE CAROLINAS DWG. 04.04–08.
4. A 40" MINIMUM CLEARANCE IS REQUIRED BETWEEN CLOSEST METAL PARTS OF COMMUNICATION AND UNGROUNDED POWER EQUIPMENT.
5. ONLY TELEPHONE TERMINAL BOXES AND AMPLIFIERS PERMITTED ABOVE COMMUNICATION CABLES.
6. THE CLEARANCES ON THIS DRAWING APPLY TO BOTH GROUNDED METALLIC COMMUNICATION CABLES AND DIELECTRIC FIBER OPTIC CABLES.
7. MIDSPAN CLEARANCE BETWEEN COMMUNICATION AND SUPPLY CONDUCTORS (INCLUDING THE NEUTRAL) IS TO BE 30".
8. JOINT USER SHALL BOND MESSENGER WIRES TO PE GROUNDWIRE PER NESC REQUIREMENTS.

6	10/6/05	MCINTIRE	GUINN	HOYT
5	5/26/05	ROBESON	NUNNERY	SPRINGER
4	1/12/05	ROBESON	NUNNERY	SPRINGER
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

JOINT USE CONSTRUCTION

Progress Energy

PGN DWG. 09.04–02



FRONT VIEW

NOTES:

1. FOR EFFECTIVELY BONDED SPAN WIRES, THIS CLEARANCE MAY BE 4". FOR UNBONDED SPAN WIRES, THE CLEARANCE MUST BE 20".

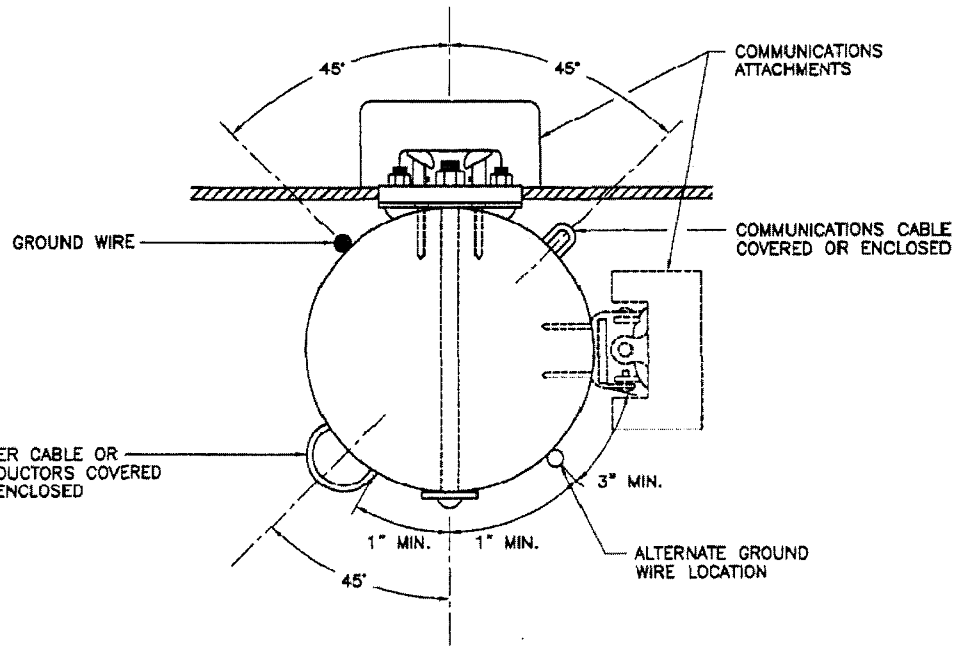
3				
2				
1	4/1/04	ROBESON	HUNNERY	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

JOINT USE CONSTRUCTION
TRAFFIC SIGNAL SUPPORT AND
POWER OPERATING CIRCUIT CLEARANCES

Progress Energy

PGN DWG. 09.04–03

LOCATION OF VERTICAL RUNS

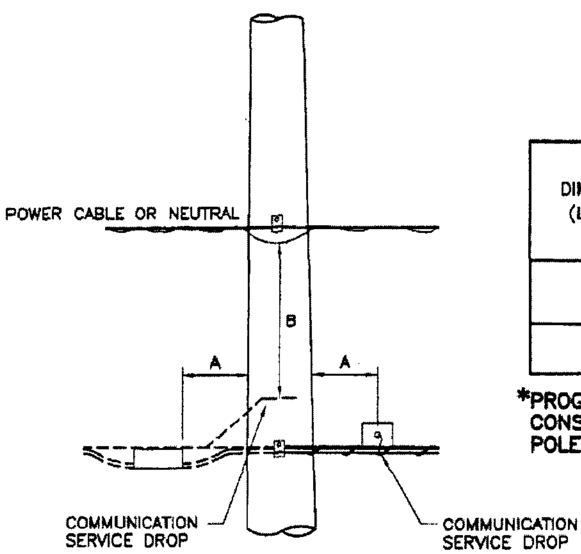


STREET SIDE

NOTES:

1. DO NOT LOCATE GROUNDED EQUIPMENT LESS THAN 1" FROM A BOLT OR STAPLE.

FOREIGN SERVICE DROPS



DIMENSION (LETTER)	NESC REQUIREMENT MINIMUM	PROGRESS ENERGY PREFERRED MINIMUM	NESC APPLICABLE REFERENCE SECTION
A	ALLOWED ON POLE	*12 INCHES	239 F2
B	40 INCHES	40 INCHES	239 F2

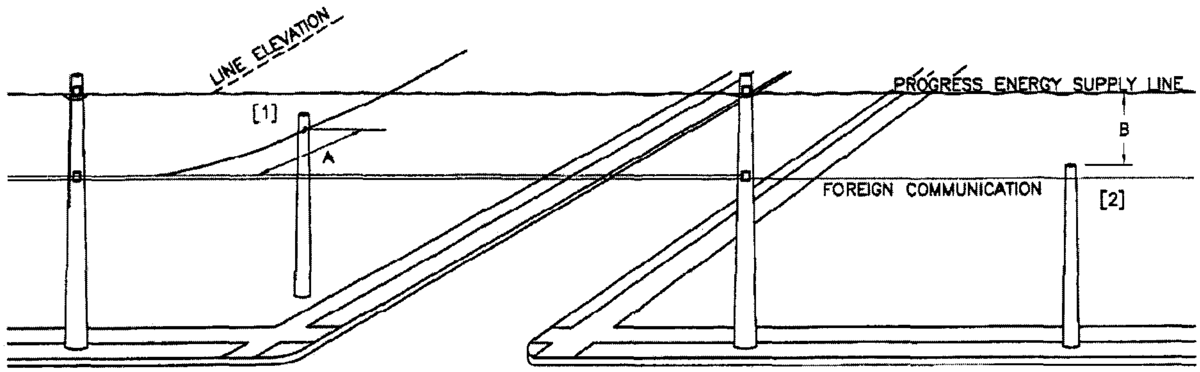
*PROGRESS ENERGY REQUIREMENT – NOT OPTIONAL ON NEW CONSTRUCTION – THIS CLEARANCE TO FACILITATE FUTURE POLE CHANGE OUT AND CLIMBING SPACE.

3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

LOCATION OF VERTICAL RUNS & FOREIGN SERVICE DROPS

Progress Energy

PGN DWG. 09.04–04



DIMENSION (LETTER)	SITUATION	NEC REQUIRED MINIMUM
A	VERTICAL DISTANCE FROM TOP OF POLE [1] TO LEVEL OF PRIMARY OR OPEN WIRE SECONDARY IS 5 FEET OR LESS	5 FEET
	VERTICAL DISTANCE FROM TOP OF POLE [1] TO LEVEL OF THE PRIMARY OR OPEN WIRE SECONDARY IS MORE THAN 5 FEET	3 FEET
B	POLE [2] FOREIGN OWNED AND PROGRESS ENERGY SUPPLY LINE VOLTAGE OVER 22kV ø–N	5.5 FEET
	POLE [2] FOREIGN OWNED AND PROGRESS ENERGY SUPPLY LINE VOLTAGE UNDER 22kV ø–N	4.5 FEET
	POLE [2] OWNED BY PROGRESS ENERGY VOLTAGE <22kV	2.5 FEET
	POLE [2] FOREIGN OR PROGRESS ENERGY OWNED AND PROGRESS ENERGY SUPPLY LINE CLASSIFIED GUY, NEUTRAL OR SECONDARY CABLE, <300V TO GROUND	2 FEET

NOTE: CHART BASED ON CLEARANCES DEFINED IN SECTION 234 OF NESC.

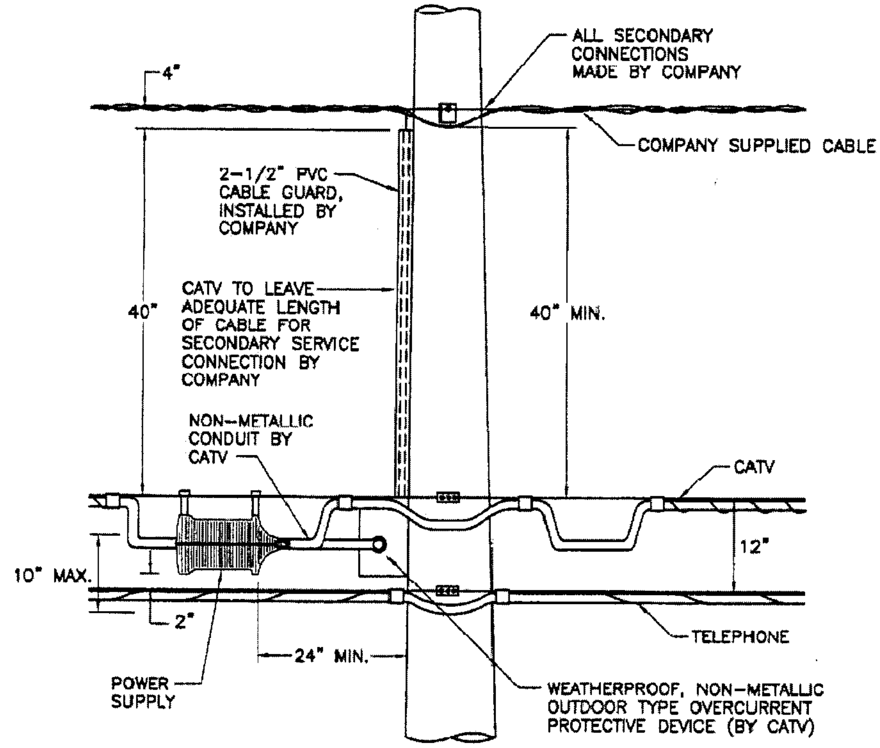
3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

FOREIGN POLE CLEARANCE AT FINAL SAG

Progress Energy

PGN DWG. 09.04–05

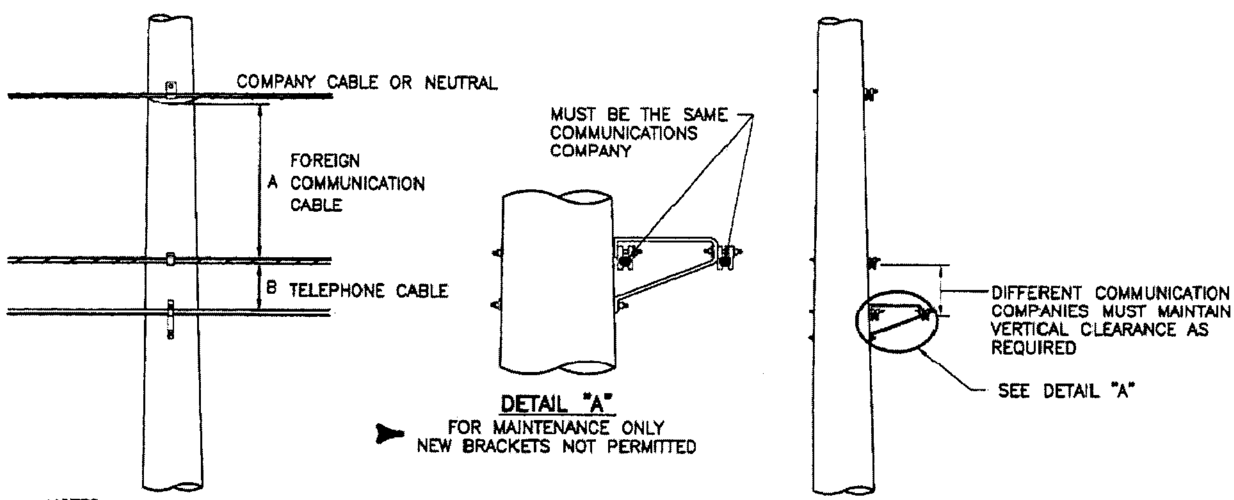
STRAND MOUNTED POWER SUPPLY



MTNC ONLY

DIMENSION (LETTER)	NESC REQUIREMENT MINIMUM	COMPANY PREFERRED MINIMUM	NESC APPLICABLE REFERENCE SECTION
A	40 INCHES	40 INCHES	235 C1
B	3 INCHES	*12 INCHES	239 F1

* COMPANY REQUIREMENT – NOT OPTIONAL



DETAIL "A"

FOR MAINTENANCE ONLY
NEW BRACKETS NOT PERMITTED

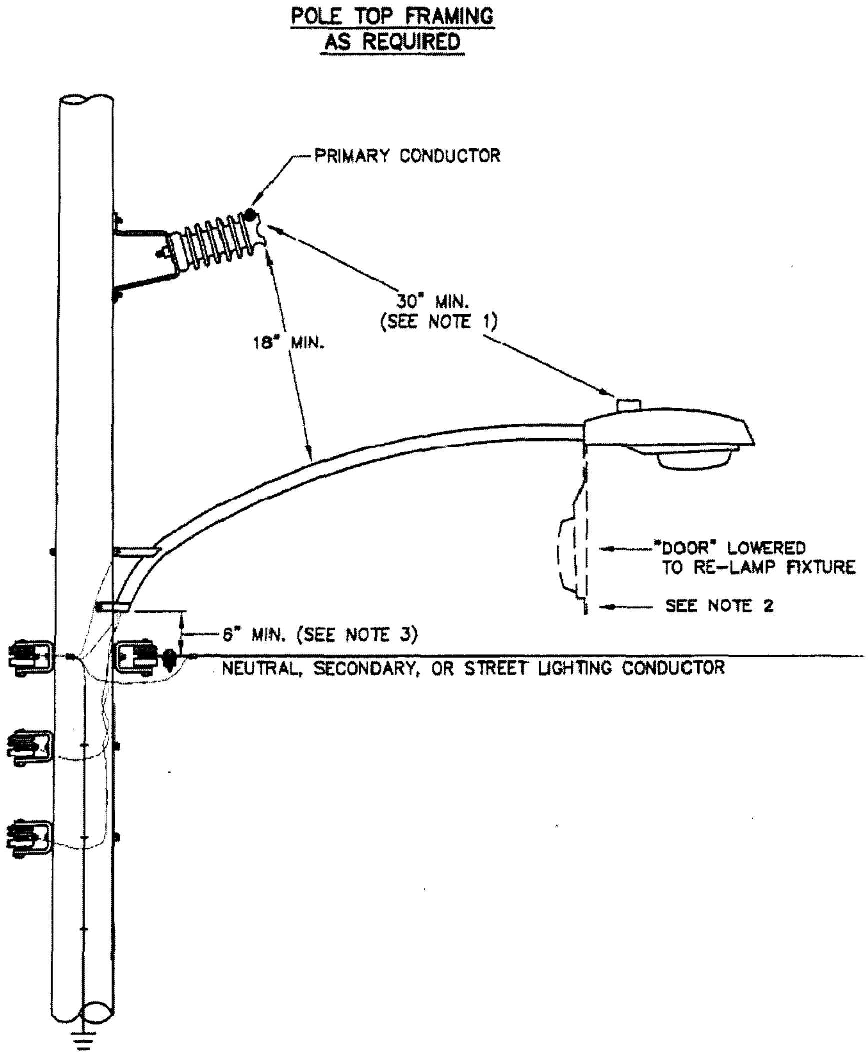
NOTES:
1. EXTENSION BRACKET MUST BE MOUNTED ON EXISTING CABLE SIDE ONLY.
2. EXTENSION BRACKET MAY BE UTILIZED IN TANGENT SITUATIONS ONLY, NOT APPROVED FOR DEAD-END POLES.
3. EXTENSION BRACKET MANUFACTURER'S SPECIFICATIONS MUST RECEIVE COMPANY APPROVAL PRIOR TO UTILIZATION.

3				
2	8/12/04	ROBESON	NUNNERY	SPRINGER
1	2/3/04	ROBESON	NUNNERY	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

STRAND MOUNTED POWER SUPPLY & FOREIGN COMMUNICATION CABLE EXTENSION BRACKET

Progress Energy

PGN DWG. 09.04–06



LIGHTING UNIT ABOVE SECONDARY

NOTES:

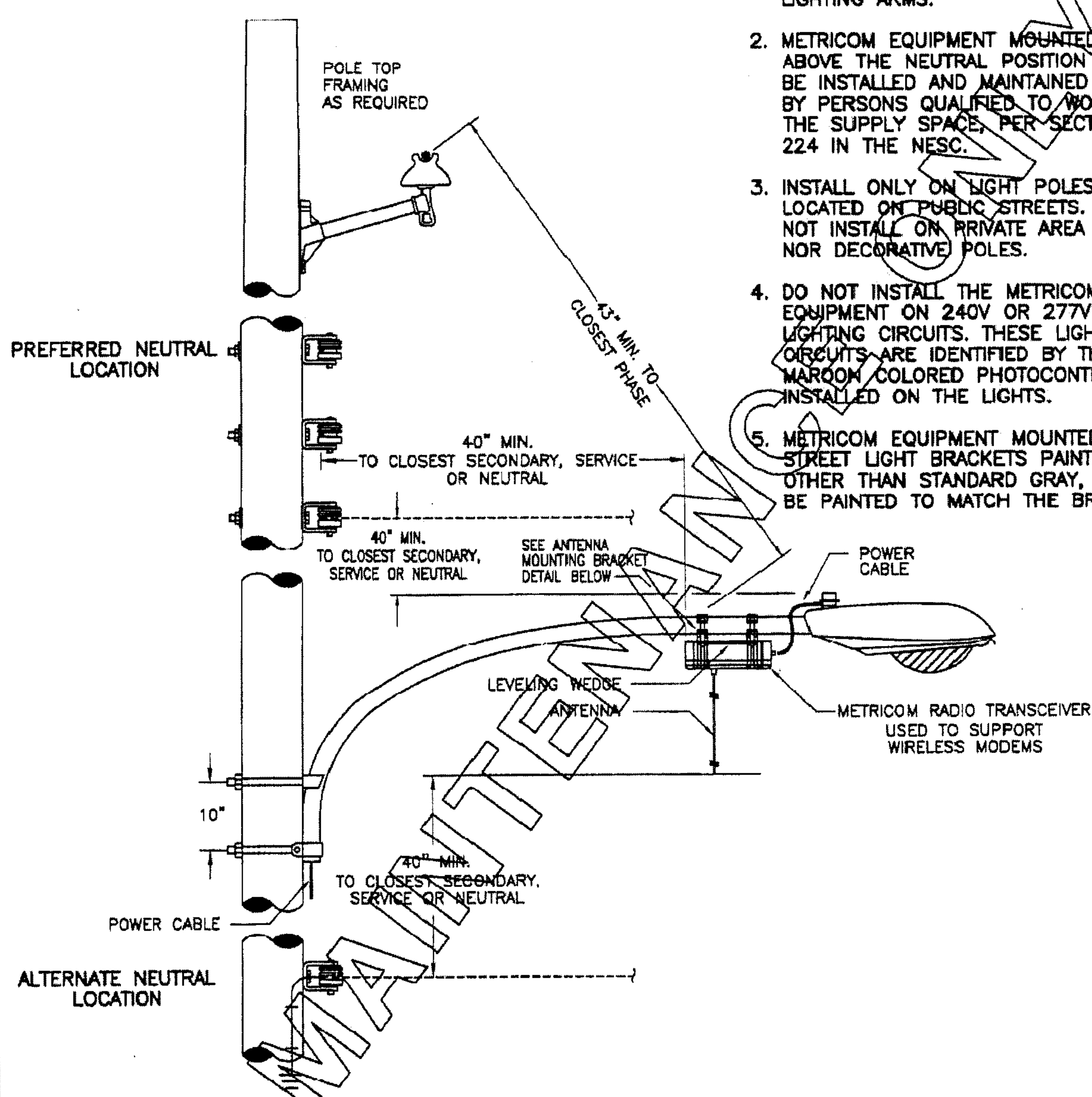
1. THIS MINIMUM DISTANCE (30") MUST BE MAINTAINED FROM THE PRIMARY CONDUCTORS TO ANY PART OF THE LUMINAIRE A PERSON MUST TOUCH TO RE-LAMP THE FIXTURE OR TO REPLACE THE PHOTOCONTROL.
2. NO MINIMUM DISTANCE SPECIFIED – "DOOR" MUST NOT TOUCH ANY CONDUCTOR LOCATED BELOW LUMINAIRE.
3. WHEN SPECIFIED BY ENGINEER, LIGHTING UNIT MAY BE INSTALLED AT SECONDARY LEVEL, OPPOSITE THE SECONDARY TO AVOID REPLACING AN EXISTING POLE.
4. FOR CLEARANCES – LIGHTING UNITS BELOW SECONDARY AND ABOVE COMMUNICATION CIRCUITS OR EQUIPMENT, SEE DWG. 09.04–02.
5. THIS DRAWING SHOWS <u>MINIMUM</u> CLEARANCES. SEE OTHER DRAWINGS AND/OR ENGINEER'S INSTRUCTIONS FOR ACTUAL MOUNTING HEIGHTS.
6. SEE DWG. 09.04–02 IF TELECOM IS ATTACHED.

3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

CLEARANCES – LIGHTING UNITS
TO POWER CIRCUITS OR EQUIPMENT

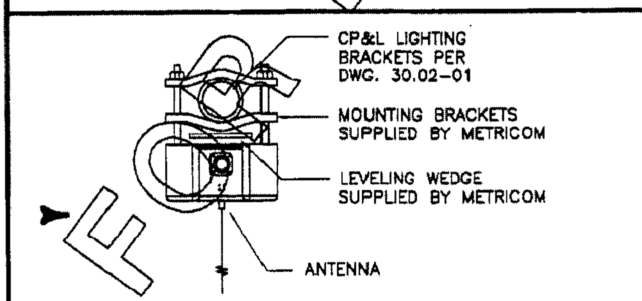
Progress Energy

PGN DWG. 09.04–07

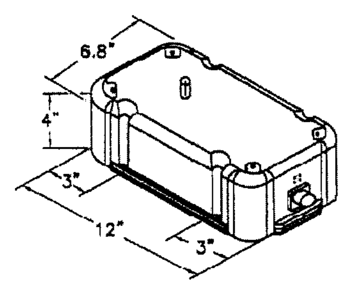


NOTES:

1. METRICOM EQUIPMENT IS TO BE MOUNTED ON ONLY 6'0" AND LONGER LIGHTING ARMS.
2. METRICOM EQUIPMENT MOUNTED ABOVE THE NEUTRAL POSITION SHALL BE INSTALLED AND MAINTAINED ONLY BY PERSONS QUALIFIED TO WORK IN THE SUPPLY SPACE, PER SECTION 224 IN THE NESC.
3. INSTALL ONLY ON LIGHT POLES LOCATED ON PUBLIC STREETS. DO NOT INSTALL ON PRIVATE AREA LIGHTS NOR DECORATIVE POLES.
4. DO NOT INSTALL THE METRICOM EQUIPMENT ON 240V OR 277V LIGHTING CIRCUITS. THESE LIGHTING CIRCUITS ARE IDENTIFIED BY THE MAROON COLORED PHOTOCONTROL INSTALLED ON THE LIGHTS.
5. METRICOM EQUIPMENT MOUNTED ON STREET LIGHT BRACKETS PAINTED OTHER THAN STANDARD GRAY, MUST BE PAINTED TO MATCH THE BRACKET.



MOUNTING BRACKET DETAIL



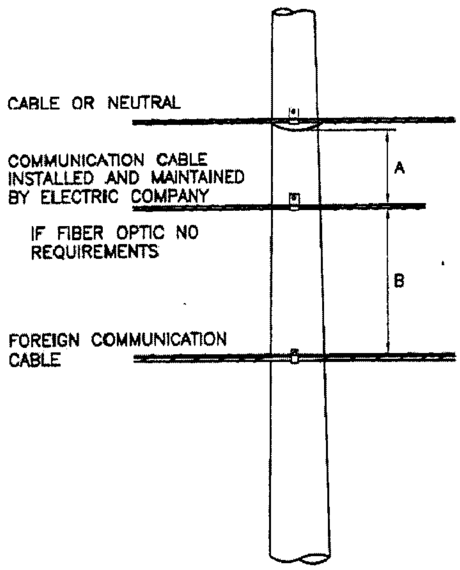
NOTE: DIMENSIONS MAY VARY ±15% DEPENDING ON STYLE

REVISED	BY	CK'D	APPR.
3			
2			
1 8/25/05	CECCONI	GUINN	HOYT
0 7/24/02	HOYT	ROBESON	WOOLSEY

TELECOM RADIO TRANSCEIVERS

Progress Energy

PGN DWG. 09.04-08



DIMENSION (LETTER)	NESC REQUIREMENT MINIMUM
A	*16 INCHES
B	40 INCHES

* NO CLEARANCE IS SPECIFIED BETWEEN NEUTRAL CONDUCTORS AND INSULATED COMMUNICATION CABLES LOCATED IN THE SUPPLY SPACE AND SUPPORTED BY AN EFFECTIVELY GROUNDED MESSENGER.

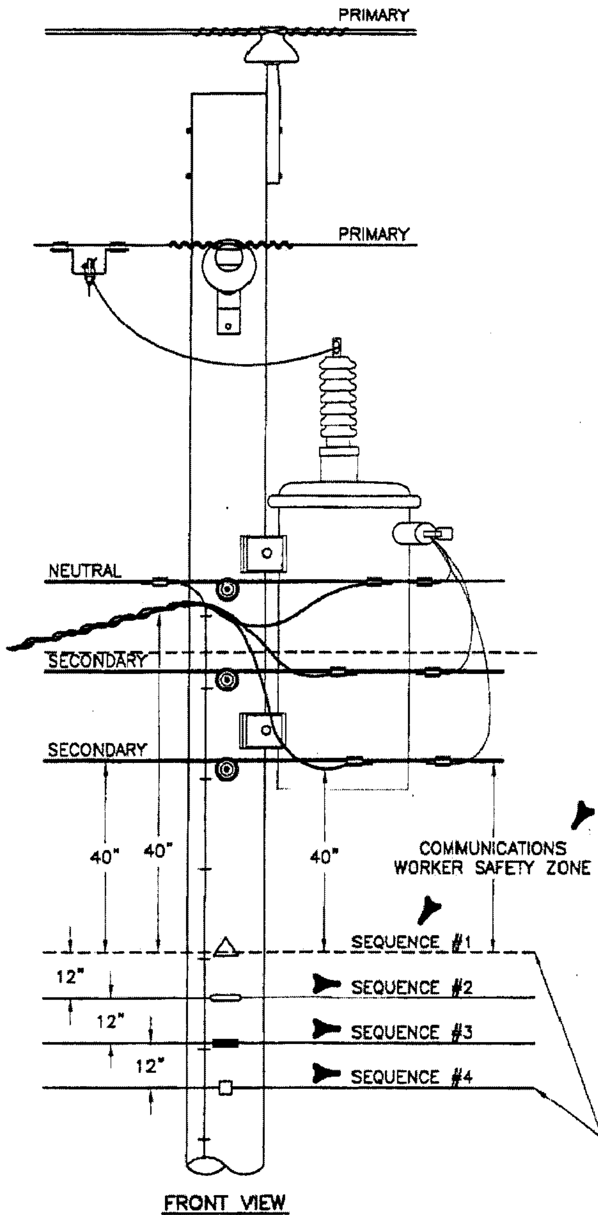
NO CLEARANCE IS SPECIFIED BETWEEN SUPPLY CONDUCTORS AND FIBER-OPTIC SUPPLY CABLES THAT ARE COMPLETELY DIELECTRIC (INCLUDING THE MESSENGER).

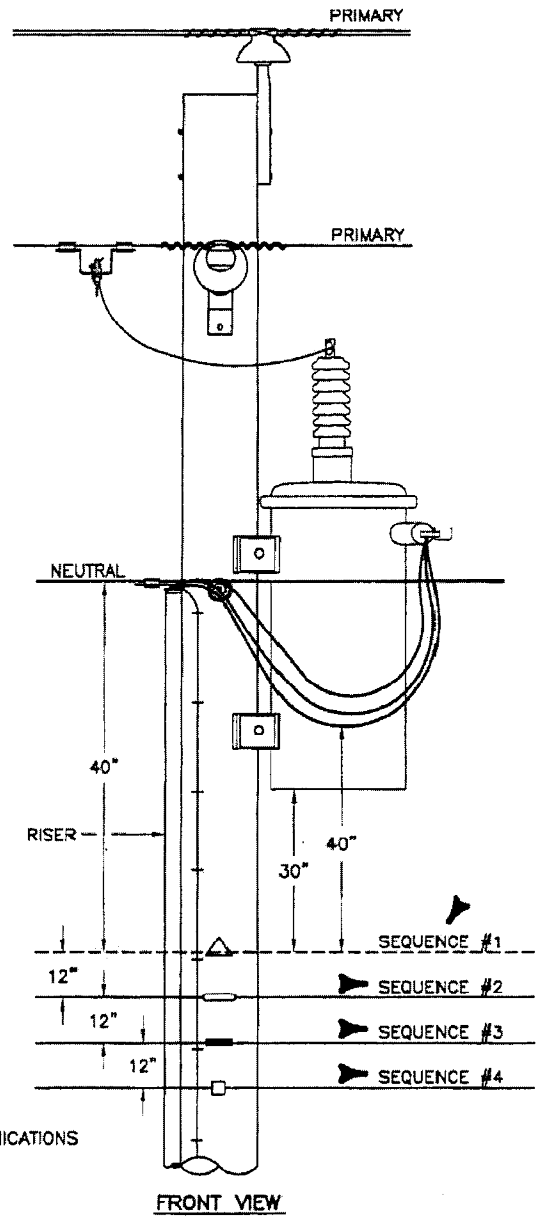
3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

COMMUNICATION CABLE INSTALLED AND MAINTAINED BY ELECTRIC COMPANY

Progress Energy

PGN DWG. 09.04-09





ADDITIONAL MIN. CLEARANCES AT THE POLE	
LIGHT BRACKET	12"
SPAN GUY	12"
DOWN GUY	12"

MINIMUM CLEARANCES MIDSPAN	
PRIMARY	30"
NEUTRAL	30"
SECONDARY	30"
SERVICE DROP	30"
SPAN GUY	12"

NOTES:

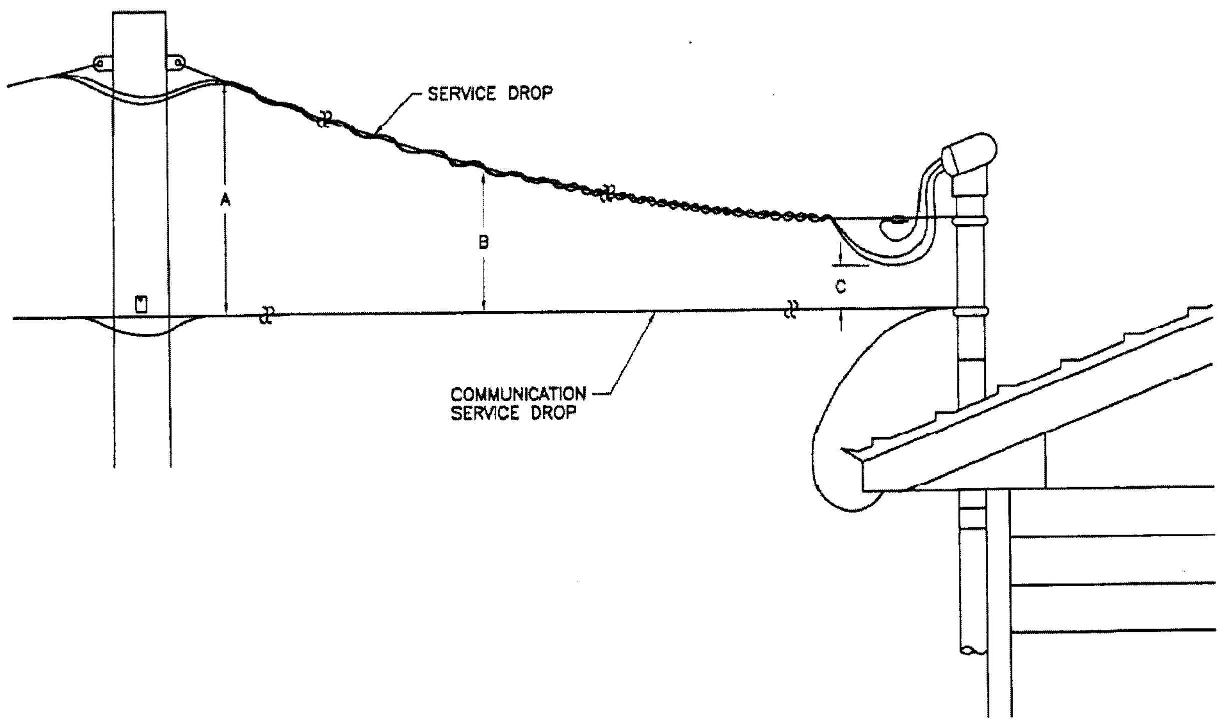
1. PROGRESS ENERGY FIBER OPTIC CABLE LOCATED AT THE BOTTOM OF THE SUPPLY SPACE (i.e. LESS THAN 40" FROM POWER) MUST HAVE A MINIMUM CLEARANCE OF 40" BETWEEN THE FIBER OPTIC CABLE AND THE TOP COMMUNICATIONS CABLE TO ENSURE THE 40" COMMUNICATION WORKER SAFETY ZONE IS NOT VIOLATED.
2. THE PEC JU-TRANSFER ASSEMBLY IS USED WHEN PROGRESS ENERGY IS THE POLE OWNER.
3. THE PEC JU-NOTIFY ASSEMBLY IS USED WHEN PROGRESS ENERGY DOES NOT OWN THE POLE.
4. THE PEC JU-ATTACH ASSEMBLY IS USED WHEN PROGRESS ENERGY IS INSTALLING AN IN-LINE POLE.

3	4/14/05	ROBESON	NUNNERY	SPRINGER
2	8/28/04	ROBESON	NUNNERY	SPRINGER
1	4/27/04	BUNCH	NUNNERY	WOOLSEY
0	2/28/03	ROBESON	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

JOINT USE CLEARANCE REQUIREMENTS

Progress Energy

PGN DWG. 09.04-14



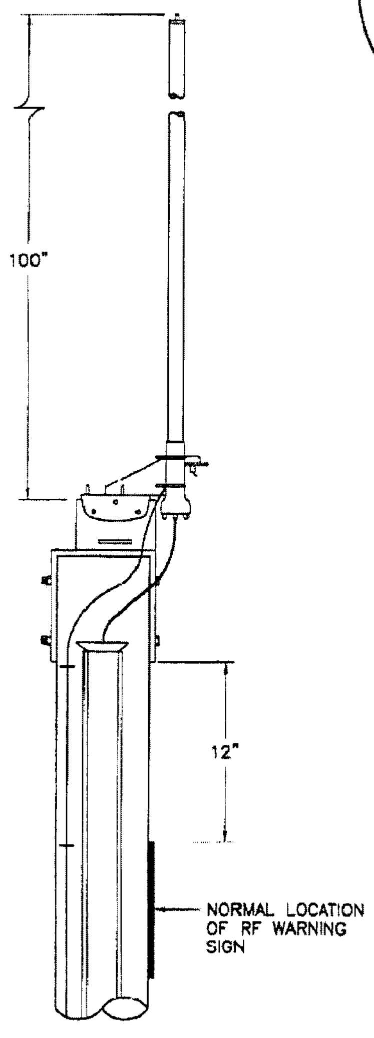
DIMENSION (LETTER)	*NESC MINIMUM REQUIREMENT	PROGRESS ENERGY PREFERRED MINIMUM REQUIREMENT	NESC APPLICABLE REFERENCE SECTION
A	40"	40"	235-5
B	12"	12"	235 C1 EXCEPTION 3
C	12"	12"	235 C1 EXCEPTION 3

3				
2				
1				
0	8/31/04	ROBESON	NUNNERY	SPRINGER
REVISED		BY	CK'D	APPR.

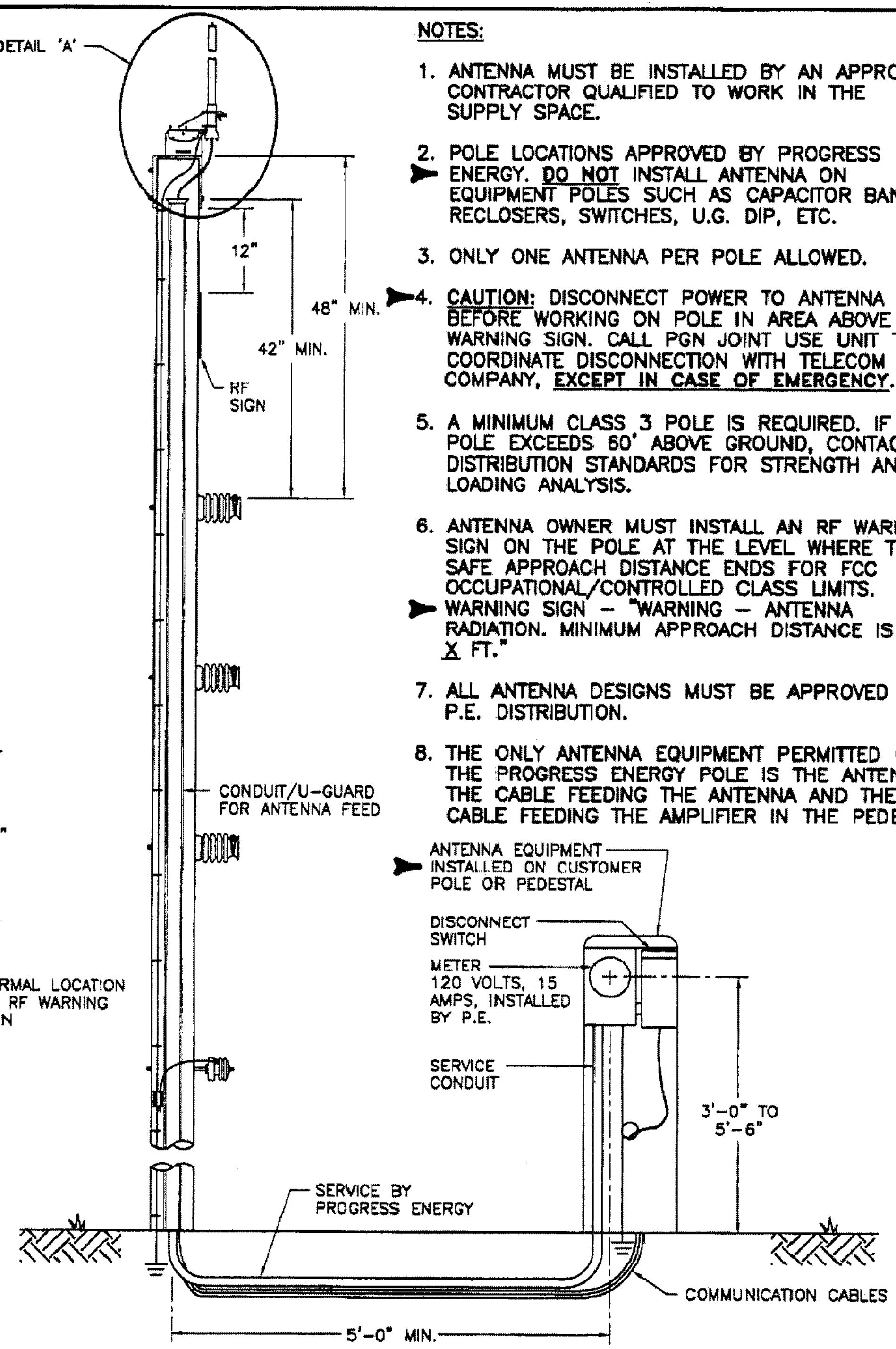
SERVICE DROP CLEARANCE TO COMMUNICATION CABLES

Progress Energy

PGN DWG. 09.04-16



DETAIL 'A'



NOTES:

1. ANTENNA MUST BE INSTALLED BY AN APPROVED CONTRACTOR QUALIFIED TO WORK IN THE SUPPLY SPACE.
2. POLE LOCATIONS APPROVED BY PROGRESS ENERGY. DO NOT INSTALL ANTENNA ON EQUIPMENT POLES SUCH AS CAPACITOR BANKS, RECLOSERS, SWITCHES, U.G. DIP, ETC.
3. ONLY ONE ANTENNA PER POLE ALLOWED.
4. CAUTION: DISCONNECT POWER TO ANTENNA BEFORE WORKING ON POLE IN AREA ABOVE RF WARNING SIGN. CALL PGN JOINT USE UNIT TO COORDINATE DISCONNECTION WITH TELECOM COMPANY, EXCEPT IN CASE OF EMERGENCY.
5. A MINIMUM CLASS 3 POLE IS REQUIRED. IF POLE EXCEEDS 60' ABOVE GROUND, CONTACT DISTRIBUTION STANDARDS FOR STRENGTH AND LOADING ANALYSIS.
6. ANTENNA OWNER MUST INSTALL AN RF WARNING SIGN ON THE POLE AT THE LEVEL WHERE THE SAFE APPROACH DISTANCE ENDS FOR FCC OCCUPATIONAL/CONTROLLED CLASS LIMITS. WARNING SIGN – "WARNING – ANTENNA RADIATION. MINIMUM APPROACH DISTANCE IS X FT."
7. ALL ANTENNA DESIGNS MUST BE APPROVED BY P.E. DISTRIBUTION.
8. THE ONLY ANTENNA EQUIPMENT PERMITTED ON THE PROGRESS ENERGY POLE IS THE ANTENNA, THE CABLE FEEDING THE ANTENNA AND THE CABLE FEEDING THE AMPLIFIER IN THE PEDESTAL.

LINE INSULATION:
BECAUSE POLE GROUND GOES TO TOP OF POLE, EXISTING LINE INSULATORS MUST BE HIGHER VOLTAGE THAN NORMAL.

12KV SYSTEM:
USE 35KV INSULATOR

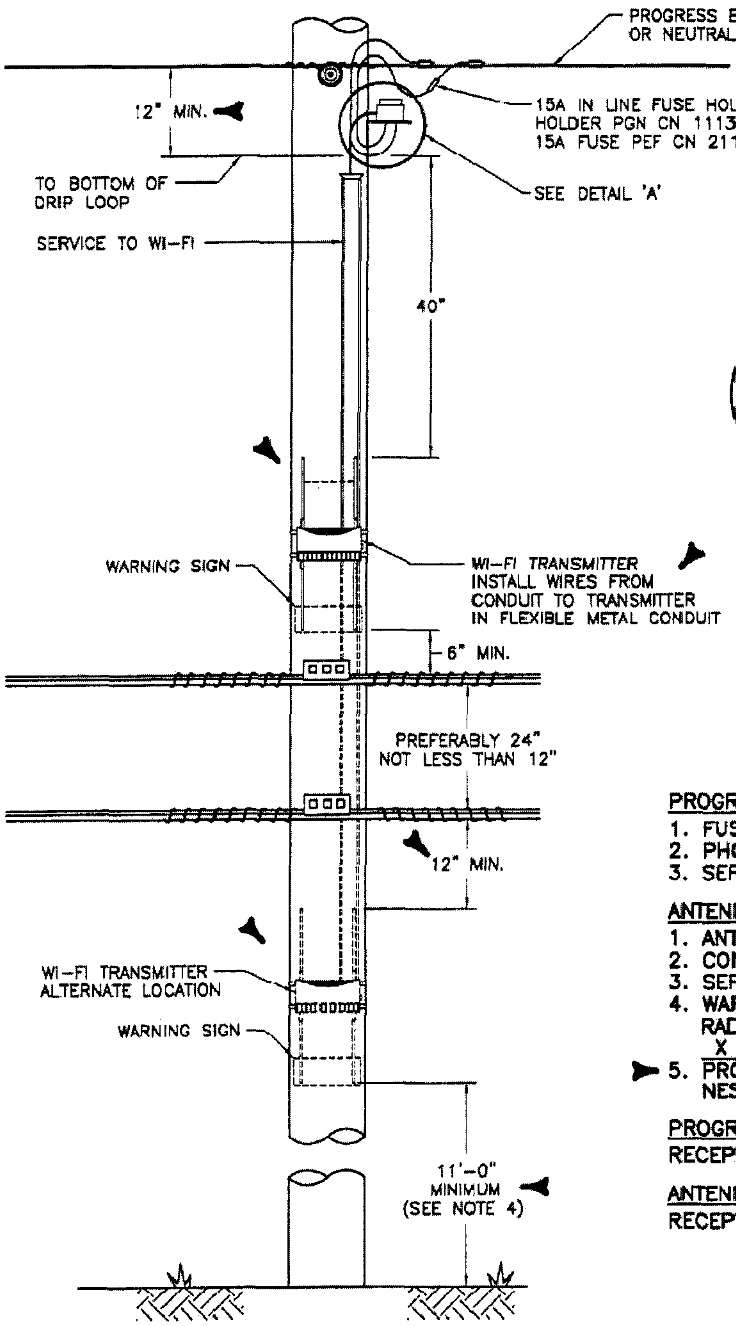
23KV SYSTEM:
USE 45KV INSULATOR

REVISED		BY	CK'D	APPR.
3				
2				
1	6/28/05	ROBESON	GUNN	HOYT
0	6/15/05	NUNNERY	NUNNERY	HOYT

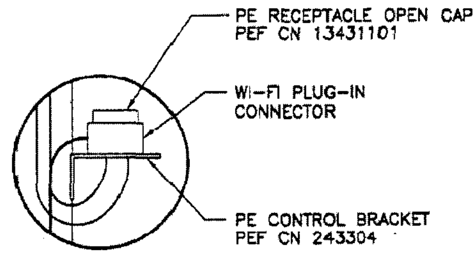
JOINT USE CONSTRUCTION
(DAS) DISTRIBUTED ANTENNA SYSTEMS

Progress Energy

PGN DWG. 09.04-30



FRONT VIEW



DETAIL 'A'

PROGRESS ENERGY PROVIDE AND INSTALL:

1. FUSE HOLDER AND FUSE
2. PHOTOCONTROL BRACKET
3. SERVICE CONNECTION

ANTENNA COMPANY PROVIDE AND INSTALL:

1. ANTENNA
2. CONDUIT/ U-GUARD
3. SERVICE CABLE WITH PLUG-IN CONNECTOR
4. WARNING SIGN - "WARNING - ANTENNA RADIATION. MINIMUM APPROACH DISTANCE IS X FT".
5. PROPER GROUNDING IN ACCORDANCE WITH NESC REQUIREMENTS.

PROGRESS ENERGY TO PROVIDE:

RECEPTACLE CAP

ANTENNA COMPANY TO INSTALL:

RECEPTACLE CAP

NOTES:

1. DO NOT INSTALL ANTENNAS ON EQUIPMENT POLES SUCH AS CAPACITOR BANKS, RECLOSERS, REGULATOR, SWITCHES, U.G. DIP, ETC.
2. ALL ANTENNA LOCATIONS MUST BE APPROVED BE BY A PROGRESS ENERGY DISTRIBUTION ENGINEER.
3. ONLY ONE ANTENNA PER POLE ALLOWED.
4. MINIMUM CLEARANCE IS BASED ON NESC TABLE 232-2(1)d.

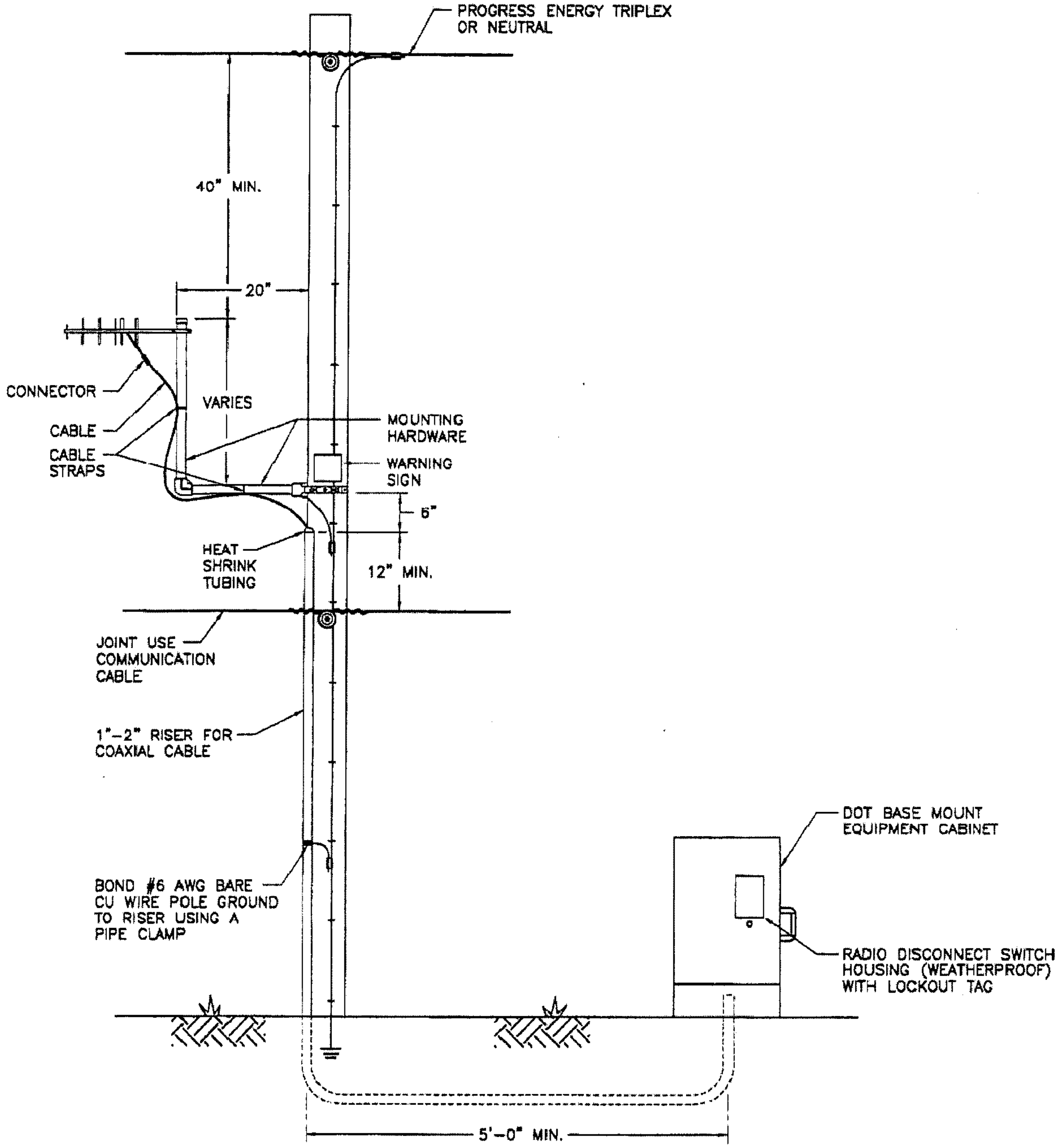
3				
2	1/18/06	MCINTIRE	GUNN	HOYT
1	6/26/05	ROBESON	GUNN	HOYT
0	7/6/05	ROBESON	MUNNERY	HOYT
REVISED		BY	CK'D	APPR.

JOINT USE CONSTRUCTION

WI-FI ANTENNA INSTALLATION

Progress Energy

PGN DWG. 09.04-35



FRONT VIEW

NOTES:

1. POLE LOCATIONS APPROVED BY PROGRESS ENERGY. DO NOT INSTALL ANTENNA ON EQUIPMENT POLE SUCH AS CAPACITOR BANKS, RECLOSERS, SWITCHES, U.G. DIP, ETC.
2. ONLY ONE ANTENNA PER POLE ALLOWED.
3. ALL ANTENNA DESIGNS MUST BE APPROVED BY P.E. DISTRIBUTION.
4. THE ONLY JOINT USE EQUIPMENT PERMITTED ON THE POLE IS THE ANTENNA AND CABLE RISER.
5. DOT TO MOUNT WARNING SIGN ON POLE: "WARNING – TURN OFF ANTENNA AT DOT EQUIPMENT CABINET BEFORE WORKING ON POLE".

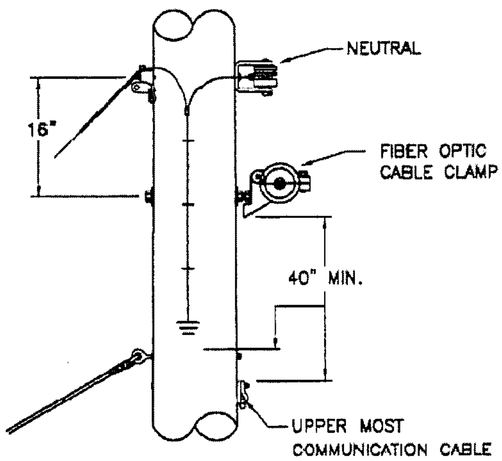
REVISED		BY	CK'D	APPR.
3				
2				
1				
0	7/27/05	ROBESON	NUNNERY	HOYT

JOINT USE CONSTRUCTION
TRAFFIC SIGNAL ANTENNA

Progress Energy

PGN DWG. 09.04–40

TANGENT AND ANGLES TO 20°



CAROLINAS BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	TAN-SUP-FOC	22008502	1	SUPPORT, TANGENT, CABLE, FOPT, ADSS
		10033512	1	BOLT, MACH, 5/8, ALL

FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	-	124205	1	FIBER SIZE: .589 - 24 CT. (.576-.625)
		124228	1	FIBER SIZE: .685 - 48/96 CT. (.676-.725)
		VARIABLE	1	BOLT, MACHINE, 5/8"

NOTES:

1. NEUTRAL GUYS NOT SHOWN FOR CLARITY.
2. CLEARANCES SHOWN TO NEUTRAL ALSO APPLY TO LOWEST OPEN-WIRE SECONDARY AND TRIPLEX.
3. USE 5/8" BOLTS FOR FIBER OPTIC CABLE SUPPORTS.

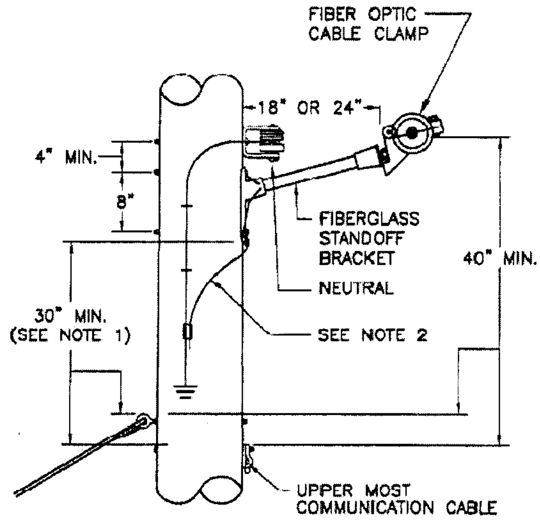
3				
2				
1				
0	11/15/06	BURLISON	GUNN	HOYT
REVISED		BY	CK'D	APPR.

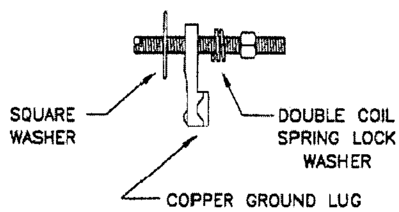
PROGRESS ENERGY FIBER OPTIC CABLE INSTALLED IN SUPPLY SPACE - INSTALLATION DETAILS

Progress Energy

PGN DWG. 09.04-42

TANGENT AND ANGLES TO 20°





FIBERGLASS BRACKET
BONDING DETAIL

CAROLINAS BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	CATALOG NUMBER	QUANTITY	DESCRIPTION
	BKT-18ST-FOC	13334404	1	BRACKET, 18" FBG, ST. FOPT, ADSS
		10033512	1	BOLT, MACH, 5/8", ALL
		22008502	1	SUPPORT TANGENT, CABLE, FOPT, ADSS
	BKT-24ST-FOC	13334503	1	BRACKET, 24" FBG, ST. FOPT, ADSS
		10033512	1	BOLT, MACH, 5/8", ALL
		22008502	1	SUPPORT TANGENT, CABLE, FOPT, ADSS

FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	CATALOG NUMBER	QUANTITY	DESCRIPTION
	-	124205	1	FIBER SIZE: .589 - 24 CT. (.576-.625)
		124228	1	FIBER SIZE: .685 - 48/96 CT. (.676-.725)
		VARIABLE	1	BOLT, MACHINE, 5/8"
	FIBERGLASS STANDOFF BRACKET SUPPLIED BY ENGINEERING			

NOTES:

1. 30" IF BASE OF FIBERGLASS STANDOFF BRACKET IS BONDED TO POLE GROUND AND THE COMMUNICATION CABLE IS BONDED TO POLE GROUND, 40" IF NOT.
2. SEE DWG. 09.04-49 FOR BONDING DETAILS.

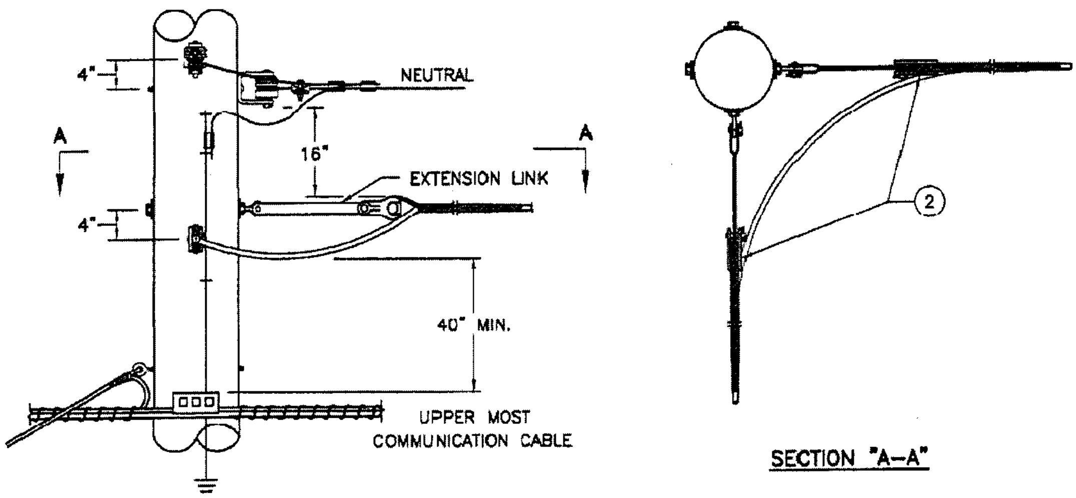
3				
2				
1				
0	11/15/05	BURLISON	QUINN	HOYT
REVISED		BY	CK'D	APPR.

PROGRESS ENERGY FIBER OPTIC CABLE
INSTALLED IN SUPPLY SPACE -
INSTALLATION DETAILS

Progress Energy

PGN DWG. 09.04-44

ANGLES GREATER THAN 20°



CAROLINAS BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	BKT18UPSFODE	13334800	1	BKT,18", FBG, UPS, DE, FOPT, ADSS
		13013013	1	LINK, EXTENSION, ALL
		11156106	1	ASSEMBLY, DE, FOPT, ADSS
		10033512	1	BOLT, MACH, 5/8, ALL
2	DE-FOC	11156106	1	ASSEMBLY, DE, FOPT, ADSS
		13013013	1	LINK, EXTENSION, ALL
		10026011	1	BOLT, EYE, 5/8", ALL

FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	CATALOG NUMBER	QUANTITY	DESCRIPTION
2	-	091312	1	FIBER SIZE: .589 – 24CT (.576–625)
		091309	1	FIBER SIZE: .685 – 48/96CT (.676–.725)
		119666	1	THIMBLE CLEVIS
		119768	1	TURNBUCKLE, 5/8" (FOR ROAD CROSSINGS)
		–	1	EXTENSION LINK
		VARIABLE	1	BOLT, MACHINE, 5/8"

NOTES:

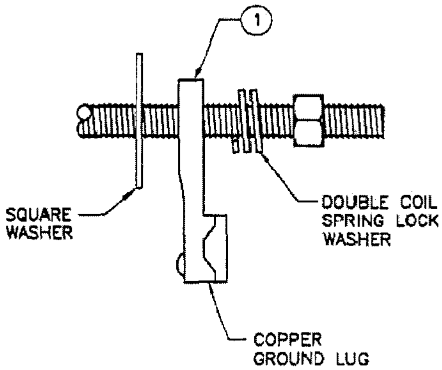
1. NEUTRAL GUYS NOT SHOWN FOR CLARITY.
2. CLEARANCES SHOWN TO NEUTRAL ALSO APPLY TO LOWEST OPEN-WIRE SECONDARY AND TRIPLEX.
3. USE 5/8" BOLTS FOR FIBER OPTIC CABLE SUPPORTS.
4. 30" IF BASE OF FIBERGLASS STANDOFF BRACKET IS BONDED TO POLE GROUND AND THE COMMUNICATION CABLE IS BONDED TO POLE GROUND, 40" IF NOT.
5. SEE DWG. 09.04-49 FOR FIBERGLASS BONDING DETAIL.
6. NEW FOPT REINFORCING RODS MUST BE USED WHEN TRANSFERRING DEADENDS.

3			
2			
1			
0 11/15/06	BURLISON	GUINN	HOYT
REVISED	BY	CK'D	APPR.

PROGRESS ENERGY FIBER OPTIC CABLE INSTALLED IN SUPPLY SPACE – INSTALLATION DETAILS

Progress Energy

PGN DWG. 09.04-46



FIBERGLASS BRACKET
BONDING DETAIL

PROGRESS ENERGY BILL OF MATERIALS						
ITEM NO.	PEC ASSEMBLY	PEC CATALOG NO.	PEF ASSEMBLY	PEF CATALOG NO.	QTY.	DESCRIPTION
1	–	11177102	–	11177102	1	LUG, COPPER, GROUNDING
		10544005		013264	1	DBL. COIL SPRING LK WASH.
		10543007		013308	1	SQUARE WASHER

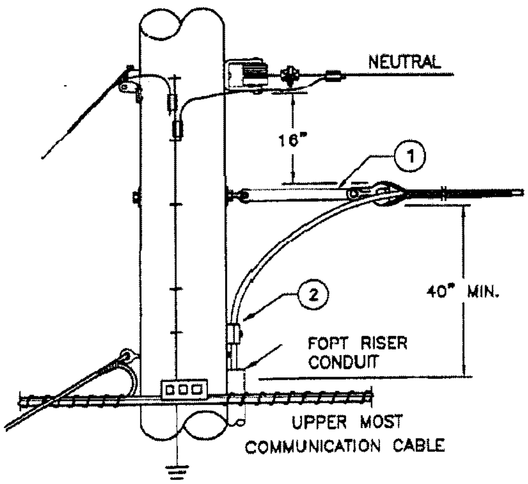
3				
2				
1				
0	11/15/06	BURLISON	GUINN	HOYT
REVISED		BY	CK'D	APPR.

PROGRESS ENERGY FIBER OPTIC CABLE
INSTALLED IN SUPPLY SPACE –
INSTALLATION DETAILS

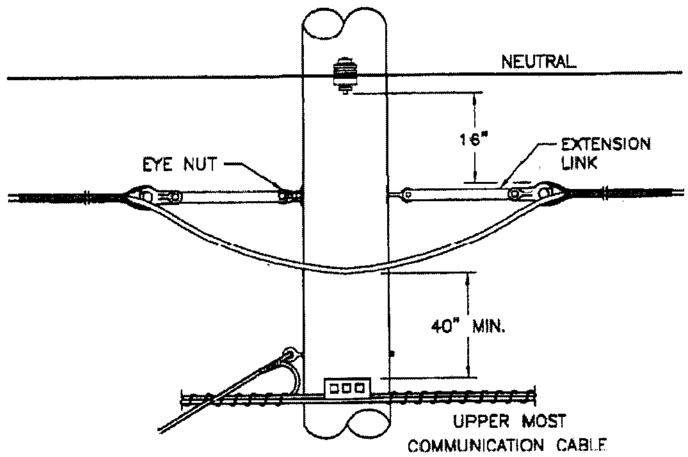
Progress Energy

PGN DWG. 09.04–49

DEAD-END AND FOPT DOWNLEAD



DOUBLE DEAD-END



CAROLINAS BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	DE-FOC	11156106	1	ASSEMBLY, DE, FOPT, ADSS
		13013013	1	LINK, EXTENSION, ALL
		10026011	1	BOLT, EYE, 5/8", ALL
2	DWN-CLAMP-FO	11108008	1	CLAMP, DOWNLEAD, FOPT
		10312007	1	SCREW, LAG, HX, 1/2" X 4", GLV

FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	-	091312	1	FIBER SIZE: .589 - 24CT (.576-625)
		091309	1	FIBER SIZE: .685 - 48/96CT (.676-.725)
		119666	1	THIMBLE CLEVIS
		119768	1	TURNBUCKLE, 5/8" (FOR ROAD CROSSINGS)
		-	1	EXTENSION LINK
		VARIABLE	1	BOLT, MACHINE, 5/8"
2	-	124217	1	FIBER SIZE: .589 - 24CT (.576-625)
		124218	1	FIBER SIZE: .685 - 48/96CT (.676-.725)

NOTES:

1. CLEARANCES SHOWN TO NEUTRAL ALSO APPLY TO LOWEST OPEN-WIRE SECONDARY AND TRIPLEX.
2. USE 5/8" BOLTS FOR FIBER OPTIC CABLE SUPPORTS.
3. MINIMUM BEND RADIUS OF THIS ADSS FIBEROPTIC CABLE IS 16".

REVISED		BY	CK'D	APPR.
3				
2				
1				
0	11/15/06	BURLISON	GUINN	HOYT

PROGRESS ENERGY FIBER OPTIC CABLE INSTALLED IN SUPPLY SPACE - INSTALLATION DETAILS

Progress Energy

PGN DWG. 09.04-52

Progress Energy

Annual Reliability Report to FPSC

March 1, 2007

II. STORM HARDENED FACILITIES

a. Describe each storm hardening activity undertaken in the field during 2006.

Distribution

In addition to the activities identified in PEF's Storm Hardening Plan, Wood Pole Inspection Plan, and other initiatives identified and discussed herein, Progress Energy Florida Distribution undertook the following specific Storm Hardening Activities during 2006:

Existing Overhead to Underground Conversion:

See Attachment H - "Major Conversions Historical Data".

Network Maintenance and Replacement:
2006 O&M Actuals - $600k and Capital Actuals - $200k
Livefront Switchgear Replacement – 2006 Capital Actuals - $900k
Underground Cable Replacement – 2006 Capital Actuals - $9.9M

New Construction Cable footage installed underground:
In 2006, PEF installed 4,992,701 linear feet of new underground cable, which represents 75% of all new primary construction. Overall, 41% of PEF's 31,317 distribution system primary circuit miles are underground.

Small Diameter Conductor Upgrade:
2006 Capital Actuals - $1.1M

Midfeeder Electronic Sectionalizing (Reclosers):
2006 Capital Actuals - $600k

Wood Pole Inspection and Treatment:
2006 O&M Actuals - $2.3M

Wood Pole Replacement:
2006 Capital Actuals - $3.5M

Padmount Transformer Inspection:
2006 O&M Actuals - $600k

Padmount Transformer Replacement:
2006 Capital Actuals - $4.4M

Transmission

In addition to the activities identified in PEF's Storm Hardening Plan, Wood Pole Inspection Plan, and other initiatives identified and discussed herein, Progress Energy Florida Transmission undertook the following specific Storm Hardening Activities during 2006:

Maintenance Change outs:
Progress Energy Florida Transmission is installing either steel or concrete poles when replacing existing wood poles. This activity resulted in the replacement of 523 wood poles with steel or concrete during 2006.

DOT/Customer Relocations and Line Upgrades and Additions:
Progress Energy Florida Transmission will design any DOT or Customer Requested Relocations and any line upgrades or additions to meet or exceed the current NESC Code Requirements and will construct these projects with either steel or concrete poles. This activity resulted in replacement of approximately 516 poles with steel or concrete during 2006.

b. Describe the process used by your company to identify the location and select the scope of storm hardening projects.

Distribution

The location and scope of projects that deliver hardening benefits varies by type of construction, maintenance, or replacement activity. Primary factors considered include operational and storm performance, remaining life, condition assessment of equipment as determined by inspection, and cost to repair or replace. In all cases, the cost to install, maintain, or replace equipment is balanced against the expected long term operational and cost benefit.

Transmission

Maintenance Change outs
Poles that require change out are identified by Procedure MNT-TRMX-00053, "Ground Patrols" (See Attachment I). The change out schedule is determined by the condition of the wood pole based upon inspector experience.

DOT/Customer Relocations
Poles that are changed out and upgraded are identified by requests from DOT or Customers.

Line Upgrades and Additions
Progress Energy Florida Transmission Planning will determine where and when lines need to be upgraded.

c. **Provide the costs incurred and any quantified expected benefits.**

Distribution

See Subsection (a) above.

Transmission

Maintenance Change outs

Progress Energy Florida Transmission spent approximately $ 10,185,883 for Capital Improvements in 2006. Capital Improvement includes pole change outs and complete insulator replacements. Progress Energy Florida Transmission also spent $471,881 for OHGW replacement. Progress Energy Florida Transmission also spent $915,519 on OHGW Bonding and Grounding (O&M).

Quantified benefits will be a stronger and more consistent material supporting Transmission Circuits. Over next 10 years, percentage of wood poles on Progress Energy Florida's Transmission system should reduce wood poles on the system from approximately 75% to approximately 50%.

DOT/Customer Relocations and Line Upgrades and Additions

Progress Energy Florida Transmission spent approximately $43.3 million for DOT/Customer Relocations and Line Upgrades and Additions. Quantified benefits will be a stronger and more consistent material supporting Transmission Circuits. Over next 10 years, percentage of wood poles on Progress Energy's Transmission system should reduce wood poles on the system from approximately 75% to approximately 50%.

d. **Discuss any 2007 projected activities and budget levels.**

Distribution

Progress Energy Florida Distribution's storm hardening strategy and activities for 2007 are still ongoing and under development and will be included in PEF's May 5th Storm Hardening Construction Rules filing.

Transmission

Progress Energy Florida Transmission's storm hardening strategy and activities for 2007 are still ongoing and under development and will be included in PEF's May 5th Storm Hardening Construction Rules filing. At this time, however, Progress Energy Transmission reports as follows:

Maintenance Change outs

Progress Energy Florida Transmission should replace approximately 500 poles for 2007. Capital Budget for Line Maintenance is $8,000,333 for 2007 which includes Pole Change outs, insulator replacements and any OHGW replacements.

DOT/Customer Relocations and Line Upgrades and Additions

Progress Energy Florida Transmission should replace approximately 1,000 poles for 2007. Current identified DOT/Customer Relocation Projects and Line Upgrades and Additions has a capital budget of $30 million.

IV. Wood Pole Inspection Program

a. Provide a detailed description of the Company's wood pole inspection program.

The intent of the PEF wood pole inspection program is to determine the condition of the wood pole plant and provide remediation for any wood poles that are showing signs of decay or fall below the minimum strength requirements outlined by NESC standards.

PEF is utilizing the expertise of OSMOSE to perform the inspections on an eight year cycle. OSMOSE is using visual inspection, sound and boring, and full excavation down to 18 inches below ground line to determine the condition of the pole. In addition OSMOSE is providing remediation of decayed poles through external and internal treatments. If the pole is below NESC standards and has the minimum remaining wood above ground line, OSMOSE will also reinforce the pole back to original strength.

See Attachment J - "Wood Pole Inspection Plan".

b. Discuss 2006 accomplishments

Distribution

In 2006, PEF inspected 64,208 wood poles from May thru December 2006. This total met the required prorated number of inspections needed to meet an 8 year pole inspection cycle. In addition to the inspections, GPS coordinates and physical attributes were updated and/or verified and inspection results were collected in a central database on all 64,208 wood poles.

Transmission

In 2006, PEF Transmission ground patrol inspected 15,161 wood pole structures. Please see Attachment L – "System PSC Inspection Recording Requirements". This represents approximately 45% of the wood pole structures on the PEF Transmission system.

c. Discuss projected accomplishments for 2007

Distribution

Among other things, PEF's goal for 2007 is to inspect at least 95,000 wood poles throughout the PEF territory and to continue verifying and updating GPS coordinates, inspection results, and physical attributes for all poles inspected.

Transmission

Among other things, current plans are to inspect approximately 1/3 to 1/5 of the system, which equates to approximately 1,000 miles of Transmission Circuits (or approximately 7,650 wood structures). We will have a 3rd party contract crew complete ground line sound and bore and complete treatment for approximately 5,600 wood poles. We also will aerial patrol the entire transmission system three (3) times during 2007.

d. **Include pole inspection report** – *see information attached hereto*

For Distribution Pole Inspection Report – See Attachment K - CD containing Excel file – "2006 Distribution Pole Inspection Data".

For Transmission Pole Inspection Report – See Attachment L - CD containing Excel file – "System PSC Inspection Recording Requirements".

Pole Inspection Report

1) **A description of the methods used for structural analysis and pole inspection.**

   See Attachment J - "Wood Pole Inspection Plan", pages 1 - 4 and 6 - 8.

2) **A description of the selection criteria that was used to determine which poles would be inspected.**

   See Attachment J - "Wood Pole Inspection Plan".

3) **A summary report of the inspection data including the following:**

   Distribution

   a. Number of poles inspected. **64,208**
   b. Number of poles not requiring remediation. **61,930**
   c. Number of poles requiring remedial action. **2,278**
   d. Number of pole requiring minor follow up. **48,158**
   e. Number of poles requiring a change in inspection cycle. **0**
   f. Number of poles that were overloaded. **N/A**
   g. Number of poles that with estimated remaining life less than 8 years. **2,278**
   h. Number of inspections planned. **63,749**

   Transmission

   a. Number of poles inspected. **15,161 wood structures**
   b. Number of poles not requiring remediation. **13,066**
   c. Number of poles requiring remedial action. **2,095**
   d. Number of pole requiring minor follow up. **1,896**
   e. Number of poles requiring a change in inspection cycle. **0**
   f. Number of poles that were overloaded. **0**
   g. Number of poles that with estimated remaining life less than 8 years. **N/A**
   h. Number of inspections planned. **7,650**

4) **A pole inspection report that contains the following detailed information:**

   a. Transmission circuit name.
   b. Pole identification number.
   c. Inspection results.
   d. Remediation recommendation.
   e. Status of remediation.

For Distribution - See Attachment K - CD containing Excel file - "2006 Distribution Pole Inspection Data".

For Transmission – See Attachment L – CD containing Excel file - "System PSC Inspection Recording Requirements".

V. EIW INITIATIVES

VEGETATION MANAGEMENT – THREE YEAR CYCLE (*Initiative 1*)

a. **Provide a complete description of the Company's vegetation management program (policies, guidelines, practices) for 2006 and 2007 in terms of both activity and costs.**

- *See Attachment M - "PEF's Storm Preparedness Plan".*
- *See Attachment N - "Internal Policy & Guidelines".*
- *For activities and costs - See information herein on pages 33- 36.*

b. **Describe tree clearing practices in utility easements and authorized rights-of-ways.**

See Attachment N - "Internal Policy & Guidelines".

c. **Identify relevant portions of utility tariffs pertaining to utility vegetation management activities within easements and authorized rights-of-ways.**

PEF's tariffs do not contain language pertaining to utility vegetation management activities within easements and authorized rights-of-ways.

d. **Describe tree removal practices for trees that abut and/or intrude into easements and authorized rights-of-ways.**

See Attachment N - "Internal Policy & Guidelines".

e. **Describe tree clearing practices outside of utility easements and authorized rights-of-ways.**

See Attachment N - "Internal Policy & Guidelines".

f. **Identify relevant portions of utility tariffs pertaining to utility vegetation management activities outside of easements and authorized rights-of-ways.**

PEF's tariffs do not contain language pertaining to utility vegetation management activities outside of easements and authorized rights-of-ways.

g. **Describe tree removal practices for trees outside of easements and authorized rights-of-ways.**

See Attachment N - "Internal Policy & Guidelines".

h. **Identify relevant portions of utility tariffs pertaining to customer vegetation management obligations as a term or condition of electric service.**

There is no language in PEF's tariffs that pertain to customer vegetation management obligations as a term or condition of electric service. However, in Section 4 of PEF's tariff book, Sheets 4.11 and 4.123, reference is made to a customer's responsibility regarding vegetation management.

i. **Describe Company practices regarding customer trim requests.**

When a customer calls into the call center, either a tree work ticket is generated or a Progress Energy Florida field resource will submit a ticket using the work management system. For the remaining process, please see Attachment O - "Work Requests – STORMS".

j. **Describe the criteria used to determine whether to remove a tree, replace a tree, spot-trim, demand trim, or mid-cycle trim, etc.**

The criteria used is comprised of a number of considerations, i.e., location, customers on the line, removal vs. trim candidate, species, customer permission, easement rights and risk. Apart from identifying these factors, as a general matter, PEF cannot elaborate as to how these factors may apply in a given factual circumstance.

k. **Discuss any 2007 projected activities and budget levels.**

See charts below.

SYSTEM VEGETATION MANAGEMENT PERFORMANCE METRICS

	Feeders			Laterals		
	Unadjusted*	Adjusted	Diff.	Unadjusted*	Adjusted	Diff.
(A) Number of Outages	N/A *	128	N/A *	N/A *	5,247	N/A *
(B) Customer Interruptions	N/A *	60,724	N/A *	N/A *	228,439	N/A *
(C) Miles Cleared	N/A *	723.41	N/A *	N/A *	2,703.25	N/A *
(D) Remaining Miles	N/A *	132.62	N/A *	N/A *	495.06	N/A *
(E) Outages per Mile [A ÷ (C + D)]	N/A *	.15	N/A *	N/A *	1.64	N/A *
(F) Vegetation CI per Mile [B ÷ (C + D)]	N/A *	70.94	N/A *	N/A *	266.86	N/A *
(G) Number of Hotspot trims	N/A *	**	N/A *	N/A *	**	N/A *
(H) All Vegetation Management Costs	N/A *	$4,104,283	N/A *	N/A *	$15,445,066	N/A *
(I) Customer Minutes of Interruption	N/A *	4,669,195	N/A *	N/A *	17,565,069	N/A *
(J) Outage restoration costs	N/A *	****	N/A *	N/A *	****	N/A *
(K) Vegetation Management Budget (current year) - 2006	N/A *	$4,104,283	N/A *	N/A *	$15,445,066	N/A *
(L) Vegetation Goal (current year) - 2006	N/A *	856.03 miles	N/A *	N/A *	3,198.86 miles	N/A *
(M) Vegetation Management Budget (next year) - 2007	N/A *	$6,060,289	N/A *	N/A *	$13,489,050	N/A *
(N) Vegetation Management Goal (next year) - 2007	N/A *	1,267.24 miles	N/A *	N/A *	2,839.76 miles	N/A *
(O) Trim-Back Distance	N/A *	***	N/A *	N/A *	***	N/A *

* There is no unadjusted data on tree caused storm events that would be relevant to PEF's tree trimming program. It would not be practical to gather this data and furthermore the data would not be accurate if we could obtain it. It would take extraordinary effort and considerable conjecture to estimate the impact of trees on PEF's distribution system for outage causes that are currently coded "storm". It would not be practical to gather such data because contractors move

around the System and operate under a myriad of restoration contracts and agreements. To track this data, it would require the establishment of both a financially based tracking system to monitor costs as well as crew activity system-wide during a catastrophic event. Additionally, it is not practical to perform a forensic analysis of outages during a catastrophic event for the purpose of obtaining the root cause since several agencies assist in the effort as well as the magnitude of damage that impact a localized area of the system. During a storm event, outage tracking migrates from Outage Management System event to a Damage Assessment event. As such, our ability to capture reliable data becomes significantly compromised.

** This data was not previously tracked. It is being tracked in 2007 and will be reported in subsequent reports.

*** Distance varies according to species' growth rates.

**** This data was not previously tracked. A means of extracting tree outage data from total storm restoration costs is currently being investigated.

MANAGEMENT REGION (NORTH CENTRAL) VEGETATION MANAGEMENT PERFORMANCE METRICS

	Feeders			Laterals		
	Unadjusted*	Adjusted	Diff.	Unadjusted*	Adjusted	Diff.
(A) Number of Outages	N/A *	50	N/A *	N/A *	1,474	N/A *
(B) Customer Interruptions	N/A *	20,170	N/A *	N/A *	75,877	N/A *
(C) Miles Cleared	N/A *	145.31	N/A *	N/A *	546.65	N/A *
(D) Remaining Miles	N/A *	50.39	N/A *	N/A *	189.52	N/A *
(E) Outages per Mile [A ÷ (C + D)]	N/A *	.26	N/A *	N/A *	2.00	N/A *
(F) Vegetation CI per Mile [B ÷ (C + D)]	N/A *	103.07	N/A *	N/A *	103.07	N/A *
(G) Number of Hotspot trims	N/A *	**	N/A *	N/A *	**	N/A *
(H) All Vegetation Management Costs	N/A *	$987,823	N/A *	N/A *	$3,717,335	N/A *
(I) Customer Minutes of Interruption	N/A *	1,446,853	N/A *	N/A *	5,442,922	N/A *
(J) Outage restoration costs	N/A *	****	N/A *	N/A *	****	N/A *
(K) Vegetation Budget (current year) - 2006	N/A *	$987,823	N/A *	N/A *	$3,717,335	N/A *
(L) Vegetation Goal (current year) - 2006	N/A *	195.69 miles	N/A *	N/A *	736.18 miles	N/A *
(M) Vegetation Budget (2007)	N/A *	$1,458,599	N/A *	N/A *	$3,246,559	N/A *
(N) Vegetation Management Goal (next year) - 2007	N/A *	288.82 miles	N/A *	N/A *	605.82 miles	N/A *
(O) Trim-Back Distance	N/A *	***	N/A *	N/A *	***	N/A *

MANAGEMENT REGION (SOUTH CENTRAL) VEGETATION MANAGEMENT PERFORMANCE METRICS

	Feeders			Laterals		
	Unadjusted*	Adjusted	Diff.	Unadjusted*	Adjusted	Diff.
(A) Number of Outages	N/A *	25	N/A *	N/A *	569	N/A *
(B) Customer Interruptions	N/A *	16,623	N/A *	N/A *	62,532	N/A *
(C) Miles Cleared	N/A *	133	N/A *	N/A *	502	N/A *
(D) Remaining Miles	N/A *	44	N/A *	N/A *	164	N/A *
(E) Outages per Mile [A ÷ (C + D)]	N/A *	.14	N/A *	N/A *	2.13	N/A *
(F) Vegetation CI per Mile [B ÷ (C + D)]	N/A *	3.10	N/A *	N/A *	109.80	N/A *
(G) Number of Hotspot trims	N/A *	**	N/A *	N/A *	**	N/A *
(H) All Vegetation Management Costs	N/A *	$797,546	N/A *	N/A *	$3,001,290	N/A *
(I) Customer Minutes of Interruption	N/A *	1,225,067	N/A *	N/A *	4,608,585	N/A *
(J) Outage restoration costs	N/A *	****	N/A *	N/A *	****	N/A *
(K) Vegetation Management Budget (current year) - 2006	N/A *	$797,546	N/A *	N/A *	$3,001,290	N/A *
(L) Vegetation Goal (2006)	N/A *	177 miles	N/A *	N/A *	666 miles	N/A *
(M) Vegetation Management Budget (next year) - 2007	N/A *	$1,177,639	N/A *	N/A *	$2,621,197	N/A *
(N) Vegetation Management Goal (next year) - 2007	N/A *	338.15 miles	N/A *	N/A *	791.45 miles	N/A *
(O) Trim-Back Distance	N/A *	***	N/A *	N/A *	***	N/A *

MANAGEMENT REGION (NORTH COASTAL) VEGETATION MANAGEMENT PERFORMANCE METRICS

	Feeders			Laterals		
	Unadjusted*	Adjusted	Diff.	Unadjusted*	Adjusted	Diff.
(A) Number of Outages	N/A *	17	N/A *	N/A *	1,664	N/A *
(B) Customer Interruptions	N/A *	13,682	N/A *	N/A *	51,471	N/A *
(C) Miles Cleared	N/A *	240	N/A *	N/A *	904	N/A *
(D) Remaining Miles	N/A *	10	N/A *	N/A *	39	N/A *
(E) Outages per Mile [A ÷ (C + D)]	N/A *	.07	N/A *	N/A *	1.76	N/A *
(F) Vegetation CI per Mile [B ÷ (C + D)]	N/A *	54.57	N/A *	N/A *	54.57	N/A *
(G) Number of Hotspot trims	N/A *	**	N/A *	N/A *	**	N/A *
(H) All Vegetation Management Costs	N/A *	$1,007,522	N/A *	N/A *	$3,790,468	N/A *
(I) Customer Minutes of Interruption	N/A *	1,365,771	N/A *	N/A *	5,137,900	N/A *
(J) Outage restoration costs	N/A *	****	N/A *	N/A *	****	N/A *
(K) Vegetation Budget (current year) - 2006	N/A *	$1,007,522	N/A *	N/A *	$3,790,468	N/A *
(L) Vegetation Goal (2006)	N/A *	251 miles	N/A *	N/A *	943 miles	N/A *
(M) Vegetation Budget (2007)	N/A *	$1,487,295	N/A *	N/A *	$3,310,430	N/A *
(N) Vegetation Management Goal (next year) - 2007	N/A *	358.95 miles	N/A *	N/A *	864.94 miles	N/A *
(O) Trim-Back Distance	N/A *	***	N/A *	N/A *	***	N/A *

MANAGEMENT REGION (SOUTH COASTAL) VEGETATION MANAGEMENT PERFORMANCE METRICS

	Feeders			Laterals		
	Unadjusted*	Adjusted	Diff.	Unadjusted*	Adjusted	Diff.
(A) Number of Outages	N/A *	36	N/A *	N/A *	1,540	N/A *
(B) Customer Interruptions	N/A *	19,102	N/A *	N/A *	71,860	N/A *
(C) Miles Cleared	N/A *	201	N/A *	N/A *	755	N/A *
(D) Remaining Miles	N/A *	27	N/A *	N/A *	103	N/A *
(E) Outages per Mile [A ÷ (C + D)]	N/A *	.16	N/A *	N/A *	1.79	N/A *
(F) Vegetation CI per Mile [B ÷ (C + D)]	N/A *	83.71	N/A *	N/A *	83.71	N/A *
(G) Number of Hotspot trims	N/A *	**	N/A *	N/A *	**	N/A *
(H) All Vegetation Management Costs	N/A *	$1,311,657	N/A *	N/A *	$4,935,972	N/A *
(I) Customer Minutes of Interruption	N/A *	1,343,975	N/A *	N/A *	5,055,908	N/A *
(J) Outage restoration costs	N/A *	****	N/A *	N/A *	****	N/A *
(K) Vegetation Management Budget (current year) - 2006	N/A *	$1,311,657	N/A *	N/A *	$4,935,972	N/A *
(L) Vegetation Management Goal (current year) - 2006	N/A *	228 miles	N/A *	N/A *	858 miles	N/A *
(M) Vegetation Management Budget (next year) - 2007	N/A *	$1,936,765	N/A *	N/A *	$4,310,864	N/A *
(N) Vegetation Management Goal (next year) - 2007	N/A *	281.32 miles	N/A *	N/A *	577.55 miles	N/A *
(O) Trim-Back Distance	N/A *	***	N/A *	N/A *	***	N/A *

<u>Comparison with a Three-Year Program</u>: Provide a comparison of a three-year trim cycle program and the achieved performance of the program implemented on both an adjusted and unadjusted basis.

PEF has not identified a method to compare data from the "Company Program" to a "Three-Year Cycle Program" other than using the metrics that Staff has identified when recommending approval of PEF's "IVM" Vegetation Management Plan. Aside from using such metrics, PEF does not have baseline data, derived from a comparable three-year cycle program, to compare its data. To the extent that Staff is suggesting that PEF compare its plan to another utility that is currently using a three-year cycle program, PEF believes that neither an accurate nor a reliable comparison can be made given the variables associated with a number of facts, types of vegetation and conditions, etc. that may exist between the two utilities.

Subject to this clarification, please see documents and information included herewith as Attachment P.

Local Community Participation: A discussion addressing utility efforts to collect and use input from local communities and governments regarding (a) r-o-w tree clearing, (b) easement tree clearing, (c) hard-to-access facilities, (d) danger trees not within r-o-w or within easements where the utility has unobstructed authority to remove the danger tree, and (e) trim-back distances.

Please see pages 51-53.

PriorityTrees – Additional Questions

a) Number of priority trees removed? **1,301**
b) Expenditures on priority tree removal? **$480,000**
c) Number of request for removals that were denied? **105 (These trees were on private property. The owners refused a request for removal. The trees were instead trimmed as much as possible within the legal rights that PEF had to do so.)**
d) Avoided CI with priority trees removed (estimate)? **[See Below]**
e) Avoided CMI with priority trees removed (estimate)? **[See Below]**

In response to items d) and e), the determination of the number of customers (CI) that would have been interrupted and/or the extent of an outage (CMI) is dependent upon a number of variables such as: species of tree; tree wind resistance characteristics; age of tree; condition of tree; type of failure – electrical vs. mechanical (limb or stem); location along the feeder; soil conditions, the extent of any disease and/or insect infestation; the type, magnitude and duration of a storm; etc. To quantify or estimate the avoided CI or CMI as a general matter for all possible conditions would require PEF to guess and speculate on conditions for which it has neither reliable nor supporting data. PEF therefore can not provide data for these fields.

JOINT-USE POLE ATTACHMENT AUDITS FOR THE YEAR (*Initiative 2*)

a) **Percent of system audited.** Feeders: *100%* Laterals: *100%*
b) **Date audit conducted?** *May – December 2006*
c) **Date of previous audit?** *2001 – Full system audit; 2005 – Partial system audit*
d) **List of audits conducted annually.** *Partial system audits are conducted annually. Full system audits are conducted every 5 years.*

Joint-Use Attachment Audits – Distribution Poles

(A) Number of company owned distribution poles.	1,008,321
(B) Number of company distribution poles leased.	500,000
(C) Number of owned distribution pole attachments (cable & phone attachments on PE poles)	872,403
(D) Number of leased distribution pole attachments. (PE attachments on phone poles)	14,576
(E) Number of authorized attachments.	800,217
(F) Number of unauthorized attachments. (pole attachment audit completed in Dec 2006)	72,186*
(G) Number of distribution poles strength tested. (complete loading analysis needed)	3,792
(H) Number of distribution poles passing strength test. (complete loading analysis needed)	3,791
(I) Number of distribution poles failing strength test (overloaded).	1
(J) Number of distribution poles failing strength test (other reasons).	0
(K) Number of distribution poles corrected (strength failure) (added down guy)	1
(L) Number of distribution poles corrected (other reasons).	0
(M) Number of distribution poles replaced.	0
(N) Number of apparent NESC violations involving electric infrastructure.	None
(O) Number of apparent NESC violations involving 3rd party facilities.	None

* For all unauthorized attachments that PEF discovered in its 2006 full system audit, PEF is following up with all the owners of those unauthorized attachments and is pursuing appropriate actions under controlling rules, laws and regulations.

Joint-Use Attachment Audits – Transmission Poles

(A) Number of company owned transmission poles.	41,639
(B) Number of company transmission poles leased.	2,500
(C) Number of owned transmission pole attachments (cable & phone attachments on PE poles)	4,845
(D) Number of leased transmission pole attachments. (PE attachments on phone poles)	0
(E) Number of authorized attachments.	4,710
(F) Number of unauthorized attachments. (pole attachment audit completed in Dec 2006)	135*
(G) Number of transmission poles strength tested.	83
(H) Number of transmission poles passing strength test.	83
(I) Number of transmission poles failing strength test (overloaded).	0
(J) Number of transmission poles failing strength tests (other reasons).	0
(K) Number of transmission poles corrected	0
(L) Number of transmission poles corrected (other reasons).	0
(M) Number of transmission poles replaced	0
(N) Number of apparent NESC violations involving electric infrastructure.	None
(O) Number of apparent NESC violations involving 3rd party facilities.	None

* For all unauthorized attachments that PEF discovered in its 2006 full system audit, PEF is following up with all the owners of those unauthorized attachments and is pursuing appropriate actions under controlling rules, laws and regulations.

State whether pole rents are jurisdictional or non-jurisdictional. If pole rents are jurisdictional, then provide an estimate of lost revenue and describe the company's efforts to minimize the lost revenue.

Pole attachment rents are jurisdictional and are booked in Account 454 – "Rent from Electric Property". PEF found approximately 72,000 unauthorized attachments in 2006 which, on an estimated average basis, could equal approximately $1.2M in joint attachment fees.

PEF conducts partial audits of it's pole attachments throughout the year. Full audits are conducted every 5 years. When PEF discovers unauthorized attachments on PEF poles, PEF follows-up with the attacher who owns the unauthorized attachments and PEF seeks all revenue applicable under controlling laws, rules, and regulations.

SIX YEAR INSPECTION CYCLE FOR TRANSMISSION STRUCTURES (*Initiative 3*)

Describe the extent of the inspection and results pertaining to transmission wires, towers, and substations for reliability and NESC safety matters. The intent is to assure the Commission that utilities know the status of their facilities and that reasonable efforts are taken to address transmission structure reliability and NESC safety matters.

Progress Energy Florida's Transmission Department follows Procedure MNT-TRMX-00053 titled "Ground Patrols" to periodically assess the condition of the transmission circuits. The primary goal of the ground patrol is to inspect transmission line structures and associated hardware and conductor on a routine basis to identify any required material repairs or replacements. Please also see Initiative 3 in PEF's Storm Hardening Plan attached hereto.

Transmission Circuit, Substation and Other Equipment Inspections

	2006 Activity		2006 Current Budget		Next Year	
	Goal	Actual	Budget	Actual	Goal	Budget
(A) Total transmission circuits.	N/A	430	\$2,779,985	\$3,526,899	N/A	\$2,996,257
(B) Planned transmission circuit inspections.	N/A	129	N/A	N/A	120	N/A
(C) Completed transmission circuit inspections.	N/A	159	N/A	N/A	N/A	N/A
(D) Percent of transmission circuit inspections	N/A	37%	N/A	N/A	28%	N/A
(E) Planned transmission substation inspections.	N/A	461	\$11,611,365	\$12,121,889	461	\$11,502,308
(F) Completed transmission substation inspections.	N/A	461	N/A	N/A	N/A	N/A
(G) Percent transmission substation inspections	N/A	100%	N/A	N/A	N/A	N/A
(H) Planned transmission equipment inspections (other equipment).	N/A	N/A	N/A	N/A	N/A	N/A
(I) Completed transmission equipment inspections (other equipment).	N/A	N/A	N/A	N/A	N/A	N/A
(J) Percent of transmission equipment inspections completed (other	N/A	N/A	N/A	N/A	N/A	N/A

Note: For most entries of "N/A" in the chart above, Progress Energy Florida does not specifically budget for Transmission line or substation inspections on an item by item basis. The budget and actual figures that are entered include inspections, emergency response, preventative maintenance, training, and other O&M Costs.

Transmission Tower Structure Inspections

	Activity		Current Budget		Next Year	
	Goal	Actual	Budget	Actual	Goal	Budget
(A) Total transmission tower structures.	N/A	3431	Please see note 1	N/A	N/A	Please see note 1
(B) Planned transmission tower structure inspections	N/A	Please see note 2	N/A	Please see note 2	N/A	N/A
(C) Completed transmission tower structure inspections.	N/A	1436	N/A	N/A	N/A	N/A
(D) Percent of transmission tower structure inspections completed.	N/A	42%	N/A	N/A	N/A	N/A

Note 1: *Please see the previous budget and actuals on page 37 for line inspections. All inspections for wood poles, towers, steel and concrete structures are included in the O&M budget. Progress Energy Florida does not specifically budget for Transmission line or substation inspections on a item by item basis. The budget and actual figures that are entered include inspections, emergency response, preventative maintenance, training, and other O&M Costs.*

Note 2: *Transmission circuits with towers are inspected on a 5 year cycle. Inspections are planned and completed based upon the 5 year cycle. Total number of transmission structure inspections planned for 2007 are 10,075 which include wood, steel and concrete structures.*

Transmission Pole Inspections

	Activity		Current Budget		Next Year	
	Goal	Actual	Budget	Actual	Goal	Budget
(A) Total number of transmission pole structures.	N/A	41,639	$2,779,985 See Note 1	$3,526,899 See Note 1	N/A	$2,996,257 See Note 1
(B) Number of transmission pole structures strength tested. *Item A: number of poles analyzed* *Item B: Number of pole structures ground inspected*	N/A	A: 83 B: 17,826	N/A	N/A	See Note 3	N/A
(C) Number of transmission pole structures passing strength test. *Item A: number of poles analyzed* *Item B: Number of pole structures ground inspected*	N/A	A: 83 B: 15,731	N/A	N/A	N/A	N/A
(D) Number of transmission poles failing strength test (overloaded).	N/A	0	N/A	N/A	N/A	N/A
(E) Number of transmission poles failing strength test (other reasons). – *Ground Inspection (See Note 1)*	N/A	2095	N/A	N/A	N/A	N/A
(F) Number of transmission poles corrected (strength failure).	N/A	N/A	N/A	N/A	N/A	N/A
(G) Number of transmission poles corrected (other reasons). *Ground Inspection*	N/A	523 see note 2	N/A	N/A	N/A	N/A
(H) Total transmission poles replaced.	N/A	523	N/A	N/A	N/A	N/A

Note 1: Progress Energy Florida does not specifically budget for Transmission line or substation inspections on an item by item basis. The budget and actual figures that are entered include inspections, emergency response, preventative maintenance, training, and other O&M costs.

Note 2: Progress Energy Florida Transmission has prioritized the remaining number of transmission poles that need to be corrected based upon the inspection results and the status of the poles. Poles that needed to be replaced quickly have already been replaced as reflected above. Poles that can remain in service have been prioritized and PEF is in the process of working through corrections based on those prioritizations.

Note 3: Transmission circuits are inspected on a 3 or 5 year cycle depending on structural material. Inspections are planned and completed based on the 5 year cycle. Total number of transmission structure inspections planned for 2007 are 10,075 which include wood, steel and concrete structures.

STORM HARDENING ACTIVITIES FOR TRANSMISSION STRUCTURES (*Initiative 4*)

Describe the extent of any upgrades to transmission structures for purposes of avoiding extreme weather, storm surge or flood-caused outages, and to reduce storm restoration costs. The intent is to assure the Commission that utilities are looking for and implementing storm hardening measures.

Hardening of Existing Transmission Structures

	Activity		Current Budget		Next Year	
	Goal	Actual	Budget	Actual	Goal	Budget
(A) Transmission structures scheduled for hardening.	900	N/A	$36.4M	N/A	1,500	$38.0M
(B) Transmission structures hardening completed.	N/A	1,039	N/A	$43.3M	N/A	N/A
(C) Percent transmission structures hardening completed.	N/A	115%	N/A	N/A	N/A	N/A

GEOGRAPHIC INFORMATION SYSTEM (GIS) (*Initiative 5*)

Distribution OH Data Input

	Activity		Current Budget		Next Year	
	Goal	Actual	Budget	Actual	Goal	Budget
(A) Total number of system wide OH assets for input.	N/A	1,375,668	N/A	N/A	N/A	N/A
(B) Number of OH assets currently on system.	N/A	1,375,668	N/A	N/A	N/A	N/A
(C) Percent of OH assets already on system.	N/A	100%	N/A	N/A	N/A	N/A
(D) Annual OH assets targeted for input (goal).	N/A	N/A	N/A	N/A	N/A	N/A
(E) Annual OH assets input to system (actual).	N/A	N/A	N/A	N/A	N/A	N/A
(F) Annual percent of OH assets input.	N/A	100%	N/A	N/A	N/A	N/A

Distribution UG Data Input

	Activity		Current Budget		Next Year	
	Goal	Actual	Budget	Actual	Goal	Budget
(A) Total number of system wide UG assets for input.	N/A	133,101	N/A	N/A	N/A	N/A
(B) Number of UG assets currently on system.	N/A	133,101	N/A	N/A	N/A	N/A
(C) Percent of UG assets already on system.	N/A	100%	N/A	N/A	N/A	N/A
(D) Annual UG assets targeted for input (goal).	N/A	N/A	N/A	N/A	N/A	N/A
(E) Annual UG assets input to system (actual).	N/A	N/A	N/A	N/A	N/A	N/A
(F) Annual percent of UG assets input.	N/A	100%	N/A	N/A	N/A	N/A

Transmission OH Data Input

	Activity		Current Budget		Next Year	
	Goal	Actual	Budget	Actual	Goal	Budget
(A) Total number of system wide OH transmission assets for input.	N/A	45,070	N/A	N/A	N/A	N/A
(B) Number of OH transmission assets currently on system.	N/A	40,563	N/A	N/A	$45,070	N/A
(C) Percent of OH transmission assets already on system.	N/A	90%	N/A	N/A	100%	$200,000
(D) Annual OH transmission assets targeted for input.	N/A	N/A	N/A	N/A	N/A	N/A
(E) Annual OH transmission assets input to system.	N/A	N/A	N/A	N/A	N/A	N/A
(F) Annual percent of OH transmission assets input.	N/A	90%	N/A	N/A	100%	N/A

Transmission UG Data Input

	Activity		Current Budget		Next Year	
	Goal	Actual	Budget	Actual	Goal	Budget
(A) Total number of system wide UG transmission assets for input.	N/A	58.25 miles	N/A	N/A	N/A	N/A
(B) Number of UG transmission assets currently on system.	N/A	58.25 miles	N/A	N/A	N/A	N/A
(C) Percent of UG transmission assets already on system.	N/A	100%	N/A	N/A	N/A	N/A
(D) Annual UG transmission assets targeted for input.	N/A	N/A	N/A	N/A	N/A	N/A
(E) Annual UG transmission assets input to system.	N/A	N/A	N/A	N/A	N/A	N/A
(F) Annual percent of UG transmission assets input.	N/A	100%	N/A	N/A	N/A	N/A

PEF's Wood Pole Inspection Plan

Progress Energy

Comprehensive Wood Pole Inspection Plan

Purpose and Intent of the Plan:

To implement a revised wood pole inspection program that complies with FPSC Order No. PSC-06-0144-PAA-EI issued February 27, 2006 (the "Plan"). The Plan concerns inspection of wooden transmission and distribution poles, as well as pole inspections for strength requirements related to pole attachments. The Plan is based on the requirements of the National Electric Safety Code ("NESC") and an average eight-year inspection cycle. The Plan provides a detailed program for gathering pole-specific data, pole inspection enforcement, co-located pole inspection, and estimated program funding required to effectuate the Plan. This Plan also sets forth pole inspection standards utilized by Progress Energy Florida ("PEF") that meet or exceed the requirements of the NESC.

The Plan includes the following specific sub-plans:

- Transmission Wood Pole Inspection Plan ("Transmission Plan").
- Distribution Wood Pole Inspection Plan ("Distribution Plan").
- Joint Use Wood Pole Inspection Plan ("Joint Use Plan").

These three inspection sub-plans are outlined and described below. All of these sub-plans will be evaluated on an ongoing basis to address trends, external factors beyond the Company's control (such as storms and other weather events), and cost effectiveness.

1) Transmission Wood Pole Inspection Plan

A. Introduction

Ground-line inspection and treatment programs detect and treat decay and mechanical damage of in-service wood poles. PEF's Transmission Department will accomplish this by identifying poles that are 8 years of age or older and treating these poles as necessary in order to extend their useful life. As required, PEF will also assess poles and structures for incremental attachments that may create additional loads. Poles that can no longer maintain the safety margins required by the NESC (ANSI C2-2002) will be remediated. These inspections will result in one of four or a combination of the following actions: (1) No action required; (2) Application of treatment; (3) Repaired; (4) Replaced. PEF will also inspect poles that PEF does not own on which PEF assets are located. If such poles are in need of treatment, repair, or replacement, PEF will provide such information to the pole owner so that such action can be taken.

B. General Plan Provisions

(i). Pole Inspection Selection Criteria

Comprehensive Wood Pole Inspection Plan

Transmission will perform ground patrols to inspect transmission system line assets to allow for the planning, scheduling, and prioritization of corrective and preventative maintenance work. These patrols will assess the overall condition of the assets including insulators, connections, grounding, and signs, as well as an assessment of pole integrity. These patrols will be done on a three-year cycle and the assessment data and reports generated from these patrols will be used to plan the ground-line inspections set forth in Section 1B(ii) below. The ground patrol inspections will categorize wood poles into four conditions or states (State 2-5). PEF will conduct ground-line inspections of State 2 and 3 poles. State 3 poles will be given priority for ground-line inspection scheduling. PEF will replace State 4 and 5 poles. PEF will no longer utilize the State 1 category.

In performing inspection and patrols, the following Transmission Line Wood Poles Inspection State Categories shall apply:

State 2 : Meeting all of the criteria listed below:

- No woodpecker holes or woodpecker holes have been repaired.
- A pole that has been cut and capped.
- Checks/cracks show no decay or insect damage.
- Ground-line inspected/treated with no data in the remarks field of the report and no noted reduction in effective pole diameter.
- Hammer test indicates a hard pole.
- No pole top deflection noted.

State 3 : Meeting one or more of the criteria listed below:

- Checks/cracks show decay or insect damage, or the presence of minimal shell cracking.
- Ground-line inspected/treated with decay noted in the remarks field of the report and a noted reduction in effective pole diameter.
- Hammer test indicates a minimal amount of ground-line decay.
- Pole has been repaired (e.g., C-truss).
- Poles with a wood bayonet or a pole that needs to be cut and capped.
- Pole can be partially hollow but with no less than 3 – 4 inches of shell thickness and cannot be caved during a hammer test.
- Pole top deflection is less than 3 feet.

State 4 : Meeting one or more of the criteria listed below and should be scheduled to be replaced:

- Woodpecker holes which have deep cavities and are not repairable.
- Checks/cracks show significant decay or insect damage, or the presence of substantial shell cracking.
- Decay in the pole top is extensive such that the pole cannot be cut and capped nor is the pole top section a candidate for a bayonet.

• Ground-line inspected/treated and identified as rejected/restorable or rejected/non-restorable.
• When hammer tested, ground-line decay pockets are found and are greater than 5 inches wide and 2 inches deep.
• Pole is hollow with less than 3 – 4 inches of shell thickness extending over more than one-quarter of the pole circumference, determined by hammer test and/or a screw driver.
• Pole top deflection is between 3 to 5 feet.

<u>State 5</u> : Meeting one or more of the criteria listed below. (This pole should be scheduled to be replaced as soon as possible):

• Woodpecker holes which have deep cavities and are not repairable, severely affecting the integrity of the pole.
• Ground-line inspection indicates the pole as "priority."
• When hammer tested, ground-line decay pockets are found and are greater than 8 inches wide by 3 inches deep.
• Pole is hollow with less than 2 inches of shell thickness extending over more than one-third of the pole circumference.
• Pole deflection exceeds 5 feet.

(ii). <u>Ground-Line Inspections</u>

Ground-line inspections of wood transmission poles will be conducted by qualified pole inspectors on an average 8-year cycle. This will result in, on average, approximately 12.5% of the remaining population of wood poles receiving this type of inspection on an annual basis. Treatment and inspection work shall be done or supervised by a foreman with a minimum of six months experience and shall be certified as being qualified for this work.

For poles without an existing inspection hole, the pole will be bored at a 45 degree angle below the ground line to a depth that extends past the center of the pole. For previously inspected poles, the original ground-line inspection plug shall be bored out and the depth of the inspection hole measured to ensure that the pole has been bored to the required depth. Fumigant application plug(s) will be bored out and the depth of these holes measured to ensure compliance. Hammer marks should be evident to show that the pole has been adequately sounded.

All work done, materials used, and materials disposed of shall be in compliance and accordance with all local, municipal, county, state, and federal laws and regulations applicable to said work. Preservatives used shall conform to the minimum requirements as set forth in this Transmission Plan.

The inspection method used will be a sound and bore inspection that will include the following components:

- Above Ground Observations - Visual inspection of the exterior condition of the pole and visual inspection of components hanging from the pole.
- Sound with Hammer – The exterior of the pole is tested with a hammer and the inspector listens for "hollowness" of the pole.
- Bore at Ground Line – The pole is bored at a 45 degree angle below the ground line. This inspection method helps to determine internal decay at the base as well as measure the amount of "good wood" left on the interior of the pole.
- Excavate to 18 inches (Full Ground Line Inspection) – The soil is removed 18 inches below ground line. Decay pockets are identified and bored to determine the extent of decay.
- Removal of Surface Decay – Identified areas of decay are removed down to "good wood" using a sharp pick.
- Assessment of Remaining Strength – All data collected from the inspection will be used to determine effective circumference and remaining strength of the pole. In evaluating pole conditions, deductions shall be made from the original ground line circumference of a pole to account for hollow heart, internal decay pockets, and removal of external decay. The measured effective critical circumference shall be at the point of greatest decay removal in the vicinity of the ground line taking into account the above applicable deductions. A pole circumference calculator shall be used to determine the measured effective critical circumference. To remain in service "as-is," the pole shall meet minimum NESC strength requirements. The measured effective critical circumference will be compared to the minimum acceptable circumference for the applicable class pole listed in the latest version of ANSI 05.1-1992, American National Standard for Wood Poles and NESC-C2-1990(1). Poles below the minimum acceptable circumference shall be rejected and will be marked in the field for replacement as either a State 4 or State 5 pole.
- Where excavation at the ground line cannot be achieved due to concrete or similar barriers, pole integrity will be assessed using a drilling resistance measuring device. These devices are now available on the market and are able to accurately detect voids and decay in poles at and below the ground where excavation is not possible.

(iii) Structural Integrity Evaluation

As part of the visual inspection of the poles, the inspector will note and record the type and location of non-native utility pole attachments to the pole or structure. This information will be used by the Joint Use Department to perform a loading analysis on certain poles or structures, where necessary, as more fully described in the Joint Use section of this Plan. In such cases, the loading information obtained from this analysis will be used along with the strength determined in the ground-line inspection. If the loads exceed: a) the strength of the structure when new and b) the strength of the existing structure exceeds the strength required at replacement, according to the NESC, the structure will either be braced to the required strength or will be replaced with a pole of sufficient strength. Specific information on this process in contained in the Joint Use section of this Plan.

(iv). Records and Reporting

A pole inspection report will be filed with the Division of Economic Regulation by March 1st of each year. The report shall contain the following information:

1) A description of the methods used for structural analysis and pole inspection.

2) A description of the selection criteria that was used to determine which poles would be inspected.

3) A summary report of the inspection data including the following:

    a. Number of poles inspected.
    b. Number of poles not requiring remediation.
    c. Number of poles requiring remedial action.
    d. Number of pole requiring minor follow up.
    e. Number of poles requiring a change in inspection cycle.
    f. Number of poles that were overloaded.
    g. Number of poles that with estimated remaining life less than 8 years.
    h. Number of inspections planned.

4) A pole inspection report that contains the following detailed information:

    a. Transmission circuit name.
    b. Pole identification number.
    c. Inspection results.
    d. Remediation recommendation.
    e. Status of remediation.

C. Program Cost and Funding

- In order to meet the obligations set forth in Order No. PCS-06-0144-PAA-EI, the number of poles inspected per year will start at approximately 4800 poles. It is expected that this program change will result in increases in pole replacements and treatments.

In order to ramp up to the average 8-year cycle, the current funding will be allocated to inspections only and replacements only for 2006. This will help PEF align with the "all wood pole" average 8-year inspection cycle. However, funding increases will be required to meet all aspects of an average 8-year pole inspection cycle as reflected in the chart below. The estimated figures in this chart are "best estimates," given information and facts known at this time and are subject to change or modification.

Wood Pole Program Cost Estimates

Annual Unit & Cost Estimate		
Cycle		
Years per cycle	8	
Poles inspected per year	4,800	
Assumed poles replaced*	4%	
O&M Cost		
GL inspection	$67,200	
Treatment	$60,480	
	$127,680	
Capital Cost		
Pole replacements	$2,688,000	

* Assumption is made that approximately 4% of the poles inspected will be identified for replacement.

2) Distribution Wood Pole Inspection Plan

A. Introduction

In accordance with FPSC Order No. PSC-06-0144-PAA-EI, PEF's Distribution Department will conduct wood pole inspections on an average 8-year cycle. These inspections will determine the extent of pole decay and any associated loss of strength. The information gathered from these inspections will be used to determine pole replacements and to effectuate the extension of pole life through treatment and reinforcement. Additionally, information collected from the wood pole inspections will be used to populate regulatory reporting requirements, will provide data for loading analyses, and will be used to track the results of the inspection program over time. PEF will also inspect poles that PEF does not own on which PEF assets are located. If such poles are in need of treatment, repair, or replacement, PEF will provide such information to the pole owner so that such action can be taken.

B. General Plan Provisions

(i). Ground-line Inspection Purpose

- The ground-line inspection process is the industry standard for determining the existing condition of wood pole assets. This inspection helps to determine extent of decay and the remaining strength of a pole. Ground-line inspections also provide insight into the remaining life of a wood pole.

- The ground-line inspection is performed at the base of the pole because the base is the location of the largest "bending moment," as well as the area subject to the most fungal decay and insect attack. Assessing the condition of the pole at the base is the most efficient way to effectively treat and restore a wood pole.

(ii). <u>Pole Inspection Process</u>

When a wood distribution pole is inspected, the following tasks will be performed:

- Above Ground Observations - Visual inspection of the exterior condition of the pole and visual inspection of components hanging from the pole.
- Partial Excavation – The soil is removed around the base of the pole and the pole is inspected for signs of decay.
- Sound with Hammer – The exterior of the pole is tested with a hammer and the inspector listens for "hollowness" of the pole.
- Bore at Ground Line – The pole is bored at a 45 degree angle below the ground line. This inspection method helps to determine internal decay at the base as well as measure the amount of "good wood" left on the interior of the pole.
- Excavate to 18 Inches (Full Ground Line Inspection) – If significant decay is found during the full excavation, the soil is removed 18 inches below ground line. Decay pockets are identified and bored to determine the extent of decay.
- Removal of Surface Decay – Identified areas of decay are removed down to "good wood" using a sharp pick.
- Assessment of Remaining Strength – All data collected from the inspection is used to determine effective circumference and remaining strength of the pole.
    - If the effective pole circumference has been reduced by 25% in comparison to the original effective pole circumference, then the pole is classified as a Priority 2 (One Tag) pole. This 25% reduction in effective circumference results in a 58% reduction in pole strength.
    - If the effective pole circumference has been reduced by 50% in comparison to the original effective pole circumference, then the pole is classified as a Priority 1 (Two Tag) pole. This 50% reduction in effective circumference results in an 87% reduction in pole strength.
    - Priority 1 poles will take precedent over Priority 2 poles during replacement.

- Using current inspection data, approximately 3% of the Distribution pole population cannot be excavated due to obstruction from concrete. If 3% of the poles inspected out of the 95,624 inspections per year are assumed to be encased in concrete, 2,869 wood poles would not otherwise be subject to excavation each year. If sound and bore is the only ground line inspection method used for these poles, it is estimated that potentially 18 poles out of the 2,869 concrete encased poles inspected in one wood pole inspection year would go undiscovered as "reject poles." In order to improve the results provided by traditional sound and bore on such poles, PEF plans to use a drilling resistance measuring device where excavation at the ground line cannot be achieved. These devices are now available on the market and are able to accurately detect voids and decay in poles at and below the ground where excavation is not possible.

(iii) Data Collection

All data collected through the inspection process will be submitted to PEF's Distribution Department in electronic format by inspection personnel. This data will be used to determine effective circumference and remaining strength of the pole. In evaluating pole conditions, deductions shall be made from the original ground line circumference of a pole to account for hollow heart, internal decay pockets, and removal of external decay. The measured effective critical circumference shall be at the point of greatest decay removal in the vicinity of the ground line taking into account the above applicable deductions. A pole circumference calculator shall be used to determine the measured effective critical circumference. To remain in service "as-is," the pole shall meet minimum NESC strength requirements. The measured effective critical circumference will be compared to the applicable minimum acceptable circumference listed in the most current versions of ANSI 05.1-1992, American National Standard for Wood Poles, and NESC-C2-1990(1). Poles below the minimum acceptable circumference shall be rejected and will be marked in the field for replacement.

(iv). Structural Integrity Evaluation

- As part of the visual inspection of the poles, the inspector will note the type and location of non-native utility pole attachments to the pole or structure. This information will be used by the Joint Use Department to perform, as necessary, a loading analysis on certain poles or structures as more fully described in the Joint Use section of this Plan. In such instances, the loading information obtained from this analysis will be used along with the strength determined in the ground-line inspection. If the loads exceed: a) the strength of the structure when new and b) the strength of the existing structure exceeds the strength required at replacement, according to the NESC, the structure will either be braced to the required strength or will be replaced with a pole of sufficient strength. Specific information on this process in contained in the Joint Use section of this plan.

- Poles not meeting the required strength for loading will be processed in the same manner as loss of strength due to decay.

(v). Records and Reporting

A pole inspection report will be filed with the Division of Economic Regulation by March 1st of each year. The report shall contain the following information:

1) A description of the methods used for structural analysis and pole inspection.

2) A description of the selection criteria that was used to determine which poles would be inspected.

3) A summary report of the inspection data including the following:

a. Number of poles inspected.
b. Number of poles not requiring remediation.
c. Number of poles requiring remedial action.
d. Number of pole requiring minor follow up.
e. Number of poles requiring a change in inspection cycle.
f. Number of poles that were overloaded.
g. Number of poles that with estimated remaining life less than 8 years.
h. Number of inspections planned.

4) A pole inspection report that contains the following detailed information:
a. Distribution circuit name.
b. Pole identification number.
c. Inspection results.
d. Remediation recommendation.
e. Status of remediation.

C. Program Cost and Funding

(i). Poles Program Cost Estimates

In order to meet the obligations set forth in Order No. PCS-06-0144-PAA-EI, the number of poles inspected per year will have to increase. This increase will also result in increases in pole replacements, bracings, and treatments. In order to ramp up to the average 8-year cycle, the current funding will be allocated to inspections only and replacements only for 2006. This will help PEF align with the "all wood pole" average 8-year inspection cycle. However, funding increases will be required to meet all aspects of an average 8-year pole inspection cycle as reflected in the charts below. The estimated figures in these charts are "best estimates," given information and facts known at this time and are subject to change or modification.

Annual Unit Estimate							
Years per Cycle	Wood Poles for 2006	Non-CCA Replacements	CCA Replacements	Non-CCA Bracing	CCA Bracing	Non-CCA Treatments	CCA Treatments
8	95,624	1,641	83	947	48	16,410	821

Annual Cost Estimate							
Years per Cycle	O&M Costs		Capital		O&M Total	Capital Total	Program Total Cost
	Inspections (S&B + Excavation)	Treatments (add'l to inspection)	Replacements	Braces			
8	$2,486,224	$206,772	$5,172,000	$278,600	$2,692,996	$5,450,600	8,143,596

3) Joint Use Pole Inspection Plan

A. Introduction

PEF currently has approximately 700,000 joint use attachments on distribution poles and approximately 5,000 joint use attachments on transmission poles. On average, PEF receives approximately 12,000 new attachment requests per year. All new attachment requests are reviewed in the field to assure the new attachments meet NESC and company clearance and structural guidelines. The information provided below outlines PEF's attachment permitting process and how PEF intends to gather structural information on certain existing joint use poles over an average 8-year inspection cycle to meet the obligations set forth in Order No. PCS-06-0144-PAA-EI.

B. General Plan Provisions

(i). Structural Analysis for a Distribution Pole New Joint Use Attachment

When the Joint Use Department receives a request to attach a new communication line to a distribution pole, the following will be done to ensure that NESC clearance and loading requirements are met before permitting the new attachment:

- Each pole is field inspected, and the attachment heights of all electric and communication cables and equipment are collected. The pole number, pole size and class (type) are noted as well as span lengths of cables and wires on all sides of the pole.
- For each group of poles in a tangent line, the pole that has the most visible loading, line angle and longest or uneven span length is selected to be modeled for wind loading analysis.
- The selected pole's information is loaded into a software program called "Pole Foreman" from PowerLine Technologies. The pole information is analyzed and modeled under the NESC Light District settings of 9psf, no ice, 30° F, at 60 MPH winds to determine current loading percentages.
- If that one pole fails, the next worst case pole in that group of tangent poles is analyzed as well.
- Each pole is analyzed to determine existing pole loading and the proposed loading with the new attachment.

- If the existing analysis determines the pole is overloaded, a work order is issued to replace the pole with a larger class pole. If the pole fails only when the new attachment is considered, a work order estimate is made and presented to the communication company wishing to attach.
- The results of the analysis and the new attachment are entered into the FRAME system.

(ii). <u>Structural Analysis for a Transmission Pole New Joint Use Attachment</u>

When the Joint Use Department receives a request to attach a new communication line to a transmission pole with distribution underbuild, the following will be done to ensure that NESC clearance and loading requirements are met before permitting the new attachment:

- Each pole is field inspected, and the attachment heights of all electric and communication cables and equipment are collected. The pole number, pole size and class (type) are noted as well as span lengths of cables and wires on all sides of the pole.
- All pole information including structural plan and profiles are sent to the engineering company, Morrison & Hershfield in Plantation, Florida, to be modeled in PLS-CADD/LITE and PLS-POLE for structural analysis.
- Morison and Hershfield engineers determine the worst case structures in a tangent line and request the structural drawings and attachment information on those selected poles. Typically, transmission poles with line angle and uneven span lengths are the poles considered for wind loading analysis.
- The selected pole information is loaded into the PLS-CADD and PLS-POLE software. Depending on the pole location per the NESC wind charts, one of the following load cases is run. **NESC Light District:** 9psf, no ice, 30° F, 60mph; **NESC Extreme:** 3 sec gust for the specific county, no ice, 60° F (Ex: Orange County is 110 mph); or **PEF Extreme** at 36psf, 75° F, wind chart mph
- If that one pole fails, the next worst case pole in that group of tangent poles is analyzed as well.
- Each pole is analyzed to determine existing pole loading and the proposed loading with the new attachment.
- If the existing analysis determines the pole is overloaded, a work order is issued to replace the pole with a larger class pole. If the pole fails only when the new attachment is considered, a work order estimate is made and presented to the communication company wishing to attach.
- The results of the analysis and the new attachment are entered into the FRAME system.

(iii). <u>Analysis of Existing Joint Use Attachments On Distribution Poles</u>

There are approximately 700,000 joint use attachments on approximately 500,000 distribution poles in the PEF system. All distribution poles with joint use attachments will be inspected on an average 8-year audit cycle to determine existing structural analysis for wind loading. These audits will start at the sub-station where the feeder originates. For each group of poles in a tangent line, the pole that has the most visible loading, line angle, and longest or uneven span length will be selected to be modeled for wind loading analysis. Each pole modeled will be field inspected. The attachment heights of all electric and communication cables and equipment will be collected. The pole age, pole type, pole number, pole size / class, span lengths of cables and wires, and the size of all cables and wires on all sides of the pole will be collected.

The selected pole's information will then be loaded into a software program called "Pole Foreman" from PowerLine Technologies. The pole information will be analyzed and modeled under the NESC Light District settings of 9psf, no ice, 30° F, at 60 MPH winds to determine current loading percentages. If that one pole fails, the next worst case pole in that group of tangent poles will be analyzed as well. Each pole analyzed will determine the existing pole loading of all electric and communication attachments on that pole. If the existing analysis determines the pole is overloaded, a work order will be issued to replace the pole with a larger class pole. Should the original pole analyzed meet the NESC loading requirements, all similar poles in that tangent line of poles will be noted as structurally sound and entered into the database as "PASSED" structural analysis. The results of the analysis and all communication attachments will be entered into the FRAMME system. Reporting from the FRAMME system will indicate the date and results of the analysis. Poles rated at 100% or lower will be designated as "PASSED." Poles that are analyzed and determined to be more than 100% loaded will be designated as "FAILED," and scheduled to be changed out. Once the pole is changed out, FRAMME will be updated to reflect the date the new pole was installed with the new loading analysis indicated.

(iv). <u>Analysis of Existing Joint Use Attachments On Transmission Poles</u>

There are approximately 5,000 joint use attachments on approximately 2,500 transmission poles in the PEF system. All transmission poles with joint use attachments will be inspected on an average 8-year audit cycle to determine existing structural analysis for wind loading. Audits will start at the sub-station where the feeder originates. All pole information (pole size, class, type, age, pole number, cable, wire, equipment attachment heights, span lengths) including structural plan and profiles will be sent to the engineering company, Morrison & Hershfield in Plantation, Florida, to be modeled in PLS-CADD/LITE and PLS-POLE for structural analysis. Morrison and Hershfield engineers will determine the worst case structures in a tangent line and request the structural drawings and attachment information on those selected poles. Typically, transmission poles with line angle and uneven span lengths are the poles considered for wind loading analysis.

The selected pole information will be loaded into the PLS-CADD and PLS-POLE software. Depending on the pole location per the NESC wind charts, one of the following load cases is run. **NESC Light District:** 9psf, no ice, 30° F, 60mph; **NESC Extreme:** 3 sec gust for the specific county, no ice, 60° F (Ex: Orange County is 110 mph); or **PEF Extreme** at 36psf, 75° F, wind chart mph. If that one transmission pole fails, the next worst case pole in that group of tangent poles will be analyzed as well. Each transmission pole analyzed will determine the existing pole loading of all electric and communication attachments on that pole. If the existing analysis determines the transmission pole is overloaded, a work order will be issued to replace the pole with a larger class pole. Should the original pole analyzed meet the NESC loading requirements, all similar poles in that tangent line of poles will be noted as structurally sound and entered into the database as "PASSED" structural analysis.

The results of the analysis and all communication attachments will be entered into the FRAMME system. Reporting from the FRAMME system will indicate the date and results of the analysis. Transmission poles rated at 100% or lower will be designated as "PASSED." Transmission poles that are analyzed and determined to be more than 100% loaded will be designated as "FAILED," and scheduled to be changed out. Once the transmission pole is changed out, FRAMME will be updated to reflect the date the new pole was installed with the new loading analysis indicated.

(v). Records and Reporting

A pole inspection report will be filed with the Division of Economic Regulation by March 1st of each year. The report shall contain the following information:

1) A description of the methods used for structural analysis and pole inspection.

2) A description of the selection criteria that was used to determine which poles would be inspected.

3) A summary report of the inspection data including the following:

a. Number of poles inspected.
b. Number of poles not requiring remediation.
c. Number of poles requiring remedial action.
d. Number of pole requiring minor follow up.
e. Number of poles requiring a change in inspection cycle.
f. Number of poles that were overloaded.
g. Number of inspections planned.

C. Program Cost and Funding

(i). Pole Analysis Funding

As stated above, there are currently approximately 700,000 joint use attachments on approximately 500,000 distribution poles and approximately 5,000 joint use attachments on approximately 2,500 transmission poles. PEF will analyze the "worst case" poles in a tangent line of similar poles as deemed appropriate during field inspections.

In order to meet the obligations set forth in Order No. PCS-06-0144-PAA-EI, PEF would require incremental funding annually to successfully gather data and enter it into the required reporting format. See calculation that follows. The estimated figures in these charts are "best estimates," given information and facts known at this time and are subject to change or modification.

Annual Unit & Cost Estimate									
Distribution poles with joint use	Annual inspected (8-yr cycle)	10% of Distribution poles analyzed	1% of Distribution poles replaced	Transmission poles with joint use	Annual inspected (8-yr cycle)	30% of Transmission poles analyzed	20% of Transmission poles replaced	Total cost to analyze poles (O&M)	Total cost to replace poles (capital)
500,000	62,500	6,250	630	2,500	313	94	63	$479,800	$2,772,000

Progress Energy

Ongoing Storm Preparedness Plan

Purpose and Intent of the Plan:

To implement Progress Energy Florida's ("PEF") Ongoing Storm Preparedness Plan (the "Plan") that complies with FPSC Order No. PSC-06-0351-PAA-EI issued April 25, 2006 (the "Order"). The Plan addresses the specific ten-points that the Florida Public Service Commission (the "Commission") identified in the Order.

The Plan includes the following specific sub-plans:

- Vegetation Management Cycle for Distribution Circuits.
- Audit of Joint Use Attachment Agreements.
- Transmission Structure Inspection Program.
- Hardening of Existing Transmission Structures.
- Transmission and Distribution Geographic Information System.
- Post-Storm Data Collection and Forensic Analysis.
- Collection of Outage Data Differentiating Between the Reliability Performance of Overhead and Underground Systems.
- Increased Utility Coordination With Local Governments.
- Collaborative Research on Effects of Hurricane Winds and Storm Surge.
- Natural Disaster Preparedness and Recovery Program.

These ten sub-plans are outlined and described below. PEF has already implemented several of the sub-plans. All of these sub-plans will be evaluated on an ongoing basis to address, among other things, data and data trends, new information, external factors, and cost effectiveness. All cost figures provided in this Plan are PEF's best estimates based on available information and data and are subject to revision and change as circumstances may dictate or as more definitive information becomes available.

1) Vegetation Management Cycle for Distribution Circuits

PEF recommends a fully integrated vegetation management ("IVM") program. The IVM program consists of at least the following subprograms: routine maintenance "trimming," herbicide applications, vine removal, customer request work "tickets," and right-of-way floor brush "mowing." The IVM program incorporates a combination of both cycle based maintenance and reliability driven prioritization of work. Actual spending versus initial budget can vary during any particular year based on a number of factors which may include timing, changes in priorities within the program, and unforeseen events such as major storms and other factors.

Based on these considerations, PEF has revised its vegetation management contracts to add items such as:

- Cutting brush within an eight foot radius of all device poles;

- To the extent practical and reasonably feasible, felling "dead danger trees" within 25 feet of the closest conductor that have a high likelihood of falling on the conductors; and
- Cutting of underbrush instead of topping it.

These items have been added to help address some of the emerging issues in both the preventable and non-preventable tree-caused outage categories.

In general, the main objectives are to optimize the IVM program cost against reliability and storm performance objectives. Some of the main program objectives are:

- Customer and employee safety;
- Tree caused outage minimization, with the objective to reduce the number of tree caused outages, particularly in the "preventable" category;
- Effective cost management; and
- Customer satisfaction, with the goal to provide the customer top quartile service.

As part of the IVM program, PEF has implemented a comprehensive feeder prioritization model to help ensure that tree caused outages are minimized by focusing on the feeders that rate high in the model. Prioritization ranking factors are based on past feeder performance and probable future performance. Some of the criteria used in feeder prioritization include the number of customers per mile, the number of tree caused outages in prior years, outages per mile, the percentage of outages on backbone feeders, the percentage of total tree outages categorized as preventable (i.e., outages caused by trees within PEF rights-of-way), and total tree customer minutes of interruption ("CMI"). In implementing this prioritized process, PEF follows the ANSI 300 standard for pruning and utilizes the "Pruning Trees Near Electric Utility Lines" by Dr. Alex L. Shigo.

Generally, PEF attempts to maintain an average trimming cycle of three years. Although PEF works toward a benchmark goal of a three-year weighted average system maintenance cycle, it balances this goal against overall system reliability, customer impact, and cost effectiveness in determining its ultimate trim cycles. In some instances, PEF may defer maintenance on some feeders without significantly impacting reliability while accelerating maintenance on other feeders that are experiencing more significant issues than others. This approach has resulted in a significant improvement in system reliability, as measured by SAIDI, since 2001, including an improved SAIDI related to tree caused outages.

A mandatory three-year trim cycle without regard to system reliability, customer impact, and cost-effectiveness would not benefit PEF's customers when compared to a focused and targeted plan such as PEF's IVM program. Additionally, in recent years, PEF has experienced availability challenges within the tree trimming labor force in Florida. A non-targeted, mandatory three-year trim cycle would adversely impact all electric utilities within the state by forcing them to compete for an already scarce resource. Such demand could be expected to inflate costs for all utilities. Further, a mandatory, non-targeted three-year cycle would not provide the flexibility that PEF can currently leverage to address tree conditions that can vary significantly depending a number of variables, most significantly weather conditions. PEF estimates that a mandatory three-year cycle would immediately increase costs by approximately $7M in the first year of its implementation and could increase PEF's overall budget needs at a conservative rate of three percent (3%) per year. PEF does not endorse this approach. Rather, PEF can more effectively manage tree resources while providing the maximum benefit to our customers by utilizing PEF's IVM program.

2) Audit of Joint Use Attachment Agreements.

PEF currently has approximately 700,000 joint use attachments on distribution poles and approximately 5,000 joint use attachments on transmission poles. While the majority of these attachments are on wood poles, approximately 15% of the distribution joint use attachments are on concrete or metal structures and approximately 25% of the transmission joint use attachments are on concrete or metal poles. The information provided below outlines PEF's plan to gather information on "non-wood" existing joint use poles over an average 8-year inspection cycle as outlined in Order No. PCS-06-0144-PAA-EI.

PEF plans to inspect all PEF distribution poles (regardless of pole type) with joint use attachments on the 8 year audit cycle outlined in Order No. PCS-06-0144-PAA-EI. These audits will start at the sub-station where the feeder originates. For each group of poles in a tangent line, the pole that has the most visible loading, line angle, and longest or uneven span length will be selected to be modeled for wind loading analysis. Each pole modeled will be field inspected. The attachment heights of all electric and communication cables and equipment will be collected. The pole age, pole type, pole number, pole size / class, span lengths of cables and wires, and the size of all cables and wires on all sides of the pole will be collected.

The selected pole's information will then be loaded into a software program. The pole information will be analyzed and modeled under the NESC Light District settings of 9psf, no ice, 30° F, at 60 MPH winds to determine current loading percentages. If that one pole fails, the next worst case pole in that group of tangent poles will be analyzed as well. Each pole analyzed will determine the existing pole loading of all electric and communication attachments on that pole. If the existing analysis determines that the pole is overloaded, a work order will be issued to replace the pole with a larger class pole. Should the original pole analyzed meet the NESC loading requirements, all similar poles in that tangent line of poles will be noted as structurally sound and entered into the database as "PASSED" structural analysis. The results of the analysis and all communication attachments will be entered into the FRAMME system. Reporting from the FRAMME system will indicate the date and results of the analysis. Poles rated at 100% or lower will be designated as "PASSED." Poles that are analyzed and determined to be more than 100% loaded will be designated as "FAILED," and scheduled to be changed out. Once the pole is changed out, FRAMME will be updated to reflect the date the new pole was installed with the new loading analysis indicated.

PEF plans to inspect all transmission poles (regardless of pole type) with joint use attachments on the 8 year audit cycle outlined in Order No. PCS-06-0144-PAA-EI and PEF's Pole Inspection Plan filed with the Commission on April 1, 2006. Audits will start at the sub-station where the transmission circuit originates. All pole information (pole size, class, type, age, pole number, cable, wire, equipment attachment heights, span lengths) including structural plan and profiles will be sent to an outside engineering firm to be modeled in PLS-CADD/LITE and PLS-POLE software for structural analysis. The firm will determine the worst case structures in a tangent line and request the structural drawings and attachment information on those selected poles. Typically, transmission poles with line angle and uneven span lengths are the poles considered for wind loading analysis.

The selected pole information will be loaded into the PLS-CADD and PLS-POLE software. Depending on the pole location per the NESC wind charts, one of the following load cases is run. **NESC Light District:** 9psf, no ice, 30° F, 60mph; **NESC Extreme:** 3 sec gust for the specific county, no ice, 60° F (Ex: Orange County is 110 mph); or **PEF Extreme** at 36psf, 75° F, wind chart mph. If that one transmission pole fails, the next worst case pole in that group of tangent poles will be analyzed as well. Each transmission pole analyzed will determine the existing pole loading of all electric and communication attachments on that pole. If the existing analysis determines the transmission pole is overloaded, a work order will be issued to replace the pole with a stronger pole. Should the original pole analyzed meet the NESC loading requirements, all similar poles in that tangent line of poles will be noted as structurally sound and entered into the database as "PASSED" structural analysis.

The results of the analysis and all communication attachments will be entered into the FRAMME system. Reporting from the FRAMME system will indicate the date and results of the analysis. Transmission poles rated at 100% or lower will be designated as "PASSED." Transmission poles that are analyzed and determined to be more than 100% loaded will be designated as "FAILED," and scheduled to be changed out. Once the transmission pole is changed out, FRAMME will be updated to reflect the date the new pole was installed with the new loading analysis indicated.

Pursuant to the requirements of FPSC Order No. PCS-06-0144-PAA-EI, PEF will file a wood pole inspection report with the Division of Economic Regulation by March 1st of each year. The report shall contain the following information:

1) A description of the methods used for structural analysis and pole inspection.

2) A description of the selection criteria that was used to determine which poles would be inspected.

3) A summary report of the inspection data including the following:

    a. Number of poles inspected.
    b. Number of poles not requiring remediation.
    c. Number of poles requiring remedial action.

d. Number of pole requiring minor follow up.
e. Number of poles requiring a change in inspection cycle.
f. Number of poles that were overloaded.
g. Number of inspections planned.

In this annual report, PEF will also file the same information for "non-wood" transmission and distribution structures that have joint attachments.

In PEF's wood pole inspection plan previously filed with the Commission under Order No. PCS-06-0144-PAA-EI, all poles, regardless of pole type, were included in the cost estimate for "Joint Use Inspection" Below is an extrapolation of "other than wood" pole audit cost for transmission and distribution poles with joint attachments.

Estimated Cost to Analyze "Other than Wood Poles"

Cycle Year	500,000 Dist Poles in System with JU (15.4%)	10% of Dist Poles Analyzed	Cost per Dist Pole to Analyze	2,500 Trans Poles in System with JU (25%)	30% of Trans Poles Analyzed	Cost per Trans Pole to Analyze	Annual cost to Analyze "Other than Wood" Poles
1	9,625	963	$70.00	78	23	$450.00	$77,940.00

3) Transmission Structure Inspection Program.

Pursuant to FPSC Order No. PSC-06-0144-PAA-EI, PEF filed a wood pole inspection plan for its wooden transmission assets with the FPSC on April 1, 2006. In conjunction with PEF's wood pole inspection plan, PEF will conduct other Transmission Line assessments. These assessments will primarily include Transmission Line Aerial Inspections and Transmission Line Ground Inspections, as well as Transmission substation inspections.

(i). Aerial Patrols

Aerial patrols will utilize helicopter surveys of the transmission system on average three times per year to identify potential problems and needed corrective actions. Patrols will be conducted with qualified Line and Forestry personnel to look for and document conditions on the following items:

Guys	Braces	Conductors	Substation Equipment
Aerial Markers	Poles	Crossarms	Line Traps
Arresters	OHGW & OPGW	Encroachments	ROW Condition
Insulators	Splices/Dampers	Line Sect. Switches	Vegetation Issues

The aerial patrols will inspect the condition of 69 - 500 kV voltage class transmission lines and associated hardware/equipment. These patrols will be used to aid the Transmission Line Maintenance Crew in scheduling and planning preventive/corrective maintenance work.

(ii). Transmission Line Ground Inspections

PEF will perform ground patrols to inspect transmission system line assets to allow for the planning, scheduling, and prioritization of corrective and preventative maintenance work. These patrols will assess the overall condition of the assets including insulators, connections, grounding, and signs, as well as an assessment of pole integrity. Each transmission line shall have a ground patrol conducted once every 5 years. The primary goal of a ground patrol is to inspect transmission line structures and associated hardware on a routine basis with the purpose of finding and documenting any required material repairs or replacements.

(iii) Structural Integrity Evaluation

The joint use inspector will note and record the type and location of non-native utility pole attachments to the pole or structure. This information will be used by the Joint Use Department to perform a loading analysis, where necessary, of the pole or structure. Specific information on this process is contained in the Joint Use section of this Plan.

(iv). Transmission Substation Inspections

PEF will perform monthly inspections of Transmission – Transmission Substations, Transmission – Distribution Substations and Generation Plant Substations. These inspections will consist of a visual analysis of Substation Assets and documentation of operation information. This visual inspection and operation information will be used to develop actions to correct any discrepancies and to schedule preventative maintenance.

(v). Records and Reporting

An asset inspection report will be filed with the Division of Economic Regulation by March 1st of each year. The report shall contain the following information:

1) A description of the methods used for analysis and inspection;

2) A description of the selection criteria that was used to determine which assets would be inspected; and

3) A summary report of the inspection data;

Transmission Line Inspections Cost Estimates

O&M Costs	10 Year Total Cost
Aerial Patrols	$3,000,000
Ground Patrols & Misc. Repairs	24,000,000
Ground Line Inspections	$2,400,000
Total O&M Cost	$29,400,000

4) Hardening of Existing Transmission Structures.

PEF currently has over 45,000 transmission structures with approximately 4800 miles of transmission lines in the Florida Grid. Approximately 34,000 structures (or 75%) are currently supported with wood poles. PEF currently averages approximately 500 wood pole to concrete or steel pole maintenance change outs per year. Additionally, PEF currently relocates approximately 100 poles per year due to developer requests or highway improvements, and these poles are replaced with concrete or steel poles. Furthermore, PEF will also be performing system upgrades due to system growth on several lines over the next 10 years. This, on average, will result in approximately 250-350 wooden structures per year being changed out and replaced with concrete or steel poles over the next 10 years.

PEF also estimates that it will be adding 300-400 structures per year over the next 10 years due to system expansion and growth. All new structures will be constructed with either concrete or steel and will be designed to meet or exceed current NESC Code requirements. Based upon these projections of new additions and pole change, this should reduce the percentage of wood structures on the PEF system from 75% to less than 50 % during a 10 year period. The following table provides PEF's estimated costs:

Costs	Changeouts or new Poles /Year	Cost/Year	Total Changeouts or new Poles/10 years	Total 10 Year Costs (Present Value)
Maintenance Change outs	500	$7.0 Million	5000	$70 Million
DOT Relocations	100	$7.0 Million	1000	$70 Million
Line Upgrades and Additions	750	$ 50.0 Million	7500	$500 Million
Increased GL Inspection	200	$2.8 Million	2000	$ 28 Million
Total	1550	$66.8 Million	15500	$668 Million

5) Transmission and Distribution Geographic Information System.

Distribution

With respect to Distribution, PEF's ultimate goal for collecting and maintaining asset and performance data is to first create an environment that contains all the elements referenced by the Commission in Order No. PSC-06-0351-PAA-EI (i.e., GIS capable of locating, mapping, and keeping inspection, vintage, and performance data on all transmission and distribution assets). To achieve this goal, additional capital and O&M funding is necessary to enhance existing systems.

Currently, PEF has a GIS system that provides an operational view of our assets. In other words, PEF's current GIS system has information that is location specific, not asset specific. To implement an enhanced GIS, PEF would need to change its current GIS system from location driven to asset driven. This would enable PEF to collect data from many sources including operations, inspections, performance systems, and other sources, which would provide PEF the ability to look for trends in performance of individual assets as well as trends in the aggregate of its assets. To fully implement this strategy, PEF Distribution would need to invest in several systems and perform additional field inspections and audits on it assets. The estimated costs are set forth below.

Systems:

Computer Maintenance Management System
Estimated Costs - $1M

One of the first systems that would need to be developed would be a Computer Maintenance Management System. This system would be responsible for collecting performance and historical data on PEF's assets. This system would be linked to PEF's GIS.

Operational Datamart
Estimated costs - $950k

This system would be responsible for pulling information out of the GIS and the CMMS systems to provide reporting capabilities like asset analysis, trends, and early identification of potential asset failures. This provides decision support tools as well as interfaces to those required systems like GIS, CMMS, and CDMS.

Asset Management - Corporate Document Management Systems (CDMS)
Estimated Costs - $250k

The implementation of a new corporate document management system would support archival of and access to all documents and drawings related to distribution assets and the aggregation of those assets to a system. This would likely facilitate the referencing of standards in the past as well as current design standards.

Facility Baseline Inspection
Estimated Costs - $6.6M

PEF would further need to execute a comprehensive inspection of its distribution facilities to gather additional information and data for its new GIS system. This would be a critical component to establish an informational baseline for PEF facilities and assets. This baseline then would be used in conjunction with the CMMS to store the results of the inspections as well as update the GIS with any net new removals or additions to the Distribution facilities.

Total One time Costs - 1M+950k+250k+6.6M = $8.8M

Transmission

PEF Transmission has a functioning GIS system (MapInfo) that is linked to PEF's work management system. This system contains information on the location of the pole, the type of pole, and it contains a photo image of the pole or structure. Presently, this system does not contain the maintenance history of the facility. Over the next 6 years, PEF plans to populate the system with maintenance data that will be captured in PEF's Transmission Line Inspection Plan. The data would include:

1. Date Inspected;
2. Type of Inspection;
3. Conditional Assessment of the Transmission facility;
4. Status of Remediation/Repair Work Order.

Estimated Costs		Total 10-Yr Cost
	Inspection and Data Entry	$ 2,000,000
	Computer system upgrades	$1,000,000

6) Post-Storm Data Collection and Forensic Analysis.

Distribution

The purpose of forensic assessment is to provide data on causal modes for distribution pole and structure damage due to major storms. Four functional roles have been defined to support the collection of forensic data during major storm response; System Forensic Assessment Coordinator, Regional Forensic Lead, Forensic Assessor, and Forensic Support.

The following is a list of key activities identified for each functional role defined in support of the Forensic Assessment process during major storm response:

System Forensic Assessment Coordinator- This position is responsible for the coordination of collecting and collating forensic data of distribution pole and structure damage due to a major storm. Key activities may include:

- Monitor path of approaching storm and coordinate a pre-storm conference call with Regional Forensic Leads at least 48 hours prior to expected landfall.
- Facilitate and document substation and feeder assignments among Regional Forensic Leads.
- Coordinate end-of-day conference calls with Regional Forensic Leads to determine daily progress and communicate system forensic assignments for the following day.
- Develop and deliver post-storm System Forensic Summary Report to the Damage Assessment Manager within 2 weeks after storm restoration activity has been completed.

Regional Forensic Lead- This position is responsible for the execution of a forensic review of the assigned region and for coordinating the field activities of the Forensic Assessors and Forensic Support functions. Key activities may include:

- Participate in pre-storm conference call with System Forensic Coordinator at least 48 hours prior to expected landfall to determine high-priority substations for Forensic Assessment and additional calls, as needed.
- Communicate team assignments and expected initial reporting time/location to Forensic Assessor and Forensic Support team members 48 hours in advance of expected landfall.
- Secure and assign vehicles for all Forensic Assessment teams within the region.
- Determine and communicate daily substation and feeder assignments by team.
- Establish protocols and timelines with Forensic Assessment teams within the region for communicating daily start, stop, and safety check-in times and notify system Damage Assessment Manager and System Forensic Coordinator if communication is not established with teams as expected.
- Participate in end-of-day conference calls with System Forensic Coordinator and other Regional Forensic Leads to determine the system-wide status of Forensic Assessment and assign assessment locations for the following day.
- Provide complete Region Substation Forensic Summary Reports to System Forensic Coordinator within 1 week after storm restoration activity has been completed.

Forensic Assessor- This position is responsible for the resources necessary to conduct the Forensic Assessment in the field, including the direct supervision of an assigned Forensic Support team member. Key activities may include:

- Be proficient in the data collection process and procedure necessary to conduct Forensic Assessment.
- Prepare field kit upon initial notification of assignment from Regional Forensic Lead.
- Confirm daily Forensic Assessment assignment with Regional Forensic Lead and confirm protocols and timelines with for communicating daily start, stop, and safety check-in times.
- Initiate contact with assigned Forensic Support team member and provide just-in-time refresher of expectations as required.
- Conduct pre-trip inspection with Forensic Support prior to departing local Operation Center to ensure all materials and resources are available and that the vehicle is in safe working order.
- Conduct pre-job briefing before each inspection.
- Conduct field Forensic Assessment of assigned substations and/or feeders and collect required data for each pole identified as damaged or in need of repair.
- Report daily observations and status update to Regional Forensic Lead as assigned.
- Complete and submit hardcopy checklist to Regional Forensic Lead for each pole identified as damaged or in need of repair no later than 2 days after restoration activity has been completed.

Forensic Support- This position will provide field support to the Forensic Assessor in the collection of required data during Forensic Assessment in the field. Key activities may include:

- Participating in pre-job briefings.
- Safe operation of assigned passenger vehicle.
- Cataloguing time, location, and other required data for each pole identified as damaged or in need of repair.
- Assisting in the preparation of summary reports for use by the Regional Forensic Lead.

PEF has implemented the Forensic Assessment process for the upcoming 2006 storm season.

Transmission

Field Data Collection

PEF Transmission will establish a contract with an engineering/survey firm that will require the firm to provide resources immediately after a storm event. This contractor will collect detailed post storm data necessary to perform storm damage and forensic analysis. This data will include:

1. Photographs of the failed facility;
2. Conditional assessment of the failed facility;

3. Sample collection of any failed components; and
4. Date stamps, name plate data.

Maintenance/GIS Data

The balance of needed data will be collected from the GIS data base and will include:

1. Location of the facility (GPS coordinates);
2. Type and design of the facility;
3. Facility vintage; and
4. Maintenance history of facility.

Data Reduction

The above data will be provided to a consultant. Using the storm data that was collected from the field collection process, data contained in the GIS data base, and available weather data, a forensic analysis will be performed in order to correlate storm intensity, design standards, maintenance history, geographic locations, materials, facility types, and vintage. From this analysis, the consultant will make recommendations storm hardening improvements.

Estimated Costs

Estimated costs will be based on the amount of storm damage that occurs as a result of a single storm in one year. The estimated costs listed below are based upon the illustrative assumption of 100 transmission structures that are damaged and require analysis.

Costs	Total 10-Yr Cost
Field Data Collection	$5 Million
GIS Data Collection	$2 Million
Data Reduction and Recommendations	$2 Million
Total Cost	$9 Million

7) Collection of Outage Data Differentiating Between the Reliability Performance of Overhead and Underground Systems.

PEF will collect information to determine the percentage of storm caused outages on overhead systems and underground systems. Some assumptions are required when assessing the performance of overhead systems versus underground systems. For example, underground systems are typically protected by overhead fuses. PEF will provide for these factors in its analysis.

PEF has an internal hierarchy in its Outage Management System (OMS) that models how all of its facilities are connected to each other. This information provides the connection to the feeder breaker down to the individual transformer. PEF's Customer Service System (CSS) captures which customer is tied to what individual transformer. PEF's Geographical Information System (GIS) provides several sets of data and information points regarding PEF's assets. PEF will use these systems to help analyze the performance of the following types of assets:

Breakers
Electronic Reclosers
Fuses
Hydraulic Reclosers
Interrupters
Motor Operated Switches
OH Conductors
OH Transformers
Primary Meters
Switch Gear Fuses
Sectionalizers
Services
Switches
Terminal Pole Fuses
Under Ground Conductors
Under Ground Transformers

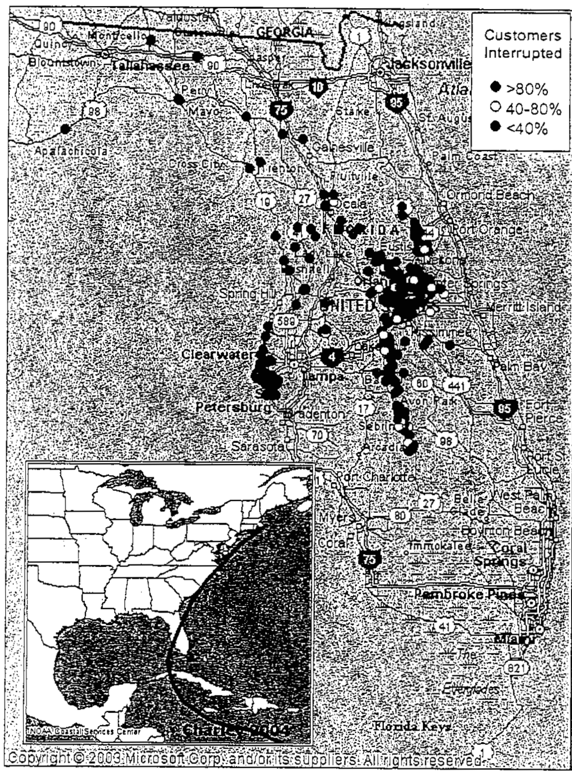
As part of this process, the location of each feeder circuit point is determined by approximating the geographic midpoint of each circuit. Outages experienced as a result of a named storm will be extracted from system data. The outages will then be grouped by feeder circuit ID and by outage type, where outage type is either overhead or underground. The number of customers interrupted by an overhead device will then be summed by feeder circuit ID and the number of customers interrupted by an underground device will be summed by feeder circuit ID. A single feeder circuit may have overhead and underground outages, so approximations will be made in those circumstances.

Once this information is collected, the percentage of customers interrupted will be calculated by dividing the sum of customers interrupted per feeder circuit by the total customers served for that feeder circuit. This process is applied as the sum of customers interrupted by all overhead devices on a feeder circuit divided by the number of customers served by the feeder circuit and the sum of customers interrupted by all underground devices on a feeder circuit divided by the number of customers served by the feeder circuit. As a result of this process, PEF will produce graphic representations of performance such as those depicted below:

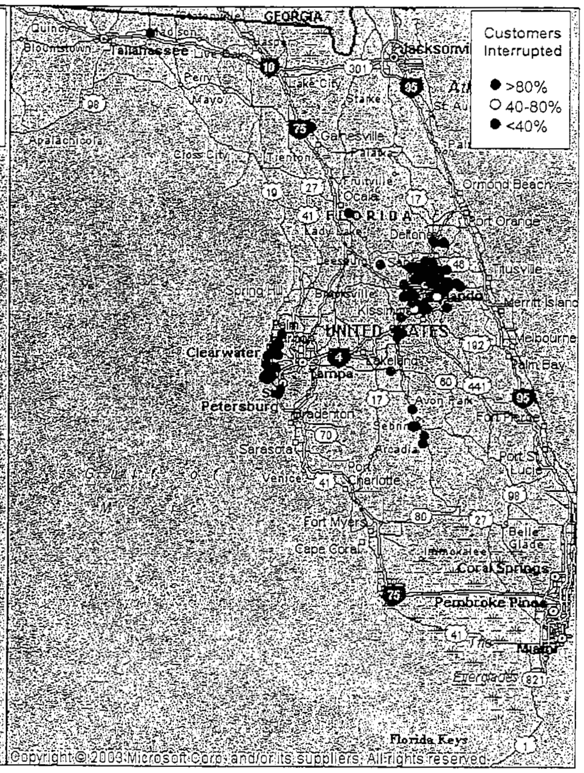
Progress Energy

Ongoing Storm Preparedness Plan

OH Construction Outage Severity



UG Construction Outage Severity



PEF will also collect available performance information as apart of the storm restoration process via servicemen in the field, such as:

Restore time;
Cause code;
Observations and comments;
Failed device name;
Failed device size;
Failed device type;
Failed device phase; and
Failed device location.

The implementation of a new GIS system discussed above would enhance PEF's ability to collect data relevant to asset performance, and PEF would use this data to analyze and compare the performance of its overhead and underground systems.

8) Increased Utility Coordination With Local Governments.

This part of the Plan addresses increased coordination with local governments to enhance PEF's ability to prepare for and respond to storms and other severe weather events. PEF's goal is to provide excellent customer service and collaboration with local governments before, during, and after emergencies through organization, commitment, strong relationships, the provision of resources, and communication and feedback mechanisms. Through a collaborative partnership with local governments, PEF can take advantage of the mutual interest in excellent response to communities through year-round dialogue and planning. Specifically, PEF will focus on the following in implementing this plan in conjunction with local governments:

- Identify opportunities throughout the year to improve preparedness on both the part of the utility and the public taking advantage of government's local knowledge and existing organization.
- Develop enhanced organization and planning to improve readiness.
- Educate the public on proper storm preparation and restoration actions.
- Provide local governments with the support needed to facilitate the coordination of outage restoration in a safe and efficient manner.
- Provide local governments with ongoing information and updates in advance of, during and after storm events to assist them with their local storm preparation and restoration efforts including informing the public.
- Assist in the resolution of local governmental issues and concerns related to storm and emergency situations.

In order to meet the requirements of FPSC Order No. PSC-06-0351-PAA-EI, PEF has established an internal team focused on local governmental coordination activities. These activities include dedicated resources, training, continuous coordination with government, storm preparation, storm restoration and an EOC program.

a) Staffing and Training

A cross-functional internal team has been established utilizing personnel from numerous areas including community relations, regulatory affairs, and account management. The role of the team will be to develop and implement initiatives focused on governmental coordination and to participate in both internal and external storm preparation planning activities.

- Staffing – The governmental coordination team consists of approximately 70 employees throughout PEF's service territory. Each member is assigned to a specific role. Job descriptions have been developed for each role. These will be updated annually to meet current needs and requirements. Below are the roles for this team and the approximate number of employees in each role.

Government Coordination Roles
- **Storm Coordinator (1)**
- **State EOC Coordinator (1)**
- **Community Relations Manager – CRM (6)**
- **Manager, CIG Accounts (1)**
- **Back Up CRM/Support (23)**
- **EOC Representative (28)**
- **Operations Center Liaison (10)**

Members of the team are responsible for familiarizing themselves with their job description, participating in annual training and general readiness for storm duty as required. In addition, certain members will work with assigned communities throughout the year to identify opportunities for enhanced coordination and support local community storm preparation activities.

Annually a system-wide internal storm drill will be conducted in which members of the team will participate. The State EOC Coordinator will work with state agencies to coordinate the company's participation in the annual state storm drill.

Staffing scenarios are created to simulate different storm impacts and staffing assignments to support each impact scenario. Personnel are flexible to shift to positions throughout the state as needed. This supports initiatives to coordinate with local government including emergency management organizations throughout the year (i.e. community storm drill activities, updating EOC infrastructure restoration priority account lists and EOC contact lists).

Training is been developed for all team members. Training will be conducted on an annual basis in multiple locations throughout the system and will include the following elements:

Overview of government coordination organization
Storm assignments and roles
Job requirements
Material and resource requirements
EOC crew management module
NIMS training

In addition to classroom training, an internal electronic site is being developed to house information and resources that are accessible by all team members before, during, and after storm events. This site will include, but not be limited to, the information listed below.

Training Presentations and Materials	Storm Job Descriptions
Staffing Priority List	Team Member Lists/Contact Info
Maps, Location/Contact Information	Territorial Maps
Government/Agency Contact Information	Storm Staffing Scenarios
Calendar of Activities	Storm Organization Chart

b) On Going Coordination

Throughout the year, company representatives will work with local government officials and agency representatives to enhance the flow of information and to identify coordination opportunities. Coordination opportunities fall into several categories – storm related activities, vegetation management programs, undergrounding programs, and other coordination efforts.

- Storm Related Activities

  Representatives from PEF will participate in local storm workshops and expositions throughout PEF's service territory. In many cases, PEF will act as presenters or co-sponsor for these events. These events will occur in each region of PEF's service territory. In addition, PEF will hold workshops and other coordination meetings with local officials and agencies to educate on restoration programs, develop coordination plans, exchange feedback and generally enhance communication between organizations. Some key events scheduled for 2006 are listed below.

  - PEF is taking steps to enhance public information through the media. Among a number of activities, PEF will be participating as a panelist in hurricane preparedness town hall-type meetings forums in the Tampa and Orlando television markets. The programs are designed to educate the public and will include representatives from local government emergency management, the Red Cross, and FEMA.

Ongoing Storm Preparedness Plan

- PEF is scheduled to participate in EOC Coordination activities in most counties served including events and briefings in the following counties:

  Pinellas County
  Orange County
  Columbia County
  Gulf County
  Highlands County
  Pasco County
  Volusia County

- PEF is scheduled to participate in State-sponsored events:
  Governor's Hurricane Conference
  State Storm Drill

- PEF Sponsored events:
  South Coastal Community Storm Meeting and Expo (Pinellas and Pasco Counties)
  Progress Energy's 911 First Responders Storm and Safety Expo (Winter Garden Operation Center – covering Orange, Osceola, Seminole, Lake, Volusia, Gilchrist, Sumter and Polk)
  PEF is incorporating into its SCORE workshops for commercial, industrial and governmental customers a segment on hurricane preparedness and PEF restoration processes.

- Vegetation management coordination program

It has become essential to implement programs designed to improve coordination with communities regarding vegetation management. Not only will these activities support efforts to improve overall reliability improvement programs, but they will also support storm preparation and restoration activities. PEF has completed the development of a community vegetation management education program. This program is designed to:

- Ensure that all Progress Energy customers will have received some form of vegetation management education through community outreach, events, web site information, advertising and other communication mechanisms.
- Improve relationships with local governments, offering successful vegetation programs in their communities.
- Launch a Radio/Public Service Announcement Campaign in 2006 that will reach more than 30% of the Progress Energy market.
- Distribution of information in 2006 on vegetation management that will reach more than 30% of the Progress Energy market.
- Vegetation programs and events in Progress Energy communities in Florida.

- Undergrounding Programs

  The impact of hurricanes in Florida since 2004 has renewed local government interest in burying overhead power lines. In an effort to work with communities to address this renewed interest in undergrounding their utilities, PEF is enhancing its programs in this area and has seen a marked increase in interest in the programs. PEF has ongoing undergrounding partnerships with a number of communities. Within these projects, the company acts as project manager and facilitates coordination not only with the municipality but also with other utilities (i.e., cable, TV).

  Local government underground cost recovery tariff - PEF is in the process of revising its local government underground cost recovery tariff. This tariff allows local governments to recover the CIAC portion of the cost for underground projects through electric bills of customers within the local government's jurisdiction. The revised tariff will increase government flexibility in managing the cost of underground projects. As part of this program, the company is developing the concept of a secure external portal designed to assist governments in managing their underground projects utilizing the tariff.

- Street lighting repair program

  PEF has implemented an improved program for customers to report street light outages to enhance the repair process. As part of the effort, we are coordinating with local government to communicate the improved process and encourage better utilization by government of improved reporting mechanisms. Communications have been sent to all city and county governments.

- Other coordination activities

  PEF continues to develop opportunities to enhance relationships and communication with local government for improved service, reliability and restoration efforts. For example, the company plans to send out a communication to each local government within our service territory to encourage a link to the company's storm information web site be place on the community web site.

c) Plan implementation during storm events

When a major storm event occurs, the local government coordination storm plan will be executed. All team members will participate in pre-storm planning activities and receive assignments to specific regions and roles. The following is a high-level list of actions that will be performed by the team intended to provide excellent execution of community restoration activities and support of local government efforts.

- Communications with local government officials, agencies and key community leaders prior to the storm event notifying of PEF storm readiness activities and status.
- Ongoing communications to government officials, agencies and key community leaders providing updates of outage and storm restoration efforts of the company.

- Oversight of EOC Representatives (State) assigned to state and local EOCs.
- Provide updates and information for coordination purposes to internal leadership and operation personnel within the company.
- Obtain the Governor's Executive Order and distribute to PEF Logistics personnel for logistical purposes.
- Prepare DOT Waivers and communicate with DOT SEOC personnel (ESF 16) to expedite arrival of out-of-state crews prior to entry into the State of Florida.
- Prepare Aviation Waivers and obtain approvals from ESF 1 & ESF 3 (DOT & Public Works).
- Coordinate with PEF Storm Centers for the exchange of accurate information pertaining to restoration efforts before, during and after a major storm.
- Communicate with local officials regarding power outage data for the county as well as restoration efforts.

d) Emergency Operation Center (EOC) Plan

PEF has created and will be implementing a specific program for the management of restoration activities in coordination with local government at state and county EOCs during storm events. The specific role of the EOC Representative has been created to engage with EOC management on pre-storm planning and during storm events. The company has also assigned specific personnel to represent the company and to be stationed in a number of key EOCs throughout the storm event.

The primary responsibility of the EOC Representative is to work with the EOC personnel to establish current priorities for restoration, communicate this information to appropriate operating center personnel and ensure EOC priorities are worked successfully. The EOC Representative and other team members are responsible for establishing contact with assigned EOC and to update storm restoration infrastructure priority lists prior to the beginning of the storm season.

Pre-storm duties:

- Work with local governments to update specific city/county and EOC priorities (e.g. designated hospitals, shelters, traffic lights, essential water treatment facilities and lift stations, etc.) and develop prioritized account list for each county.
- Create list of all governmental facilities in the County including responsible operating center, substation, and feeder.
- Review PEF procedures with EOC staff and establish working relationship and rules.
- Work internally with operations personnel to establish EOC priority work flow.
- Provide feeder maps or outage information for the County for use at the EOC.
- Obtain a street level utility territory map for the County.

- Assure a network connection that will accommodate a Progress Energy computer exists at the EOC.
- Attend scheduled meetings as the storm approaches.
- Participate in software training at EOCs.

Duties during major storm event:

- Organize and report "911" type issues to Dispatch
- Advise company of the need for press briefings or public official meetings
- Attend scheduled EOC meetings
- Provide regular briefings on PE progress and deliver key communications to EOC personnel
- Communicate internally for the exchange of timely and accurate information

Duties after major storm:

- Attend scheduled EOC debriefing meetings
- Responsible for "break-down" of PEF area in EOC facility

9) Collaborative Research on Effects of Hurricane Winds and Storm Surge.

PEF will support a collaborative effort to conduct research and development (R&D) on the effects of hurricane winds and storm surge to the electrical system of Florida. The company also will support the leadership of the R&D effort to be facilitated through a centrally coordinated effort managed by an entity within the state that can draw from various universities and research organizations not only in Florida, but across the United States as well.

PEF believes the necessary leadership to serve as the R&D coordinator is available from the Public Utility Research Center ("PURC") in the Warrington College of Business Administration at the University of Florida. PURC is a long-standing research organization with a strong working relationship among the investor-owned utilities, cooperatives and municipals. Therefore, PURC is well positioned to either provide or secure the resources necessary for the R&D effort envisioned by the Commission.

PURC's position within the university community of the state and the nation allows the organization to draw from a number of resources otherwise unknown to utilities. Therefore, by coordinating the overall R&D initiative, unnecessary duplication of effort and superfluous spending should be avoided. However, if a utility has a need for a specific type of research to determine a solution to its unique problem, the utility is not hindered from engaging in independent research on its own through a local university or research organization other than PURC.

Estimated Costs and Timeline

PEF believes the collaborative research plan described above meets the intent of the Commission. The cost for this initiative will be determined by the extent and duration of R&D requested by the IOUs.

10). Natural Disaster Preparedness and Recovery Program.

Please see Attachments A, B and C to this Plan for PEF's Preparedness and Recovery Programs.

- Attachment A – Department Storm Plans
- Attachment B – Transmission Department Corporate Storm Plan
- Attachment C – Distribution & Transmission Storm Plans - Florida

1) Vegetation Management Cycle for Distribution Circuits

Per Order No. PSC-060351, PEF assessed the feasibility of a three-year vegetation management ("VM") cycle for all distribution circuits and compared the results to an alternative plan.

As a result of recent hurricane experience and the analysis noted above PEF recommends a fully integrated vegetation management ("IVM") program. The tenets of the IVM program include the following subprograms: public education, routine maintenance "trimming," herbicide applications, right-of-way floor brush "mowing", vine removal, and customer request work "tickets". The IVM program also incorporates a combination of both cycle based maintenance and reliability driven prioritization of work that includes:

- All feeder backbones trimmed on a 3 year cycle,
- All feeder laterals trimmed on a 5 year cycle. Laterals will be prioritized based on a combination of schedule and reliability performance, thus providing a "safety net" to identify and correct a wide variety of adverse trends in reliability metrics.
- Annual pre-hurricane season patrols of all feeder backbones and corrective spot trimming.

The combination of cycle based trimming miles and annual pre-hurricane season patrols of feeder backbones will result in an "effective cycle" of less than 3 years for all overhead circuit miles.

		PEF IVM		FPSC Plan	
	Total Miles	Annual Miles	Effective Cycle	Annual Miles	Effective Cycle
Feeder Backbone	3,800				
3 year cycle		1,267		1,267	
Pre-Hurricane Season Patrol (net)		2,533			
Feeder Lateral	14,200				
3 year cycle		---		4,733	
5 year cycle		2,840		---	
Total	18,000	6,640	2.7 years	6,000	3 years

Based on these considerations, PEF has revised its vegetation management contracts to add items such as:

- Cutting brush within an eight foot radius of all device poles,
- To the extent practical and reasonably feasible, felling "dead danger trees" within 25 feet of the closest conductor that have a high likelihood of falling on the conductors; and
- Cutting of underbrush instead of topping it.

These items have been added to help address some of the emerging issues in both the preventable and non-preventable tree-caused outage categories.

In general, the main objectives are to optimize the IVM program cost against reliability and storm performance objectives. Some of the main program objectives are:

- Customer and employee safety;
- Effective cost management; and
- Tree caused outage minimization, with the objective to reduce the number of tree caused outages, particularly in the "preventable" category;
- Customer satisfaction.

As part of the IVM program, PEF has implemented a comprehensive feeder prioritization model to help ensure that tree caused outages are minimized by focusing on the feeders that rate high in the model. Prioritization ranking factors are based on past feeder performance and probable future performance. Some of the criteria used in feeder prioritization include the number of customers per mile, the number of tree caused outages in prior years, outages per mile, the percentage of outages on backbone feeders, the percentage of total tree outages categorized as preventable (i.e., outages caused by trees within PEF rights-of-way), and total tree customer minutes of interruption ("CMI"). In implementing this prioritized process, PEF follows the ANSI 300 standard for pruning and utilizes the "Pruning Trees Near Electric Utility Lines" by Dr. Alex L. Shigo.

PEF intends to maintain an effective trimming cycle of three years or less. Although PEF works toward a benchmark goal of a three-year weighted average system maintenance cycle, it balances this goal against overall system reliability, customer impact, and cost effectiveness in determining its ultimate trim cycles. In some instances, PEF may defer maintenance on some feeders without significantly impacting reliability while accelerating maintenance on other feeders that are experiencing more significant issues than others. This approach creates a "safety net" for detection of a wide variety of adverse trends in reliability metrics and has resulted in a significant improvement in system reliability, as measured by SAIDI, since 2001, including an improved SAIDI related to tree caused outages.

PEF's comparison of performance and incremental cost over a 10 year period are summarized below.

	Tree SAIFI in 10 years	Avg Annual Storm CI avoided per event	Annual Cost ($M's)	Annual Cost Increment ($M's)	Cost per avoided storm CI
FPSC Plan	0.183	40,500	26.5	12.0	$ 296
PEF IVM	0.192	34,600	19.5	5.0	$ 145
PEF Base Plan	---	---	14.5	---	---

By focusing on the feeder backbone PEF's IVM achieves a majority of the improvement at lower cost. The incremental $7 million needed for the FPSC plan is focused on feeder laterals which have significantly lower customer exposure, higher tree density, are less prone to preventable tree impacts from within the right-of-way and more prone to non-preventable impacts from outside the right-of-way. This results in a higher incremental cost of projected reductions in storm related CI. **A** mandatory three-year trim cycle without regard to system reliability, customer impact, and cost-effectiveness would not benefit PEF's customers when compared to a focused and targeted plan such as PEF's IVM program. Additionally, in recent years, PEF has experienced availability challenges within the tree trimming labor force in Florida. A non-targeted, mandatory three-year trim cycle would adversely impact all electric utilities within the state by forcing them to compete for an already scarce resource. Such demand could be expected to inflate costs for all utilities and raise significant barriers to full implementation. Further, a mandatory, non-targeted three year cycle would not provide the flexibility that PEF can currently leverage to address tree conditions that can vary significantly depending a number of variables, most significantly rainfall and weather conditions. PEF estimates that a mandatory three-year cycle would immediately increase costs by approximately $7M in the first year of its implementation and could increase PEF's overall budget needs at a conservative rate of three percent (3%) per year.

PEF endorses the IVM approach and has fully implemented in 2006. The IVM plan enables more effective management of tree resources while providing the maximum overall benefit to our customers. As a result of PEF instituting an IVM program, PEF was recently recognized as a 2006 TreeLine USA company.

PEF recommends annual re-evaluation of this plan using performance and forensics data to ensure continuous improvement.

CONFIDENTIAL

2. What are the cost components that make up the $7,000,000 incremental difference in vegetation management between the FPSC plan and the PEF IVM program? How were these amounts estimated? Provide assumptions used. In addition, if not included in the $7,000,000 incremental difference, please provide PEF's best estimate of offsetting (O&M) costs reflecting reduced outage restoration costs which may be expected during non-storm periods associated with the FPSC Plan and the PEF IVM program. If it is not part of the $7,000,000, explain why it is not.

[redacted]

[redacted]

This document was in response to Staff's Informal Data Request dated September 8, 2006. The confidential document was filed along with PEF's Notice of Intent dated September 15, 2006 in Docket No. 060198-EI.

1. What is the methodology, assumptions, and calculations (the latter in spreadsheet format, including annual projections) used for estimating "average annual storm CI avoided per event" and "Tree SAIFI in 10 Years" for both the FPSC Plan and the PEF IVM program?

	Tree related CI as % of Total	Tree related CI	
		Inside R/W	Outside R/W
Non-hurricane	24%	62%	38%
Hurricane	52%	46%	54%

Source: 2004 PEF reliability data

The primary influence of vegetation management practices on hurricane tree related CI can be expected within the right-of-way. Therefore changes in hurricane performance are measured in terms of impact within the right-of-way.

The percent of total hurricane CI related to tree conditions inside the right-of-way was estimated by multiplying the tree related CI as percent of total (0.52) times percent of tree related CI due to conditions inside the right-of-way (0.46). The result was then multiplied by the average CI per event (685,000). The result is 164,000 tree related CI per event from inside the right-of-way. Improvement resulting from alternative vegetation management plans is expected to be proportional to changes in non-hurricane CI. The average differences over the 10 year study period are shown on the table in question 3 and on page 3 of the document titled "Vegetation Management Cycle for Distribution Circuits".

The logic employed in the calculation of SAIFI and CI due to trees is based on a tree SAIFI of 0.28 projected to improve by 32% to 0.19 over a ten (10) year period. The basis for the assumptions used in this analysis is the utilization of various proven vegetation management initiatives that provide both short and long term reliability improvements when implemented concurrently in an Integrated Vegetation Management (IVM) program. This IVM program provides for 'ground to sky' approach that includes; surveys, maintenance trimming, reactive trimming, danger tree removal, overhang removal, herbicide application, mowing and public education programs. Each of these programs was assigned a reliability improvement factor based on both industry and regional knowledge and experience. Upon achievement of the expected improvements, it was assumed that the same level of funding would be applied to the various IVM initiatives, along with the associated incremental labor escalators, to maintain the projected level of performance over the entire analysis period.

2. What are the cost components that make up the $7,000,000 incremental difference in vegetation management between the FPSC plan and the PEF IVM program? How were these amounts estimated? Provide assumptions used. In addition, if not included in the $7,000,000 incremental difference, please provide PEF's best estimate

of offsetting (O&M) costs reflecting reduced outage restoration costs which may be expected during non-storm periods associated with the FPSC Plan and the PEF IVM program. If it is not part of the $7,000,000, explain why it is not.

The $7,000,000 incremental difference between the PEF IVM and the FPSC plan is due primarily to the difference in cycle-based miles between the plans.

3. Please provide similar comparative analysis shown in the table using four year trim cycle for laterals.

	Tree SAIFI in 10 years	Avg Annual Storm CI avoided per event	Annual Cost ($M's)	Annual Cost Increment ($M's)	Cost per avoided storm CI
FPSC Plan	0.183	40,500	26.5	12.0	$296
FPSC Plan (2)	0.187	37,600	22.1	7.6	$202
PEF IVM	0.192	34,600	19.5	5.0	$145
PEF Base Plan	---	---	14.5	---	---

FPSC Plan (2) - 3 year backbone cycle, 4 year lateral cycle

4. Refer to the table on Page 1 of the July 14 response titled "Vegetation Management Cycle for Distribution Circuits. The table shows the cycle trimming under the PEF IVM and the FPSC Plan. Please complete a third column titled "Base Plan" (see the base plan PEF includes in its performance and cost table appearing at the end of the same response). Include security patrol miles in each case where appropriate. Explain whether contracted security patrol miles include trimming that is as extensive as contracted vegetation trim miles, and how these two activities differ. Explain to what extent the various trim cycles are averages rather than the period in which all circuits are trimmed. Explain what the range of the trim cycle (in years) may be for any particular feeder or lateral under the three different programs.

		PEF IVM		FPSC Plan		Base Plan (2005 Actual)	
	Total Miles	Annual Miles	Effective Cycle	Annual Miles	Effective Cycle	Annual Miles	Effective Cycle
Feeder Backbone	3,800						
Cycle trimming		1,267		1,267		605	
Pre-Hurricane Season Patrol (net)		2,533		2,533			
Feeder Lateral	14,200						
Cycle trimming		2840		4,733		2,263	
Total	18,000	6,640	2.7 years	8,533	2.1 years	2,868	6.3 years

The base plan refers to 2005 actual spending and production miles. The influence of demand trimming is not considered in this analysis. Production in 2005 was hampered by large and frequent off-system tree resource deployments to other Gulf region utilities. A comprehensive evaluation of the PEF vegetation management program was conducted in 2005, and during the evaluation period all trimming was performed under "time and equipment". The evaluation took into consideration PEF's direct experience gleaned from the 2004 hurricane season as well as lessons from other utilities that bore the brunt of an active 2005 hurricane season. The end product was a more robust program that ultimately became the Integrated Vegetation Management program. The need for a formalized IVM was identified in 2005 and incremental dollars were added to the 2006 budget. The IVM cost represents a 34.8% increase in vegetation management spending over the base plan. Though rate case MFR's dealing with relevant spending projections were filed in 2005, they were ultimately superseded by a Stipulation and Settlement Agreement. Therefore 2005 actual spending levels are the appropriate base line.

Pre-hurricane season backbone patrols consist of inspections and targeted trimming by qualified contractors of the most critical portion of feeders, the 3 phase backbone extending from breaker to tie switch. The purpose is to identify and remove any tree conditions that threaten primary conductor. Cycle trimming is governed by PEF's tree trimming spec and is awarded by the competitive bid process. Cost is based on unit pricing. All mileages are annual averages over the 10 year period of study. Actual trimming for any given feeder could occur in the year before or after the system average cycle.

The trim cycles employed are as follows:

- Cycle (Production) Trimming – process by which feeders are trimmed in a predetermined order of priority based on length of time since last cycle trim and previous year reliability performance.
- Demand trimming - process by which specific problem areas are trimmed based on identification by field resources or customers.
- Hurricane hardening trimming - process by which feeder backbones are patrolled by trained vegetation management personnel and problem areas trimmed prior to the onset of hurricane season. Addresses some conditions outside the established right-of-way.

5. What is the annual rate of growth and annual miles of growth in PEF's feeders historically and over the next 10 years? Laterals?

Historical annual growth rate for overhead feeder miles is approximately 1%. Data for lateral miles added is not available, however it can be estimated at approximately 142 miles based on existing ratio of lateral to backbone miles.

6. What is PEF's definition of a tree-preventable outage? Non-preventable tree outage?

A tree preventable outage originates from a tree condition inside the right-of-way. Any outage caused by the normal growth of tree limbs into the lines from either underneath, beside or over the lines that is known to have caused the outage. Non-preventable outages are caused by tree conditions outside the right-of-way. Outages caused by falling trees or limbs that break out of trees, including palm fronds that fall from the palm and contact the line. For both preventable and non-preventable outages first responders look for physical evidence either on the line, in the tree or a part of the tree in the vicinity that verifies electrical contact with the line.

7. What is the Company's projected CI for tree caused outages (storm and non-storm) for 2006 and for as many years as the Company makes

such projections? What assumptions and methodology does PEF use to make such projections.

Projected non-hurricane tree CI under the IVM is expected to drop from 415,867 in 2007 to 305,289 in 2016. Under the FPSC plan CI is expected drop from 404,756 in 2007 to 289,273 in 2016.

The basis for the assumptions used in this analysis is the utilization of various proven vegetation management initiatives that provide both short and long term reliability improvements when implemented concurrently in an Integrated Vegetation Management (IVM) program. This IVM program provides for 'ground to sky' approach that includes; surveys, maintenance trimming, reactive trimming, danger tree removal, overhang removal, herbicide application, mowing and public education programs. Each of these programs was assigned a reliability improvement factor based on both industry and regional knowledge and experience

Outside Plant Consulting Services, Inc.

National Electrical Safety Code & Extreme Wind Loads Applied to Distribution Poles

Florida PSC Hearing
August 31, 2006

Dr. Lawrence M. (Larry) Slavin
lslavin@ieee.org
973-983-0813 (voice/fax)

1

Florida PSC Proposed Rule 25-6.034(5)

(Extreme Wind Loading)

2

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET 060172-EU
NO. 060173-EU Exhibit No. 4
Company/ Verizon
Witness: Verizon's Presentation
Date: 08/31/06

PSC Proposed Rule 25-6.034(5)

Situation likely would be made worse

- Delayed restoration (more downed poles) following typical storms
- Errors in implementation
- Significantly increased vehicular fatalities and injuries
- Unknown unintended consequences

3

PSC Proposed Rule 25-6.034(5)

Increased costs

- Typical joint-usage distribution application poles required to be 1½ - 4 times present required strength (3 - 8 pole Class sizes)
- Alternatively, correspondingly shorter span lengths -- requiring 1½ - 4 times more poles

4

Change Proposal CP2766
(NESC 2007 Preprint)

- Extends Extreme Wind Loading to structures ≤ 60 ft.
- Much less radical than proposed PSC Rule 25-6.034(5)
- Limits wind pressure* for such structures

* corresponding to wind speeds causing wind-blown debris, branches

5

Change Proposal CP2766
(NESC Subcommittee Decision)

- Rejected by vote of 17 to 7 (1 abstention)
- "CP's 2766, 2673, and 2798 are rejected based on information obtained from public comments. Utility experience has demonstrated that electrical distribution and communication line structures, under 60 ft in height, are damaged during extreme wind events by trees, tree limbs, and other flying debris. Designing structures with heights less than 60 ft for extreme winds will increase pole strengths for distribution systems resulting in large increases in cost and design complexity without commensurate increase in safety. Safety of employees and the public is provided using the current NESC loading requirements."

6

National Electrical Safety Code

(Accredited Standards Committee C2)

7

National Electrical Safety Code (NESC)

- Electrical Supply and Communications Lines
- Outdoor Delivery Lines, Hardware and Equipment (vs. NEC: Indoor/Utilization Wiring)
- Overhead and Underground
- Performance/Safety Code (not Design Code) -- "Basic Provisions for Safety"

8

National Electrical Safety Code (NESC)

Section

9	**SC 2**	Grounding Methods
10-19	**SC 3**	Electric Supply Stations
20-23	**SC 4**	Overhead Lines - Clearances
24-27	**SC 5**	Overhead Lines - Strength & Loading
30-39	**SC 7**	Underground Lines
40-44	**SC 8**	Work Rules

9

NESC Strength & Loading Review

- NESC 2002
- NESC 2007
  - Accepted Changes
  - Rejected Changes
- PSC Proposed Rule 25-6.034
- Recommendations

10

NESC 2002

11

Section 25

"Loadings for Grades B and C"

- Rule 250B (Combined Ice and Wind Loading)
- Rule 250C (Extreme Wind Loading)

Section 26

"Strength Requirements"

- Rule 261 ("Grades B and C Construction")
- Rule 263 ("Grade N Construction")

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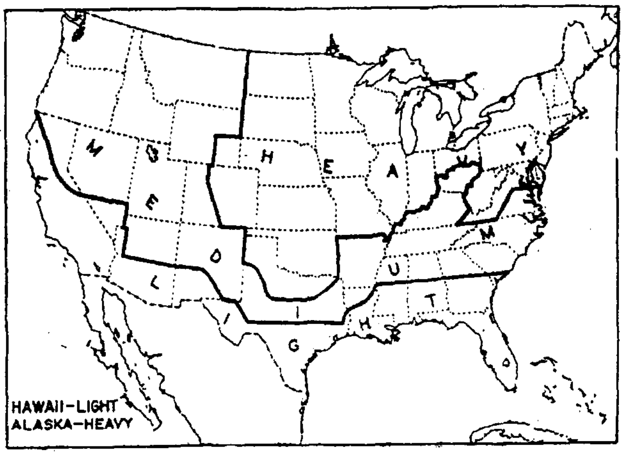
PART 2. SAFETY RULES FOR OVERHEAD LINES

Storm Loading Map Rule 250B
Combined Ice and Wind



Loading Districts

Fig 250-1
General Loading Map of United States
with Respect to Loading of Overhead Lines

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NESC "Winter" Storm (Rule 250B)

Combined Ice and Wind Loading

- Heavy (0.5-in. radial ice, 40 mph wind, 0°F)
  - 4 lbs. per sq. ft. wind pressure load (projected area)
- Medium (0.25-in. radial ice, 40 mph wind, 15°F)
  - 4 lbs. per sq. ft. wind pressure load (projected area)
- "Light" (0-in. radial ice, 60 mph wind, 30°F)
  - 9 lbs. per sq. ft. wind pressure load* (projected area)

* Wind pressure is proportional to square of wind speed

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2002 Extreme Wind Map (Rule 250C)

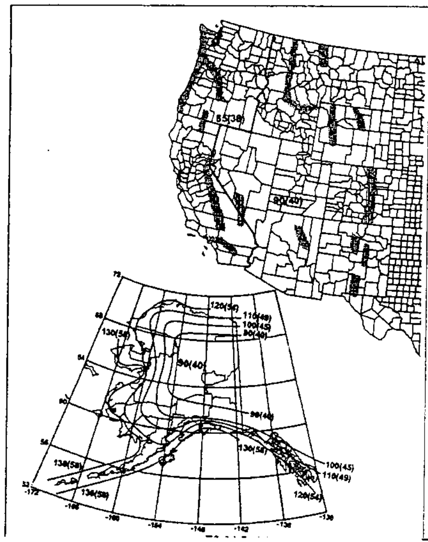

Fig 250-2(a)
Basic Wind Speeds

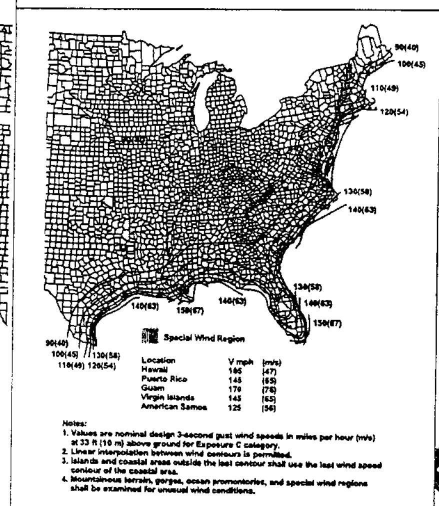

Fig 250-2(b)
Basic Wind Speeds

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(Note: Not required for structures ≤ 60 ft. height)

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2002 Extreme Wind Map (Rule 250C)

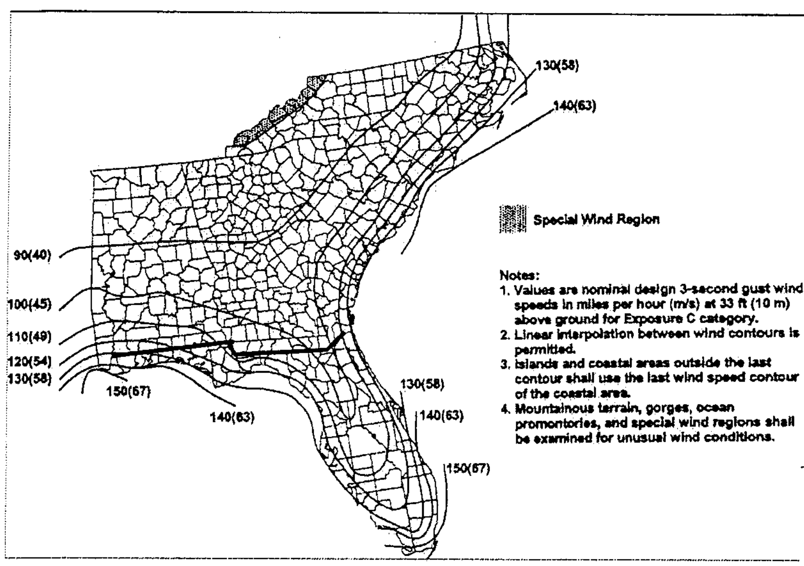

Fig 250-2(d)
Eastern Gulf of Mexico and Southeastern US Hurricane Coastline

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NESC 2002 "Summer" Storm (Rule 250C)

- ASCE 7-98 Extreme Wind Map
  - 50 year recurrence (0.02 annual probability)
  - Gusts (3-second average)*
  - Open terrain (ASCE Exposure C)
  - 33 ft. elevation
- Includes Gust Response Factors
  - Height
  - Span length
- Not required for structures ≤ 60 ft. height

* approx. 20% greater than 1-minute averages for categorizing hurricane levels (Saffir Simpson Hurricane Scale)

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Conductor Loading

Combined Ice and Wind, or Extreme Wind

- Vertical weight of bare conductor plus ice
- Horizontal force of wind on conductor plus ice
- "Additive constant" to resultant (for tension)
- Corresponding temperature (0°F, 15°F, 30°F; 60°F)

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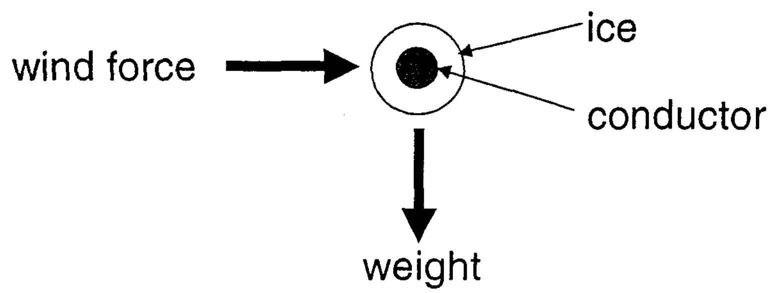
Conductor Loading



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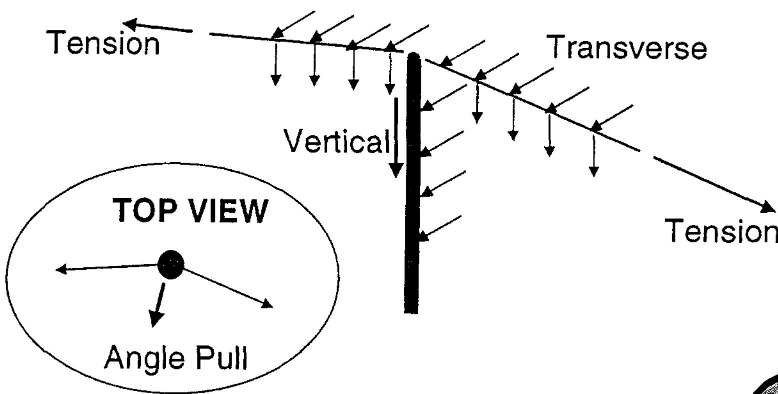
Loads on Line Supports

- Vertical Loads
  - Dead weight of bare supports and conductors
  - Ice load on conductors and wires (not supports)

- Transverse Loads
  - Wind force on bare structures (without ice)
  - Wind force on ice-covered conductors and wires

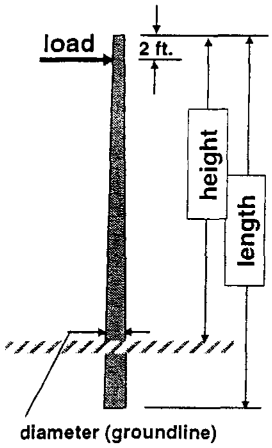
20

Loads on Line Supports



Wood Pole Strength & "Class"

ANSI-O5.1 Wood Pole Standard



Pole Class (Size*)	Strength/Capacity (lbs)
10	370
9	740
7	1,200
6	1,500
5	1,900
4	2,400
3	3,000
2	3,700
1	4,500
H1	5,400
H2	6,400
H3	7,500
H4	8,700
H5	10,000
H6	11,400

* Stronger pole (Class Size) ⇒ larger diameter
** Longer pole, same Class ⇒ larger diameter

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Strength & Overload Factors Supports (Structures, Guys, ...)

Strength x **Strength Factor** ≥ Load x **Overload Factor**

or

Strength ≥ Load x **Overload Factor ÷ Strength Factor**

Thus, effective "Design/Safety Factor" =
Overload Factor ÷ Strength Factor

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Strength & Overload Factors Supports (Structures, Guys, ...)

Strength ≥ Load x "Design/Safety Factor"

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Conductor/Messenger (NESC Rule 261)

- Combined Ice-Wind
  (60% rated strength)
- Extreme Wind
  (80% rated strength)
- Tension increased by "additive constant"

26

Grade of Construction (NESC Section 24)

- Grade B
  - Highest - most "reliable" grade
  - Crossings (railroad, limited-access highways)
  - Details (voltage levels, type cables, area, ...)
- Grade C
  - > 750 volts (primary power)
  - Details (voltage levels, type cables, area, ...)
  - Typical distribution design (joint-usage, power, ...)

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Grade of Construction (NESC Section 24)

- Grade N
  - Lowest grade
  - e.g., $\leq$ 750 volts (telecommunications, secondary power, "rural" area*, ...)
  - No detailed requirements (NESC Rule 263)
    - "need not be equal to or greater than Grade C"
    - "initial size or guyed or braced to withstand expected loads, including line personnel working on them"

* deleted in NESC-2007

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Strength & Overload Factors
(Wood Poles, Transverse Wind Load)

	Grade of Construction	Rule 250B (Combined Ice & Wind)	Rule 250C (Extreme Wind)
Overload Factor	B	2.50	1.00
	C	1.75	1.00***
Strength Factor	B	0.65	0.75
	C	0.85	0.75
Effective Design Factor	B	2.50/0.65 = 3.85*	1.00/0.75 = 1.33
	C	1.75/0.85 = 2.06**	1.00/0.75 = 1.33***

* approx. "4"
** approx. "2"
*** reduced in NESC-2007

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NESC 2007

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Accepted Changes

Reduced Overload/Design Factor for Extreme Wind, Grade C

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Additional Extreme Winter Storm (Rule 250D)

50-YEAR MEAN RECURRENCE INTERVAL UNIFORM ICE THICKNESSES DUE TO FREEZING RAIN WITH CONCURRENT 3-SECOND GUST SPEEDS: CONTIGUOUS 48 STATES.

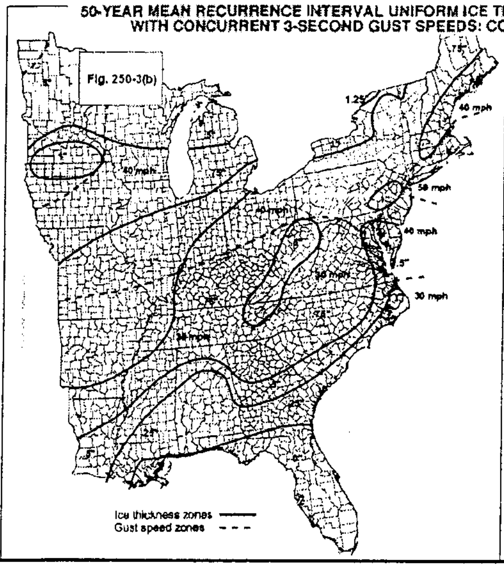

Figure 250-3(b) -- Uniform Ice thickness with concurrent wind

32

Additional Extreme Winter Storm (Rule 250D)

New Rule 250D (Extreme Ice with Concurrent Wind)

- Based upon ASCE 7-02 map
- Negligible impact in Florida (mostly 0-in. ice, low wind speed, low overload/design factor)
- Retains 60 ft. exemption (distribution)

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Reduced Overload/Design Factor for Extreme Wind (Rule 250C)

	Grade of Construction	Rule 250B (Combined Ice & Wind)	Rule 250C (Extreme Wind)
Overload Factor	B	2.50	1.00
	C	1.75	~~1.00~~ 0.87*
Strength Factor	B	0.65	0.75
	C	0.85	0.75
Effective Design Factor	B	2.50/0.65 = 3.85*	1.00/0.75 = 1.33
	C	1.75/0.85 = 2.06**	~~1.00~~ 0.87/0.75 = ~~1.33~~ 1.16**

* 0.75 if > 100 mph (except Alaska)

** 1.00 if > 100 mph (except Alaska)

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Reduced Overload/Design Factor for Extreme Wind (Rule 250C)

Thus, contrary to extending Rule 250C to all structures (including poles ≤ 60 ft. tall), NESC 2007 reduces loads by a minimum of 13% (25% for most of Florida) for Grade C, where applicable (> 60 ft. tall)

Rationale: Grade C should not be required to be at same level of reliability as Grade B

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Rejected Change Proposals & Related Discussions

Extending Rule 250C (Extreme Wind) to Distribution Poles, ...

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Change Proposal CP2766
(NESC 2007 Preprint - "Recommended")

CP2766

- Extends Rule 250C to structures ≤ 60 ft.
- Limits wind pressure for such Grade C structures (≤ 60 ft. tall) to 15 psf*
- No significant impact in Florida vs. present Rule 250B, requiring 18 psf

* corresponds to wind speed causing wind-blown debris, branches, ...

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Change Proposal CP2766
(Industry Response)

- Received most comments (79 of 633) of all CPs submitted by Subcommittee 5
- Overwhelming number of strong objections (90%) (for some: "lesser of evils" due to pressure limits)
- Next 3 runnerup CPs also related to extending Rule 250C to structures ≤ 60 ft.
- Typical: "almost all poles downed by flying debris, so no benefit from this change"

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Change Proposal CP2766
(NESC Subcommittee Decision)

- Rejected by vote of 17 to 7 (1 abstention)
- "CP's 2766, 2673, and 2798 are rejected based on information obtained from public comments. Utility experience has demonstrated that electrical distribution and communication line structures, under 60 ft in height, are damaged during extreme wind events by trees, tree limbs, and other flying debris. Designing structures with heights less than 60 ft for extreme winds will increase pole strengths for distribution systems resulting in large increases in cost and design complexity without commensurate increase in safety. Safety of employees and the public is provided using the current NESC loading requirements."

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General Comment

NESC well-respected document, believed to have served the industry well

Therefore, significant changes to the NESC are introduced gradually

Such gradual changes minimize potential impact and unintended consequences

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Florida PSC Proposed Rule 25-6.034(5)

(Extreme Wind Loading)

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- Delays in Restoration
- Other Consequences
- Direct Effect (System Cost)

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PSC Proposed Rule 25-6.034(5) (Direct Effect)

- Consider reference Grade C application*, Rule 250B (design factor ≈ 2:1*): relative strength = 100%
- Design factor Grade B ≈ 4:1
- Assume (reasonable) design factor Grade N = 1:1
- Compare to Rule 250C (NESC 2002 edition) Extreme Wind loads (Grade B = Grade C; assume also applied to Grade N); wind speeds 95 mph - 150 mph

* transverse wind, tangent structure

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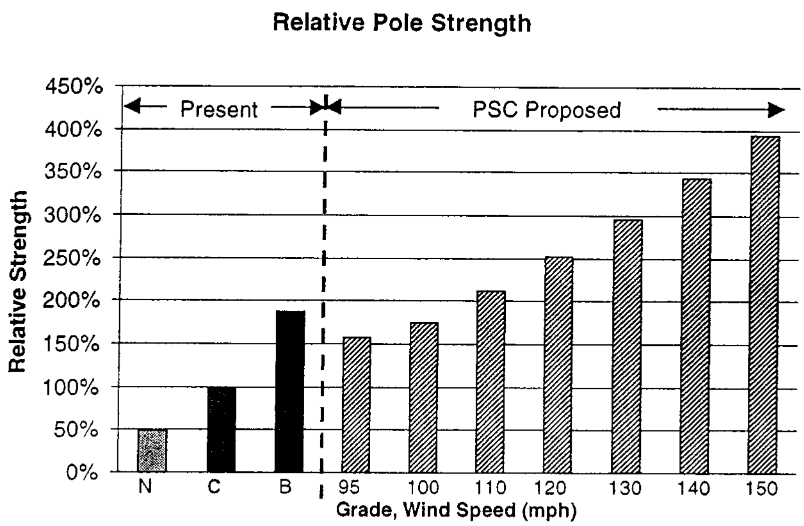
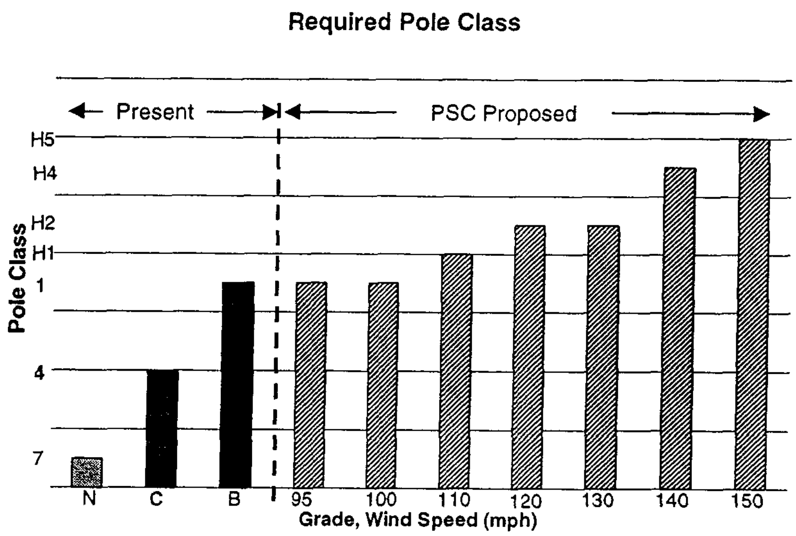
PSC Proposed Rule 25-6.034 (Relative Pole Strength)



44

PSC Proposed Rule 25-6.034 (Required Pole Class)



45

PSC Proposed Rule 25-6.034(5) (Increased Costs)

- Grade C applications required to be 1½ - 4 times present required strength (3 - 8 pole Class sizes)
- Alternatively, correspondingly shorter span lengths -- i.e., 1½ - 4 times more poles
- Grade B affected less (≤ 2 times present strength)
- Grade N applications 3 - 8 times present (reasonable) required strength (6 - 11 Class sizes)
- More extensive use of non-wood (concrete, steel, ...) poles

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PSC Proposed Rule 25-6.034(5) (Other Consequences)

- Delayed restoration (greater number of poles, or more massive poles, or delayed availability of appropriate non-wood poles) for "typical" case in which poles will be downed regardless of extreme wind design considerations
- Confusion, delays, and possible errors in implementation, due to relative complexity of Rule 250C extreme wind design rules
- Significant increase in fatalities and/or injuries due to vehicular accidents with pole(s)

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Confusion, Delays, Errors

Rule 250B (Combined Ice and Wind)

load (lbs) = 4 - 9 psf x shape factor x projected area (sq ft)

Rule 250C (Extreme Wind) NESC 1997

load (lbs) = $0.00256 (V_{mph})^2$ x shape factor x projected area (ft^2)

where V_{mph} = fastest-mile (Figure 250-2, 1997)

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Confusion, Delays, Errors

NESC 2002

load (lbs) = 0.00256 $(\mathbf{V}_{mph})^2$ x shape factor x projected area (sq ft) x k_z x G_{RF} x I

where V_{mph} = 3-sec. gust (2002 Extreme Wind Map),
k_z = velocity pressure exposure coefficient,
G_{RF} = gust response factor, and
I = importance factor (=1.0)

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Confusion, Delays, Errors

Structure: $k_z = 2.01 \times (0.67h/900)^{(2/9.5)}$, $60\text{ ft} \le h \le 900\text{ ft}$
where h = height structure (ft)

Wire: $k_z = 2.01 \times (h/900)^{(2/9.5)}$, $33\text{ ft} \le h \le 900\text{ ft}$
where h = height attachment point (ft)

minimum $k_z = 0.85$

Height, h (ft)	k_z (Structure)	k_z (Wire)
<33	0.92	1.00
>33 to 50	1.00	1.10
>50 to 80	1.10	1.20
>80 to 115	1.20	1.30
>115 to 165	1.30	1.40
>165 to 250	1.40	1.50
>250	Use Formulas	Use Formulas

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Confusion, Delays, Errors

Structure: $G_{RF} = [1 + 2.7E_s(B_s)^{0.5}]/k_v^2$

Wire: $G_{RF} = [1 + 2.7E_w(B_w)^{0.5}]/k_v^2$

where

$E_s = 0.346 \times [33/(0.67h)]^{1/7}$

$E_w = 0.346 \times [33/h]^{1/7}$

$B_s = 1/[1 + 0.375h/220]$

$B_w = 1/[1 + 0.8L/220]$

$k_v = 1.43$

L = Design Wind Span (ft)

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Confusion, Delays, Errors

Gust Response Factor, G_{RF}
Tabulated Values (Structure and Wire)

Height h (ft)	Structure G_{RF}	Wire G_{RF}, Span Length L (ft)						
		≤250	250<L≤500	500<L≤750	750<L≤1000	1000<L≤1500	1500<L≤2000	L>2000
≤33	1.02	0.93	0.86	0.79	0.75	0.73	0.69	Formulas
>33 to 50	0.97	0.88	0.82	0.76	0.72	0.70	0.67	Formulas
>50 to 80	0.93	0.86	0.80	0.75	0.71	0.69	0.66	Formulas
>80 to 115	0.89	0.83	0.78	0.73	0.70	0.68	0.65	Formulas
>115 to 165	0.86	0.82	0.77	0.72	0.69	0.67	0.64	Formulas
>165 to 250	0.83	0.80	0.75	0.71	0.68	0.66	0.63	Formulas
>250	Formulas	Formulas	Formulas	Formulas	Formulas	Formulas	Formulas	Formulas

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Confusion, Delays, Errors

CP2718 (proposed by Subcommittee 5 transmission engineer)

- Attempts to simplify Rule 250C.
- Rejected by vote of 19 to 4 (2 abstentions)
  "... The current method is complete and consistent with industry standard practice. ...."
- Thus, Rule 250C is generally (*but not unanimously*) considered sufficiently clear for intended transmission applications

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Vehicular Accidents

- US Department of Transportation:
  "Each year, 1200 to 2000 people are killed and an additional 60,000 to 110,000 people are injured due to collision between motor vehicles and timber utility poles."
- US DOT objective is to reduce number of utility poles
- Immediate effect of PSC Rule 25-6.034(5) will be contrary to US DOT objectives (also Florida DOT)

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Recommendations

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PSC Proposed Rule 25-6.034(5) (OPCS Recommendations)

Primary Recommendation

- Enforce present NESC rules (Rule 250B, ...)
- Continue to maintain NESC 60 ft. exemption for Rule 250C (Extreme Wind)
- Monitor development of 2012 edition of NESC, as available (e.g., 2007 - 2010)
- Contribute to development process of 2012 edition (e.g., NARUC representative to Subcommittee 5)

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PSC Proposed Rule 25-6.034(5) (OPCS Recommendations)

Alternate Recommendation

- Explicitly exclude Grade N applications
- Explicitly cite NESC 2007 for appropriate overload/design factors (13% - 25% reduction for Grade C)
- Apply as pilot study, initially limited to specified geographic area and defined period (e.g., 1 - 2 years)

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Future NESC Meetings (2012 Edition)

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NESC 2012 - Schedule

• Public Proposals Due	**July 2008**
• NESC Subcommittee Recommendations	**Oct. 2008**
• Preprint of Proposed Changes	**Sept. 2009**
• Public Comments Due	**May 2010**
• NESC Subcommittee Resolution	**Oct. 2010**
• Submitted to NESC Committee and ANSI	**Jan. 2011**
• Re-Submitted to ANSI (Final Recognition)	**May 2011**
• Published	**Aug. 2011**
• Effective	**Feb. 2012**

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NESC 2012 (Initial Anticipated Effort)

- January 2007 -- IEEE PES Towers, Poles & Conductors Subcommittee, Panel Session on NESC 2007 edition, Strength & Loading
- Will include presentation of (rejected) CP2766 regarding 60 ft exemption
- Anticipate comments from audience (e.g., regarding recent hurricane damage)
- Subcommittee 5 will probably begin to meet later in 2007 for initiating development of 2012 edition

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BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

In the Matter of:

PROPOSED AMENDMENTS TO RULES REGARDING OVERHEAD ELECTRIC FACILITIES TO ALLOW MORE STRINGENT CONSTRUCTION STANDARDS THAN REQUIRED BY NATIONAL ELECTRIC SAFETY CODE. — DOCKET NO. 060173-EU

PROPOSED RULES GOVERNING PLACEMENT OF NEW ELECTRIC DISTRIBUTION FACILITIES UNDERGROUND, AND CONVERSION OF EXISTING OVERHEAD DISTRIBUTION FACILITIES TO UNDERGROUND FACILITIES, TO ADDRESS EFFECTS OF EXTREME WEATHER EVENTS. — DOCKET NO. 060172-EU

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THE .PDF VERSION INCLUDES PREFILED TESTIMONY

PROCEEDINGS:	RULE DEVELOPMENT WORKSHOP
DATE:	Monday, April 17, 2006
TIME:	Commenced at 9:30 a.m. Concluded at 3:18 p.m.
PLACE:	Betty Easley Conference Center Room 148 4075 Esplanade Way Tallahassee, Florida
REPORTED BY:	JANE FAUROT, RPR LINDA BOLES, RPR, CRR FPSC Official Commission Reporters

I think Manny was first, and then Mr. Nelson, is it, Nelson Bingel?

Manny.

MR. MIRANDA: Manny Miranda, Florida Power and Light. Generally, we are in agreement with the context of it. One area that we would like to ask about is during a storm restoration event, and we would like to make sure that during a storm event that we have an exclusion for that. We would come back and rebuild, but there is a possibility that we don't want anything that would delay our restoration efforts.

So we want to make sure that, you know, for example, you may have a concrete pole that broke due to some kind of toppled tree or something. We may want to go back with a wood pole temporarily, get lights on and then come back and build it back to the appropriate code.

MR. TRAPP: As you propose that language, keep in mind that temporary repairs should not be permanent repairs.

MR. MIRANDA: We understand that.

MR. TRAPP: And so any exclusion that we grant should be followed by, in my mind at least, a very stringent requirement to get the permanent repair in.

Mr. Bingel, I believe it is.

MR. BINGEL: Yes. I'm Nelson Bingel with Osmose, and I am also on the NESC. And there is -- at every meeting we get together there is always a reminder that it is a basic safety standard. That is the definition of the NESC. It is not a design guide.

But I think, Bob, you were moving in the direction that maybe could blend these two requirements together with the idea that if it said as the minimum standards for safe construction of transmission and distribution facilities, then we are not really calling it a construction guide or a design guide.

MR. TRAPP: That is a point well taken.

Do we have other comments? Barry.

MR. MOLINE: Bob, I just want to clarify, to follow up David's question about major and your comment back to him that said staff was a little uncertain about what you were -- how you were defining that. And you asked us for words to define that or economic analysis. What are you looking for? I mean, we can do anything, but are you looking for a list of 20 examples we consider this to be major and this not to be? I mean, are you looking for, you know, just a sentence that tries to define it? But, you know, you asked us for information, but I'm trying to figure out what kind of information you need to have to define it.

MR. TRAPP: As we attempt to define the granularity, I guess, of what we mean by what is a replacement, what is major, what is minor, what is in between, it occurs to me that the decision has to be governed to some degree by cost, cost language that we see right now seems to be encouraging, in fact, that we are going to design to NESC minimums, whatever those safety criteria are. And I just want to point out that for distribution lines in particular, I would submit that there is not a single line in the state of Florida that was initially designed at NESC minimums, nor would there be one, in my belief, in the entire United States.

In other words, the distribution system is designed and built with some fat in the system because it is intended to be a capital asset that is going to last for 35 or 40 or even 50 years. So you have to put some fat into the design to allow the additional underbuild, you know, the additional cable TV, telephone, et cetera, potentially to reconductor that line with larger conductors at a point in time in the future where we don't have to replace all the structures.

So this language that I'm seeing, I guess my question is this language is sort of saying that utilities are not going to be able to design distribution systems the way they have in the past, which is to include some excess capacity, so to speak, to allow for future additions of, for instance, underbuild without having to go through, you know, some formal rate determination procedure.

MR. TRAPP: I don't believe that is the intent.

Mr. Bingel, I know that you probably represent your company nationwide. Do you have any examples from other jurisdictions that might help us here in terms of standards of construction adoption language?

MR. BINGEL: I thought what Martin was referring to is the fact that when you -- distribution in particular, when you build a line you don't engineer each span. And so you will look at some of the higher loaded spans and pick a class pole, and you will install a hundred of those. And, typically, then there is a little extra margin on the majority of the installations out there. I would say that it is true that the vast majority of poles are not loaded to 100 percent. So there is some extra margin in there, but I think that is just part of a construction tolerances kind of thing.

MR. TRAPP: And I think we agree, and I know the word gold-plating was used, but it is not our intent to accuse anyone of gold-plating here today or intentionally doing it in the future. You necessarily want to design more into the system.

I was a Star Trek freak. I just loved it, and you know, Scotty never gave you the true number. He always held back at least 10 percent, so you know. I'm struggling, though, with how to capture that in terms of rulemaking language. And if -- I mean, again, the concept was very simple. We are simple-minded staff. Start with the National Electrical Safety Code, allow the utilities to build in fat where it is prudent to do so, address two specific areas of hardening. That was where we started. If there is some better language to do that, that's what we would like to know.

MR. BINGEL: I think this might fit in with the previous discussion and your comment about the fact that it's the most cost-effective way to not engineer every single span; it's to engineer the whole line. And inherently there is some extra capacity in most of the poles, but that is still the most cost-effective way to build it.

MR. BUTLER: The concern, though, that I think that -- this is John Butler, Florida Power and Light Company. The concern that we have about the reporting aspect of this is that taken literally and at its extreme, just using the example given of a line where some of it requires a particular size and strength of pole, other parts that are not quite as highly loaded you could you get by and meet the minimum with a little bit less of a pole. And maybe some other part on the line it could be even a slightly smaller pole.

At its extreme, read literally, this reporting requirement would have the utility going in and determining kind of pole by pole where that's the case, and then reporting to you each one of them, what the justification for that one versus another one is. It seems like that could be very burdensome and really not give you any information you're particularly looking for.

This needs some sort of either de minimis threshold quantified? Not that I have found so far. But the intent was to say all of these areas that have been impacted -- when you look at the Carolinas, they had five hurricanes in a two-and-a-half-year time frame, from '98 to 2000. So the intent was to say based upon all the global feedback that we've received, is there risk, greater risk by not adopting this for distribution poles. And what I have inferred from my reading, is that that is not the conclusion they came to. The conclusion was there is not greater risk.

MR. TRAPP: How granular was their study? Did they, for instance, differentiate between just any distribution pole and like feeders? Did they look at feeders separately or --

MR. McDONALD: To my level of understanding right now, I couldn't answer how granular it was.

MR. BREMAN: These are all investor-owned utilities primarily that are on the NESC committee?

MR. McDONALD: That is not correct from what I have read. There were cooperatives --

MR. BREMAN: But you are not on the committee at all?

MR. McDONALD: Myself?

MR. BREMAN: Well, I mean, Progress isn't represented on the committee?

MR. TRAPP: Go ahead. Yes, sir.

MR. BINGEL: Progress actually has a very good transmission engineer on the committee. I just thought I would give a little background on the extreme wind load case. Previous to 1977, there was only light, medium, and heavy loading in NESC. There was no extreme wind load case. Then what happened in the -- and the light, medium, and heavy is considered a winter storm, because there was a combination of ice and wind.

Then there were several transmission failures in the northern central part of the U.S., and it was only in transmission, and they were in the summer. So they were high wind summer events, and that's when the code said, you know what, we have to adopt an additional criteria for transmission poles to protect against summer storms. In 1977 then is the first time that extreme wind was in the code, and that is what its function was.

During the late '60s and '70s, as wire size increased, that was the difference in what happened, was that the higher speeds and the larger wire started causing those transmission systems to fail. So that becomes the governing load case even in icy areas, the extreme wind with a large conductor.

Now, for the last 30 or 40 years all the wind speeds have been measured at 33 feet above ground. And there were people on the code saying, well, look, this new map we just adopted all the speeds are at 33 feet, yet we are saying don't apply it until 60 feet. It didn't seem to make technical sense. And that was the genesis of saying, you know, I think we could remove that exclusion and apply that extreme wind to all structures.

A task force was formed which I was part of to evaluate that. And after several meetings, a lot of discussion, the general feeling was that once debris starts flying around in a storm, that's when the wind-only loading criteria kind of aren't adequate. It's hard to design for tool sheds running into lines. And so the result of the task force effort was to cap the speeds.

For Grade B it was 94 miles an hour, and for Grade C it was 77 miles an hour. And that tied in with the Saffer-Simpson Hurricane Category 2, which is where they describe is when things start flying in the air. And that category is 96 to 110 miles an hour. And Fujitsu Tornado Damage Scale, where it said F-1, 73 to 112 miles an hour is when things start flying around. So that was the effort in the task force, to say, hey, if we really want to increase reliability and safety, we can only go up to the point where debris starts to fly around, because it would be very difficult to design for those conditions.

The public comment came back. We received 167 comments on that proposal, and overwhelmingly from people that were out after storms seeing what had happened, there is a very strong opinion that trees and debris cause a majority of the failures, as well as foundation failures. Now, I am also aware that in last year's storms in Florida there were some pure wind failures.

But based on the cost to design all lines to the extreme wind criteria and the uncertainty of the improved reliability and the comments from the public, I couldn't really justify increasing four pole classes and still being unsure of what the benefit that was going to be from a reliability and a safety standpoint. So the end result was that proposal was rejected, and the NESC at this point still has the 60-foot exclusion limit in there. And I throw that out as background to understand what was the original intent of the extreme wind load case.

And the one thing I might submit is it could well be that just going all the way from not applying it to a 40-foot pole to applying the full impact of extreme wind might be way beyond the load case where you really get some benefit from it. And just an idea in my mind would be to evaluate it more closely and say, well, rather than going just from your light conditions of 60-miles-an hour wind times four, that to go all the way to extreme wind might go way beyond where you are going to get benefit from it. And that maybe there is some point in between, but just the idea that that could be looked at and come up with perhaps the best solution. And, again, I think the targeted idea is -- that's a wise way to apply it, as well.

MR. TRAPP: I assume under a targeted idea we could -- we could collect the science. We could collect the data. We could refine standards over time?

MR. McDONALD: Well --

MR. TRAPP: But where do we start is the problem I'm having.

MR. McDONALD: Obviously, we are going to have to look at our history from 2004 and 2005 to see if there is any areas that we may have that is targeted application. But as we go forward we are going to continually refine that and make that part of our standards as we learn those lessons.

MR. TRAPP: Well, it's 2006 now, so I'd have to ask the question what have you incorporated into your own standards now as a result of those two years of storms? And I'm looking at you, but I am asking everybody. What has been put -- you know, give staff a feel of what amendments you have done to your own internal standards that would help to support a targeted approach only. And I'll swing to Power and Light down here, and start down there again, if you don't mind, Manny.

MR. MIRANDA: For FPL, our change, of course, is our announcement (phonetic) storm secure, which goes forward with NESC extreme wind, which in some ways kind of adapts those specific areas to upgrade. And that's the approach that we are taking going forward.

MR. TRAPP: Have you adopted this map?

are out, they are out. But the point we want to make is that if they are out because a live oak saturated with water that we couldn't trim on private property fell on them, they are out as well if we have these standards. And then, not only are they out, but they are paying more money, and we have problems justifying why. So that's the biggest concern that we had with that. But to answer your question, absolutely flying debris and spin-off activity.

MR. HAINES: Tampa Electric would concur with that. Again, the experience that we had in 2004, pole failures, very few, but the ones that we did experience were due to trees, trees outside the right-of-way. And we think that improving the vegetation management program that we have and our maintenance program is probably dollars better spent than investing in a higher construction standard that you're going to have similar issues with.

MR. BINGEL: Connie, I just want to respond, too, that the NESC evaluation is always looking at things from a safety perspective, not necessarily reliability. And the thought was that once roofs are flying around from a safety standpoint that there is not much we can do in the structures, because people shouldn't probably be exposed to that anyhow.

And I just wanted to add, too, the point I was making before is right now if you go from a Grade B construction to approximately 140-mile-an-hour extreme wind that requires an 80 percent stronger pole. It's almost twice as strong. And my point was that it could be that a 30 percent stronger pole is going to give you some additional reliability, and anything beyond that you have got another weak link. It could be the foundation, which also would be addressed, but there could be a variety of things that conductors are snapping. You're going to have outages anyhow.

And that was the point I was trying to make, is that maybe there is some range in between the light, medium, and heavy loading districts and extreme where there is definitely a benefit and a cost justification. And then beyond which that -- I mean, there is no additional benefit from a reliability standpoint.

MR. BREMAN: Larry, I think it's to you. We're about ready to shift.

MR. HARRIS: I think now might be a good time for a short break. Let's give the court reporter a few minutes to limber up again. And we are going to move on to -- I guess shift gears a little bit. We have been talking about above ground, I guess the next section deals with undergrounding a little bit. So ten minutes. We will be back at -- let's call it 11:15.

(Recess.)

MR. HARRIS: Did we have anymore comments on Paragraph 5 or are we ready to move on to Paragraph 6?

BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

In the Matter of:

PROPOSED RULES GOVERNING PLACEMENT OF NEW ELECTRIC DISTRIBUTION FACILITIES UNDERGROUND, AND CONVERSION OF EXISTING OVERHEAD DISTRIBUTION FACILITIES TO UNDERGROUND FACILITIES, ADDRESS EFFECTS OF EXTREME WEATHER EVENTS. ______________________________/ — DOCKET NO. 060172-EU

PROPOSED AMENDMENTS TO RULES REGARDING OVERHEAD ELECTRIC FACILITIES TO ALLOW MORE STRINGENT CONSTRUCTION STANDARDS THAN REQUIRED BY NATIONAL ELECTRIC SAFETY CODE. ______________________________/ — DOCKET NO. 060173-EU

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PROCEEDINGS:	HEARING
BEFORE:	CHAIRMAN LISA POLAK EDGAR COMMISSIONER J. TERRY DEASON COMMISSIONER ISILIO ARRIAGA COMMISSIONER MATTHEW M. CARTER, II COMMISSIONER KATRINA J. TEW
DATE:	Thursday, August 31, 2006
TIME:	Commenced at 9:30 a.m. Concluded at 4:05 p.m.
PLACE:	Betty Easley Conference Center Room 148 4075 Esplanade Way Tallahassee, Florida
REPORTED BY:	LINDA BOLES, RPR, CRR JANE FAUROT, RPR Official FPSC Reporters (850)413-6734 and (850)413-6732

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this point?

MR. MEZA: No, ma'am. Thank you.

CHAIRMAN EDGAR: All right. Commissioners, any questions for the BellSouth presenters at this time? No?

Okay. Then let's move on. You're recognized.

MR. O'ROARK: Again, good morning, Madam Chairman and Commissioners. I'm De O'Roark representing Verizon. First of all, Verizon agrees with BellSouth with respect to its concerns about cost. Verizon also has addressed those concerns in its comments and in the affidavit of Steve Lindsey. We agree with BellSouth concerning the jurisdictional issue, and we also fully support the infrastructure hardening proposal that was just presented.

In an effort to avoid simply duplicating the points that BellSouth has made, what we're going to do this morning is focus exclusively on the extreme wind loading issue. And Verizon's presentation on extreme wind loading will be made by Dr. Larry Slavin. Dr. Slavin has worked in the telecommunications field for 45 years: 28 years with Bell Labs, another 12 years with Telecordia. Dr. Slavin has been an active member of the NESC, that is the National Electrical Safety Code, subcommittee that deals with extreme wind loading. He's been involved with that subcommittee since 1998. He was involved in developing the 2002 and 2007 versions of the NESC. And he has prepared a PowerPoint presentation that we would like to have admitted as an exhibit next in order. And, Madam Chairman, we would suggest that perhaps be named Verizon's Presentation.

CHAIRMAN EDGAR: Okay. And that will be Exhibit 4.

(Exhibit 4 marked for identification and admitted into the record.)

DR. SLAVIN: I'd like to thank the Commissioners for the opportunity to speak to you this morning. I'll try not to abuse the privilege. You have a handout with lots of slides; I think over 60. I'll only address about half of them, unless you want me to go into some of those others in detail. There's a slide number in the lower right-hand corner, so I'll try to keep you up-to-date on which slide I'm referring to at the moment.

I'll be talking about the National Electrical Safety Code and what it says about extreme wind loads, and in particular how it relates to distribution poles.

Slide 2. Your public service proposed Rule 6.034(5) deals with extreme wind loading.

Slide 3. Right upfront I'm going to tell you that if you do adopt those rules as written, you'll probably make your situation worse. You'll delay restoration because you'll have more downed poles following typical storms. There will be errors in implementation.

From another safety perspective, you'll probably have more automobile accidents because of the additional or more massive poles. And there's probably going to be some other unknown consequences which I haven't thought about at this point.

Slide 4. The most obvious effect is going to be increased costs. Typical joint usage poles will be required to be one and a half to four times your present required strength. That's three to eight pole class sizes, and I'll describe what pole class means in a few slides from now. That is very major. The alternative to stronger poles is to have more poles by just decreasing your span lengths. In that case, you'll have one and a half to four times more poles.

Now I want to point out -- I'm on Slide 5. I want to point out that in the last edition, the 2007 Edition just issued -- it was just issued this month as we speak, all right, so it's already essentially effective. It has to be effective by February, but it can be effective at any time. We did consider a change proposal, a very specific one, Change Proposal 2766. It was rejected. But what the purpose of this was was to extend extreme wind loading to structures less than 60 feet. That means distribution poles. It was a much less radical change than what's in your proposed rule, much less radical.

One of the limitations in this rule was that it would limit the wind pressures or the wind speeds that had to be considered to a level above which you would have flying debris basically taking down your poles anyway. All right? So it recognized there was a limit, a practical limit to the wind speeds we should be dealing with.

Slide 6. Nonetheless, it was rejected by a vote of 17 to 7. And I'm not going to read through the formal comment. Underneath you see the formal comment of the Subcommittee 5. And just to paraphrase it briefly, what it said is distribution structures, meaning under 60 feet, they're damaged during extreme wind by trees, tree limbs, flying debris. If you design those structures for extreme wind, you'll increase the pole strengths, you'll have a large increase in cost, design complexity, and you're not going to have a commensurate increase in safety. Okay. Slide 6.

Now the rest of the talk -- I'm on Slide 10 now. The rest of the talk will be divided into four parts basically to support the conclusions and the comments that I just made.

The first talk, I'll briefly review what 2002 says. That's the edition of the NESC that's explicitly cited in your change proposal -- in your proposed rule. I'll tell you a little bit about 2007 which was just issued because there's one or two things that relate to, you know, what we're talking about today. I'll tell you how it impacts -- how it's impacted and how it relates with your proposed Rule 6.034(5), and I'll give you my own recommendations.

Okay. Slide 11 and 12. I'm talking about the 2002 Edition now. There are two sections of the NESC that explicitly deal with this issue. There's Section 25 or Chapter 25, the title of which is "Loadings for Grades B and C." Now I'm -- I highlighted the Grades B and C part, but that's, but that's a direct exact description of that chapter. In other words, those loadings which are specified in Section 25 do not apply to all grades of construction. It applies to two of the popular grades, especially Grade C, but not all grades. And there are two rules explicitly listed in Section 25, two storms that are explicitly listed: There is Rule 250B and 250C. Now just to avoid confusion, the 250B and 250C, that B and C has nothing to do with Grades B and C. That's just, you know, that's not -- you know, there's no connection there.

Rule 250B is basically a winter storm. It's a combined ice and wind loading that we expect the poles to withstand. That applies to all transmission and distribution structures as long as they're Grades B and C.

Rule 250C, which I highlighted in red, is the rule that's in question now. Rule 250C is the extreme wind loading that's been proposed to be applied to all distribution poles. Right now it is not applicable to distribution poles.

Section 26 of the NESC entitled "Strength Requirements" has two main rules -- actually has one main rule. Main Rule 261 is entitled "Grades B and C Construction." And what it does is it tells you how to select or design poles so that they can withstand the loadings that are described in Section 25 above.

Now there is a Rule 263, it's a very minor rule, that refers to another grade of construction, the remaining grade, Grade N construction. You can picture "N" standing for no rule. That's not what it stands for, but you can imagine it that way. It talks about this other third -- this other grade of construction which I'll briefly describe.

All right. Next, next slide. I'm talking about the winter storm now. This map, this loading districts map that you see in front of you, I'm sure many of you have seen this, it's been around about 100 years, it's been modified slightly. It divides the United States for the purposes of winter storm into three regions, into three districts: Heavy in the northeast, medium and light. And you can see that Florida is in the light area.

The next slide is 14. This winter storm, Rule 250B, is as follows: It specifies, for example, in the heavy portion of the country, in the northeast, that the conductors shall be able to accumulate 1/2 inch radial ice. Radial means that you have 1/2 inch on top, on the bottom and on the side. So you're actually adding an inch of ice to a conductor if you imagine that. And we apply to that ice-laden conductor a transversed wind load corresponding to 40 miles an hour. Actually it's specified four pounds per square foot. That corresponds to a 40-mile-an-hour wind. So we apply this four pounds per square foot to the projected area, the bigger area of the conductor surrounded by ice.

In the medium portion of the country, in the midsection, we have the same four-pounds-per-square-foot wind pressure with only 1/4 inch radial ice.

Now at the bottom of this slide, of course, is the one we're interested in. I have it in red. In the light section of the country -- oh, and a conductor, I might add, is a wire, it's a cable, it's a telephone cable, it's a power cable, it's any of the cables that you see stretched, you know, spanning between the poles when you walk down the street. It could be cable TV, it could be power, it could be telephone. Okay. We use them interchangeably in the code and we're not always explicitly clear about it. Okay? Conductors, wires, cables, all the same thing.

All right. Now in Florida, you see it's in red and it's considered light. Okay. Well, "light" I put in quotes. That is a total misnomer. We're getting away from that terminology to some extent. We did a little bit in the 2007 Edition. The reason that we say it's light is because it's light on ice. There's no ice in Florida, for example. But we apply a 60-mile-an-hour wind. That 60-mile-an-hour wind corresponds to nine-pounds-per-square-foot wind pressure, more than twice as much as in the rest of the country. And even though it's on a conductor without ice, in many cases that can be a much more significant load. So the term "light" is really a misnomer.

And as you'll see later on, we take these wind pressures for this winter storm -- and this winter storm, remember, does apply now to all transmission and all distribution structures. In fact, it becomes the basic design rule for distribution across the country. We apply a safety factor to those numbers to make them even more severe. Okay?

Slide 15. So now let's get over to the, to the extreme wind load, Rule 250C. This is the one we're talking about extending the structure to distribution structures. If you -- there's a contour map that's in the National Electrical Safety Code. I'll show you a more detailed one on the next slide. But if you look at the bottom of this slide, this wind load is not required for structures less than or equal to 60 feet in height, meaning it exempts distribution structures, distribution poles. That's the point of it.

Slide 16 shows a particular figure, it's 250-2(d), and this is explicitly referenced in your, you know, your PSC proposal, and because it, you know, highlights what's happening in Florida. And you can see that the wind speeds that are talked about are as high as 150 miles an hour and down to a little bit under 100, let's say 95 miles an hour in the northern tip over there just for, you know, purposes of, of the discussion. I also assumed that in some of the calculations I'm going to show you. So we have something between 95 and 150 miles an hour for Florida.

Now jump ahead to Slide 21, okay, flip ahead a few pages. All right. There's stuff in between you can ask me about afterwards, if you're so inclined.

All right. This wind from either the hurricanes under the extreme wind loading which we're talking about today or from the 60-mile-an-hour winds that we talk about in the winter, this wind puts a horizontal load on the conductors or the wires or the cables as you see in red on that figure. Okay? And it also blows on the pole, as you can see. That tends to be the dominant design criteria for poles. The weight of the ice, the weight of the pole, the weight of the conductors, minor, minor effect. This may not be intuitive to you, but it's not. It's the lateral horizontal force that's applied to the conductors or the wires on the pole which is generally the design criteria for the poles. Okay?

That is why, if you go ahead to Slide 22 -- or actually let's go to 22 and let's go to 23. What I'm going to do is I'm going to tell you what wood pole class means in case you're not familiar with it. Okay?

Slide 23. It shows -- this is right out of the ANSI-05 Wood Pole Standard. I serve on the ANSI-05 also. But it's a very, you know, common standard that people in the industry are familiar with, both power industry and communications.

All right. We define the strength of poles, of wood poles. But let me tell you, the nonwood poles have to match up to this because everybody's familiar with the wood poles since it's the standard. So the nonwood poles we'll also talk equivalent classes. All right? There's some issues with that, but basically they'll say this is an equivalent Class 4 pole even if it's made out of something that's not wood. And the way we define the strength of these, of our poles, wood or otherwise, is you put a lateral load near the top of the pole, and you can see a load two feet from the top of the pole. And this is how the tests are done actually. Okay? It's not done on poles on the ground. You know, we do it a little differently. But basically you put a load two feet from the tip of the pole and you classify the pole by how much that load can be.

So if you look in this table to the right, you'll see I highlighted Class 4s. You see the four in red and the 2,400 pounds next to it. That is a typical, you know, distribution pole, Class 4. That can take 2,400 pounds applied near the tip of the pole. And then we have a whole spectrum of strengths starting with Class Size 10, which is very small. The higher number classes are actually weak. It's sort of like wire gauge; a higher number wire gauge is a thin wire. A smaller wire gauge is a thick wire. Spaghetti pasta is classified that way also. All right? The higher numbers are, you know, generally smaller and thinner.

So you start from the Class 10, which is a very small pole, can take a few hundred pounds, and you go down to a Class 1 which is really big for distribution, which is 4,500 pounds, and then you can get into the H Class size, all right, you know, which are, you know, hardly ever used for distribution, and you go H1, H2, H3, H4, H5 and H6. And in this case the strength goes up with the H number. So this is how we classify the poles. All right? Remember, Class 4 is pretty typical. You might see Class 5s out there a lot, Class 3s out there a lot. That's a typical distribution pole.

All right. Let's move ahead to Slide 25. Now how do we pick the strength of the pole to match the storm loads? We do not simply take the strength from that chart that I just showed you and say, well, that has to be at least as big as the load that's applied by the wind blowing. Now that's -- and you have to check whatever wind is appropriate, whether it's the extreme wind which is not for distribution but it is for transmission, okay, or whether it's the winter storm load. And you multiply that load, those pressures -- remember, I mentioned nine pounds per square foot, you should remember. We multiply that by a design or a safety factor. It's an amplification factor, it's a safety factor. So in the case of Grade C construction which I'm going to talk about, the design factor is two. In the case of Grade B, it's four. So it's a healthy design factor, a safety factor that's applied to those winter storms. All right.

Next slide, 27. The magnitude of that safety factor depends on the grade of construction. Grade B is the highest grade of construction. It's the one that's supposed to be the most reliable. It will have the highest safety factor, possibly four to one. It will be four to one for the winter storm. It's very rarely required. It's required at crossings, railroad crossings, limited access highways, so it's not a very common -- it's not commonly required.

The one that is commonly required is Grade C. Grade C, and I highlighted it in red, is typical distribution designed for joint usage applications. It will apply when you have primary power on the pole, meaning you have thousands of volts at the top of the pole. Okay? And you might have a transformer which steps down those thousands of volts to, say, hundreds of volts which you would use in your home: 120 volts, 240 volts. And then a few feet below that you would have your communications cables, telephone cable, TV or whatever. That's typical Grade C construction. That is the most common one and that's the one we should be thinking about primarily in terms of my discussion here. Although I will refer to the others too, Grade C is the one to worry about.

Okay. But what is Grade N? Grade N is the lowest grade of construction. I'm not sure how much of it is that's out there. It's not unusual. This applies when you don't have thousands of volts at the top of the pole, which means you have secondary power. You don't have the transformers on these poles. A typical example would be when you have telecommunications-only poles. Now we're not talking about that today. I mean, there could be a lot of telecommunications-only poles in that category.

But in terms of the joint use poles where you have power-owned poles, it would apply, you know, to when you had secondary power on the pole. There are no detailed requirements on this in the NESC. The most we say about this in Rule 263 is it doesn't have to be as good as Grade C. Okay? I put the quotes there for the exact words. But as I say, it doesn't have to be as good as Grade C. We're not telling you what it is. But we're also saying that initially it should be able to withstand expected loads without telling you what those expected loads are. Because, remember, those storm loads come out of the chapter that refers to Grade B and Grade C. All right? So it's very vague and you have to -- you know, reasonable people can make reasonable judgments of how to, you know, apply this, and I did something like this in one of the slides I'm going to show you, but there's nothing really specific in the code about this whole category of structures.

So let me tell you about -- go to Slide 30. I'm going to tell you a little bit about what happened in 2007. 2007 was just issued this month as we speak. Okay? It's applicable any time between now and February of 2007. Okay. It's 2007 because of the February date. Okay?

Go to Slide 31. We had several changes in the code, but the one that's immediately relevant to this is the fact that we actually reduced the design or the safety factor for the extreme wind load where it's applicable. Where is it applicable? It's applicable for transmission for the tall structures. For those structures for Grade C, and this is Rule 250C, okay, we actually reduced the safety factor by a certain amount. Okay? So we're going the other direction. All right?

Now go to Slide 36. We did talk a whole lot about extending this Rule 250C to distribution poles. It was rejected. This discussion comes up every code cycle. It came up last code cycle for 2002, it came up this code cycle and it's going to come up next code cycle. I can promise you that. All right?

Let's go to Slide 37. What is there about this change proposal? It's Change Proposal 2766. This was developed internally to Subcommittee 5. Change proposals can in theory come from outside the subcommittee, from the public, and we get many, or they can come from within the subcommittee.

The most important ones come from within the subcommittee. We know it's important, we have to address these things, and we're going to be doing it again next code cycle. All right?

But in any case, in the preprint, the preliminary version of the 2007 code where we try to announce to the public a few years early what we're considering, this change proposal was put in as recommended. Now recommended doesn't mean, hey, we're going to run in and adopt it. What it means is please take a look at this very carefully. We're very seriously considering this and we want your public comments on this. All right? It's an important item here. And what it does is it would extend this extreme wind loading, this Rule 250C, to structures less than 60 feet, the distribution structures. All right?

But there's a very critical mitigating factor in this change proposal. It would limit the wind pressures for Grade C structures, for example. It also limits it for Grade B, but I'm talking Grade C here is the most common. It limits the wind pressure for Grade C structures that are less than 60 feet tall to 15 pounds per square foot, because at that pressure level you're having winds that are basically going to blow around debris and branches and take it down for other reasons that you're not designing for. Okay? Now these are very rough numbers. It's hard to pick out these numbers when debris and branches start flying around. But this is the number that approximately we're talking about.

You know what? If this rule is passed, which it wasn't, it would have no significant impact in Florida because basically we're already designing for pressures that are at least that high. Because, remember I told you, remember that nine-pounds-per-square-foot pressure for Florida for wind? There's a safety factor of two applied to that. Nine times two is 18. We're already designing for within those pressure limits. Okay? Meaning above that pressure you're going to get flying debris. Okay?

Now let's go to Slide 38. Okay. This change proposal, as moderate as it is, okay, nothing compared to, you know, the one that's in your change, in your proposed rule, received the most comments of all change proposals submitted by Subcommittee 5. And that's a challenge because we have a lot of controversial issues. All right. Subcommittee 5 deals with a lot of these controversial subjects. More than 10 percent of the comments that came in regarding -- were addressing this particular change proposal. An overwhelming number of those comments, 90 percent of them, had strong objections. The minority, the 10 percent, said, look, we can live with this as a lesser of evils because we have those pressure limits in there. All right? And, by the way, the next three runner-up change proposals for comments also related to this rule. And the typical response from the industry across the country --

and, remember, most of the industry that's commenting on this is the power industry. Okay? Telecommunications comments, you know, were involved, but really the NESC and all the comments are pretty much dominated by the power industry. When I give presentations at panel sessions, it's to the power industry. All right? So, anyway, that's Slide 38.

Let's go to Slide 39. It was rejected, and I showed this one before, by a vote of 17 to 7. And the reason, you know, I highlighted in red again is because, look, you're going to increase pole strengths and cost and complexity. You're not going to get any significant increase in safety.

All right. Now I will tell you that different circumstances -- this vote 17 to 7 was one-sided but it's not unanimous by any means. Different circumstances might have affected that vote. But if you go back a minute to two slides before that, Slide 37, remember what they were voting on. They were voting on a very moderate change proposal that would have limited the wind pressure for such structures to 15 pounds per square foot. All right? If that limitation was not in it, first of all, it would not have been recommended in the first place in the preprint. Maybe it never would have gotten in. Who am I to say not recommended? Right? The public can still look at it and make their comments. You know, sometimes we reverse things. But it would not have been recommended.

Going to the next slide, 38. Instead of 90 percent strong objections, you can figure it would be 99 percent strong objections, maybe 100. All right? And if you go to Slide 39, it would not have been rejected by a vote of 17 to 7. It would have been a much more one-sided vote. Okay? So there was no way that there was any possibility that the proposal such as you're proposing in, you know, in your Rule 6.034 would have been, you know, consistent with anything we would do in the NESC.

Okay. Now a general comment that I want to make, and this is true in general for the NESC but in particular for this, we believe the NESC, we ourselves, you know, believe the NESC is a well-respected document. We believe it's served the industry well. I base this on the comments that we, that we get from the industry, the interest when we give presentations and, you know, any other input that we've gotten. We, therefore, are very reluctant to make significant, dramatic changes because we don't want to disturb it too much, so we'll introduce gradual changes. And these gradual changes will minimize the potential impact and unintended consequences that may happen with a dramatic change. You have a dramatic change and I'm going to go into that a little bit.

Okay. Slide 41 is the proposed, proposed rule.

Slide 42. You're going to have three different effects or three different categories as I listed here. There will be a delay in restoration after a storm, there will be other consequences and, of course, you have the direct effect.

Let me quantify this. Go to Slide 44. Okay? All right. This is a chart here, but I think it's understandable. What I've shown here is what the relative strengths would be based on the present rules, the present rules which are basically the winter storm that's applied to, you know, all structures, both distribution and transmission. And what would happen if we actually adopted this rule the way it's written now? On the left side of the dotted line, this vertical dotted line, it shows the present rules. On the right side it shows proposed rules by PSC, by Florida PSC. All right? Now let's look at the left side. I've got these three colored bars. The red one is the main one we should be thinking of. That's the typical Grade C construction. I show that at 100 percent, you know, just for relative magnitude. That has a two-to-one safety factor built into that nine-pounds-per-square-foot pressure I mentioned. The blue bar, which is Grade B, is twice as strong because it has a four-to-one safety factor approximately. Okay? The green bar, which is, I said, Grade N, well, there is no rule for Grade N. But what I said is, look, let's assume a safety factor of one-to-one for Grade N. That's a reasonable assumption, reasonable people might assume that, but there's no requirement in any way, as I indicated, for Grade N.

But let's look at the Grade C. That's at a

100 percent level. Now let's look to the right of the dotted line. For 95 miles an hour, which is at least what you're going to have in Florida at the very tip there, down to 150 miles an hour, that shows the magnitude of what's going to be required for the pole strength. That means that Grade C pole will now be at least one and a half times to possibly as much as four times the present required strength. Okay? That's Slide 44.

Slide 45 shows what it means in terms of pole classes, which I introduced to you before. People in the power and, you know, the distribution industry, the utilities and in telecommunications are familiar with class sizes, possibly more than you are. But what it would show is that this class -- a typical Class 4 pole for Grade C which is shown in red, okay, you've got this four next to the red bar there, that's a typical size for distribution poles. Now you'd be jumping up a minimum of three class sizes to as much as eight class sizes up to H5 poles. This is really horrendous. Okay? So you're going to have an enormous increase in pole classes, okay, which corresponds to the required increase in strength. Okay?

Go to Slide 46. This is going to put in words in front of you what I just described informally. What's going to happen is this. You can have whatever increased costs are associated with the following: The Grade C applications will be one and a half to four times the present required strength, three to eight pole classes, or the alternative is to just shorten your spans. Okay? You can accomplish it that way. All you'll need is one and a half to four times more poles. Now Grade B is affected less but still significantly affected. The Grade N applications, if it's applied to that too, and I saw nothing in the code that excluded anything like this, you will have three to eight times present required strength or six to 11 class, pole class sizes. Enormous. And there will also be more extensive use of nonwood poles.

Now I'm not personally against nonwood poles. I wrote the change proposals for some of these. All right. I've been involved in trying to -- I think they're good ideas in general, they have their place in the utility industry, and I think they should have access to it. But the combination of extensive use of nonconventional poles with more poles, stronger poles is going to have, going to have some other unintended consequences, other consequences. For one thing, when the typical storm comes along and knocks them down anyway because of the flying debris, you're going to have more poles to replace, more massive poles to replace, more nonconventional poles to replace. That is going to slow down your restoration. All right?

In addition, there's going to be a lot of confusion in areas in implementation. This rule, this extreme wind loading rule is complicated to use. The transmission engineers complain when you put this into the code. The transmission engineers are very experienced. I mean, they're dealing with these tall structures, they deal with these type of issues. But they complain when we start putting this in. It's getting too complicated. Not that they're not doing it, but it's getting too close to what they're doing and they're getting a little nervous. Some of them are not so comfortable with this to the extent that they suggested change proposals to make these rules a little bit easier for them to use. Distribution people don't even come close to this. All right? They're going to make errors, there's going to be delays. And what the errors will do, I have no idea. We can only guess. All right. That's going to happen.

All right. And in the bottom there, the last one is there's going to be a significant increase in fatalities and injuries that are vehicular accidents. We're going the wrong direction of what the U.S. Department of Transportation wants and I believe the Florida Department of Transportation based on what I've seen recently. The U.S. Department of Transportation wants less poles. They don't want car accidents to the same extent. They're encouraging, you know, less poles. Here we are giving them more poles or more massive poles. All right? So there's going to be this other factor here which also relates to safety.

So what are my recommendations? Jump ahead to 55.

There are a whole lot of other slides in between. Some of them are complicated. The intention was to give you a headache if you want to get into it because I wanted to show you how complicated these rules would be. All right?

Let's go to Slide 56. Okay. And I'll step down this slide. These are my recommendations. I have basically -- my primary recommendation means if I had my druthers, you know, I mean, if I really had that, I would say, look, enforce your present rules. The present rules do give you a certain basic robustness, okay, as I've described during the talk. All right? I don't know to what extent this may have been, you know, a factor in the problems that you've had, but they should be enforced. And what does that mean? Make sure your design -- that your poles are within the capacity as defined by those winter storms, you know, with those safety factors. Pole inspection, I understand, you know, you're actively introducing. That's good. That's consistent with the NESC. It says you have to maintain strengths of your poles, and for Grades B and C it even tells you how strong they have to be. So those are good. That, to me, is the primary thing that you should do. All right.

I would not, therefore, adopt this other rule for extreme wind for all the reasons I've given you, not in its present form certainly. And I would encourage you to get active in the next issue.

Now we just had a 2007 issue, and it sounds like the 2012 issue is six years off. It is not. It is not. Outsiders and guests comment all the time, our meetings are open, and they give presentations and they express their concerns. And we also have people who are active members of our subcommittee from Florida, from the utilities. All right? They're very outspoken and they're very vocal. And this 2012 Edition, work will start on that next year because the stuff that we do in Subcommittee 5, unlike the other subcommittees, we can't wait until 2010 which is when the code has to be finalized. We start right away. All right.

So 2007 we're going to start putting change proposals together. You're going to be sure there's going to be something addressing this issue. There's no doubt about it. It comes up every time. It's important. You know, we understand what you're going through. We wrestle with it all the time. It has to be finalized by 2010. So in this period between next year and a few years after that you're going to know what's happening and you can have a lot of input into that. In fact, your input could be very direct. NARUC, the National Association of Regulatory Utility Commissioners, has a representative on Subcommittee 5. All right. That can be very -- that -- they're voting members, all right, they're voting members. They have been since I gave a presentation in San Francisco to the commissioners there following ice storms and other problems that were in the northeast in '98. Okay? So you have a direct input, okay, to Subcommittee 5.

Now what's my alternative recommendation? I told you what I would do, you know, if I had my druthers. What would the alternative be? 57. Please limit the scope of this. At least exclude -- if you're going to go through with it, okay, exclude explicitly -- okay, be explicit about some of these things. Explicitly exclude Grade N applications. All right? They're not even covered in some of the -- in most of the rules that we're reciting here.

All right. Two, explicitly cite the 2007 Edition. The 2007 Edition, as I indicated, reduced the overload factors for Grade C when it applies, which is transmission only, of course. But if you're going to extend it down to distribution, at least use what's in 2007. It reduces the overload factors by -- it says 13 to 25 percent for Florida. It will be basically 25 percent for most of the state. That helps. It helps. You know, not as much as it should, but it helps. All right?

And, finally, I would really encourage you to do this as a pilot study because of all the problems that I described. Limit it to a specific area, a defined period. It would be very useful to have that information, you know, and I think it would prevent you from having widespread problems as I described. And that is it.

PROPOSAL FOR REVISION OF
2007 Edition,
NATIONAL ELECTRICAL SAFETY CODE

CHANGE PROPOSAL NO.: 2766
RULE: 250A1
PREPRINT PAGE NO.: 390

COMMENT: The 60' exclusion should not be removed for the following reasons: (1) field experience has shown that pole failure during extreme wind conditions is caused by fallen trees and windblown debris and not wind pressure on the pole, (2) no technical information has been presented that refutes this field experience conclusion and no quantifiable data given on how this change would increase safety and decrease pole failure rates, (3) design cost and time would be dramatically increased due to the complex calculations required for each installation, (4) material and labor cost would be dramatically increased due to the need for larger class wood or steel poles and/or increase in the number of poles needed in a given length of line, (5) communication cables are attached to many distribution poles and contribute significantly to extreme wind loading conditions. This would force electric utilities to not allow communication attachments or increase the rates considerably, which would in turn escalate communication costs. Therefore, it is strongly recommended that the 60' exclusion not be removed in the 2007 Edition of the National Electrical Safety Code.

SUBMITTER:
Name: Tom Myers, V.P., Engineering
Company: Berkeley Electric Coop., Inc.
Address: 414 U.S. Hwy. 52 North
City/State/Zip: Moncks Corner, S.C. 29461
Organization Represented (if any): Berkeley Electric Coop., Inc.

TEMPLATE FOR COMMENT on PROPOSAL FOR REVISION of 2007 Edition, NATIONAL ELECTRICAL SAFETY CODE

(A separate form must be used for each Comment)

CHANGE PROPOSAL No.: 2766
RULE: 250 A1
PREPRINT PAGE No.: 361
COMMENT:

Based on our experience the leading problem during a wind event is flying debris. While I recognize that this proposal does attempt to take this into account by applying a 15 psf wind level, it still adds a great deal of complexity to the design process for no real net gain in safety. Lines designed at this higher level will still be subject to damage and outages at the same level as our current design. This provision adds additional protection for poles and lines taking into consideration the force of wind. The only time that I have seen a distribution pole blown down by the force of wind alone was when a tornado hit a section of the line. Other times on our system when a pole has broken it has been due to downed trees, pole decay or other factors which this design change will not effect. While I may see this as somewhat of a compromise when compared to Change Proposals 2673 and 2737, in the end it would still be a waste of resources to enact this change when there will be no net gain in safety.

This change proposal will add cost of construction. Distribution wood poles (under 60 foot), of which under existing line designs have been satisfactory for years, will increase by one-to-two pole classes. We believe this change proposal is not justified on an engineering or cost basis.

****

SUBMITTER:
Name: Steven J. McCachern
Company: EnergyUnited
Address: P O Box 1831
City/State/Zip Statesville, NC 28687
Organization Represented (if any):

PROPOSAL FOR REVISION OF
2007 Edition,
NATIONAL ELECTRICAL SAFETY CODE

CHANGE PROPOSAL NO.: 2766
RULE: 250A1
PREPRINT PAGE NO.: 390

COMMENT: The 60' exclusion should not be removed for the following reasons: (1) field experience has shown that pole failure during extreme wind conditions is caused by fallen trees and windblown debris and not wind pressure on the pole, (2) no technical information has been presented that refutes this field experience conclusion and no quantifiable data given on how this change would increase safety and decrease pole failure rates, (3) design cost and time would be dramatically increased due to the complex calculations required for each installation, (4) material and labor cost would be dramatically increased due to the need for larger class wood or steel poles and/or increase in the number of poles needed in a given length of line, (5) communication cables are attached to many distribution poles and contribute significantly to extreme wind loading conditions. This would force electric utilities to not allow communication attachments or increase the rates considerably, which would in turn escalate communication costs. Therefore, it is strongly recommended that the 60' exclusion not be removed in the 2007 Edition of the National Electrical Safety Code.

SUBMITTER:

Name: Robert F. Higbe, P.E.
Company: Santee Electric Cooperative, Inc.
Address: 424 Sumter Highway
City/State/Zip: Kingstree, SC 29556
Organization Represented (if any):

PROPOSAL FOR REVISION OF
2007 Edition,
NATIONAL ELECTRICAL SAFETY CODE

CHANGE PROPOSAL NO.: 2766
RULE: 250A1
PREPRINT PAGE NO.: 390

COMMENT: The 60' exclusion should not be removed for the following reasons: (1) field experience has shown that pole failure during extreme wind conditions is caused by fallen trees and windblown debris and not wind pressure on the pole, (2) no technical information has been presented that refutes this field experience conclusion and no quantifiable data given on how this change would increase safety and decrease pole failure rates, (3) design cost and time would be dramatically increased due to the complex calculations required for each installation, (4) material and labor cost would be dramatically increased due to the need for larger class wood or steel poles and/or increase in the number of poles needed in a given length of line, (5) communication cables are attached to many distribution poles and contribute significantly to extreme wind loading conditions. This would force electric utilities to not allow communication attachments or increase the rates considerably, which would in turn escalate communication costs. Therefore, it is strongly recommended that the 60' exclusion not be removed in the 2007 Edition of the National Electrical Safety Code.

SUBMITTER:
Name: Rob Ardis (VP, Engineering and Operations)
Company: Pee Dee Electric Cooperative, Inc.
Address: 1355 East McIver Road
City/State/Zip: Darlington, SC 29532
Organization Represented (if any): Engineering Association of the Electric Cooperatives of South Carolina

CP 2766 removes the 60' exemption for wind loading and applies a wind pressure cap of 15 PSF (Grade C) and a cap of 22.5 PSF (as modified) for Grade B for those structures under 60'. This reflects realistic conditions as experienced in storms. Years of experience have shown that above 75-80 MPH the large majority of failures are attributable to wind-blown objects impacting or becoming entangled in conductors. This generally results in circuit deenergization and removal of public exposure to the hazards of downed conductors. We must realize that the utility has no influence or control over foreign objects likely to become missiles in extreme winds. It is impractical to anticipate the effect of foreign object impact. Likewise, it would not be a wise use of resources to design lines for a purely hypothetical condition of no impact by wind-blown objects at a wind speed which experience has shown such outside influences are likely.

I recommend adoption of CP 2766 as modified.

TEMPLATE FOR COMMENT on PROPOSAL FOR REVISION of 2007 Edition, NATIONAL ELECTRICAL SAFETY CODE

(A separate form must be used for each Comment)

CHANGE PROPOSAL No.: 2766
RULE: 250, A1
PREPRINT PAGE No.: 390
COMMENT:

This change was to eliminate the 60' and lower exemption on a high wind calculation, but introduced a 15 psf maximum on the extreme wind of Grade C construction. We find this proposal unacceptable, excluding certain conditions. From our 60 plus years of providing electric service, we have found that our existing pole design methods are adequate. In the western piedmont of North Carolina, we experience a variety of challenges from weather. We experience thunderstorms and hurricane remnants during the summer and fall months. However, due to a commitment to the safety of the public and reliability of the system, we have strictly followed the current NESC rules. During the last years, we had no pole failures due to wind loadings. All pole failures are a result of foreign objects (i.e. trees, blown debris, etc.) colliding with the poles.

As a result of the weather and topology of the western piedmont of North Carolina, we have a varied terrain and vegetation. While a pole structure taller than 60' can experience wind, the typical distribution line will be below the tree line and protected by hills and mountains. This provides a natural buffer from wind. From time to time, trees do impact the line, but this phenomenon creates no more frequent danger than the average person who comes in contact with falling trees in their normal environment.

In light of these events and natural formations, we have determined that safety is not gained from an increase in the stringency of the code while resources required will be significantly increased.

If the committee is determined to make all lines be subjected to extreme wind, then we find that a maximum on the extreme wind is mandatory. In data contained in the Safir-Simpson Hurricane Scale, 76 mph (15 psf) is the point that debris begins to cause collateral damage to lines. This will de-energize any affected lines before the point of being blown down to cause harm or destruction, meanwhile the public will be at risk of damage and injury by projectile debris rather than just power lines.

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If your comment has suggested text, please use the following format:

First make sure track changes are turned off. Additions are shown with underlined text, and deletions are shown with ~~strikethrough~~ text. Please note the paragraph styles in the paragraph style drop down box above will aid in your easy format of suggested text.

SUBMITTER:
Name: Thomas M. Haire
Company: Rutherford EMC
Address: P.O. Box 1569
City/State/Zip Forest City, NC
Organization Represented (if any): Rutherford EMC

COMMENT on PROPOSAL FOR REVISION of 2007 Edition, NATIONAL ELECTRICAL SAFETY CODE

CHANGE PROPOSAL No.: 2766
RULE: 250C
PREPRINT PAGE No.: 390
COMMENT:

We oppose removal of the 60' exemption from extreme winds. In short, my 29 years of experience indicates that utility wind damage is predominately from tree limbs, debris, etc., blown into the lines. As evidence, we offer this analysis for all major storms, by root cause, from 1/1/1994 to the present for Duke Energy. In this summary, we use the major storm definition of at least 10% of the Duke Energy system customers being without power at one time. In short, this definition will include all major storms, i.e., ice, wind, etc.

Description - Root Cause Category	System Event Occurrences	Percent Occurrences of Total
Live Trees	**2,191**	77%
Recloser Failures/Unknowns	165	6%
Un-Retrofitted Transformers	145	5%
OCB Lockout without/Perm Fault	124	4%
Dead Trees and Overgrown Primary	**39**	1%
Other Causes	27	1%
Live Trees completely Off RW	**26**	1%
Transformer Outages	20	1%
Substation Equipment Problems	19	1%
Planned - ED and ET	17	1%
Trees on Transmission Lines	**14**	0.5%
Insulator/Arrester/Switch Failure	13	0.4%
Conductor Burn Down - OCB's and Line Reclosers	11	0.4%
Transmission Equipment Problems	10	0.3%
Primary UG Failure	10	0.3%
OCB Fail to Reclose	7	0.2%
OH Services/Meters/	6	0.2%
Duke Human Error/ocb,rc,fuse,subst,T-line	6	0.2%
Public Accidents-All Devices	5	0.2%
Recloser Blocked & Fault Occurred	1	0.04%
Pole or Crossarm Decay	1	0.02%
Secondary UG Cable/Service Failures	1	0.02%
Major Storm SAIDI - 1/1/1994 to 12/31/2004 Total Individual Occurrences→	**2,856**	100%
All Tree Outage Occurrences Summary	**2,270**	**79%**

As shown in the table above, the overwhelming evidence indicates that damage to power lines is by windblown trees. Also, we believe the experience of other utilities will indicate a similar experience with windblown trees and debris too. Inherently, a factor of utility life is that trees and windblown debris have always been the major contributors to significant damage. With regard to this CP, changing the 60' extreme wind exemption, e.g., attempting to make the structure more robust, will have little impact on the safety of the public. As shown in the table above, with 80% of all outages in a major storm caused by trees and not structure failure, removing the 60' exemption is ineffective. In short, the windblown trees and debris will continue to damage the power lines as in the past, while the expense of this change is passed along to the public without enhancement to public safety.

The impact of the additional expense caused by the removal of the 60' exemption, without an increase in public safety is counterproductive. This is especially true in light of the preponderance of utility experience that indicates such a change is ineffective. In brief, the body of evidence indicates that trees, not weak structures, cause power line damage in wind storm events.

In summary, there is no technical justification indicating the removal of the 60' exemption will enhance public safety. Again, overwhelming utility experience indicates windblown trees and debris, not structure failure, as the number 1 casualty factor by a wide margin.

SUBMITTER:
Name: David West
Company: Duke Energy
Address: 526 South Church Street
City/State/Zip: Charlotte, NC 28202-1806
Organization Represented (if any): Self

PROPOSAL FOR REVISION OF
2007 Edition,
NATIONAL ELECTRICAL SAFETY CODE

CHANGE PROPOSAL NO.: 2766
RULE: 250A1
PREPRINT PAGE NO.: 390

COMMENT: The 60' exclusion should not be removed for the following reasons: (1) field experience has shown that pole failure during extreme wind conditions is caused by fallen trees and windblown debris and not wind pressure on the pole, (2) no technical information has been presented that refutes this field experience conclusion and no quantifiable data given on how this change would increase safety and decrease pole failure rates, (3) design cost and time would be dramatically increased due to the complex calculations required for each installation, (4) material and labor cost would be dramatically increased due to the need for higher class wood or steel poles and/or increase in the number of poles needed in a given length of line, (5) communication cables are attached to many distribution poles and contribute significantly to extreme wind loading conditions – this would force electric utilities to no longer allow communication attachments or increase the rates considerably which would in turn escalate communication costs. It is therefore strongly recommended that the 60' exclusion not be removed in the 2007 Edition of the National Electrical Safety Code.

SUBMITTER:

Name: Jason G. Merchant
Company: Newberry Electric Cooperative
Address: 882 Wilson Road
City/State/Zip: Newberry, SC 29108
Organization Represented (if any) ECSC Engineering Association

TEMPLATE FOR COMMENT on PROPOSAL FOR REVISION of 2007 Edition, NATIONAL ELECTRICAL SAFETY CODE

(A separate form must be used for each Comment)

CHANGE PROPOSAL No.: 2766
RULE: Table 250-2
PREPRINT PAGE No.: 390
COMMENT:

BellSouth opposes the proposed removal of the present exemption from extreme wind design for structures 60 feet and less in height. This proposed change would require significant and unnecessary increases in pole strengths for distribution systems resulting in large increases in costs. BellSouth believes that the proposed requirement will not provide a significant increase in network or system reliability because most distribution pole failures in extreme wind events are caused by windblown debris, fallen trees, and similar extreme loads, which cannot be easily quantified or predicted. In addition, most network failures occur as a result of collateral loading rather than wind alone. Moreover, we believe that man-made structures and natural obstructions such as trees and mountainous terrain, (Typical of the southeastern United States), significantly reduce the effective wind velocity at typical poles heights in most locations. Lastly, while the proposed changes will require complex design evaluations and substantial increase in pole sizes, there is no current statistical evidence suggesting that the proposed changes will actually result in technically quantifiable decreases in network failures under extreme wind conditions.

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If your comment has suggested text, please use the following format:
First make sure track changes are turned off. Additions are shown with underlined text, and deletions are shown with ~~strikethrough~~ text. Please note the paragraph styles in the paragraph style drop down box above will aid in your easy format of suggested text.

SUBMITTER:

Name: Gabriel Gonzalez
Company: BellSouth Telecommunications
Address: 675 W Peachtree St Suite #22C45
City/State/Zip: Atlanta, GA 30375
Organization Represented (if any): Network Support Staff

TEMPLATE FOR COMMENT on PROPOSAL FOR REVISION of 2007 Edition, NATIONAL ELECTRICAL SAFETY CODE

(A separate form must be used for each Comment)

CHANGE PROPOSAL No.: 2766
RULE: 250A1
PREPRINT PAGE No.: 390 - 402
COMMENT:
The American Public Power Association's Industry Standards Committee rejects the acceptance of this change proposal. Some of our member utilities along the coast have experience with hurricane force (extreme) winds. There experience has been that poles have not broken due to wind but as a result of falling trees. Poles also have fallen over, but did not break, due to saturated soil associated with rain during hurricanes. The removal of the extreme wind loading exemption for poles below 60' would result in increases in design costs while there is no indication of how this change would increase safety.

The removal of the 60' exemption by this proposal, as modified, would require the increase of at least one pole class to meet extreme wind loading requirements for Grade B construction. In most cases Grade C construction practices would not be affected. Since most of our distribution poles are installed to Grade C requirements, there seems to be no justification to approve a proposal that has very little effect on current construction requirements at Grade C, yet requires extreme wind loading calculations. The requirements of Grade B construction are already well above Grade C, and there is no supporting argument that these additional requirements for Grade B would improve safety.

Additionally, since the communication cables are generally larger than the conductors on a pole, they have a greater impact on the loading under extreme wind conditions. The removal of the 60' exemption would possibly force the utilities to no longer allow the attachment of communication cables or significantly increase the cost of attaching. Communications companies would be forced to install more cable underground, also increasing costs. Coordination between communications and electrical utilities on attachment policies and procedures would become critical and expensive.

****

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First make sure track changes are turned off. Additions are shown with underlined text, and deletions are shown with ~~strikethrough~~ text. Please note the paragraph styles in the paragraph style drop down box above will aid in your easy format of suggested text.

SUBMITTER:

Name: Michael Hyland
Company: American Public Power Association
Address: 2301 M Street NW
City/State/Zip: Washington/DC/20037

Organization Represented (if any):

The American Public Power Association (APPA) is the service organization for the nation's more than 2,000 community-owned electric utilities.

PROPOSAL FOR REVISION of 2007 Edition, NATIONAL ELECTRICAL SAFETY CODE

CHANGE PROPOSAL No.: 2766
RULE: 250A1
PREPRINT PAGE No.: 390
COMMENT:

Our experience with hurricane force (extreme) winds has been that poles have not broken due to wind but as a result of falling trees. Poles also have fallen over, but did not break, due to saturated soil associated with rain during hurricanes. The removal of the extreme wind loading exemption for poles below 60' would result in increases in design costs while there is no indication of how this change would increase safety.

The removal of the 60' exemption by this proposal, as modified, would require the increase of at least one pole class to meet extreme wind loading requirements for Grade B construction. In some cases Grade C construction practices would also increase pole size. Additionally, extreme wind loading calculations would be required at new installations as well as each time a cable is added, which would increase design time. The requirements of Grade B construction are already well above Grade C, and there is no supporting argument that these additional requirements for Grade B would improve safety.

Additionally, since the communication cables are generally larger than the conductors on a pole, they have a greater impact on the loading under extreme wind conditions. The removal of the 60' exemption would possibly force the utilities to no longer allow the attachment of communication cables or significantly increase the cost of attaching. Communications companies would be forced to install more cable underground, also increasing costs. Coordination between communications and electrical utilities on attachment policies and procedures would become critical and expensive.

SUBMITTER:
Name: Jane E Cooke
Company: Santee Cooper
Address: One Riverwood Dr.
City/State/Zip Moncks Corner, SC 29461
Organization Represented (if any):

Comments on CP 2766 Rule 250

The proposal to remove the 60 foot exemption does not, in our opinion, necessarily increase safety and reliability. Our utility is located in central Pennsylvania in what is considered a heavy loading zone. We have been designing our facilities to grade B or C construction. In my experience during the past 26 years or so that I have been a licensed engineer, we have experienced a number of pole failures during high wind events, but all of them have been related to debris or more commonly trees falling into the line. Tree clearance is an issue that we have been working on during all of my years in practice. As comments said previously on earlier attempts to make this change during previous code cycles, removal of this exemption ignores the fact that it is what is blown into our facilities that causes the damage. We have in place a very strong pole maintenance program that involves detection of deterioration, particularly at the ground line. We believe that this type of maintenance program is far more effective in preventing pole failures and protecting the public that the removal of the 60 foot exemption. Another issue that we see from high winds in our area is that occasionally, poles will tend to lean over under high wind conditions. A heavier pole will not prevent that problem when it is more backfill related than pole class related.

TEMPLATE FOR COMMENT on PROPOSAL FOR REVISION of 2007 Edition, NATIONAL ELECTRICAL SAFETY CODE

(A separate form must be used for each Comment)

CHANGE PROPOSAL No.: 2766
RULE: 250A1, 250C, 250C2, 261A1c, 261A2f
TABLES: 253-1, 253-2, 250-2
PREPRINT PAGE No.: 390
COMMENT:

Regarding exclusion of structures, 60 feet or less for extreme wind loading

The Unitil companies do not support this proposal.

Including poles 60 feet and less under the extreme wind loading requirement will not materially increase reliability or safety. Our experience has shown that high winds always cause coincident damage from trees, tree limbs, and other flying debris. Our service territory is one of the more heavily treed areas in the country. Even with enhanced tree trimming, we expect that tree-related damage to our system will occur under extreme wind loading conditions. Experience with past hurricanes and one microburst support this comment. All line outages experienced during these extreme wind cases occurred as the result of tree-related incidents. In my experience, I have only known of poles falling over as the result of rotted poles, soil failures (overturning), and vehicular accidents.

Installing larger class poles and heavier guying, or shorter spans between poles will add substantially to our company's and customers' cost with minimal benefit to safety or reliability.

Recommendation

Do not include structures 60 feet and below for extreme wind loading.

SUBMITTER:
Name: Albert J. Zogopoulos
Company: Unitil Service Corp.
Address: 6 Liberty Lane West
City/State/Zip: Hampton, NH 03842
Organization Represented (if any): Unitil Service Corp.

TEMPLATE FOR COMMENT on PROPOSAL FOR REVISION of 2007 Edition, NATIONAL ELECTRICAL SAFETY CODE

(A separate form must be used for each Comment)

CHANGE PROPOSAL No.: 2766
RULE: 250A1, 250C, 250C2, 261A1c, 261A2f
TABLES: 253-1, 253-2, 250-2
PREPRINT PAGE No.: 390
COMMENT:

Regarding exclusion of structures, 60 feet or less for extreme wind loading

SS Utility Solutions, PLLC does not support this proposal.

Including poles 60 feet and less under the extreme wind loading requirement will not materially increase reliability or safety. Our experience has shown that high winds always cause coincident damage from trees, tree limbs, and other flying debris. Our service territory is one of the more heavily treed areas in the country. Even with enhanced tree trimming, we expect that tree-related damage to our system will occur under extreme wind loading conditions. Experience with past hurricanes and one microburst support this comment. All line outages experienced during these extreme wind cases occurred as the result of tree-related incidents. In my experience, I have only known of poles falling over as the result of rotted poles, soil failures (overturning), and vehicular accidents.

Installing larger class poles and heavier guying, or shorter spans between poles will add substantially to our company's and customers' cost with minimal benefit to safety or reliability.

Recommendation

Do not include structures 60 feet and below for extreme wind loading.

SUBMITTER:
Name: Scott Shepard
Company: SS Utility Solutions, PLLC
Address: 6 Liberty Lane West
City/State/Zip: Hampton, NH 03842
Organization Represented (if any): SS Utility Solutions, PLLC

TEMPLATE FOR COMMENT on PROPOSAL FOR REVISION of 2007 Edition, NATIONAL ELECTRICAL SAFETY CODE

(A separate form must be used for each Comment)

CHANGE PROPOSAL No.: CP 2766
RULE: 250A1
PREPRINT PAGE No.: 390
COMMENT:

Recommendation: CP2673, CP2766 & CP2798 should be rejected.

Supporting Comment on Recommendation:

> We are not in favor of the removal of the 60' exemption because the extreme wind damage to facilities of 60' and less in our service territory is typically collateral damage from falling trees, etc that contact our facilities. Public safety and system reliability would be better served if any resultant increases in spending, due to the removal of the 60' exemption, were instead used to reduce the causes of collateral damage.

****

If your comment has suggested text, please use the following format:
First make sure track changes are turned off. Additions are shown with underlined text, and deletions are shown with ~~strikethrough~~ text. Please note the paragraph styles in the paragraph style drop down box above will aid in your easy format of suggested text.

SUBMITTER:
Name: Timothy M. Croushore
Company: Allegheny Power
Address: 800 Cabin Hill Drive
City/State/Zip: Greensburg/PA/15601
Organization Represented (if any): Allegheny Power

NATIONAL ELECTRICAL SAFETY CODE TEMPLATE FOR CHANGE PROPOSALS

SUPPORTING COMMENT

Salem Electric Cooperative does not support CP 2766. Most utilities do not perform design calculations for distribution poles, but utilize construction standards that meet or exceed the requirements of the NESC. This proposed change would add significant cost to the design and construction of distribution lines without improving safety or reliability of the facilities. From our experience, distribution poles are not failing because of extreme wind loading on the poles. They fail due to things such as trees falling into the lines which apply forces that far exceed wind loading forces.

CHANGE PROPOSAL #2766

I oppose this proposed change because in my experience distribution line components designed without using the extreme wind design criteria have not failed from wind even after hurricanes. These lines typically are on poles that are less than 60 feet above ground level. They are normally built on rights of way with a total width of thirty feet. The only damage I have seen from wind was indirect, from uprooted trees, broken treetops and limbs, and wind-blown debris. Eliminating the "sixty foot exemption" will not prevent this type of indirect damage from wind and would be a waste of resources in construction.

TEMPLATE FOR COMMENT on PROPOSAL FOR REVISION of 2007 Edition, NATIONAL ELECTRICAL SAFETY CODE

(A separate form must be used for each Comment)

CHANGE PROPOSAL No.:2766
RULE:
PREPRINT PAGE No.:
COMMENT:

Texas Electric Cooperatives, Inc., (TEC) is a statewide association of 66 electric distribution cooperatives with more than 286,000 miles of lines serving more than 1.65 million meters in 241 of Texas' 254 counties. The main mission of electric distribution cooperatives is to provide quality electric service to their members at affordable prices.

In support of this mission, TEC owns and operates a pole treating division, providing over 125,000 poles per year. In the governance of TEC, a committee oversees the treating division. This seven-member committee represents each of seven geographical areas in Texas, and is comprised of distribution cooperative managers, several of whom are Professional Engineers. The members of this committee are all well versed in system design, operation, and maintenance. In a meeting on April 22, 2005, this committee unanimously voted the following.

Do not remove the 60-foot extreme wind exemption. There were several proposals made prior to the issuance of the 2002 Code to remove the present exemption from extreme wind design for structures 60 feet and less in height. This would have required extreme increases in pole strengths for distribution systems resulting in large increases in costs. Many in the industry believed that this increase in cost would not provide a commensurate increase in system reliability because of the belief that most distribution pole failures in extreme wind events are caused by windblown debris, fallen trees, and similar extreme loads, that cannot be easily quantified or predicted. Based upon comments to this effect, the NESC committee voted to not remove the exemption from the 2002 Code.

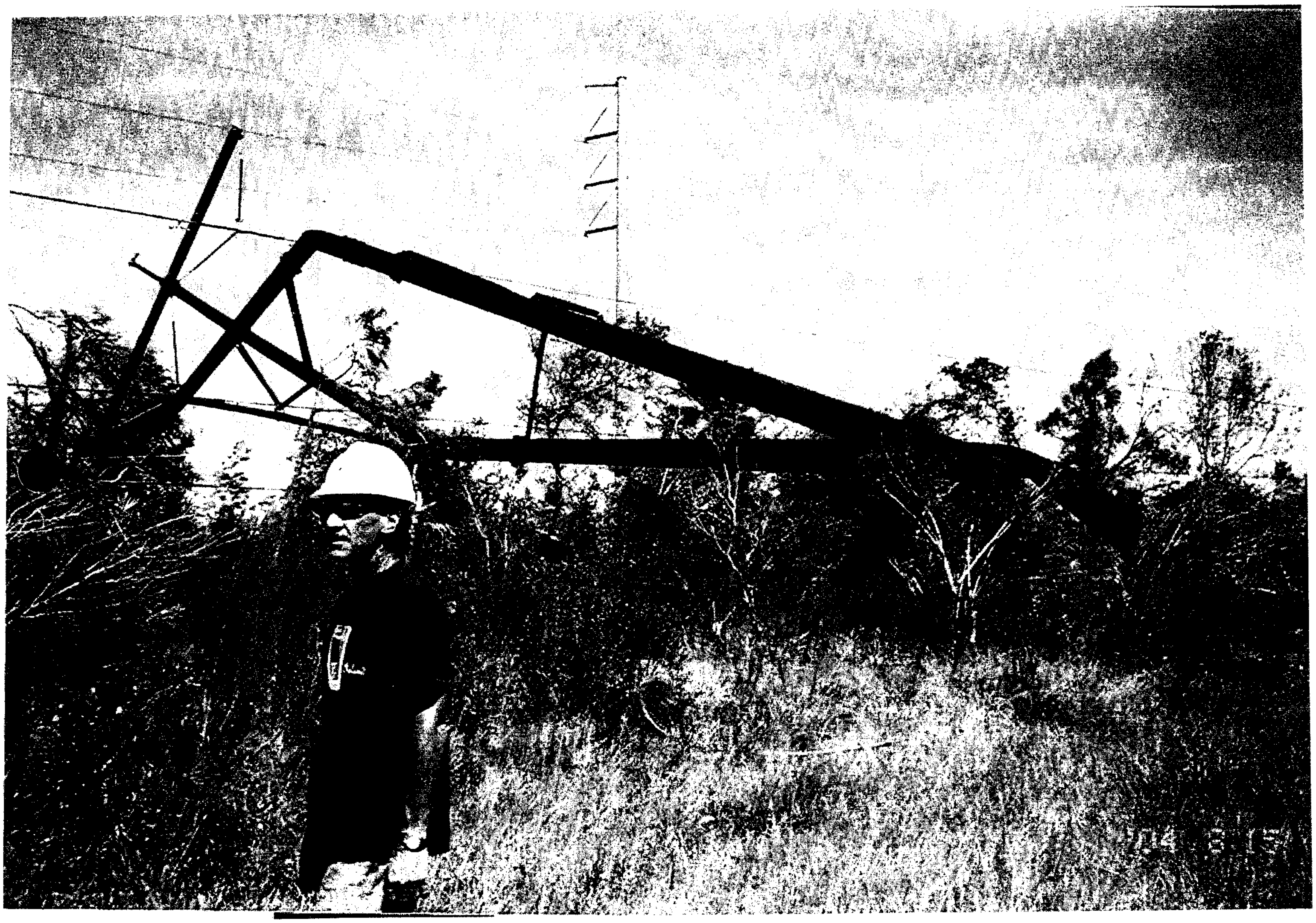
However, this issue is again the subject of several CPs submitted for the 2007 edition of the Code. In order to avoid the extreme costs associated with the large increase in pole sizes associated with earlier proposals, several of the CPs limit the maximum wind load applicable to these shorter structures. However, none of the proposals eliminate the need for significant changes in many areas. Additionally, the issue remains that the engineers responsible for distribution line design would be forced to go through a very complex calculation procedure to evaluate the extreme wind loading, even though it may not be the controlling design criteria. The need to perform this evaluation may overload the technical capacity of many small cooperatives.

The NESC committee rejected the proposal to remove the 60-foot exemption from the 2002 Code based on comments from the utility sector which indicated most failures occurred as a result of collateral loading rather than wind alone. TEC understands that no information was submitted with any of the change proposals for 2007 to refute these field reports. Therefore, cooperatives in Texas would be required to go through an additional complex design evaluation and many may have to substantially increase pole sizes, without any technically quantifiable decrease in failures under extreme wind conditions.

The TEC Treating Committee confirms these observations and recommends that CP2766 be rejected.

SUBMITTER:

Name: Charles Faulds
Company: Texas Electric Cooperatives, Inc
Address: PO Box 510
City/State/Zip Jasper, TX 75951
Organization Represented (if any):

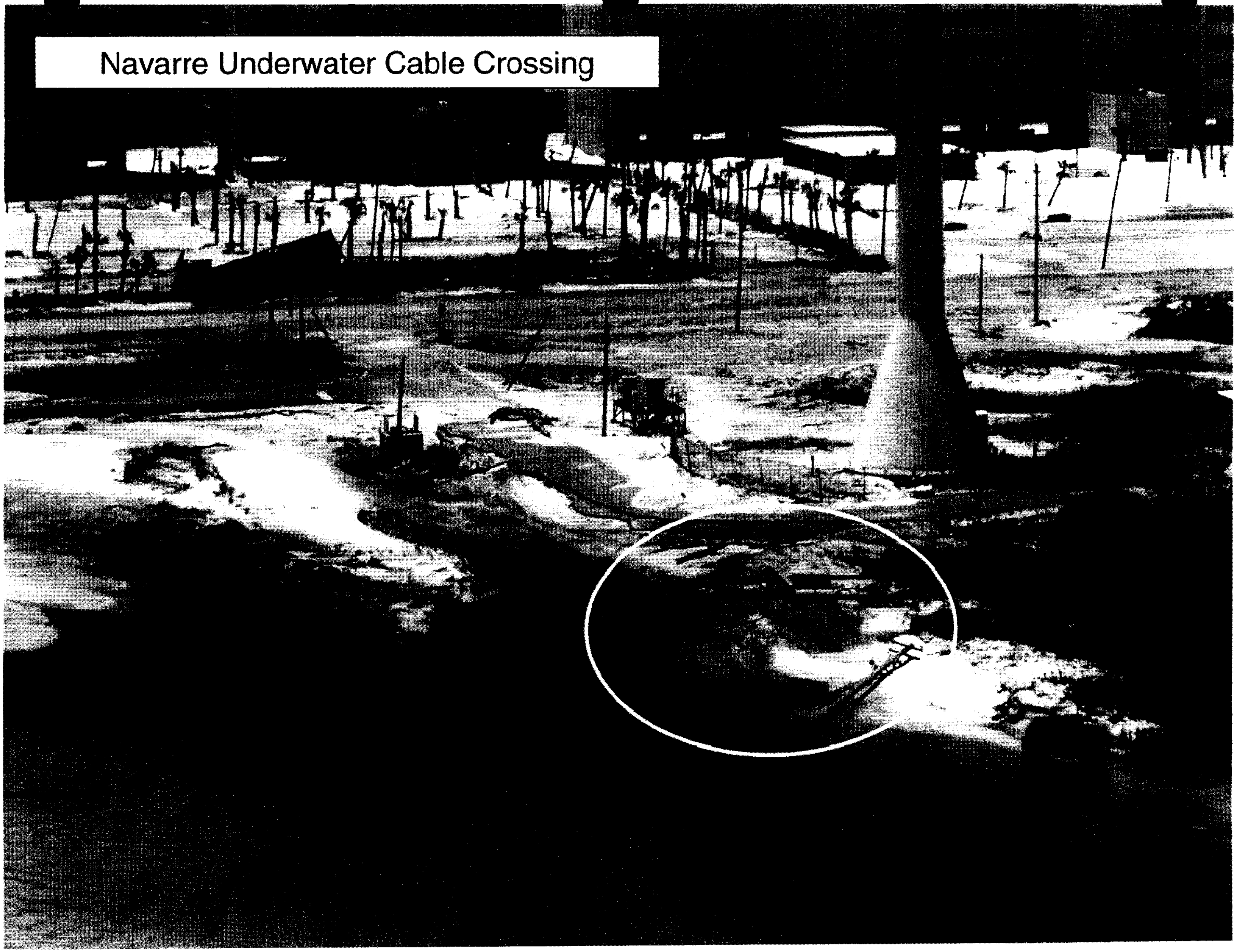


Electric Infrastructure Workshop

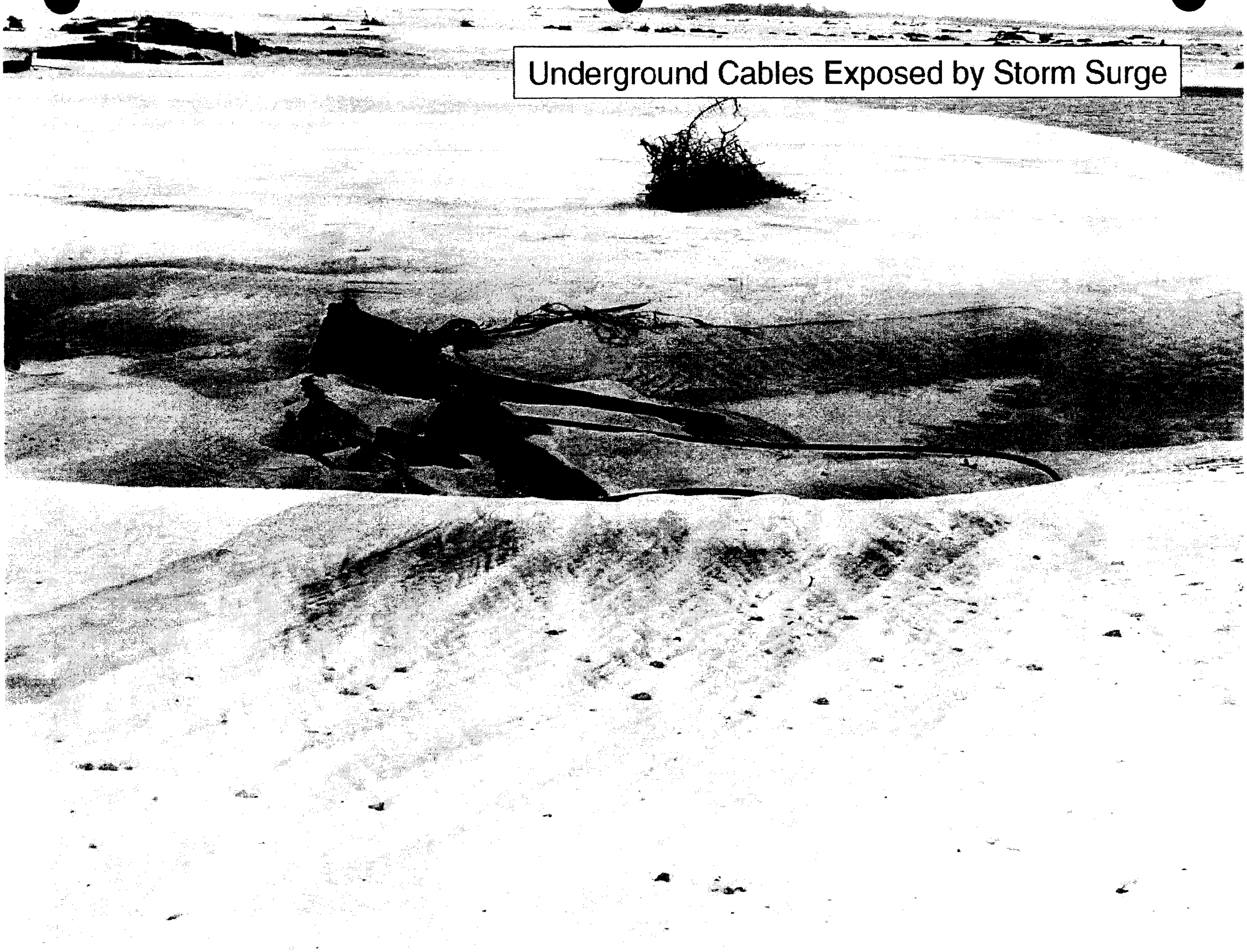
Gulf Power Company

January 23, 2006

GULF POWER
A SOUTHERN COMPANY

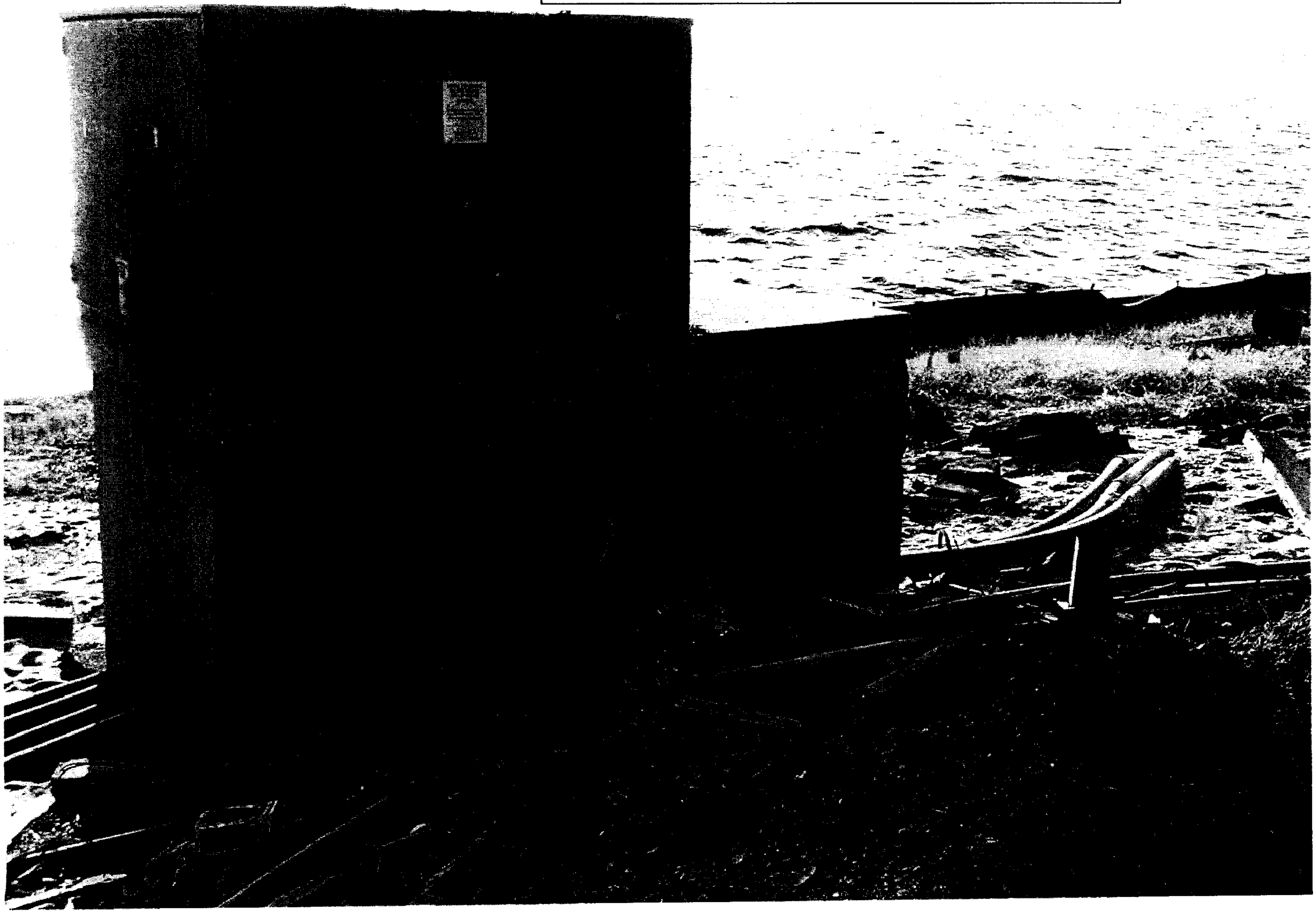


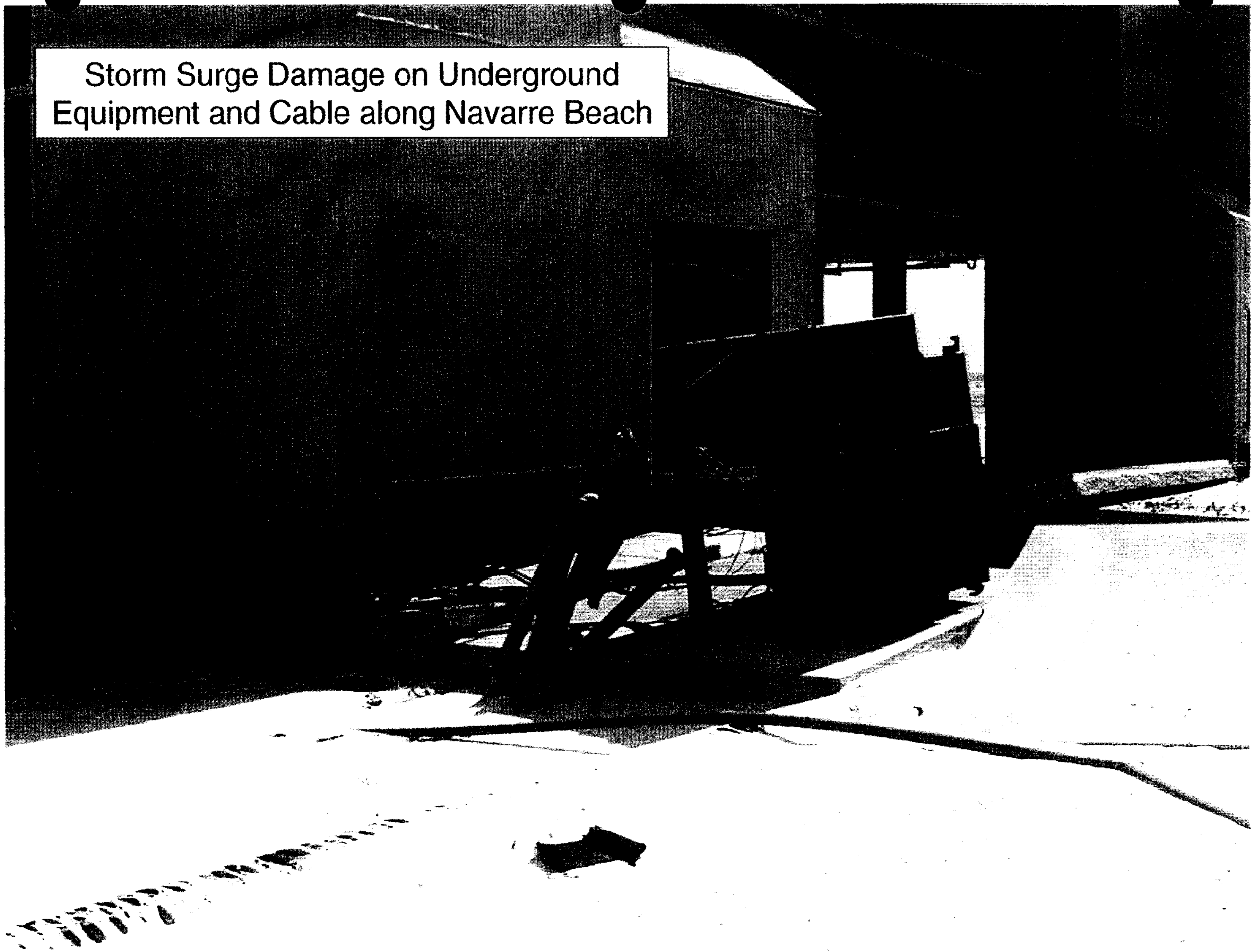
Navarre Underwater Cable Crossing



Underground Cables Exposed by Storm Surge

Erosion around Padmount Switchgear





Storm Surge Damage on Underground Equipment and Cable along Navarre Beach


Destroyed Underground Switching Cabinet

Voice | Data | Internet | Wireless | Entertainment

EMBARQ™

Embarq Corporation
Mailstop: FLTLHO0201
1313 Blair Stone Road
Tallahassee, FL 32301
EMBARQ.com

May 4, 2007

Mr. Paul Lewis, Jr.
Progress Energy
106 East College Avenue, Suite 800
Tallahassee, FL 32301-7740

In RE: Progress Energy 2007 – 2009 Storm Hardening Plan

Dear Mr. Lewis:

Embarq has reviewed the Progress Energy Storm Hardening Plan for the years 2007 through 2009 as presented in the two meetings held with third party attachers. That information identified 17 storm hardening projects which Progress proposes to complete in the Embarq service territory during the three year time frame identified. The estimated cost to Embarq associated with those 17 projects is $425,000.

Progress Energy's Hardening Plan may benefit Embarq by reducing the amount of damage to our facilities, thereby reducing the number of customer outages and reducing the time to restore service. The extent of these benefits will not be known until the next storm and they cannot be readily quantified in dollar savings; Embarq does not know whether these benefits will outweigh the costs.

Sincerely,

Sandra A. Khazraee

Sandra A. Khazraee

cc: Henry Bowlin, Embarq
Bill Radel, Embarq
John T. Burnett, Progress Energy
R. Alexander Glenn, Progress Energy

Sandra A. Khazraee
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May 3, 2007

VIA ELECTRONIC MAIL

Mr. John Burnett, Esquire
Associate General Counsel - Florida
Progress Energy Service Company, LLC
P.O. Box 14042
St. Petersburg, Florida 33733
john.burnett@pgnmail.com

Re: Progress Energy's Storm Hardening Plan

Dear Mr. Burnett:

I am writing on behalf of the Florida Cable Telecommunications Association (FCTA) concerning Progress Energy's 2007 Storm Hardening Plan ("Plan"). As you know, Rule 25-6.0342(6), Florida Administrative Code, requires pole owning utilities, such as Progress, to seek input from third party attachers and attempt in good faith to accommodate concerns raised by such other entities with existing agreements to share the use of its electric facilities.

FCTA participated in the March 2, 2007, meeting at Progress's headquarters regarding the general overview of Progress's Storm Hardening Plan. Thereafter, FCTA also participated in the April 10 meeting, which involved a more detailed discussion of what Progress intends to address through its Storm Hardening Plan. To date, Progress has not provided a complete written draft of its Storm Hardening Plan, but has provided an 11-page outline of the Plan. Consequently, until now, FCTA has only provided oral comments and input based upon the information provided at the March 2 and April 10 meetings. The comments provided here are intended to be in addition to the comments already provided in our discussions at those meetings. These comments are based upon the information derived from the March 2 and April 10 meetings, as well as the copy of Progress Energy's Joint Use Pole Attachment Guidelines (10/29/2004) provided to us and information gleaned from the Plan outline.

As a preliminary matter, FCTA appreciates the substantial responsibility that Progress has as a pole owner and respects the management decisions Progress has reached over the course of developing its Plan. FCTA members understand the monumental task faced by Progress in seeking to develop detailed storm hardening plans for its electric transmission and distribution system in the time period allotted, and that Progress may not have been able to provide the written details of the Plan that might have otherwise been made available absent the time constraints. I am hopeful that you understand that the lack of written detail has made it difficult, and in some instances impossible, for FCTA's member operators to provide specific cost and benefit information. However, it is our hope that Progress will continue to evaluate FCTA input and develop appropriate changes even after the May 7, 2007 filing deadline.

To that end, FCTA suggests that the Plan, as well as FCTA's response, be the starting point for an ongoing discussion between pole owners and third party attachers. FCTA members believe it would be extremely beneficial to all parties to the proceeding and to Florida consumers to hold regularly scheduled workshops to ensure that, as specific plans are implemented, third party attachers have an opportunity to participate in the decision-making process. Such workshops would also allow third party attachers an opportunity to propose some additional facilities that they believe should be included as critical infrastructure and/or targeted poles. These workshops have worked well in the past to promote good working relationships and good project results, and should be beneficial in working through the storm hardening issues.

While FCTA is not able to provide precise costing data in response to the information Progress has provided thus far, FCTA nevertheless has the following comments and questions based upon the information available, which FCTA believes should be treated as initial comments in an ongoing dialogue between cable attachers and Progress.

2007 Storm Hardening Plan

General Comments

FCTA believes that the process of storm hardening should be ongoing and that communications with third party attachers should likewise be on-going. The process should include joint use and storm hardening workshops.

FCTA agrees that Grade C construction is appropriate for storm hardening initiatives, as long as such plant is well-maintained and vegetation management is consistent.

Better cooperation and communication between CATV operators and Progress during storm recovery is one of FCTA's goals. Perhaps future workshops can achieve this and other mutually beneficial objectives.

FCTA is encouraged that Progress apparently found only 1 pole overloaded during its 2006 pole inspections, and commends the use of guying as a means to correct overloading issues. Storm guying is often the best and most cost effective method of strengthening poles.

Extreme Wind Standards Pilot Projects

Progress has indicated that it will replace some poles and add some poles during the implementation of its pilot projects using extreme wind loading criteria. The number of poles to be replaced or added has not been determined. Progress will also replace overhead interstate crossings with underground crossings and remove some overhead poles, likely requiring CATV operators to convert their facilities to underground. The number of poles or feet of line to be place underground has not been determined. In order to provide input, including cost information, with regard to this aspect of Progress's Plan, CATV operators will require more detailed information regarding the number and location of poles that will be impacted.

Assuring Third Party Attachments Have Not Overloaded Poles

In its Storm Preparedness Report, filed with the FPSC on March 1, 2007, Progress stated that it had strength tested 3792 poles in 2006 with only one failure. That amounts to 5.9% of the 64,208 poles that were inspected. Consequently, FCTA does not anticipate that Progress will discover a significant number of its joint use poles overloaded and sees no reason to expect costs related to existing overloaded poles.

Progress has also reported a 9% increase in third party attachments in 2006, which it indicates was due to unauthorized attachments. However, it should be noted that Progress unilaterally changed its definition of an attachment in 2006 and now counts multiple attachments on one pole by the same CATV operator as individual attachments. The past practice was to count the facilities of a third party attacher as one attachment, even if the pole hosted a cable, drop, down guy, lateral cable attachment, etc., for that attacher. This change in the method of counting attachments is disputed by CATV operators. Thus, it should not be perceived that Progress has experienced a recent, excessive rate of unauthorized attachments.

Joint Use Pole Attachment Guidelines

At Section 8(b) of the Plan outline, Progress has indicated that it intends to incorporate its Joint Use Pole Attachment Guidelines as an exhibit to its Plan. FCTA, therefore, makes the following comments specific to that document.

- Page 2 of the Joint Use Pole Attachment Guidelines indicates that overlashing requires a permit. Overlashing a fiber optic cable to an existing cable should not require a permit. Instead, only notification should be required.

- If an existing cable is delashed and removed from an existing bundle and replaced by one of equal or smaller diameter and weight, will a permit application be required? If not, what will be required?

- Please provide additional detail on the timeframes associated with the Attachment and Overlashing permitting process.

- Will Progress consider the approach taken by the New York Public Service Commission in Case 03-M-0432 as demonstrated by the Policy Statement on Pole Attachments developed therein, which we include for ease of reference as Attachment A to this Letter? By employing the approach suggested by the New York Commission, Progress would largely remedy the concerns FCTA has identified with regard to Progress's permitting requirements for overlashing. Furthermore, by taking the approach used in New York, Progress would also benefit by limiting the potential drain on its own labor resources, as well as those of its contractors, that might otherwise occur should Progress decide to do a loading calculation on every pole where overlashing is proposed.

- On page 4 of the Joint Use Pole Attachment Guidelines, it states that, "If attacher fails to install identifying tags, PE may deem the attacher in violation of PE Standards and the Pole Attachment Agreement." In the following paragraph on the same page, it further states that when an attacher's facilities are acquired by another entity, "[i]f the acquiring entity fails or refuses to retag its facilities within the one-year time allotted, PE may deem the attacher in violation of PE Standards." This is an extremely stringent requirement, particularly with regard to the one-year retagging timeframe, and seems excessive since the tagging practice itself has no direct benefit to Progress. Please consider modifying this requirement, or working with third party attachers to develop an alternative.

- Also on page 4, it states that in the situation where an attacher's facilities are acquired by another entity, the acquiring entity must not only notify Progress and provide information and maps regarding the acquired assets, but must also obtain Progress's specific consent to the assignment of the Pole Attachment Agreement. The requirement for specific consent from Progress seems excessive and could impair or delay agreements for the transfer of assets. Unless the acquiring entity indicates specific intent to immediately modify current attachments, then consent to the assignment of the Pole Attachment Agreement should not be required.

- On page 5 of the Joint Use Pole Attachment Guidelines document, it indicates that power supplies may only be mounted on attacher-owned facilities. In certain situations, this simply may not be feasible. Progress should consider modifying this requirement to allow power supplies to be attached in any situation that complies with NESC requirements and does not overload the pole.

- Please provide detail on the basis for the "ball park" estimates of CATV make ready work on pages 7 and 8 of the Joint Use Pole Attachment Guidelines.

Benefits and Costs to CATV operators

The greatest benefits to CATV operators from storm hardening in general will be a result of improved power reliability and pole line integrity.

Progress owns 1,008,321 distribution poles. In 2006, Progress inspected 64,208 of those poles and found that 2278 poles failed to meet the standard for NESC Grade C construction. That calculates to failure rate of 3.55%. Progress has approximately 700,000 joint use poles. If progress inspects 12.5% of its joint use poles per year, and 3.55% of those fail, then approximately 3106 joint use poles will need to be replaced due to rot and other damage. Assuming CATV operators are attached to approximately 67% of those poles and that the average cost to transfer CATV attachments from old poles to new poles is $100, the cost to CATV operators would be an estimated $208,100 per year through 2009. The benefit to CATV is nevertheless substantial and well worth the cost to transfer attachments.

FCTA members would like to work with Progress to ensure that distribution pole infrastructure is hardened to withstand stronger winds and to improve storm restoration. To that end, FCTA members strongly believe that continued open lines of communication and workshops in which details of storm hardening plans are provided and input from third parties is solicited extending over the course of the Plan's implementation would significantly contribute to the state's efforts to ensure the availability of power and communications services in extreme weather situations.

Please feel free to contact me if you have any questions or comments related to these comments and questions. We appreciate the dialogue that has occurred thus far between FCTA and Progress on this issue. We look forward to continued discussions and collaboration with the goal of hardening Progress's infrastructure in a manner that is beneficial to all.

Sincerely,

Beth Keating

Beth Keating
AKERMAN SENTERFITT
106 East College Avenue, Suite 1200
Tallahassee, FL 32302-1877
Phone: (850) 224-9634
Fax: (850) 222-0103

Attachment A

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

At a session of the Public Service
Commission held in the City of
New York on June 2, 2004

COMMISSIONERS PRESENT:

William M. Flynn, Chairman
Thomas J. Dunleavy
Leonard A. Weiss
Neal N. Galvin

CASE 03-M-0432 – Proceeding on Motion of the Commission Concerning Certain Pole Attachment Issues.

ORDER ADOPTING POLICY STATEMENT ON POLE ATTACHMENTS

(Issued and Effective August 6, 2004)

BY THE COMMISSION:

BACKGROUND

On March 27, 2003, we initiated a generic proceeding for the purpose of identifying and addressing unresolved issues concerning pole attachments.[1] Our overarching goal was to clarify and where reasonable streamline the process by which attachments to utility poles are made in order to promote the deployment of competitive telecommunications networks. We directed that the following issues, at a minimum, be addressed using a collaborative process: attachment/occupancy practices; access to poles, ducts and conduits; make-ready costs; use of outside contractors and cost control; and limitations on particular attachment techniques.

[1] Case 03-M-0432, Proceeding on Motion of the Commission Concerning Certain Pole Attachment Issues, Order Instituting Proceeding (issued and effective March 27, 2003).

Collaborative meetings were held during May through July 2003. Parties submitted a joint document listing areas of agreement and disagreement on July 9, 2003 and recommendations on July 25, 2003. After review of the submissions, staff issued proposed recommendations for further comment on September 24, 2003. The parties submitted comments on the recommendations on October 23, 2003. Staff submitted Final Recommendations in February 2004 and parties submitted comments in March 2004.[2]

The parties were able to reach agreement on some issues. Those resolutions together with our decisions on the remaining unresolved issues are reflected in the attached Policy Statement on Pole Attachments (Appendix A) which we are adopting. The Policy Statement on Pole Attachments should govern the relationship between attachers and utilities, unless they mutually agree otherwise, on a prospective basis.

DISCUSSION

The major issues of parties' disagreement and our resolution of them are set out herein.

Timelines

The parties disagree about timelines for applications, preconstruction surveys and make-ready work. Throughout the proceedings, Attachers have argued that

[2] Comments were submitted by: The Cable Telecommunications Association of New York, Inc.; AT&T Communications of New York Inc.; Fibertech Networks, LLC (Attachers); the International Brotherhood of Electrical Workers, Local 97 and Utility Workers Union of America, AFL-CIO, Local 1-2 (Unions), the United Telecom Council; Pole Owners including: Verizon New York Inc.; Central Hudson Gas & Electric Corporation; Consolidated Edison Company of New York, Inc.; Frontier, a Citizens Communications Company; New York State Electric & Gas Corporation, an Energy East Company; Niagara Mohawk Power Corporation, a National Grid Company; Orange & Rockland Utilities, Inc.; Rochester Gas & Electric Corporation, an Energy East Company; and the New York State Telecommunications Association (Owners or Utilities).

being able to attach to poles in a timely fashion is their greatest concern. Without timely attachments, they are unable to serve new customers and will lose business. Pole Owners, on the other hand, point out that if they are required to meet short deadlines for completing surveys and make-ready work, Attacher's work will take priority over their own utility-related work. Owners claim that the deadlines recommended by staff are unreasonably short.

Under the Policy Statement, preconstruction surveys must be done 45 days after a complete application has been filed with the Pole Owner. After conducting a survey of the poles, the Owner must send a make-ready work estimate to the Attacher within 14 days of completing the survey. Attachers have 14 days from receipt of the estimate to accept and pay for the make-ready work. Owners must perform the make-ready work within 45 days of receiving payment from the Attacher.

For survey work, if an Owner is unable to meet these deadlines, the Attacher may hire an outside contractor to do the survey or perform make-ready work, if the contractor is approved by the Owner.

Some Owners and the Unions object to this procedure, arguing that their collective bargaining agreements may not allow hiring outside contractors. Since time is the critical factor in allowing Attachers to serve new customers, it is reasonable to require the utilities either to have an adequate number of their own workers available to do the requested work, to hire outside contractors themselves to do the work, or to allow Attachers to hire approved outside contractors.

Make-ready Estimates and Charges

Make-ready estimates of the costs of any changes to the pole required for an attachment, including rearrangement of facilities, must be provided to the Attacher within 14 days of completion of the survey. The Attacher may question whether certain make-ready work is necessary. The schedule of charges (unit costs) that the utility uses for make-ready work are only subject to change and review annually.

Make-ready estimates and work have been the subject of some disputes. The parties disagree about whether or not make-ready estimates should be binding on the parties. An estimate is binding for the work identified. If additional work is required which changes the original estimate the change should be reviewed by the Attacher, who may decide whether or not to go forward with the work.

Since prompt attachments are critical to an Attacher's business, the Utility shall notify the Attacher that make-ready work is complete within three business days of completion.

Rearrangement of Facilities on a Pole and the "But For" Rule

If a legal attachment is made to a pole in compliance with safety standards, the legal Attacher should not be required to pay for rearrangement of its facilities for subsequent attachments. Utilities favor retention of the "but for" rule. The rule requires new attachers to pay the full costs of making utility poles ready for their facilities. Under this rule, the attachers remain liable for subsequent relocation, modification, and replacement costs that would not be incurred but for their presence on the pole. Only during the two-year period following the initial attachment are they not subject to any such additional charges.[3] However, in fairness to all Attachers, if an attachment is legal when made, subsequent rearrangements should be paid for by the Attacher that requires the rearrangement and not previous Attachers. Therefore, we will no longer use the "but for" rule in assigning pole modification costs.

Drop Poles

Drop poles are poles placed between the distribution pole line and a customer's building, when a building is located a significant distance from the main distribution pole line and the service drop cables/wires to serve this building require additional support. The cables/wires used for telecommunications service drops for customers do not normally require conventional framing hardware or drilling of the pole for attachment. Generally a smaller and lighter cable/wire is used that can be supported by simpler hardware for attachment to the drop poles. Some drop poles are owned by utilities and some are owned by the landowner. Attachments to drop poles are usually

[3] Case 95-C-0341, In the Matter of Certain Pole Attachment Issues Which Arose in Case 94-C-0095, Opinion No. 97-10 (issued June 17, 1977) at page 4, fn 1.

made at the time service is requested by a customer. For this reason, quick attachments are essential to serving the customer. The Attacher should ascertain who owns the drop pole and notify the Owner within 10 business days of the attachment. Owners may bill Attachers a pole attachment fee as with other pole attachments and require a license after the attachment has been made.

Owners object to this procedure saying Attachers should go through the regular licensing process in advance of attachment. Attachers point out that they may only learn about a drop pole when they visit the customer's premises to provide service. In view of the nature of drop pole attachments, the need for expeditious service outweighs the Owner's desire for the regular advance licensing process. The Owner is free to inspect the drop pole attachment and charge a rental fee for it.

Temporary Attachments, Boxing of Poles and Extension Arms

Attachers favor use of temporary attachments while most Owners oppose their use. Temporary attachments to poles should be used if they meet all safety requirements and if a utility is unable to meet the make-ready work timeline. The Attacher is still required to pay for all make-ready work and replace the temporary attachment with a standard attachment within 30 days of the completion of all make-ready work.

Boxing of telecommunications facilities is common around the State. Boxing involves attaching wires on opposite sides of the pole in order to meet required distances between attachments. Boxing will be allowed in cases where the cost of a conventional attachment would be exorbitant; as long as the boxing complies with safety codes and the utility practices allow boxing. Owners oppose requirements for boxing saying it should not be done for cost reasons. The Unions oppose boxing under any circumstances arguing that it may compromise worker safety. Attachers want boxing to be considered if it will expedite an attachment and/or keep costs down.

Boxing of poles owned by utilities that have a practice of boxing their poles will be allowed provided it is otherwise safe. Since it is a widespread practice, utilities that have boxed poles shall allow it for Attachers. If a utility has not allowed boxing of its poles, boxing will not be required. We are cognizant of the safety concerns expressed by the Unions. However, since boxing is allowed by some utilities and can be implemented consistent with safety concerns, we will allow boxing when the utility practice permits it.

Extension arm brackets may be used for a permanent attachment if all safety requirements are met, if their use is consistent with utility practices and if standard attachment costs are exorbitant. Extension arms may be used on a temporary basis if a utility is unable to meet the make-ready timelines. Attachers favor the use of extension arms while most utilities oppose their use. Since they are commonly used in some areas of the State, they will be allowed as set out herein.

Overlashing

A primary Attacher is attached to a utility pole and pays rent for occupying one foot of space on the pole. Overlashing is attachment of a wire to the facility of a primary Attacher, but not to the pole itself. Under our existing orders, pole Owners may charge third party overlashers for attaching to an existing facility but not first party overlashers (a primary Attacher attaching a wire to its own facility). Since an Attacher is charged for space on the pole and the overlasher uses no additional space on the pole, our existing rule will be modified. Some cable subsidiaries of telephone companies overlash to their parents' facilities and are charged for the attachment.

Owners want to keep charging third party overlashers arguing that overlashers benefit from the attachment. However, many small telephone companies were required by the Commission to form a separate affiliate for cable operations, and it is only for that reason that the cable company is considered a third party overlasher for which Owners are charging rent.

On balance, since pole rental is paid for space occupied, third party overlashing should not be treated differently from an Attacher lashing more facilities to its own attachment, for which there is no additional charge. No additional space on the pole is used so no rental charge shall be made. Opinion 97-10 is modified accordingly on this issue.

Audits

Both Attachers and Pole Owners arguably have some inaccuracies in their records of what attachments are on the poles. In order to provide a common base line for all future pole audits, all pole Owners and Attachers shall either stipulate as to what attachments are on the poles or conduct an audit to determine what is on the poles to be completed within three years of the date this policy statement is adopted.

Owners and Attachers may choose to agree that their current records will be the baseline. Parties are encouraged to compare current records before choosing to stipulate or conduct audits. If a joint audit is conducted, it will be done at each parties own expense. After the stipulation or completion of the audit, unlicensed attachments found will result in a rate of three times the pole rental per attachment back to the date of the stipulation or audit completion date. This should both discourage unlicensed attachments and provide some compensation for the effort required to police for unlicensed attachments. Until a stipulation is made or audit is completed, provisions in existing pole attachment agreements on unlicensed attachments will remain in effect.

Owners oppose doing audits at their expense, arguing that they are only required to do audits because of the presence of Attachers' facilities on their poles. Attachers favor the audits to verify records of attachments. In view of the need for some point of agreement on lawful attachments, a stipulation or audit is necessary in order to reach a starting point for the future tracking of attachments.

Periodic Inspections

Periodic inspections are conducted to ensure that attachments comply with the National Electric Safety Code (NESC). Currently periodic inspections are conducted by Owners at the Attachers' expense under pole attachment agreements. This procedure should continue. Safety violations must be corrected within 10 days of notification. Attachers oppose paying for periodic inspections, arguing that attachments should be inspected after they are made. However, in light of limitations on utility manpower we are not requiring post construction inspections as set out below. For safety reasons, we will allow periodic inspections as they are currently conducted.

Post-construction Inspections

Attachers generally favor mandatory post-construction inspections, while utilities oppose requiring them. Because utility personnel and resources are already stretched thin by construction demands, we will encourage utilities to conduct post-construction inspections and charge the attacher for them, but we will not require such inspections.

Underground Process

The Parties agree that underground conduit Occupants shall notify conduit Owners in advance of known significant upcoming projects. Unlike aerial attachments, underground attachments require a review of Owners' records to determine where there is room for attachments. In order to make an application, Attachers must be given an opportunity to determine which conduits are full and which can accommodate their proposed attachments. The utilities shall grant reasonable access to their records for this purpose.

The timelines for surveys and make-ready work for aerial attachments will also apply to underground attachments. Some utility Owners oppose the timelines as too short for conduit surveys and make-ready work. However, timely underground attachments are as important as aerial attachments for serving customers and expanding business and we are not persuaded that different timelines should apply. Therefore, the same timelines will apply to both processes unless circumstances beyond the Owner's control, other than resource problems, arise which will excuse meeting the timelines.

To facilitate installation, Owners shall conduct safety inspections of manholes within 10 days of a request by an Attacher to enter a manhole unless the Owner can show why this is not possible, in which case inspections shall be made within 20 days. Once a safety and environmental inspection is done by the Owner for a manhole, it shall be good for 30 days provided contractors do safety inspections each time they enter the manhole. All entities entering the manhole within 30 days of the initial Owner inspection shall share the cost of the inspection.

Owners may require inspectors for work in telecommunications manholes and charge costs to Attachers. Owners may also charge Attachers for entering a manhole and for slack, since the latter takes up space in the manhole. Costs must be justified.

Standard Pole Attachment Agreement/Operating Procedures

Owners and Attachers agree that a standard pole attachment agreement used by all Owners is desirable. Owners have proposed a draft standard agreement. The agreement shall be modified to be consistent with this Order and Policy Statement and submitted to the Commission for approval within 60 days of this Order. In addition, Owners have agreed to post pole attachment operating procedures, specific to their companies, on their websites. Owners request that small companies, that may not have websites, be exempt from the posting requirement. Website posting is required for all companies, but, as always, a company may seek a waiver from the requirement for good cause. The standard agreement and operating procedures must be consistent with the Policy Statement on Pole Attachments.

Dispute Resolution Process

A Dispute Resolution Process is set out in the Policy Statement to handle pole attachment disputes that may arise in the future. The process requires some resolution at the company level before a formal complaint is filed with the Secretary to the Commission. Parties may request expedited dispute resolution in their complaint. Although parties object to some of the timetables of the process, the process is a compromise between Owners' and Attachers' positions.

CONCLUSION

The Policy Statement on Pole Attachments is a reasonable resolution of the issues on which Pole Owners and Attachers disagree and is in the public interest. The Policy Statement is hereby adopted and shall govern the relationship between attachers and utilities, unless they mutually agree otherwise, on a prospective basis.

<u>The Commission orders</u>:

1. The Policy Statement, attached hereto as Appendix A, is hereby adopted.

2. Pole Owners are directed to file five (5) copies of a standard Pole Attachment Agreement, consistent with this Order, within 60 days of the date of this Order.

3. This proceeding is continued.

By the Commission,

(SIGNED) JACLYN A. BRILLING
Secretary

CASE 03-M-0432 APPENDIX A

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

CASE 03-M-0432 - Proceeding on Motion of the Commission Concerning Certain Pole Attachment Issues.

POLICY STATEMENT ON POLE ATTACHMENTS

Issued and Effective: August 6, 2004

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STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

CASE 03-M-0432 - Proceeding on Motion of the Commission Concerning Certain Pole Attachment Issues.

POLICY STATEMENT ON POLE ATTACHMENTS

I. INTRODUCTION

By Order issued March 27, 2003, the Commission instituted a proceeding directing the Office of Hearings and Dispute Resolution to establish a collaborative process to identify pole attachment issues and resolve differences among the parties as necessary. Issues to be addressed at a minimum include: attachment/occupancy practices; access to poles, ducts and conduits; make-ready costs; use of outside contractors and cost control; and limitations on particular attachments.

A collaborative process including pole Owners, Attachers, utility workers' Unions and Commission Staff was begun in July 2003. Following collaborative meetings, parties submitted a document identifying areas of agreement and disagreement, along with recommendations. Staff submitted final recommendations of unresolved issues and parties commented on those recommendations. This policy statement sets forth a resolution of pole attachment issues, as contemplated by the March 27, 2003 Order.

II. AERIAL PROCESS

A. Advance Notice

Attachers shall notify Pole Owners of known upcoming significant projects in advance of submitting applications.

B. Application Process

Applications for pole attachment licenses shall be processed by the utility pole owner within five business days of receipt. All applications shall be reviewed promptly by the pole Owners for completeness, in order to avoid miscommunications and delay. Applicants shall be notified promptly of any deficiencies. If required pre-established information is missing, the clock will not start for the pole attachment process, provided the information is reasonably available to the Attacher.

If the Owner cannot review the application within five business days and give a date to the Attacher for beginning the preconstruction survey because of multiple applications, the applicant must be contacted within the five business days and a proposed alternate schedule worked out between the parties.

The Owners' draft standard application shall be used.[1] The application field shall also include municipality/township and description of proposed attachments. If information is not available to the Attacher, it shall make that note in the application and the application will not be considered incomplete because of the omission of such information. If parties wish to work out an arrangement in which the Attacher provides more detailed information in exchange for a shorter timeline, parties are encouraged to do so.

In the case of jointly owned poles, Attachers shall apply to both Owners for licenses. The pole Owners may appoint an administrator to coordinate the attachment process. The cost of an administrator will be included in survey charges.

Proprietary information on an application shall be clearly marked "Confidential" by the party submitting it. Each Owner company shall provide a policy on its website showing how it will ensure the privacy and protection of confidential information submitted and that Attachers' confidential information is not shared with any parts of the company that would result in competitive disadvantage to the Attachers.

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[1] Case 03-M-0432, Proceeding on Motion of the Commission Concerning Certain Pole Attachment Issues, Pole Owners' Recommendations, Appendix B, Exhibits A-1 and A-2.

C. Drop Poles

There are differences between the facilities placed on drop poles and those attached to distribution poles. In order to fulfill requests for service expeditiously, Attachers need to obtain access to individual poles not previously licensed in order to meet their obligations to customers. Service or drop poles are required to support cables and wires to serve an individual premise or building when that structure is a significant distance from the main distribution pole. Service drops themselves do not normally require conventional framing hardware nor the drilling of the pole for attachments as main distribution facilities do. Installation of services requiring drop pole attachments has been performed in the past without notable incident, except pole Owners may not have been compensated for the use of their poles.

As long as the installation of service drops can be done safely and within the requirements of all relevant codes, procedures and processes, they will be allowed without prior consent and licensing.

Attachers are required to inform Owners of such attachments within 10 business days after they are made, by providing this information to a person designated by the owner by a method that assures its transmission so that the attachments become a matter of record and are counted in subsequent audits. The Attacher shall report to the owner all poles that required attachment for drops that had not been previously licensed. The Owner may require licensing after the notification and may bill the Attacher for the attachment.

D. Performance of Pre-Construction Surveys and Costs

The preconstruction survey shall be completed within 45 days of the application filing date. If the deadline is not met, an approved contractor may do the survey. The contractor may be hired by the Owner. If an Owner fails to meet a deadline and fails to hire a contractor within 45 days of the application filing date, the Attacher may hire an approved contractor. The Owner shall cooperate with the approved contractor. Attachers and Owners are encouraged to work out shorter time frames for a smaller number of attachments. The Owner may charge the Attacher for oversight personnel to oversee a contractor's activities with notification. In addition, if an Owner is required to pay its workers overtime to meet the deadlines, the Owner shall notify the Attacher. Overtime charges may be passed along to the Attacher if the Attacher is notified and agrees to the additional charges in order to meet deadlines.

Preconstruction survey charges shall be included in an Owner's operating agreement posted on its website. Owners shall supply Attachers with all supporting work papers on request. If there is evidence of double collection, it will be corrected. Owners may make changes in all charges once each year on 30 days notice.

E. Make-ready Estimates

Owners shall submit make-ready estimates to Attachers within 14 days of completion of the survey. If such estimate is not provided to an Attacher within that time, any delay will be subtracted from the pole Owner's time frame for completion of make-ready work.

Make-ready estimates shall be detailed and subject to discussion as to the reasonableness of what make-ready work is necessary. The parties shall attempt in good faith to work out any disagreements before seeking Dispute Resolution from the Commission. However, unit costs are not subject to negotiation.

F. Make-ready Charges

Attachers must pay for make-ready charges within 14 days of receiving the estimate. Make-ready work must be completed within 45 days of the date payment is received by the Owner.

Loaded labor rates may vary for legitimate reasons. Detailed work-papers on how the rate is developed shall be made available to the Attachers on request.

Double collection of expenses is not justified. Make-ready charges shall be in each Owner's operating agreement and posted on its website. All supporting documents shall be given to Attachers on request. Specific complaints may be brought to the Commission for resolution by filing a request for Dispute Resolution.

Pole Owners may change make-ready charges once each year with 30 days notice. Regardless of when rate schedules have changed, make-ready estimates are binding for 60 days.

The make-ready invoice shall include at a minimum: date of work, description of work, location of work, unit cost or labor cost per hour, cost of itemized materials and any miscellaneous charges.

Owners shall notify Attachers within three business days of the completion of make-ready work. A rolling release procedure is encouraged.

G. Rearrangements

A party already attached to the pole shall not pay rearrangement costs required for subsequent Attachers. If party A's attachment causes a non-compliant condition that must be corrected subsequently, party A shall pay for the rearrangement to correct such condition. If party B (including the pole Owner), an Attacher subsequent to A, is unable to attach without rearrangement of other attachments, party B shall pay all rearrangement costs.

H. Temporary Attachments

Temporary attachments, which are made for emergency and rebuild/upgrade processes, may also be made for the installation of facilities to compensate for delays in make-ready and other impediments to accessing poles.

The methodology used for temporary attachments must be cognizant of all relevant safety requirements and the equipment used must be manufactured and intended for the application.

If temporary attachments are used, Attachers are still required to pay for all make-ready work necessary for the permanent attachment. Make-ready work on poles with temporary attachments shall be completed within a reasonable time. When make-ready work is completed, the temporary attachments shall be replaced with standard attachments within 30 days.

I. Boxing

Boxing of a pole involves attaching wires on opposite sides of the pole in order to meet required distances between attachments. The practice is employed in order to save space in attaching facilities to utility poles. Boxing of telecommunications facilities is a relatively common practice used by some Pole Owners but not by others. Some advantages of boxing of poles may be avoidance of high make-ready costs, pole replacement, and/or saving time and expediting construction.

Boxing of poles should be allowed in certain circumstances recognizing that such attachments need to be in compliance with relevant safety codes. Boxing of poles is not the first choice to be used when any make-ready work is required. On the contrary, all facility operators have expressed preference for conventional attachments with all facilities on one side of the pole, if this can be accomplished without exorbitant costs.

There are many factors to consider when deciding whether to employ boxing techniques and it is difficult to prescribe specific conditions that can be applied universally. The determination of boxing shall be done on a case by case basis. The basis for boxing is best determined during surveys of facilities when the representatives surveying the poles are in a good position to weigh all options and costs for the attachment. If the cost for a conventional attachment is exorbitant, boxing may provide an alternative means of attachment. Boxing shall only be considered on a pole if the pole can be safely accessed by ladders, bucket trucks, or emergency equipment, so that worker safety is not compromised.

If a utility currently does not allow boxing of its poles, this provision will not require boxing.

J. Extension Arms

Extension arm brackets are commonly used in many areas of the State. Extension arms may be an appropriate method of attachment for both permanent installations, when make-ready costs are exorbitant, and/or on a temporary basis when make-ready work cannot be performed in a timely manner. Temporary extension arms shall be allowed and their removal shall be required within 30 days after make-ready work is completed.

A determination of whether extension arms may be used safely is best made during the pre-construction survey of the pole line facilities in advance of licensing. During the pre-construction survey, determinations are made concerning the specific arrangements for attachments. That review shall give consideration to the permanent use of extension arms when exorbitant make-ready costs are identified and use of an extension arm allows for safe and reliable attachments. During the pre-construction survey and subsequent design and assessment of the make-ready work, the scale and time requirements of the make-ready work become apparent. If it is anticipated that the pole Owners will not be able to make the poles ready within the time frame prescribed, allowances for temporary attachment employing extension arms, in compliance with relevant codes, shall be made. Allowing temporary attachments to poles in this manner provides pole Owners some relief from the immediate demands of the make-ready workload.

K. Power Supplies

Power supplies shall be installed in a safe, reliable, and practical manner. Equipment placement shall be determined during the initial make-ready survey or subsequent reviews for the power supply. Power supplies shall be installed in compliance with relevant safety codes giving consideration to the needs of all Attachers.

L. Standards

The general standards prescribed by the National Electric Safety Code (NESC) and conventional manuals of construction practices and procedures cover most situations regarding the safe and reliable installation and operation of telecommunications facilities. NESC is a minimum safety standard. Some pole Owners may impose standards that are stricter than NESC. If an Attacher questions a stricter standard, Owners shall explain why they have adopted a stricter practice than NESC. If facility operators (including pole Owners and Attachers) require unique conditions, that can be justified, special consideration of such prescriptions shall be made known to all parties and included in the standard procedures.

M. Post-Construction Inspections

Pole Owners may choose to perform post construction inspections within 30 days after completion of construction and charge Attachers for such inspections. If an Owner plans to do a post construction inspection, it shall notify Attachers of when inspections will be done so that Attachers may participate. However, through mutual agreement of the parties, Attachers may perform post construction inspections within 30 days after completion of construction and avoid the inspection fee.

If an Attacher conducts a post-construction inspection, it shall notify the owner. A pole Owner will have 30 days after receiving the notification to perform any review it wishes to undertake to ensure compliance such as a statistical sample.

If any violations are found by the Owner after attachment, the Attacher must correct the violation immediately and pay the Owner's cost of inspection. If a violation is not corrected within 30 days, the Owner may correct the violation at the Attacher's expense. Parties may agree to different terms, but this will serve as a default if parties do not agree.

N. Overlashing

Pole Owners and Attachers are obligated to install and operate their facilities in compliance with all relevant safety codes. Pole Owners and Attachers shall notify each other of major pole line work projects, such as overlashing, to avoid conflicts in crews trying to access the pole's work space. Notices of such projects shall be forwarded to designated liaisons for Attachers and Pole Owners as soon as the work dates are known. The date the information is provided will serve as a reservation to the first entity posting its intention of working in the area, respectful of emergency situations.

All Attachers shall notify Pole Owners of any overlashing activity when work dates are known. A predetermined, limited amount of overlashing, that is not a substantial increase to the existing facilities, shall be allowed. Typically, a fiber cable overlashed to an existing coaxial cable facility with a common trunk and feeder cable configuration adds very little to the existing facility's overall weight and bundle diameter. Consequently there is little concern about ice and wind loading.

An analysis shall be conducted by the primary Attacher whose facilities are being overlashed. That analysis shall assure that the primary facilities and those overlashed are in compliance with the NESC.

An Attacher, whose facility has a pre-existing NESC calculated span tension of no more than 1,750 lbs., shall be allowed to overlash a pre-determined maximum load of not more than 20% to the existing communications facility. Existing facilities with an NESC calculated span tension of less than 1,000 lbs. shall be allowed a pre-determined overlash of up to 40% of such pre-existing facilities.

When the analysis determines that the addition of equipment and loading is greater than the pre-determined limits, further assessment of the overlashed facility for its impact on the overall pole loading is required to assure that poles limits are not exceeded. The Attacher shall provide the pole Owner with a "worst case" pole analyses from the area to be overlashed, to be sure the additional facilities will not excessively burden the pole structures. This information is important to the pole Owner for future attachment applications and engineering.

Overlashed facilities that are added to an already licensed pole attachment do not place any additional space requirements on a pole and therefore shall not be considered an additional and separate attachment. Overlashed and third party overlashed facilities need to be installed respectful of relevant codes and guidelines. The pole Owner may not charge for overlashed equipment, except for any make-ready charges. Opinion No. 97-10 is modified to the extent required on this issue.

The overlashing of cables by third party facility operators may require the same considerations as those for first party overlashers. As with first party overlashing, all facility operators shall be informed of any substantial work project to avoid conflicts in the work space. It is unnecessary to detail the exact nature of the facilities being installed. However, the relative size and weight of the equipment shall be disclosed to allow engineering analysis for space and weight issues. All overlashed facilities shall be in compliance with NESC.

O. Audits

In order to provide a common base line for all future pole audits, all pole Owners and Attachers shall either stipulate as to what attachments are on the poles or conduct an audit to determine what attachments are on the poles to be completed within three years of the date this policy statement is adopted.

Owners and Attachers may choose to simply agree that their current records will be the baseline. Parties are encouraged to compare current records before choosing whether to stipulate or to conduct audits. If a joint audit is conducted it will be done at each parties own expense. After the stipulation or audit is completed, unlicensed attachments found will result in a rate of three times the pole rental per attachment back to the date of the stipulation or audit. Until a stipulation is made or an audit completed, provisions for unlicensed attachments in pole attachment agreements will remain in effect.

P. Billing Invoices

The audit and/or stipulation outlined above shall eliminate billing disagreements on a going forward basis as all attachments will be stipulated. Parties shall develop procedures for tracking and recording subsequent attachments. However, the ultimate responsibility for billing is on the utility to prove an amount is owed. The Attacher is required to maintain records in order to verify bills. The data base shall, at a minimum, identify pole number and municipality, and indicate if a pole is wholly or jointly owned, in such a way that each pole is uniquely identified. A single custodian for issuing invoices for jointly owned poles is encouraged but not required.

Q. Periodic Inspect

Periodic inspections of poles for compliance with the NESC may be done at the expense of the Attacher if so provided for in the pole attachment agreement. Serious violations shall be corrected within 10 days of notification.

All facility operators shall designate a means by which they wish to receive electronic notification of pole attachment issues.

III. UNDERGROUND PROCESS

A. Advance Notice of Application and Process

Underground Occupants shall notify conduit Owners of known significant upcoming projects in advance of submitting an application. The application process shall be the same as that set out for the Aerial process.

B. Pre-Installation Inspections

Attachers shall have access to conduit records, with any necessary redactions, at the Owner's office.

Time tables for underground surveys shall be the same as for overhead installation surveys. If an Owner is unable to meet a timetable for the survey, Occupants may use employees or contractors approved by the Owner, except as provided below.

Owners shall make safety inspections of a manhole within 10 days of a request by an Attacher to enter a manhole unless they can demonstrate why it is not possible. All Owners shall work toward providing inspections within the 10-day time frame. In any case, inspections shall be done within 20 days.

Safety and environmental inspections shall be good for 30 days, provided contractors working in manholes are trained to do safety inspections each time they enter the manhole. Costs of the initial inspection by the owner shall be shared by all entities entering the manhole during the 30-day period.

C. Make-ready Work

Make-ready work includes: physical inspection and verification of availability for use, rodding and roping, brushing, installation of inner-duct and installation of fiber optic cable. Owners agree that installation of inner-duct and fiber optic cable may be performed by the Attacher. While Con Edison allows Attachers to perform some of the other functions, utilities without training programs, do not. Work that may only be performed by the Owner's employees or its qualified contractors include: preliminary inspections, environmental clean up, electrical repairs and inspections. The Owner may charge the Attacher only for work required by the needs of the Attacher.

The same timetable as for overhead make-ready work will apply to the underground process. Approved contractors shall be hired if timetables are not met. However, circumstances beyond the owner's control, other than resource problems, will excuse meeting the timetable. Non-payment of charges will also stop the clock for meeting timetables.

Make-ready estimates shall be binding within a certain range, specified by the parties, and then be trued up to actual costs within the range. If extraordinary, unforeseen circumstances occur, the owner may seek relief through the Commission's dispute resolution services.

D. Inspectors

Each Owner shall provide the charges for electric manhole inspectors in its operating agreement to be posted on its website. Owners shall provide Attachers with all supporting work papers for the charges, on request.

If Owners determine that inspectors are necessary for telecommunication manholes, the reasonable cost of inspectors shall be paid by the Attacher. Owners shall provide cost support for such charges.

E. Slack

A conduit Owner may charge an Occupant for slack.

F. Standard Procedures

Owners shall develop standard procedures for all Occupants, as appropriate. Deviation from standard procedures shall be justified.

G. Point of Entry

A charge for entering a manhole is acceptable if cost justification is provided by the Owner.

IV. STANDARD AGREEMENT; OPERATING PROCEDURES; ATTACHER AND CONTRACTOR QUALIFICATIONS; AND WORKING GROUP

A. Standard Terms and Conditions

Owners shall develop standard terms and conditions for pole attachment agreements that apply to all Owners and Attachers. A standard agreement shall be approved by the Commission. The agreement will be effective for all current and future Attachers.

Substantive amendments to the standard agreement shall be filed with the Commission. However, the standard agreement may have additional terms negotiated between the parties. Agreements with additional terms shall be filed with the Commission for information only. Terms available to one party shall be available to all. If parties object to an amendment, they may seek review from the Commission.

B. Operating Procedures

The Standard Pole Attachment Agreement shall provide all general terms, conditions and procedures that apply to pole attachments. The Operating Procedures will provide specific details unique to each company. Changes to Operating Procedures shall be made on 30 days written notice, with Dispute Resolution for disputes. Parties will be expected to follow and adhere to operating procedures.

C. Licensee and Contractor Qualifications

Each Owner shall provide a list of qualified local contractors to be used by it or by Attachers for survey, pole, and conduit work. The list shall be given to Attachers along with Operating Procedures on request. If an attacher wishes to employ a contractor not on the list, the Attacher shall submit the contractor's qualifications to the Owner for approval as a qualified contractor.

D. Working Group

A working group to discuss ongoing pole attachment issues is desirable.

V. <u>EXPEDITED DISPUTE RESOLUTION</u> ("EDR")

A dispute shall be discussed at the intermediate level in a company for 10 days before going to the Company Ombudsman. The dispute shall remain with the Ombudsman for 12 days before being taken to the Commission for Dispute Resolution.

A. <u>EDR Process at the Commission</u>

An initial filing for Dispute Resolution shall be sent to the Secretary of the Commission.

B. <u>Pendency</u>

Disputed work shall continue to the extent possible during a dispute. Where the dispute is over cost, the work shall continue as long as the Attacher pays 50% of the total amount of the disputed invoice(s). Payment of the disputed invoices shall note that they are being paid under protest and subject to reconciliation following resolution of the dispute. If the dispute is over the form or location of the attachment or the use of a temporary attachment, it is not expected that the disputed work will continue.

Progress Energy

JOINT USE

POLE ATTACHMENT

GUIDELINES

10/29/2004

GENERAL

Anyone desiring to 1) attach to Progress Energy (PE) poles or 2) overlash to existing facilities whether owned by proposing attacher or another attacher on PE poles must first have a contractual agreement in place with PE. After the contractual agreement is finalized, the proposed attacher must make application to PE via an Exhibit A. These requirements shall apply to anyone wanting to attach to or occupy PE facilities, including all cable operators or telecommunications carriers, and any affiliates of PE. Throughout this document, all types of attachers and their facilities other than PE will be referred to as attachers, third party attachers, communication facilities or attacher's facilities.

Pole utilization requiring permits include: installation of new attachments, removal of existing attachments, upgrade to larger cable, lashing of new cables to existing messengers, rebuilds of cable systems, large scale relocations for road widening, etc. and installation of service drops on lift poles. Service drops may be permitted monthly on one "after the fact" permit.

A permit is required in order to maintain accurate attachment inventories and to obtain technical data necessary to review the adequacy of existing distribution and/or transmission system facilities. The attacher must submit, along with each application for pole attachment, the data contained in items 1-4 of the section below entitled "Pole Attachment and Overlash Application Procedures." All planning costs associated will be the responsibility of the attacher proposing the attachment or overlash.

POLE ATTACHMENT AND OVERLASH APPLICATION PROCEDURES

A pole attachment and/or overlash application shall include:

1. A maximum of 40 PE poles identified for proposed attachment and/or overlash per application. No more than 500 poles shall be submitted in any 45-day period.

2. One set of marked facility maps depicting the street level route of the proposed attachments to PE poles. To aid in this effort, PE will provide maps for the geographic areas under consideration to the proposed attacher as requested by the proposed attacher. The costs associated with providing maps to the proposed attacher will be paid by the proposed attacher.

3. If the proposed attachment is a new attachment or overlash to one's own facilities on any PE pole(s) and includes conductor(s) or cable(s), the proposed attacher must provide the type of cable (coax, fiber), cable size and messenger size. All poles are subject to wind loading and ice loading as applicable.

4. Each pole in the application shall include field data collected on all existing attachment information in the proposed route and recorded in the proper field on the Exhibit A. Equipment height must be measured from the base of the pole to the topmost pole attachment point (bolt). Conductors and cables will be measured from the base of the pole to the topmost pole attachment point (bolt). Each

The cost of all materials required to adjust facilities shall be paid by the attacher. All costs associated with the application requiring PE clerical, engineering and crew costs will be paid by the proposing attacher.

Overlashing third parties must have written permission in place with the attacher being overlashed. Written consent of the overlash must be provided to PE at the time of application.

Each attacher shall install identifying tags on its equipment and at an minimum interval of every five (5) poles for the purpose of identification. Attachers shall install tags at the time attacher's facilities are installed. Identifying tags must be installed on existing attacher's facilities. If attacher fails to install identifying tags, PE may deem the attacher in violation of PE Standards and the Pole Attachment Agreement.

If attacher's facilities are acquired by another entity, the acquiring entity must notify PE of said change, provide maps and/or plats of acquired assets, and obtain PE's consent to assignment of the Pole Attachment Agreement. The acquiring entity will be given one year from date of acquisition in which to retag the acquired facilities. If the acquiring entity fails or refuses to retag its facilities within the one-year time allotted, PE may deem the attacher in violation of PE Standards.

CLEARANCES

All permit requests for new attachments will be assigned an attachment height. The position order is from the bottom up in the communications space on a pole. A physical area on a pole can not be left unoccupied or reserved by a tenant.

At the time of installation, all communications facilities shall be located a minimum of 40" below PE power facilities (secondaries or neutral) per NESC rules 235C and 238.

At the time of installation, all communications facilities passing above or below ungrounded street light brackets shall be 20" away from such brackets per NESC rule 238C and 20" away from top of the streetlight luminaire. All communications facilities passing above or below grounded street light brackets shall be 4" away from such brackets and 4" away from top of the streetlight luminaire. All communication facilities must maintain a minimum clearance of 12" below the insulated conductor drip loops of the lights per NESC rule 238D.

Where floodlights or area lights are on PE permanent poles, the clearances at the time of installation shall be 20" below or above the light brackets per NESC rule 238C.

Any new cable shall be attached to each pole currently in the cable's route and be sagged consistently with other existing facilities in the span to prevent damage to either the cable or the pole by wind displacement of the cable, maintaining 12" separation at midspan. During construction or deconstruction, third party attachers shall not directly or indirectly influence the sag and tension of PE wire or cause a pole to lean, thus jeopardizing the structural integrity and reliability of its distribution systems.

Generally, attachments and/or service drops shall not extend more than 4" from the closest surface of the pole, unless prior approval is obtained from the local PE Engineering department. Amplifiers and terminals shall be a minimum of 12" from the closest surface of the pole.

Communication facilities will **not** be allowed on temporary PE poles and billable poles which are utilized solely for area lights (dusk to dawn).

Attachers must remove all of their out-of-service facilities from PE poles at the time of new attachment or overlash.

Once a PE pole is replaced and its facilities transferred, attachers have 60 days from notification to transfer their facilities to the new pole. In case of non-response, PE may remove or relocate attacher's facilities and bill attacher for all expenses incurred.

All communication messengers shall be bonded to electrical ground wherever a vertical ground wire exists.

Attacher's request to install communication facilities on a PE transmission pole requires the approval of PE's Transmission department. A complete structural analysis will be required and all costs associated with the analysis will be paid by the proposing attacher. Progress Energy will only consider requests for attachment to transmission poles that were specifically designed to accommodate underbuilt distribution and communication facilities.

Requests for exceptions to this design guide shall be referred to the Joint Use unit. Any exceptions approved will be distributed to the regions for uniform application on a system-wide basis.

WIRELESS

Wireless attachment applications will be handled on a per case basis. The minimum information required by PE includes: pole number, address/location, plat of proposed work, photo of proposed pole, radio frequency information, aerial construction details (dimension, weight connectivity), direction of antennae, and wireless component specifications. Contact the Joint Use Supervisor at (407) 942-9415.

Replace Open Wire Secondary with Triplex	$949.07	$404.94
Relocate Transformer on Pole	$470.80	$494.84
Clip Secondary to Neutral	$486.36	$352.41
Resag Neutral & Dress Transformer Loops	$486.36	$223.08

- *PEC Service Territory: This list is intended to provide licensee with a rough estimate guide for use in determination of overhead attachment versus underground installation. These costs are examples only and do not represent actual charges. For the preparation of Detailed Estimates, there will be a minimum charge of $85 per hour.*
- *Florida Service Territory: This list is intended to provide licensee with a rough estimate guide for use in determination of overhead attachment versus underground installation. These costs are examples only and do not represent actual charges. Estimate was calculated in WMS using vertical construction and includes time, material and adder charges.*

Revised
5/20/2004

Post-Inspection Codes:

PC1	Neutral or secondary conductor separation at pole	40"
PC2	Grounded equipment separation at pole	30"
MC1	Secondary conductor separation at midspan	30"
MC2	Neutral separation at midspan	30"
MC3	Separation from secondary drip loops	40"
SL1	Streetlight separation from SL bracket	4"
SL2	Streelight separation from unguarded SL drip loop	12"
V1	Cable crossing under PE neutral from different supporting structure	24"
R1	Below top of PE primary or secondary riser conduit	40"
C1	Cable or service drop above state maintained roadway	18"
C2	Cable above non-state maintained roadway or subject to truck traffic	15.5'
RC1	Cable or service drop above residential driveway not subject to truck traffic	12'
RC2	Cable or service drop above residential driveway not subject to truck traffic when attached to low building	12'
C3	Cable or service drop above areas of pedestrian access only	9.5'
C4	Cable or service drop above other areas subject to truck traffic	15.5'
DM3	Telecom service drop separation from PE service drop at midspan and attachment to building	12"
M4	Wires on different supporting structures crossing at midspan; communications only under PE	24"
G1	Guy or anchor needed	
G2	Guy or anchor slack or damaged	
G3	Guy attached to PE anchor	
GR	Grounds - messenger cable bonded to PE ground wire	
L	Cable tagging	

REARRANGEMENTS REQUIRED: **(Date each separate comment)**

POST-INSPECTION COMMENTS: **(Date each separate comment)**

Progress Energy

w ☐

Overlash ☐

POLE ATTACHMENT DATA

LOCATION (County, City/Town, State) ________________________________

In accordance with the terms and conditions of the existing Attachment Agreement, application is made for a permit to attach facilities to Progress Energy's (PE) poles as indicated below and on construction drawing(s) attached. Applicant represents it has secured all necessary permits under its franchise and easements or liceneses from owners of private property.

Progress Energy Pole Number	√Changes/Rearrangements - Comments on Back	POWER FACILITIES	Mid Span	Neut/Cable	Transformer	Street Light	Top of Riser	Sec/Svc	COMMUNICATION CABLES	Lowest Attachment on Pole	Closest to Power on Pole	Lowest Attachment Mid Span	Closest to Power Mid Span	NEW ATTACHMENT INFORMATION	Proposed CATV Attachment on Pole	Proposed CATV Attachment Mid Span	PE Req'd Att at Pole	POST INSPECTION	√Accepted	√Rejected	√if Comments on Back

Cable to be installed: ☐ Coaxial ☐ Fiber Optic

Outside Dia. (inches): ________

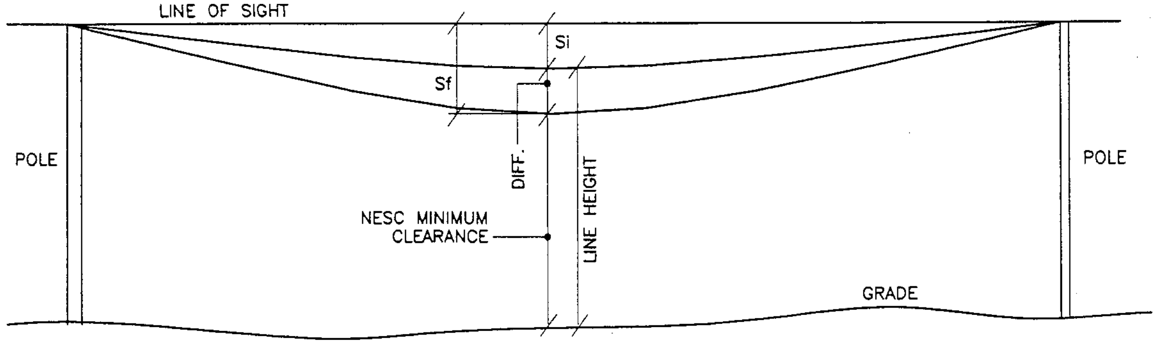
Messenger size: ________

☐ Service Drop

Progress Energy Permit No.: ____________________

Number of Attachments this page: ____________

Page ____ of ____



KEY		
	Si	INITIAL SAG @ 60°F, NO WIND (FROM SAG TABLES)
	Sf	THE GREATER OF FINAL SAG @ 120°F (180° FOR FP), NO WIND, OR 32°F W/ 1/4" ICE (CP&L ONLY)
	DIFF.	Sf – Si

NOTES:

1. USE THIS METHOD WITH THE TABLE ON DWG. 09.02-01 WHEN DETERMINING MINIMUM LINE HEIGHTS ABOVE GROUND, RAILS, ETC.
2. LINE HEIGHT (AT MID SPAN) = REQUIRED MINIMUM CLEARANCE (SEE DWG. 09.02-01) PLUS (Sf – Si).
3. ROUND UP "DIFF." (Sf-Si) VALUES TO NEAREST 1/2 FT. (E.G., 32" WOULD BECOME 3'-0".)

EXAMPLE OF USE OF INITIAL AND FINAL SAG:

1. 3-Ø 477 SAC PRIMARY WITH 1/0 ACSR NEUTRAL LINE CROSSING ROAD, 300 FT. SPAN –

REQUIRED NESC MINIMUM NEUTRAL CLEARANCE ABOVE ROAD: (120°F, NO WIND)	15.5 FT.	(DWG. 09.02-01)
DIFFERENCE BETWEEN INITIAL AND FINAL SAGS, FOR 1/0 ACSR, 300 FT. SPAN:	+ 3.0 FT.	
REQUIRED NESC HEIGHT OF NEUTRAL ABOVE ROAD SURFACE, AT INSTALLATION (INITIAL SAG, 60°F):	18.5 FT.	

** (CHECK MINIMUM DOT ROAD CLEARANCES FOR LOCAL CONDITIONS)

2. 3-Ø 477 SAC PRIMARY WITH 1/0 ACSR NEUTRAL LINE CROSSING ROAD, 150 FT. SPAN –

REQUIRED NESC MINIMUM NEUTRAL CLEARANCE ABOVE ROAD: (120°F, NO WIND)	15.5 FT.	(DWG. 09.02-01)
DIFFERENCE BETWEEN INITIAL AND FINAL SAGS, FOR 1/0 ACSR, 150 FT. SPAN:	+ 1.5 FT.	
REQUIRED NESC HEIGHT OF NEUTRAL ABOVE ROAD SURFACE, AT INSTALLATION (INITIAL SAG, 60°F):	17.0 FT.	

** (CHECK MINIMUM DOT ROAD CLEARANCES FOR LOCAL CONDITIONS)

3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

MINIMUM LINE HEIGHTS USING CONDUCTOR SAG TABLES

Progress Energy

PGN DWG. 09.00-01

MINIMUM CLEARANCES (IN FEET) OF UNGUARDED WIRES FROM INSTALLATIONS TO WHICH THEY ARE NOT ATTACHED

CONDUCTOR TYPE / CLEARANCE OF:	EFFECTIVELY GROUNDED NEUTRALS; SPAN & LIGHTNING PROTECTION WIRES; GUYS & MESSENGERS CABLED PRIMARY	INSULATED SUPPLY CABLES 0 – 750 V (TRIPLEX & QUADRUPLEX)	0 – 750 V OPEN WIRE SECONDARY & SERVICES; CABLED PRIMARY	OPEN WIRE PRIMARY 750 V – 22 kV (PHASE TO GROUND)
6. RAILROADS (WHERE WIRES RUN ALONG TRACKS): A HORIZONTAL (FROM NEAREST RAIL)	8.5'	9'	9.5'	11.5'
B. VERTICAL (FROM TOP OF RAILS)	23.5'	24'	24.5'	26.5'
7. GRAIN BINS:			SEE NESC RULE 234.F.	

NOTES:

1. THESE CLEARANCES APPLY UNDER WHICHEVER OF THE FOLLOWING CONDUCTOR TEMPERATURE AND LOADING CONDITIONS PRODUCES THE CLOSEST APPROACH:
   A. 120°F FOR CP&L, 180°F FOR FLORIDA POWER, NO WIND DISPLACEMENT, FINAL SAG.
   B. 32°F, NO WIND DISPLACEMENT, FINAL SAG, 1/4" RADIAL ICE THICKNESS.

2. WIND DISPLACEMENT CONSIDERATIONS (HORIZONTAL):
   A. FIGURES SHOWN IN PARENTHESIS ARE MINIMUM CLEARANCES WHERE CONSIDERATION OF HORIZONTAL DISPLACEMENT UNDER WIND CONDITIONS IS REQUIRED. IN APPLYING THESE CLEARANCES, THE CONDUCTOR IS DISPLACED FROM REST TOWARDS THE INSTALLATION BY A 6 PSF WIND AT FINAL SAG AT 60°F.
   B. PERPENDICULAR HORIZONTAL DISTANCE REQUIRED BETWEEN THE LINE AND THE STRUCTURE (BUILDING, ETC.) IS THE GREATER OF THE HORIZONTAL CLEARANCE OR THE SUM OF WIND CLEARANCE PLUS WIND SWING.
   C. WIND SWINGS FOR CONDUCTORS FOR VARIOUS SPANS, @ 60°F FINAL SAG WITH A 6 PSF WIND, IN FEET:

SPAN LENGTH (FEET)	CONDUCTOR											
	#2 ACSR	1/0 ACSR	336 ACSR	477 SAC	1/0 AAC	4/0 AAC	#6 CU	#4 CU	#2 CU	1/0 AAAC	336 AAC	795 AAC
150	2.5	2	1.5	1.5	2.5	2	2	1.5	1.5	.5	1	.5
200	2.5	2.5	2	2.5	2.5	2.5	2	2	1.5	1	1.5	1
250	3	2.5	2.5	3	3	2.5	2	2	1.5	1.5	2	1.5
300	3	3	2.5	3	3	2.5	2.5	2	2	2	3	2
340	3	3	2.5	3.5	3	2.5	2.5	2	2	2.5	3.5	2.5

WIND SWINGS HAVE BEEN ROUNDED UP TO THE NEXT 1/2 FT. FOR SPANS LESS THAN 150 FT., USE THE 150 FT. SPAN VALUES. FOR SPANS BETWEEN THOSE SHOWN, USE THE VALUE OF THE NEXT LARGER SPAN FOR SPANS GREATER THAN 340 FT., CONTACT DISTRIBUTION STANDARDS FOR WIND SWINGS.

3. THIS TABLE DOES NOT APPLY TO BUILDINGS OR INSTALLATIONS IN TRANSIT.

4. THIS TABLE DOES NOT APPLY TO CLEARANCE BETWEEN A SERVICE AND THE BUILDING TO WHICH IT ATTACHES (REFER TO DWG. 09.02-05), BUT DOES APPLY TO CLEARANCE BETWEEN SERVICES AND ADJACENT BUILDINGS.

5. FOR BUILDINGS UNDER CONSTRUCTION, THESE CLEARANCES MUST BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION.

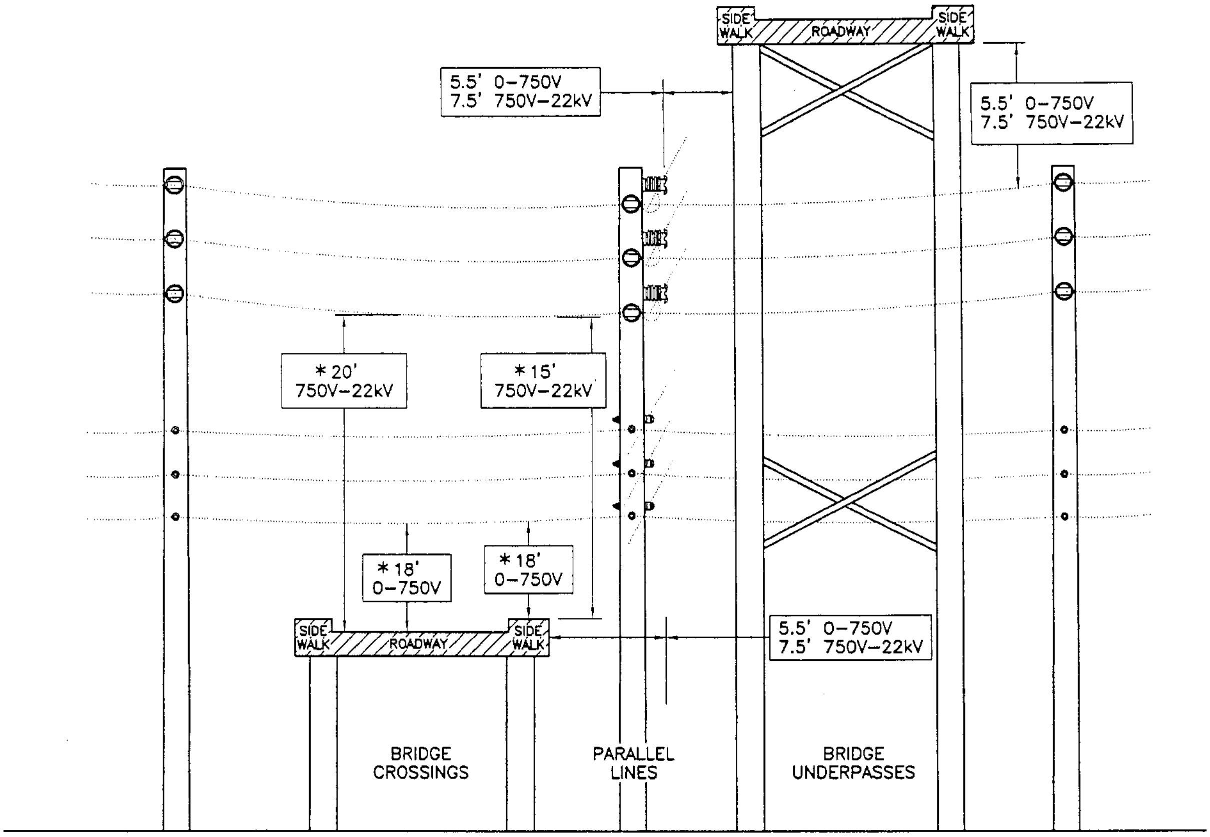
6. REFER TO NATIONAL ELECTRICAL SAFETY CODE RULE 234 FOR EXCEPTIONS AND REFINEMENTS.

3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

MINIMUM FINAL SAG CLEARANCES TO BUILDINGS, ETC.

Progress Energy

PGN DWG. 09.01-01B



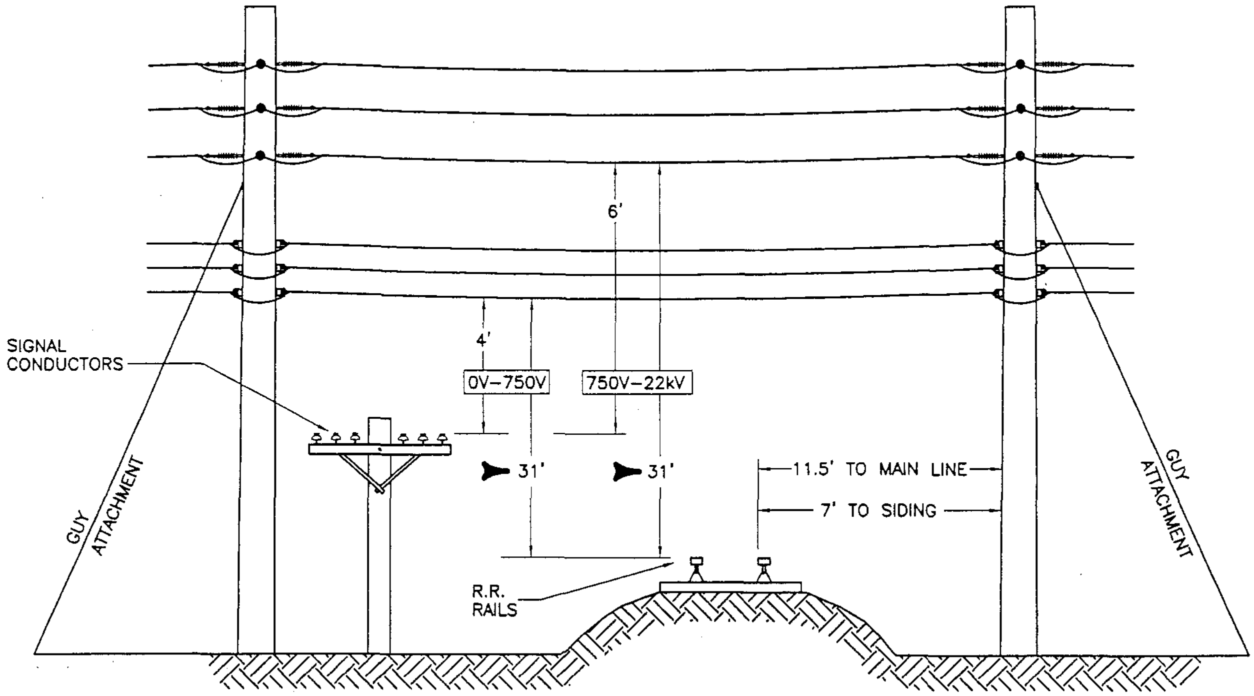
NOTE: ALL VOLTAGES ARE ø-G.

IF WIRE CROSSINGS ARE INVOLVED, SEE "MINIMUM WIRE CROSSING CLEARANCES" IN THIS SECTION. DIMENSIONS GIVEN ARE MINIMUMS. ADDITIONAL CLEARANCE SHOULD BE PROVIDED IF POSSIBLE. BRIDGE CROSSINGS HERE ARE NOT OVER NAVIGABLE WATERWAYS.

DOT OR HIGHWAY PERMITS MAY DICTATE CLEARANCE HEIGHTS.

*THESE CLEARANCES ARE TO THE ROADWAY SURFACE OF THE BRIDGE.

3					MINIMUM FINAL SAG CLEARANCES FROM BRIDGES	Progress Energy
2						
1						
0	7/24/02	HOYT	ROBESON	WOOLSEY		PGN DWG. 09.01-04
REVISED		BY	CK'D	APPR.		



NOTES:

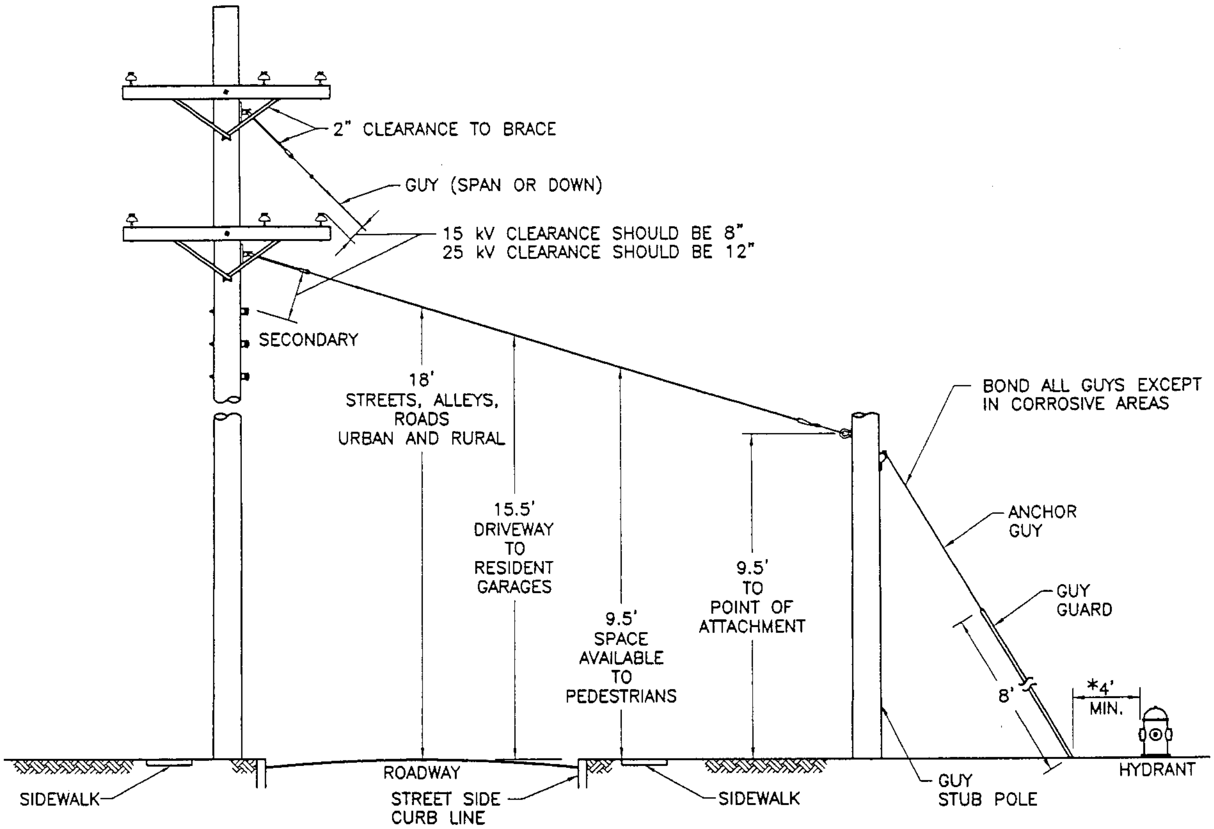
1. ABOVE 22,000 VOLTS, CLEARANCE SHALL BE INCREASED BY 0.4 INCH FOR EACH 1,000 VOLTS IN EXCESS.
2. LOCAL RAILROAD(S) MUST BE CONTACTED FOR VERIFICATION OF HORIZONTAL CLEARANCES.

3			
2			
1 4/3/03	ROBESON	SIMPSON	WOOLSEY
0 7/24/02	HOYT	ROBESON	WOOLSEY
REVISED	BY	CK'D	APPR.

MINIMUM FINAL SAG CLEARANCES
RAILROAD AND SIGNAL CROSSINGS

Progress Energy

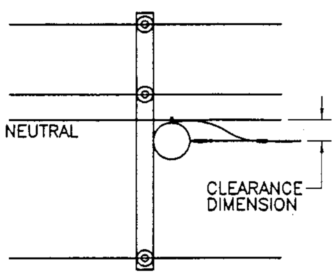
PGN DWG. 09.02–02



* WHERE CONDITIONS DO NOT PERMIT A CLEARANCE OF NOT LESS THAN 3' IS ALLOWED.

MINIMUM CLEARANCE SPECIFICATION FOR THE INSTALLATION
OF GUYS ON THE COMPANY'S DISTRIBUTION SYSTEM

1. GUY CLEARANCES FROM SUPPLY CONDUCTORS ATTACHED TO THE SAME STRUCTURE



TYPE OF GUY	** MINIMUM CLEARANCES IN ALL DIRECTIONS TO CONDUCTORS		
	TO SECONDARY	15 kV	25 kV
SPAN GUY PARALLEL TO SUPPLY CONDUCTORS	12"	15"	18"
ANCHOR GUYS PARALLEL TO SUPPLY CONDUCTORS	6"***	8"	12"
OTHER GUYS (i.e. SPAN GUY NOT PARALLEL)	6"	9"	12"

** USE OF A GUY INSULATOR DOES NOT REDUCE THIS MINIMUM CLEARANCE REQUIREMENT EXCEPT WHERE DOWN GUYS ARE INSULATED FROM SECONDARIES USING SECONDARY SPOOLS.

*** 6" CLEARANCE FROM MULTIPLEX TO ANCHOR GUYS IF PRACTICAL. IN NO CASE SHALL IT BE LESS THAN 3".

NOTE: THE ABOVE CLEARANCES ARE BETWEEN THE <u>CONDUCTOR</u> AND THE <u>GUY</u>. DOWN GUYS ATTACHED DIRECTLY TO THRU BOLTS ON OPPOSITE SIDE OF POLE FROM DEAD END OR VERTICAL ANGLE ASSEMBLIES WILL MEET THE ABOVE CLEARANCE REQUIREMENTS.

2. GUY CLEARANCES TO BUILDINGS AND OTHER STRUCTURES, VERTICAL GROUND CLEARANCES, CROSSING CLEARANCES, AND CLEARANCES TO CONDUCTORS ON DIFFERENT SUPPORTS ARE COVERED IN CAROLINAS **SECTION 2** OR FLORIDA **SECTION 2**.

3. FOR MINOR EXCEPTIONS, SEE TABLES 232-1, 235-6, AND 239-2 OF THE NESC.

NOTES:

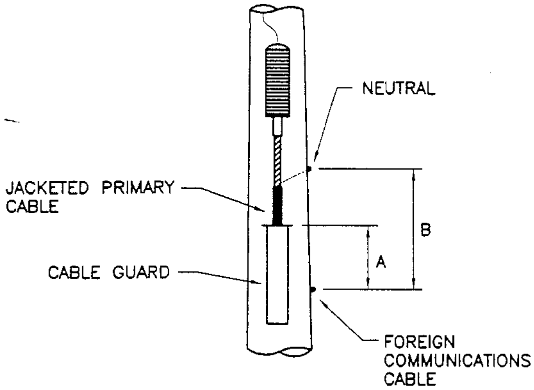
1. THE USE OF GUY INSULATORS DOES NOT NEGATE OR REDUCE ANY OF THE DIMENSIONS ON THIS PAGE.

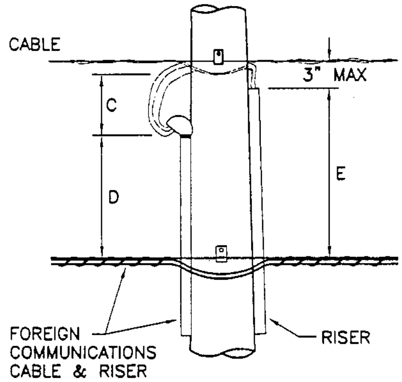
REVISED		BY	CK'D	APPR.
3				
2				
1	3/4/04	ROBESON	NUNNERY	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY

MINIMUM GUY CLEARANCE

Progress Energy

PGN DWG. 09.02-07





DIMENSION (LETTER)	PREFERRED MINIMUM
A	*40 INCHES
B	40 INCHES
C	➤ 16 INCHES
D	➤ 40 INCHES
E	40 INCHES

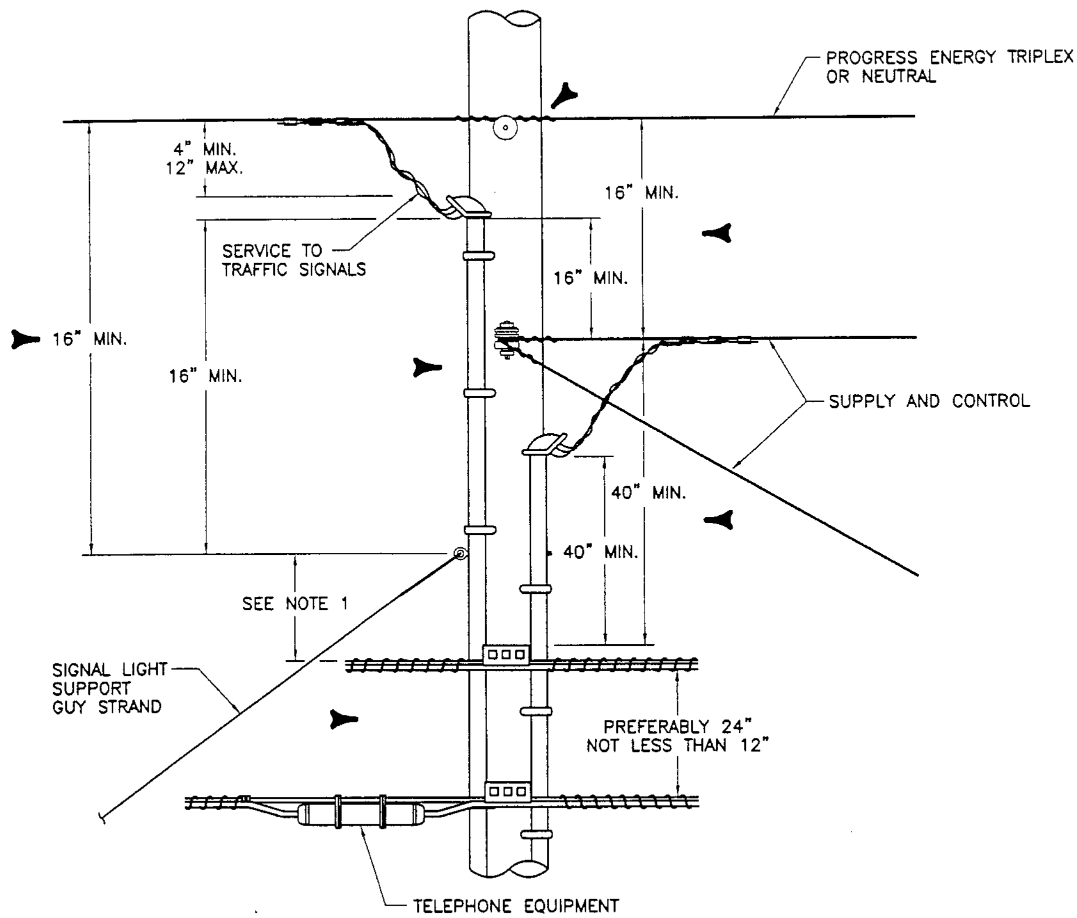
*40 INCH CLEARANCE REQUIRED. ONLY FOR METALLIC CONDUCTOR OR U-GUARD NOT BONDED TO COMMUNICATIONS MESSENGER. SEE OH-UG TRANSITION SECTION FOR NON-METALLIC CONDUIT OR U-GUARD CLEARANCE.

REVISED		BY	CK'D	APPR.
3				
2				
1	9/12/02	HOYT	ROBESON	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY

SEPARATION AT POLE
UNDERGROUND RISERS

Progress Energy

PGN DWG. 09.03-02



FRONT VIEW

NOTES:

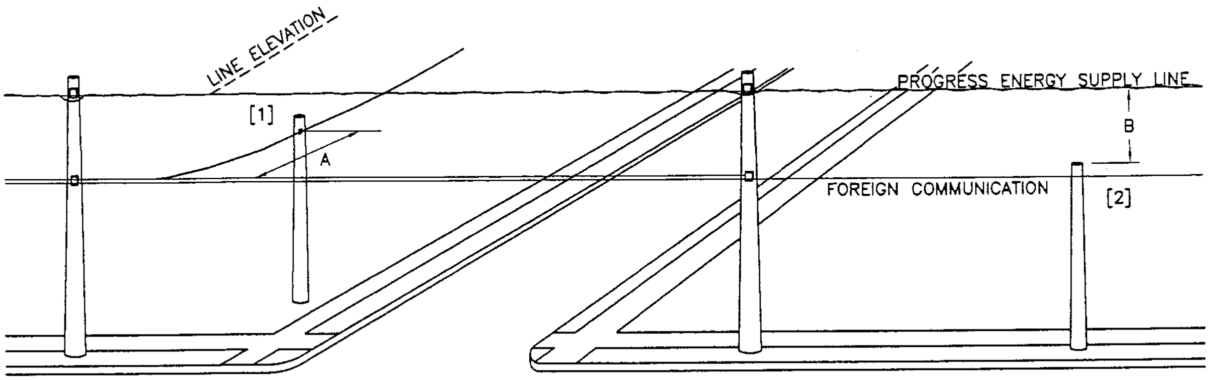
1. FOR EFFECTIVELY BONDED SPAN WIRES, THIS CLEARANCE MAY BE 4". FOR UNBONDED SPAN WIRES, THE CLEARANCE MUST BE 20".

3				
2				
1	4/1/04	ROBESON	NUNNERY	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

JOINT USE CONSTRUCTION
TRAFFIC SIGNAL SUPPORT AND
POWER OPERATING CIRCUIT CLEARANCES

Progress Energy

PGN DWG. 09.04–03



DIMENSION (LETTER)	SITUATION	NEC REQUIRED MINIMUM
A	VERTICAL DISTANCE FROM TOP OF POLE [1] TO LEVEL OF PRIMARY OR OPEN WIRE SECONDARY IS 5 FEET OR LESS	5 FEET
	VERTICAL DISTANCE FROM TOP OF POLE [1] TO LEVEL OF THE PRIMARY OR OPEN WIRE SECONDARY IS MORE THAN 5 FEET	3 FEET
B	POLE [2] FOREIGN OWNED AND PROGRESS ENERGY SUPPLY LINE VOLTAGE OVER 22kV ø–N	5.5 FEET
	POLE [2] FOREIGN OWNED AND PROGRESS ENERGY SUPPLY LINE VOLTAGE UNDER 22kV ø–N	4.5 FEET
	POLE [2] OWNED BY PROGRESS ENERGY VOLTAGE <22kV	2.5 FEET
	POLE [2] FOREIGN OR PROGRESS ENERGY OWNED AND PROGRESS ENERGY SUPPLY LINE CLASSIFIED GUY, NEUTRAL OR SECONDARY CABLE, <300V TO GROUND	2 FEET

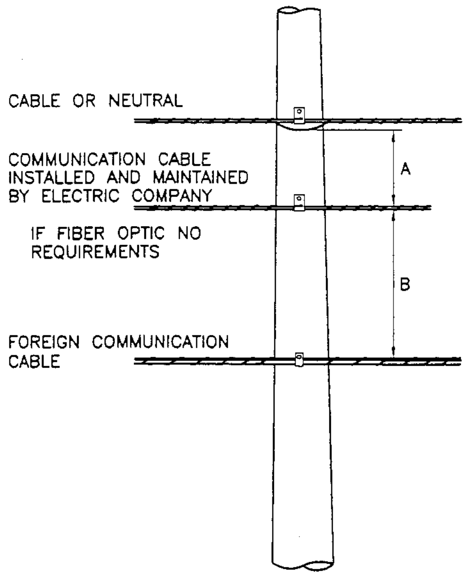
NOTE: CHART BASED ON CLEARANCES DEFINED IN SECTION 234 OF NESC.

3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

FOREIGN POLE CLEARANCE AT FINAL SAG

Progress Energy

PGN DWG. 09.04–05



DIMENSION (LETTER)	NESC REQUIREMENT MINIMUM
A	*16 INCHES
B	40 INCHES

* NO CLEARANCE IS SPECIFIED BETWEEN NEUTRAL CONDUCTORS AND INSULATED COMMUNICATION CABLES LOCATED IN THE SUPPLY SPACE AND SUPPORTED BY AN EFFECTIVELY GROUNDED MESSENGER.

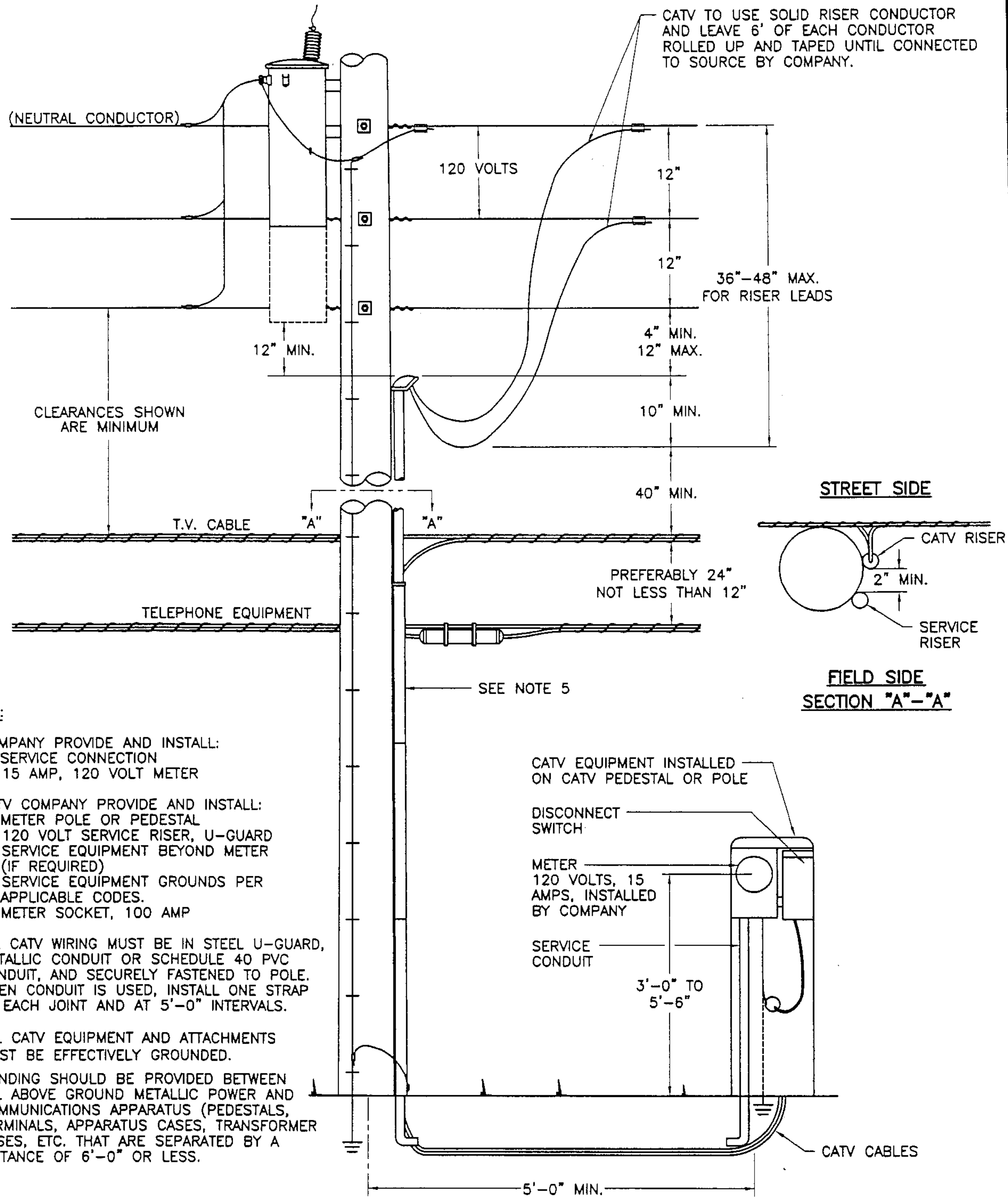
NO CLEARANCE IS SPECIFIED BETWEEN SUPPLY CONDUCTORS AND FIBER-OPTIC SUPPLY CABLES THAT ARE COMPLETELY DIELECTRIC (INCLUDING THE MESSENGER).

3			
2			
1			
0 7/24/02	HOYT	ROBESON	WOOLSEY
REVISED	BY	CK'D	APPR.

COMMUNICATION CABLE INSTALLED AND MAINTAINED BY ELECTRIC COMPANY

Progress Energy

PGN DWG. 09.04-09



NOTES:

1. COMPANY PROVIDE AND INSTALL:
   A. SERVICE CONNECTION
   B. 15 AMP, 120 VOLT METER

2. CATV COMPANY PROVIDE AND INSTALL:
   A. METER POLE OR PEDESTAL
   B. 120 VOLT SERVICE RISER, U-GUARD
   C. SERVICE EQUIPMENT BEYOND METER (IF REQUIRED)
   D. SERVICE EQUIPMENT GROUNDS PER APPLICABLE CODES.
   E. METER SOCKET, 100 AMP

3. ALL CATV WIRING MUST BE IN STEEL U-GUARD, METALLIC CONDUIT OR SCHEDULE 40 PVC CONDUIT, AND SECURELY FASTENED TO POLE. WHEN CONDUIT IS USED, INSTALL ONE STRAP AT EACH JOINT AND AT 5'–0" INTERVALS.

4. ALL CATV EQUIPMENT AND ATTACHMENTS MUST BE EFFECTIVELY GROUNDED.

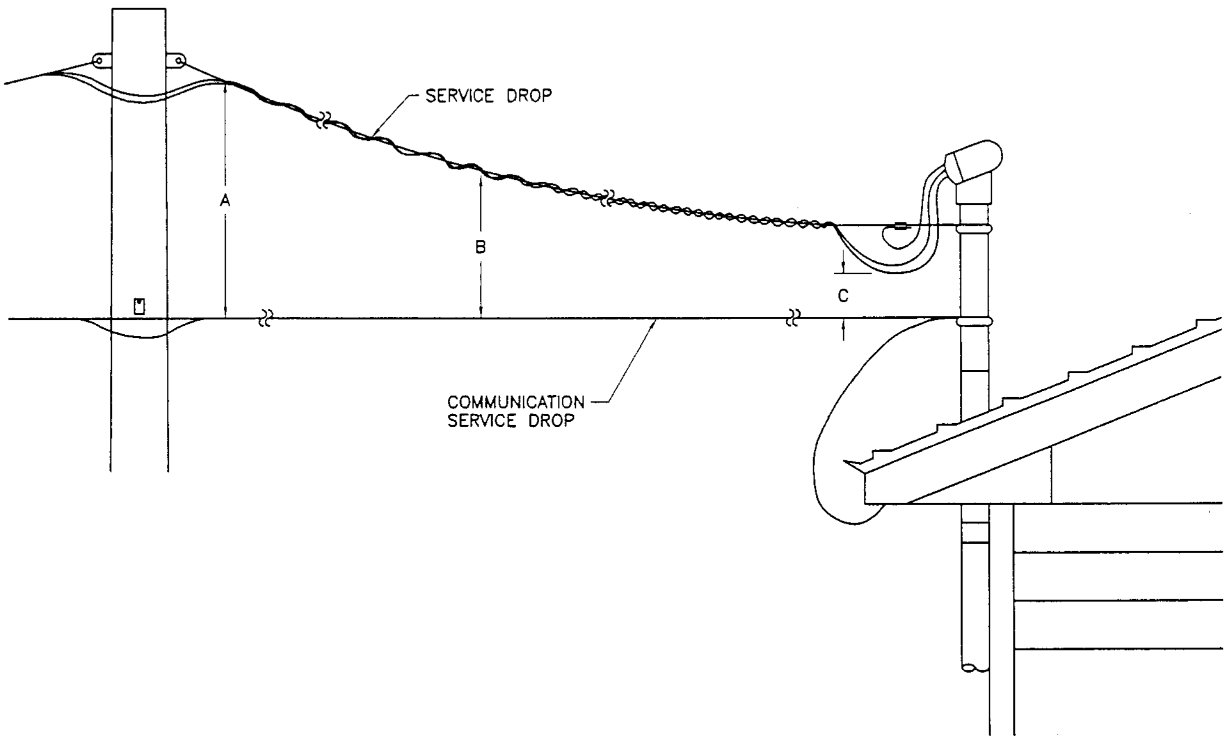
5. BONDING SHOULD BE PROVIDED BETWEEN ALL ABOVE GROUND METALLIC POWER AND COMMUNICATIONS APPARATUS (PEDESTALS, TERMINALS, APPARATUS CASES, TRANSFORMER CASES, ETC. THAT ARE SEPARATED BY A DISTANCE OF 6'–0" OR LESS.

3				
2				
1				
0	9/1/04	ROBESON	NUNNERY	SPRINGER
REVISED		BY	CK'D	APPR.

CATV INSTALLATION
120 VOLT UNDERGROUND SERVICE
(PREFERRED INSTALLATION)

Progress Energy

CAR CAROLINAS DWG. 09.04–13



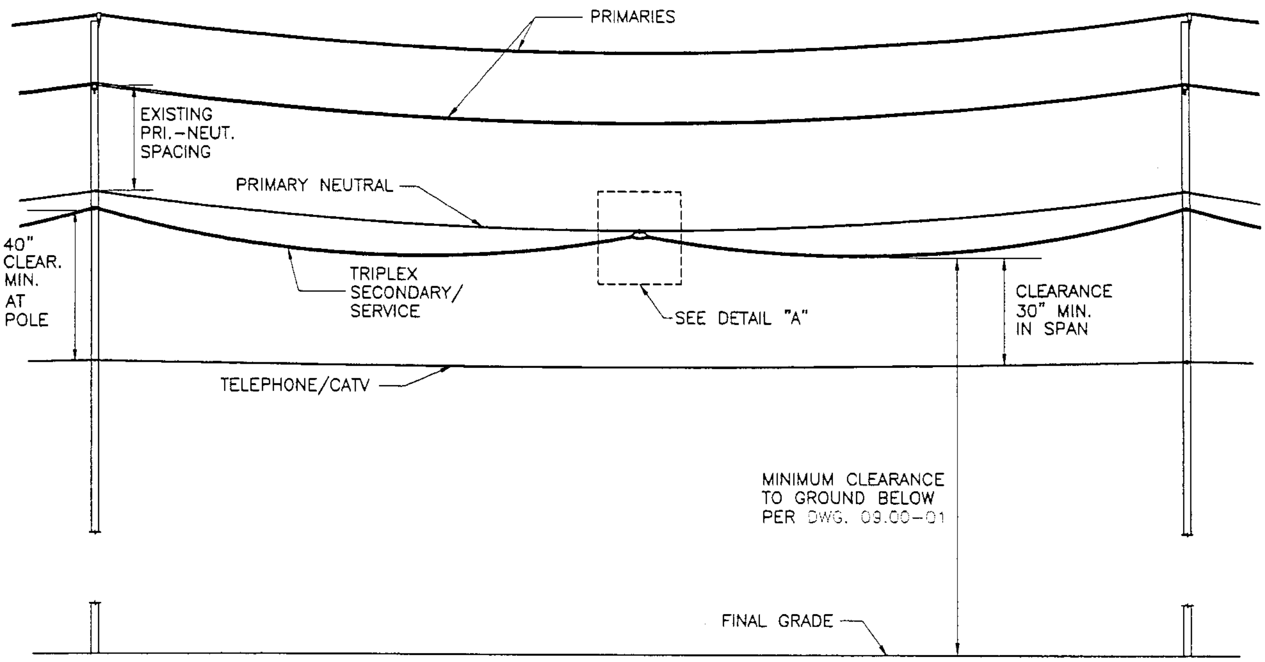
DIMENSION (LETTER)	*NESC MINIMUM REQUIREMENT	PROGRESS ENERGY PREFERRED MINIMUM REQUIREMENT	NESC APPLICABLE REFERENCE SECTION
A	40"	40"	235–5
B	12"	12"	235 C1 EXCEPTION 3
C	12"	12"	235 C1 EXCEPTION 3

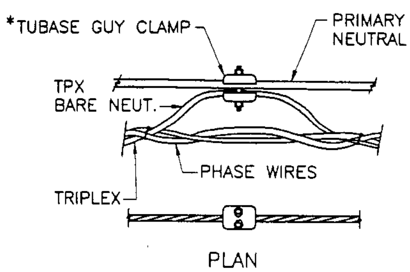
3				
2				
1				
0	8/31/04	ROBESON	NUNNERY	SPRINGER
REVISED		BY	CK'D	APPR.

SERVICE DROP CLEARANCE
TO COMMUNICATION CABLES

Progress Energy

PGN DWG. 09.04–16





DETAIL "A"
(SEE CHART FOR SIZE & CN)

PRIMARY NEUT. SIZE	TUBASE GUY CLAMP CN	TUBASE GUY CLAMP SIZE
4/0 ACSR	10045714	7/16"
1/0 ACSR	10045706	3/8"
#2 ACSR	10045607	5/16"

NOTES:

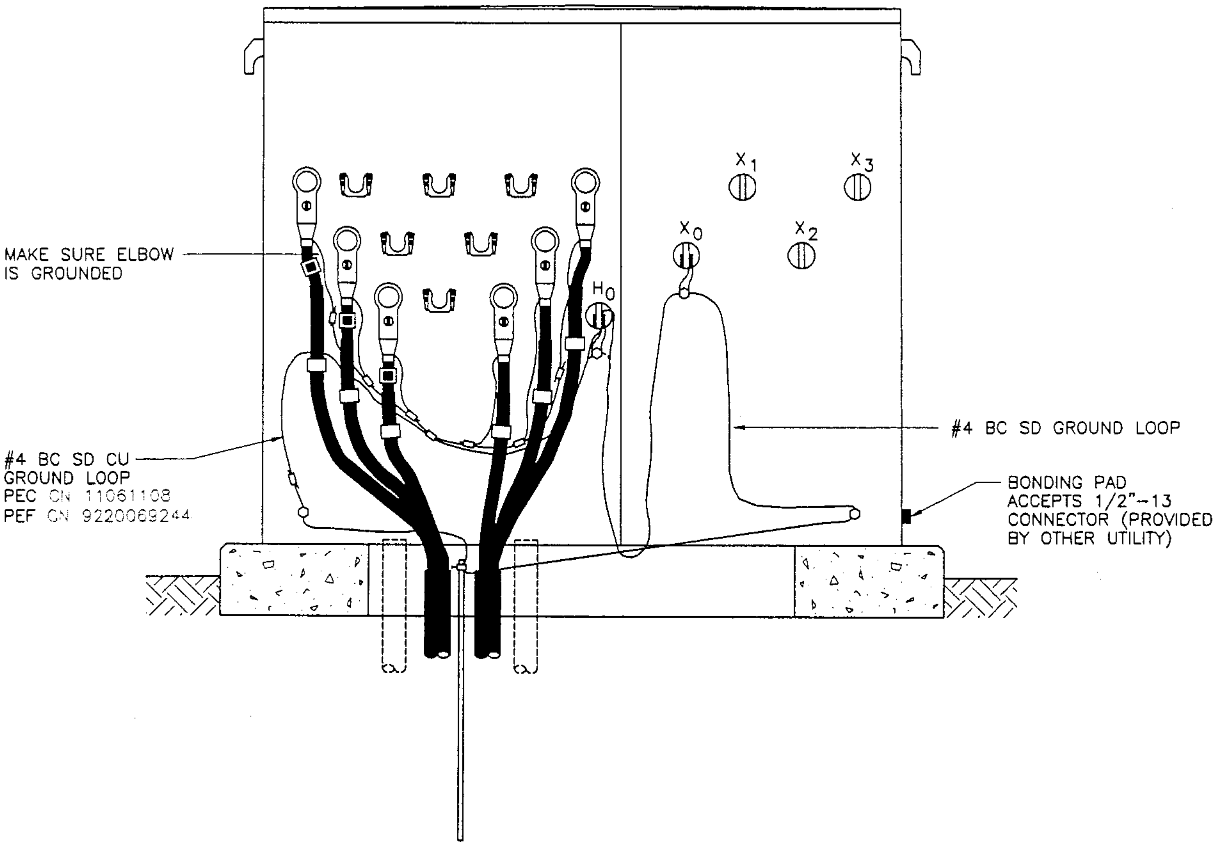
1. THE PREFERRED METHOD IS TO INSTALL THE TRIPLEX BENEATH THE PRIMARY NEUTRAL, CLEAR-SPANNING FROM POLE TO POLE.
2. THE TRIPLEX AT ITS LOWEST POINT MUST BE AT LEAST 30" ABOVE THE TELEPHONE/CATV LINES BELOW. IF THERE ARE NO TELEPHONE/CATV LINES, THE TRIPLEX AT ITS LOWEST POINT MUST HAVE THE APPROPRIATE MINIMUM GROUND CLEARANCE GIVEN BY DWG. 09.00-01.
3. IF THE SAG OF THE TRIPLEX ENCROACHES THE MINIMUM CLEARANCE TO THE TELEPHONE/CATV LINES OR GROUND BELOW, THE TRIPLEX SHOULD BE ATTACHED TO THE PRIMARY NEUTRAL, AS SHOWN IN DETAIL A ABOVE, AS OFTEN AS NECESSARY TO ACHIEVE THE REQUIRED MINIMUM CLEARANCES.
4. ONLY #2 AND #4 TRIPLEX MAY BE ATTACHED TO THE PRIMARY NEUTRAL FOR ITS SUPPORT. THE LARGER SIZE TRIPLEXES MUST BE CLEAR-SPANNED BETWEEN POLES AND NOT SUPPORTED BY THE PRIMARY NEUTRAL.

3				
2				
1				
0	6/15/04	NUNNERY	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

OVERHEAD TRIPLEX SECONDARIES

Progress Energy

CAR CAROLINAS DWG. 04.04-08



NOTES:

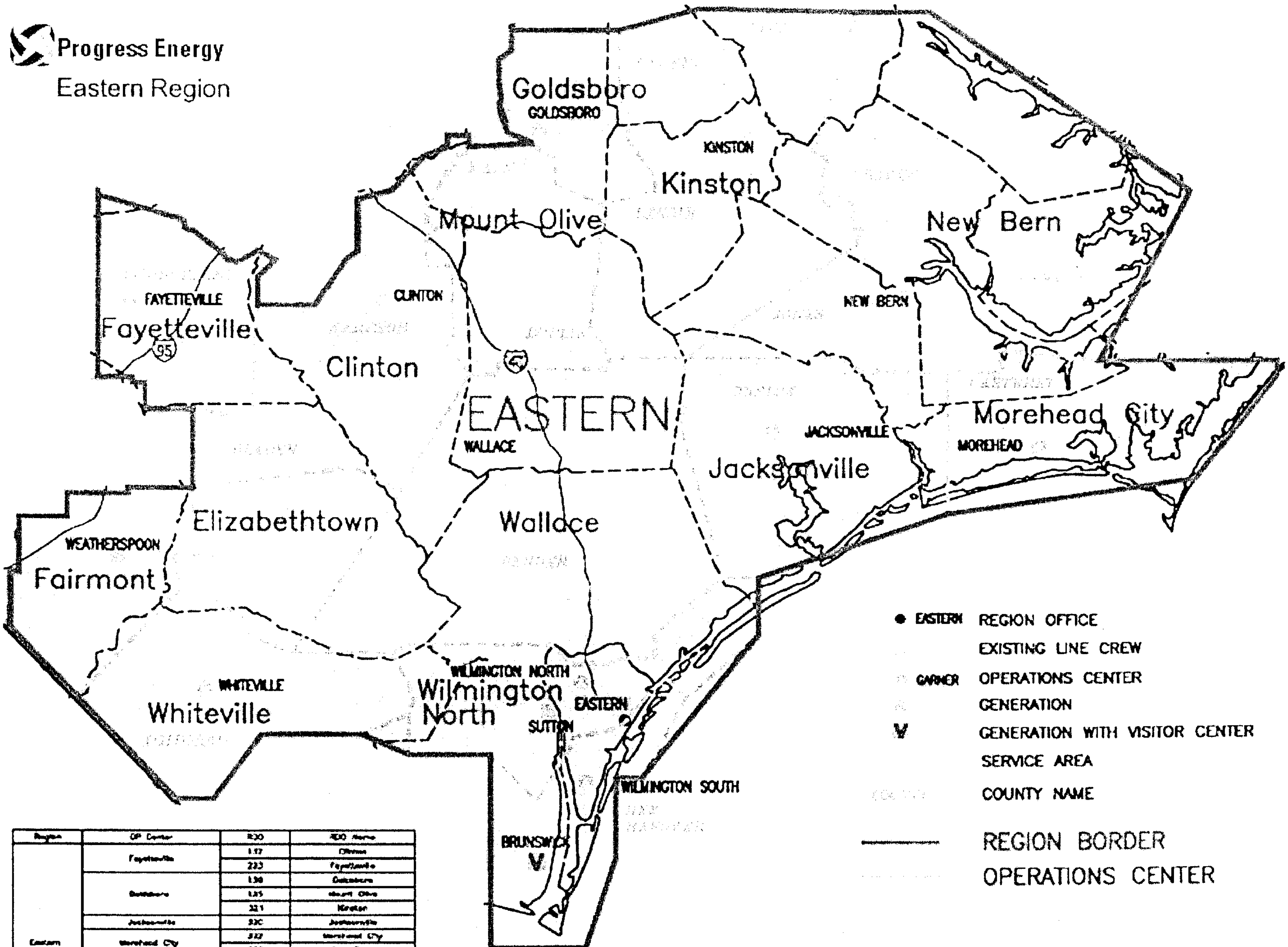
1. THE DRAWING ABOVE SHOWS A SEPARATE H0 AND X0 GROUNDING BUSHING. SOME CAROLINAS AND FLORIDA DESIGNS HAVE A COMBINED H0-X0 GROUNDING BUSHING.
2. GROUND WIRE IS TO BE BONDED TO TANK GROUND PADS IN BOTH COMPARTMENTS THROUGH THE GROUND STRAP AT THE H0 AND X0 BUSHINGS, AND TO THE PRIMARY CONCENTRIC NEUTRAL WITH A COPPER CONNECTOR.
3. FOR TRANSFORMERS WITH A SEPARATE H0 AND X0 BUSHING USED TO PROVIDE 480Y 3 WIRE SERVICES, THE GROUNDING STRAP SHOULD BE REMOVED FROM THE X0 BUSHING. DO NOT REMOVE THE GROUNDING STRAP ON THE H0 BUSHING.

3	4/1/04	SIMPSON	SIMPSON	WOOLSEY
2	7/21/03	CECCONI	NUNNERY	WOOLSEY
1	10/22/02	CECCONI	NUNNERY	WOOLSEY
0	7/23/02	CECCONI	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

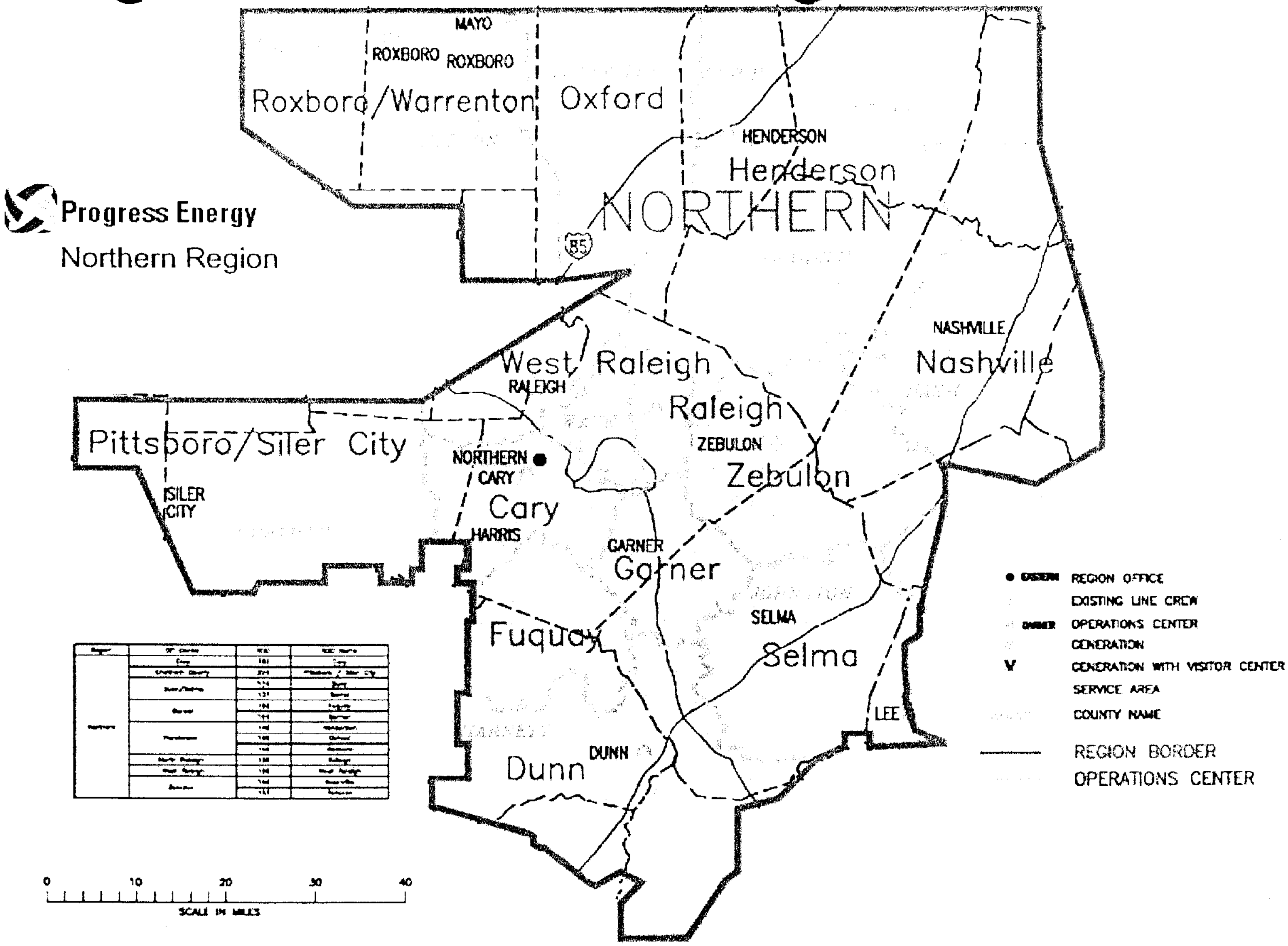
GROUND DETAILS FOR THREE PHASE LOOP FEED TRANSFORMERS

Progress Energy

PGN DWG. 27.01-04



Region	OP Center	RDO	RDO Name
Eastern	Fayetteville	117	Clinton
		223	Fayetteville
	Goldsboro	130	Goldsboro
		135	Mount Olive
		321	Kinston
	Jacksonville	320	Jacksonville
	Morehead City	322	Morehead City
		323	New Bern
	Whiteville	331	Fairmont
		311	Elizabethtown
		317	Whiteville
		[illegible]	[illegible]


Progress Energy
Northern Region
MAYO
ROXBORO
ROXBORO
Roxboro/Warrenton
Oxford
HENDERSON
Henderson
NORTHERN
85
NASHVILLE
Nashville
West Raleigh
RALEIGH
Raleigh
ZEBULON
Pittsboro/Siler City
NORTHERN
CARY
Zebulon
SILER
CITY
Cary
HARRIS
GARNER
Garner
SELMA
Fuquay
Selma
LEE
DUNN
Dunn
REGION OFFICE
EXISTING LINE CREW
OPERATIONS CENTER
GENERATION
V
GENERATION WITH VISITOR CENTER
SERVICE AREA
COUNTY NAME
REGION BORDER
OPERATIONS CENTER
0
10
20
30
40
SCALE IN MILES

Progress Energy

JOINT USE

POLE ATTACHMENT

GUIDELINES

10/29/2004

GENERAL

Anyone desiring to 1) attach to Progress Energy (PE) poles or 2) overlash to existing facilities whether owned by proposing attacher or another attacher on PE poles must first have a contractual agreement in place with PE. After the contractual agreement is finalized, the proposed attacher must make application to PE via an Exhibit A. These requirements shall apply to anyone wanting to attach to or occupy PE facilities, including all cable operators or telecommunications carriers, and any affiliates of PE. Throughout this document, all types of attachers and their facilities other than PE will be referred to as attachers, third party attachers, communication facilities or attacher's facilities.

Pole utilization requiring permits include: installation of new attachments, removal of existing attachments, upgrade to larger cable, lashing of new cables to existing messengers, rebuilds of cable systems, large scale relocations for road widening, etc. and installation of service drops on lift poles. Service drops may be permitted monthly on one "after the fact" permit.

A permit is required in order to maintain accurate attachment inventories and to obtain technical data necessary to review the adequacy of existing distribution and/or transmission system facilities. The attacher must submit, along with each application for pole attachment, the data contained in items 1-4 of the section below entitled "Pole Attachment and Overlash Application Procedures." All planning costs associated will be the responsibility of the attacher proposing the attachment or overlash.

POLE ATTACHMENT AND OVERLASH APPLICATION PROCEDURES

A pole attachment and/or overlash application shall include:

1. A maximum of 40 PE poles identified for proposed attachment and/or overlash per application. No more than 500 poles shall be submitted in any 45-day period.

2. One set of marked facility maps depicting the street level route of the proposed attachments to PE poles. To aid in this effort, PE will provide maps for the geographic areas under consideration to the proposed attacher as requested by the proposed attacher. The costs associated with providing maps to the proposed attacher will be paid by the proposed attacher.

3. If the proposed attachment is a new attachment or overlash to one's own facilities on any PE pole(s) and includes conductor(s) or cable(s), the proposed attacher must provide the type of cable (coax, fiber), cable size and messenger size. All poles are subject to wind loading and ice loading as applicable.

4. Each pole in the application shall include field data collected on all existing attachment information in the proposed route and recorded in the proper field on the Exhibit A. Equipment height must be measured from the base of the pole to the topmost pole attachment point (bolt). Conductors and cables will be measured from the base of the pole to the topmost pole attachment point (bolt). Each

Exhibit A must include the company name, representative's name and a telephone number.

5. Clearances from ground and other facilities shall be in accordance with the latest edition of the NESC, or the requirements shown in this manual, whichever is greater. Existing installations which were in compliance with the NESC at the time of their original construction need not be modified unless specified by the latest edition of the NESC handbook or PE specifications.

Pole attachment requests are to be submitted to the following addresses.

In the Carolinas:	In Florida:
Progress Energy Carolinas, Inc.	Progress Energy Florida, Inc.
Joint Use	Joint Use
410 S. Wilmington Street, OHS9	3300 Exchange Place, NP4D
Raleigh, NC 27601	Lake Mary, FL 32746
(919) 546-4699	(352) 748-8758

Contact PE's Joint Use Supervisor at (407) 942-9415 for clarification and examples of any of the above items.

PE utilizes NJUNS (National Joint Utilities Notification System) and will require all third party attachers on PE poles to utilize the system.

Each pole in the application shall be checked to meet NESC clearance requirements. Facility configuration will be rearranged to meet NESC clearance requirements. If clearance standards are not met, the pole shall be changed to the appropriate pole class and/or height or a mid-span pole may be required to accommodate existing facilities plus the proposed additional facilities. All costs associated with this work will be paid by the third party attacher proposing the attachment or overlash. It is the responsibility of the proposing attacher to obtain all necessary easements for their facilities.

Once the clearance analysis is completed, the attacher will receive an approved permit if no make-ready is required for attachment. If the attacher's application requires make-ready, the attacher will receive an invoice for make-ready costs. Payment of this invoice within 30 days will serve as PE's authorization to perform the make-ready construction. Following completion of make-ready construction, PE shall sign and issue the permit authorizing the attachment by providing a copy of the permit to the attacher. The attacher shall have 120 days from the date of permit authorization in which to complete the attachment installation and any other requirements stated in this standard. If attacher fails to do so, the permit shall expire and the attacher will be required to resubmit to PE an application for attachment with all current data required as support of its application. Attacher must promptly notify PE Joint Use upon completion of construction for each application and arrange scheduling of post-inspection.

Progress Energy

The cost of all materials required to adjust facilities shall be paid by the attacher. All costs associated with the application requiring PE clerical, engineering and crew costs will be paid by the proposing attacher.

Overlashing third parties must have written permission in place with the attacher being overlashed. Written consent of the overlash must be provided to PE at the time of application.

Each attacher shall install identifying tags on its equipment and at an minimum interval of every five (5) poles for the purpose of identification. Attachers shall install tags at the time attacher's facilities are installed. Identifying tags must be installed on existing attacher's facilities. If attacher fails to install identifying tags, PE may deem the attacher in violation of PE Standards and the Pole Attachment Agreement.

If attacher's facilities are acquired by another entity, the acquiring entity must notify PE of said change, provide maps and/or plats of acquired assets, and obtain PE's consent to assignment of the Pole Attachment Agreement. The acquiring entity will be given one year from date of acquisition in which to retag the acquired facilities. If the acquiring entity fails or refuses to retag its facilities within the one-year time allotted, PE may deem the attacher in violation of PE Standards.

CLEARANCES

All permit requests for new attachments will be assigned an attachment height. The position order is from the bottom up in the communications space on a pole. A physical area on a pole can not be left unoccupied or reserved by a tenant.

At the time of installation, all communications facilities shall be located a minimum of 40" below PE power facilities (secondaries or neutral) per NESC rules 235C and 238.

At the time of installation, all communications facilities passing above or below ungrounded street light brackets shall be 20" away from such brackets per NESC rule 238C and 20" away from top of the streetlight luminaire. All communications facilities passing above or below grounded street light brackets shall be 4" away from such brackets and 4" away from top of the streetlight luminaire. All communication facilities must maintain a minimum clearance of 12" below the insulated conductor drip loops of the lights per NESC rule 238D.

Where floodlights or area lights are on PE permanent poles, the clearances at the time of installation shall be 20" below or above the light brackets per NESC rule 238C.

Any new cable shall be attached to each pole currently in the cable's route and be sagged consistently with other existing facilities in the span to prevent damage to either the cable or the pole by wind displacement of the cable, maintaining 12" separation at midspan. During construction or deconstruction, third party attachers shall not directly or indirectly influence the sag and tension of PE wire or cause a pole to lean, thus jeopardizing the structural integrity and reliability of its distribution systems.

Attachers are not permitted to dead-end on a primary URD riser pole.

Poles shall not be boxed in and communication cable shall not be installed on both sides of a pole. Communication cable must be installed on the same side as the secondary or neutral. Communication crossarms, extension brackets or buckarms shall not be installed or used for third party's attachments.

These clearances shall apply to installations by an attacher or by PE. Any work performed by PE or by the attacher after the initial installation of facilities shall preserve required clearances of all parties on the pole. If at any time after installation of facilities, an attacher becomes aware that one or more of its facilities is not in compliance with applicable clearance requirements, the attacher shall notify PE of the clearance violations and make all reasonable efforts to immediately bring its facilities into compliance. Attacher shall notify PE following its correction of the clearance violations. Attacher shall notify PE if the attacher has reason to believe that the noncompliance has been caused by the action of some party other than the attacher. However, such a belief will not excuse the attacher from its obligation to remedy the clearance violations. PE shall also inform the attacher if PE becomes aware that the attacher's facilities are not in compliance with applicable clearance requirements. The attacher will have sixty (60) days to bring its facilities within compliance or PE may deem the attacher in violation of PE Standards.

GUYS AND ANCHORS
Attachers are responsible for their own down guys and anchors and are not permitted to utilize PE anchors.

OTHER
No permanent climbing aids are allowed on PE poles.

All new power supplies and associated metering equipment shall be mounted only on attacher owned facilities as per PE specification drawing #09.04-12 and #09.04-13.

Air dryers, nitrogen bottles, cabinets, load coils, etc. shall not be attached to PE poles.

All vertical runs installed by attacher shall be placed in conduit and attached to pole using U-guards and other protective covering. Vertical runs must be on a 45 angle from the communication company's attachment and never on the face of the pole.

Horizontal attachments to PE poles must be made by use of a three-bolt suspension clamp with a center through bolt. A two-inch minimum vertical spacing must be maintained between through bolt holes. Attachers shall make attachments using existing open bolt holes where available and applicable to meet the clearance requirements stated above. New bolt holes for attachments should only be drilled if necessary.

Generally, attachments and/or service drops shall not extend more than 4" from the closest surface of the pole, unless prior approval is obtained from the local PE Engineering department. Amplifiers and terminals shall be a minimum of 12" from the closest surface of the pole.

Communication facilities will **not** be allowed on temporary PE poles and billable poles which are utilized solely for area lights (dusk to dawn).

Attachers must remove all of their out-of-service facilities from PE poles at the time of new attachment or overlash.

Once a PE pole is replaced and its facilities transferred, attachers have 60 days from notification to transfer their facilities to the new pole. In case of non-response, PE may remove or relocate attacher's facilities and bill attacher for all expenses incurred.

All communication messengers shall be bonded to electrical ground wherever a vertical ground wire exists.

Attacher's request to install communication facilities on a PE transmission pole requires the approval of PE's Transmission department. A complete structural analysis will be required and all costs associated with the analysis will be paid by the proposing attacher. Progress Energy will only consider requests for attachment to transmission poles that were specifically designed to accommodate underbuilt distribution and communication facilities.

Requests for exceptions to this design guide shall be referred to the Joint Use unit. Any exceptions approved will be distributed to the regions for uniform application on a system-wide basis.

WIRELESS

Wireless attachment applications will be handled on a per case basis. The minimum information required by PE includes: pole number, address/location, plat of proposed work, photo of proposed pole, radio frequency information, aerial construction details (dimension, weight connectivity), direction of antennae, and wireless component specifications. Contact the Joint Use Supervisor at (407) 942-9415.

Progress Energy

Ball Park Estimates for CATV or CLEC Make-ready

Work Description	*PEC Cost Estimate	*PEF Cost Estimate
Replace 40' with 45' Pole, Tangent, 1 Phase, No equipment	$1061.65	$717.21
Replace 40' with 45' Pole, Tangent, 3 Phase, Transformer	$1885.12	$1014.02
Replace 35' with 40' Pole, Angle, 1 Phase, Transformer	$2103.35	$975.40
Replace 40' with 50' Pole, Vertical Angle, 3 phase, Transformer	$3055.36	$1539.96
Replace 40' with 45' Pole, Dead End, 3 Phase, Transformer	$2771.65	$1421.33
Replace 45' with 50' Pole, Vertical DDE, 3 Phase, No equipment	$3196.81	$2387.69
Replace 45' with 50' Pole, Angle, 3 phase, Double Circuit	$3,489.99	$2148.43
Replace 35' with 40' Pole, Secondary, UG Dip	$1357.20	$1004.24
Replace 50' with 60' Pole, 3 Phase, 3 Phase Tap, (congested)	$2929.71	$1,994.86
Replace 45' with 50' Pole, 3 Phase, 3 Phase UG Dip	$4240.70	$2,808.91
Replace 45' with 50' Pole, 3 Phase, 1200 Capacitor Bank	$5216.65	$8046.71
Install 45' Pole, 3 Phase, In-line	$1169.83	$769.79
Relocate Riser/U-Guard on Pole	$853.33	$496.39
Replace 30' with 35' Pole,Secondary and/or Service, Down Guy	$1123.08	$669.87
Replace 40' with 45' pole Tangent, 3 Phase, Transformer Vertical		$736.22
Add Section of U- Guard	$636.09	$404.26
Raise Street Light	$705.53	$420.74

Progress Energy

Replace Open Wire Secondary with Triplex	$949.07	$404.94
Relocate Transformer on Pole	$470.80	$494.84
Clip Secondary to Neutral	$486.36	$352.41
Resag Neutral & Dress Transformer Loops	$486.36	$223.08

- *PEC Service Territory: This list is intended to provide licensee with a rough estimate guide for use in determination of overhead attachment versus underground installation. These costs are examples only and do not represent actual charges. For the preparation of Detailed Estimates, there will be a minimum charge of $85 per hour.*
- *Florida Service Territory: This list is intended to provide licensee with a rough estimate guide for use in determination of overhead attachment versus underground installation. These costs are examples only and do not represent actual charges. Estimate was calculated in WMS using vertical construction and includes time, material and adder charges.*

Revised
5/20/2004

Progress Energy

PERMIT # ____________________

REFERENCE # ____________________

( ) New

( ) Rebuild

( ) Overlash 3rd Party

( ) Service Drop

( ) Overlash Self

EXHIBIT A

ATTACHMENT REQUEST

Company Name: ______________________________

Location (County, City/Town, State): ______________________________

In accordance with the terms and conditions of the existing Attachment Agreement, application is made for a permit to attach facilities to Progress Energy's poles as indicated below and on construction drawing(s) attached. Applicant represents it has secured all necessary permits under its franchise and easements or licenses from owners of private property.

Progress Energy Pole No.	Existing Attachment Height Information											✓ for Rearrange-ments (comments on back)	NEW Attachment Height	Post-Inspection (comments on back)		
	Power Facilities						Communication Cables									
	Neutral Cable	Xfmer	Street Light	Top of Riser	Secondary/ Svc Drop	Midspan	Comm. Co. Name	Lowest	Lowest @ Midspan	Closest to Power	Closest to Power M-span			Pass	Fail	Code

ATTACHMENTS REQUESTED: ________ Distribution ______ Transmission ______ Telecommunications

<u>Submitted by:</u> <u>Date:</u>

Name ______________________________

Addresss ______________________________

____

Phone No. ______________________________

Construction Completed:

<u>Cable Details</u>

( ) Coaxial

( ) Fiber Optic

______ Cable size

______ Messenger size

<u>Progress Energy Approval/Date:</u>

Trans. Eng. ______________________________

Dist. Eng. ______________________________

Joint Use ______________________________

Post-Inspection ______________________________

Post-Inspection ______________________________

Post-Inspection Codes:

PC1	Neutral or secondary conductor separation at pole	40"
PC2	Grounded equipment separation at pole	30"
MC1	Secondary conductor separation at midspan	30"
MC2	Neutral separation at midspan	30"
MC3	Separation from secondary drip loops	40"
SL1	Streetlight separation from SL bracket	4"
SL2	Streelight separation from unguarded SL drip loop	12"
V1	Cable crossing under PE neutral from different supporting structure	24"
R1	Below top of PE primary or secondary riser conduit	40"
C1	Cable or service drop above state maintained roadway	18"
C2	Cable above non-state maintained roadway or subject to truck traffic	15.5'
RC1	Cable or service drop above residential driveway not subject to truck traffic	12'
RC2	Cable or service drop above residential driveway not subject to truck traffic when attached to low building	12'
C3	Cable or service drop above areas of pedestrian access only	9.5'
C4	Cable or service drop above other areas subject to truck traffic	15.5'
DM3	Telecom service drop separation from PE service drop at midspan and attachment to building	12"
M4	Wires on different supporting structures crossing at midspan; communications only under PE	24"
G1	Guy or anchor needed	
G2	Guy or anchor slack or damaged	
G3	Guy attached to PE anchor	
GR	Grounds - messenger cable bonded to PE ground wire	
L	Cable tagging	

REARRANGEMENTS REQUIRED: **(Date each separate comment)**

POST-INSPECTION COMMENTS: **(Date each separate comment)**

Progress Energy

Permit No ________________

Exhibit B

REMOVAL REQUEST

COMPANY NAME: ____

OPERATING CENTER (Area of Attachments) ________________________

In accordance with the terms and conditions of the existing Attachment Agreement, remove from your records the following attachment(s) from the Poles listed below:

Description of Removals

Progress Energy Pole No.	Location of Pole or Arbitrary Pole Number

Applicant represents that it has removed all Communication Facilities previously attached to the above referenced Poles.

Attachments Removed: __ Distribution Pole (CATV); __ Transmission Pole (CATV); __ Non-Traditional CATV Services

Submitted by: Date: ________

Name : ____________________

Address: ____________________

____

Phone No: ____________________

Progress Energy Approval: Date:

Joint Use: ____________________

Notification to Trans. Eng.: ________________

Progress Energy

w ☐

Overlash ☐

POLE ATTACHMENT DATA

LOCATION (County, City/Town, State) ______________________________

In accordance with the terms and conditions of the existing Attachment Agreement, application is made for a permit to attach facilities to Progress Energy's (PE) poles as indicated below and on construction drawing(s) attached. Applicant represents it has secured all necessary permits under its franchise and easements or liceneses from owners of private property.

Progress Energy Pole Number	√Changes/Rearrangements - Comments on Back	POWER FACILITIES	Mid Span	Neut/Cable	Transformer	Street Light	Top of Riser	Sec/Svc	COMMUNICATION CABLES	Lowest Attachment on Pole	Closest to Power on Pole	Lowest Attachment Mid Span	Closest to Power Mid Span	NEW ATTACHMENT INFORMATION	Proposed CATV Attachment on Pole	Proposed CATV Attachment Mid Span	PE Req'd Att at Pole	POST INSPECTION	√Accepted	√Rejected	√if Comments on Back

Cable to be installed: ☐ Coaxial ☐ Fiber Optic   Outside Dia. (inches): ________   Messenger size: ________   ☐ Service Drop

Progress Energy Permit No.: ____________________   Number of Attachments this page: ____________

Page _____ of _____

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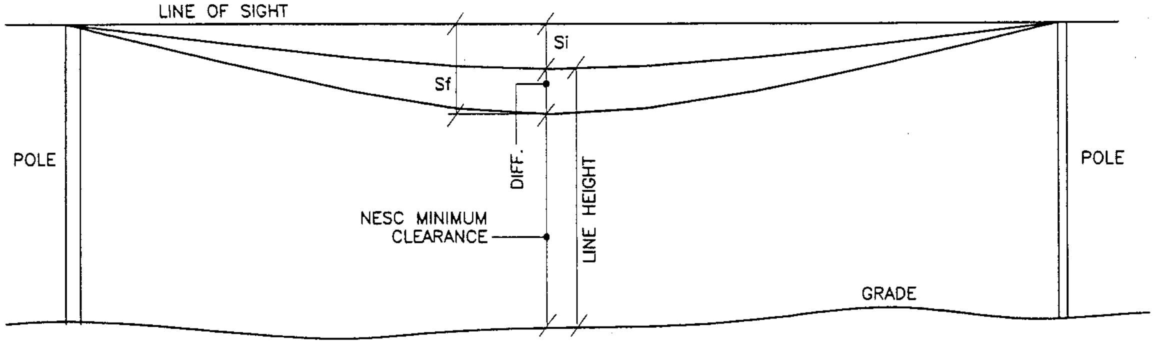


KEY		
KEY	Si	INITIAL SAG @ 60°F, NO WIND (FROM SAG TABLES)
	Sf	THE GREATER OF FINAL SAG @ 120°F (180° FOR FP), NO WIND, OR 32°F W/ 1/4" ICE (CP&L ONLY)
	DIFF.	Sf − Si

NOTES:

1. USE THIS METHOD WITH THE TABLE ON DWG. 09.02-01 WHEN DETERMINING MINIMUM LINE HEIGHTS ABOVE GROUND, RAILS, ETC.
2. LINE HEIGHT (AT MID SPAN) = REQUIRED MINIMUM CLEARANCE (SEE DWG. 09.02-01) PLUS (Sf − Si).
3. ROUND UP "DIFF." (Sf-Si) VALUES TO NEAREST 1/2 FT. (E.G., 32" WOULD BECOME 3'-0".)

EXAMPLE OF USE OF INITIAL AND FINAL SAG:

1. 3-Ø 477 SAC PRIMARY WITH 1/0 ACSR NEUTRAL LINE CROSSING ROAD, 300 FT. SPAN –

REQUIRED NESC MINIMUM NEUTRAL CLEARANCE ABOVE ROAD: (120°F, NO WIND)	15.5 FT.	(DWG. 09.02-01)
DIFFERENCE BETWEEN INITIAL AND FINAL SAGS, FOR 1/0 ACSR, 300 FT. SPAN:	+ 3.0 FT.	
REQUIRED NESC HEIGHT OF NEUTRAL ABOVE ROAD SURFACE, AT INSTALLATION (INITIAL SAG, 60°F):	18.5 FT.	

** (CHECK MINIMUM DOT ROAD CLEARANCES FOR LOCAL CONDITIONS)

2. 3-Ø 477 SAC PRIMARY WITH 1/0 ACSR NEUTRAL LINE CROSSING ROAD, 150 FT. SPAN –

REQUIRED NESC MINIMUM NEUTRAL CLEARANCE ABOVE ROAD: (120°F, NO WIND)	15.5 FT.	(DWG. 09.02-01)
DIFFERENCE BETWEEN INITIAL AND FINAL SAGS, FOR 1/0 ACSR, 150 FT. SPAN:	+ 1.5 FT.	
REQUIRED NESC HEIGHT OF NEUTRAL ABOVE ROAD SURFACE, AT INSTALLATION (INITIAL SAG, 60°F):	17.0 FT.	

** (CHECK MINIMUM DOT ROAD CLEARANCES FOR LOCAL CONDITIONS)

REVISED		BY	CK'D	APPR.
3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY

MINIMUM LINE HEIGHTS USING CONDUCTOR SAG TABLES

Progress Energy

PGN DWG. 09.00-01

MINIMUM CLEARANCES (IN FEET) OF UNGUARDED WIRES
FROM INSTALLATIONS TO WHICH THEY ARE NOT ATTACHED

CONDUCTOR TYPE / CLEARANCE OF:	EFFECTIVELY GROUNDED NEUTRALS; SPAN & LIGHTNING PROTECTION WIRES; GUYS & MESSENGERS CABLED PRIMARY	INSULATED SUPPLY CABLES 0 – 750V (TRIPLEX & QUADRUPLEX)	0 – 750 V OPEN WIRE SECONDARY & SERVICES;	OPEN WIRE PRIMARY 750 V – 22 kV (PHASE TO GROUND)
1. LIGHTING AND TRAFFIC SIGNAL SUPPORTS; POLES & SUPPORTS OF ANOTHER LINE:				
A. HORIZONTAL	3'	3'	5' (3.5')**	5' (4.5')**
B. VERTICAL	2'	2'	4.5'	4.5'
2. BUILDINGS: A. HORIZONTAL				
1. TO WALLS, PROJECTIONS & GUARDED WINDOWS	4.5'	5'	5.5' (3.5')	7.5' (4.5')
2. TO UNGUARDED WINDOWS	4.5'	5'	5.5' (3.5')	7.5' (4.5')
3. TO BALCONIES AND AREAS ACCESSIBLE TO PEDESTRIANS	4.5'	5'	5.5' (3.5')	7.5' (4.5')
B. VERTICAL 1. OVER & UNDER ROOFS OR PROJECTIONS NOT ACCESS-IBLE TO PEDESTRIANS	3'	3.5'	10.5'	12.5'
2. OVER & UNDER ROOFS OR PROJECTIONS ACCESSIBLE TO PEDESTRIANS	10.5'	11'	11.5'	13.5'
3. OVER ROOFS ACCESSIBLE TO VEHICLES BUT NOT SUBJECT TO TRUCK TRAFFIC	10.5'	11'	11.5'	13.5'
4. OVER ROOFS ACCESSIBLE TO TRUCK TRAFFIC	15.5'	16'	16.5'	18.5'
3. SIGNS, CHIMNEYS, BILLBOARDS, RADIO & TV ANTENNAS, AND OTHER INSTALLATIONS NOT CLASSIFIED AS BRIDGES: A. HORIZONTAL (PG. 105 A1, A2)	3'	3.5'	5.5' (3.5')	7.5' (4.5')
B. VERTICAL (PG. 105 B1, B2)	3'	3.5'	6'	8'
4. BRIDGES:* A. CLEARANCES OVER BRIDGES 1. ATTACHED	N/A	3'	3.5'	5.5'
2. NOT ATTACHED	N/A	10'	10.5'	12.5'
B. BESIDE, UNDER, OR WITHIN STRUCTURE				
1. READILY ACCESSIBLE PARTS (A) ATTACHED	N/A	3'	3.5'	5.5' (4.5')
(B) NOT ATTACHED	N/A	5'	5.5' (3.5')	7.5' (4.5')
2. INACCESSIBLE PARTS (A) ATTACHED	N/A	3'	3.5'	5.5' (4.5')
(B) NOT ATTACHED	N/A	4'	4.5' (3.5')	6.5' (4.5')
5. SWIMMING POOLS (INCLUDING SWIMMING BEACHES WHERE RESCUE POLES ARE USED):	SEE DWG. 09.04-05			

*BRIDGES MAY SERVE AS SUPPORTING STRUCTURES FOR ELECTRICAL LINES, AND THEREFORE THE LINES MAY BE ATTACHED TO THE BRIDGES.

**WIND SWING

REVISED		BY	CK'D	APPR.
3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY

MINIMUM FINAL SAG CLEARANCES TO BUILDINGS, ETC.

Progress Energy

PGN DWG. 09.01-01A

MINIMUM CLEARANCES (IN FEET) OF UNGUARDED WIRES FROM INSTALLATIONS TO WHICH THEY ARE NOT ATTACHED

CONDUCTOR TYPE / CLEARANCE OF:	EFFECTIVELY GROUNDED NEUTRALS; SPAN & LIGHTNING PROTECTION WIRES; GUYS & MESSENGERS CABLED PRIMARY	INSULATED SUPPLY CABLES 0 – 750 V (TRIPLEX & QUADRUPLEX)	0 – 750 V OPEN WIRE SECONDARY & SERVICES; CABLED PRIMARY	OPEN WIRE PRIMARY 750 V – 22 kV (PHASE TO GROUND)
6. RAILROADS (WHERE WIRES RUN ALONG TRACKS): A HORIZONTAL (FROM NEAREST RAIL)	8.5'	9'	9.5'	11.5'
B. VERTICAL (FROM TOP OF RAILS)	23.5'	24'	24.5'	26.5'
7. GRAIN BINS:			SEE NESC RULE 234.F.	

NOTES:

1. THESE CLEARANCES APPLY UNDER WHICHEVER OF THE FOLLOWING CONDUCTOR TEMPERATURE AND LOADING CONDITIONS PRODUCES THE CLOSEST APPROACH:
   A. 120°F FOR CP&L, 180°F FOR FLORIDA POWER, NO WIND DISPLACEMENT, FINAL SAG.
   B. 32°F, NO WIND DISPLACEMENT, FINAL SAG, 1/4" RADIAL ICE THICKNESS.

2. WIND DISPLACEMENT CONSIDERATIONS (HORIZONTAL):

   A. FIGURES SHOWN IN PARENTHESIS ARE MINIMUM CLEARANCES WHERE CONSIDERATION OF HORIZONTAL DISPLACEMENT UNDER WIND CONDITIONS IS REQUIRED. IN APPLYING THESE CLEARANCES, THE CONDUCTOR IS DISPLACED FROM REST TOWARDS THE INSTALLATION BY A 6 PSF WIND AT FINAL SAG AT 60°F.

   B. PERPENDICULAR HORIZONTAL DISTANCE REQUIRED BETWEEN THE LINE AND THE STRUCTURE (BUILDING, ETC.) IS THE GREATER OF THE HORIZONTAL CLEARANCE OR THE SUM OF WIND CLEARANCE PLUS WIND SWING.

   C. WIND SWINGS FOR CONDUCTORS FOR VARIOUS SPANS, @ 60°F FINAL SAG WITH A 6 PSF WIND, IN FEET:

SPAN LENGTH (FEET)	CONDUCTOR #2 ACSR	1/0 ACSR	336 ACSR	477 SAC	1/0 AAC	4/0 AAC	#6 CU	#4 CU	#2 CU	1/0 AAAC	336 AAC	795 AAC
150	2.5	2	1.5	1.5	2.5	2	2	1.5	1.5	.5	1	.5
200	2.5	2.5	2	2.5	2.5	2.5	2	2	1.5	1	1.5	1
250	3	2.5	2.5	3	3	2.5	2	2	1.5	1.5	2	1.5
300	3	3	2.5	3	3	2.5	2.5	2	2	2	3	2
340	3	3	2.5	3.5	3	2.5	2.5	2	2	2.5	3.5	2.5

WIND SWINGS HAVE BEEN ROUNDED UP TO THE NEXT 1/2 FT. FOR SPANS LESS THAN 150 FT., USE THE 150 FT. SPAN VALUES. FOR SPANS BETWEEN THOSE SHOWN, USE THE VALUE OF THE NEXT LARGER SPAN FOR SPANS GREATER THAN 340 FT., CONTACT DISTRIBUTION STANDARDS FOR WIND SWINGS.

3. THIS TABLE DOES NOT APPLY TO BUILDINGS OR INSTALLATIONS IN TRANSIT.

4. THIS TABLE DOES NOT APPLY TO CLEARANCE BETWEEN A SERVICE AND THE BUILDING TO WHICH IT ATTACHES (REFER TO DWG. 09.02-05), BUT DOES APPLY TO CLEARANCE BETWEEN SERVICES AND ADJACENT BUILDINGS.

5. FOR BUILDINGS UNDER CONSTRUCTION, THESE CLEARANCES MUST BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION.

6. REFER TO NATIONAL ELECTRICAL SAFETY CODE RULE 234 FOR EXCEPTIONS AND REFINEMENTS.

3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

MINIMUM FINAL SAG CLEARANCES TO BUILDINGS, ETC.

Progress Energy

PGN DWG. 09.01-01B

OSHA

1910.333(c)(3)(i)(a)

(I) "UNQUALIFIED PERSONS." (A) WHEN AN UNQUALIFIED PERSON IS WORKING IN AN ELEVATED POSITION NEAR OVERHEAD LINES, THE LOCATION SHALL BE SUCH THAT THE PERSON AND THE LONGEST CONDUCTIVE OBJECT HE OR SHE MAY CONTACT CANNOT COME CLOSER TO ANY UNGUARDED, ENERGIZED OVERHEAD LINE THAN THE FOLLOWING DISTANCES:

1910.333(c)(3)(i)(A) {1}

{1} FOR VOLTAGES TO GROUND 50kV OR BELOW – 10 FEET (305 CM);

1910.333(c)(3)(i)(A) {2}

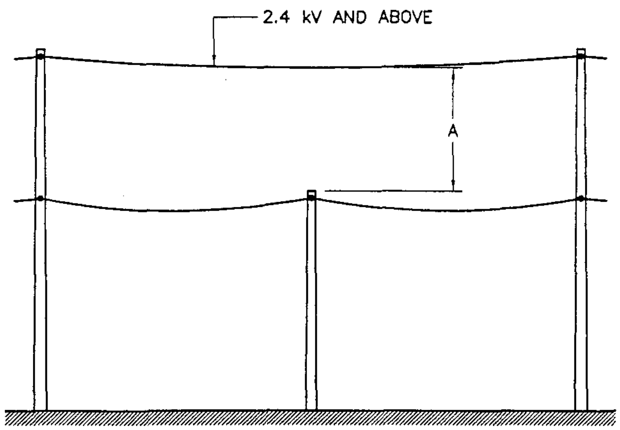
{2} FOR VOLTAGES TO GROUND OVER 50kV – 10 FEET (305 CM) PLUS 4 INCHES (10 CM) FOR EVERY 10kV OVER 50kV.

1910.333(c)(3)(i)(B)

(B) WHEN AN UNQUALIFIED PERSON IS WORKING ON THE GROUND IN THE VICINITY OF OVERHEAD LINES, THE PERSON MAY NOT BRING ANY CONDUCTIVE OBJECT CLOSER TO UNGUARDED, ENERGIZED OVERHEAD LINES THAN THE DISTANCES GIVEN IN PARAGRAPH (c)(3)(i)(A) OF THIS SECTION.

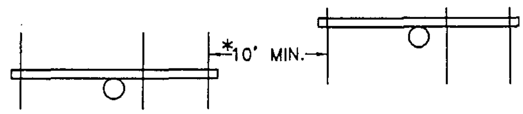
NOTE: FOR VOLTAGES NORMALLY ENCOUNTERED WITH OVERHEAD POWER LINE, OBJECTS WHICH DO NOT HAVE AN INSULATING RATING FOR THE VOLTAGE INVOLVED ARE CONSIDERED TO BE CONDUCTIVE.

MINIMUM CLEARANCE BETWEEN OVERHEAD PRIMARY CIRCUITS AND UNDERBUILT POLES



HORIZONTAL CLEARANCE FOR PARALLEL LINES UP TO 25kV

* PREFERRED DISTANCE



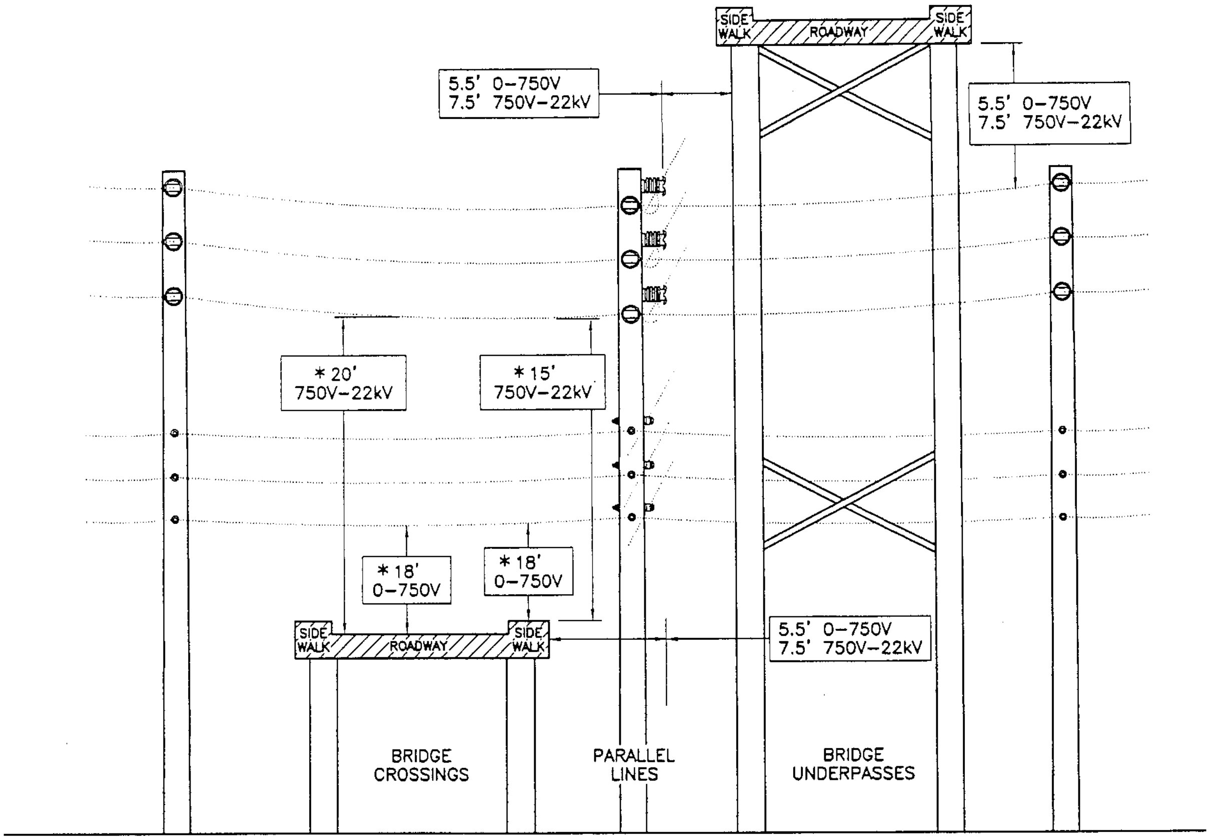
"A" = 4.5 FEET FOR VOLTAGES 0 TO 22 kV ø–G
= 5.5 FEET FOR VOLTAGES 22 TO 50 kV ø–G (69 kV)
= 7 FEET FOR VOLTAGES 70 kV ø–G (115 kV)
= 9 FEET FOR 140 kV ø–G (230 kV)

A MINIMUM VERTICAL CLEARANCE "A" SHALL BE MAINTAINED BETWEEN UNINSULATED PRIMARY CONDUCTORS OF ONE LINE AND ANY PART OF CLIMBABLE SUPPORTING STRUCTURES OF ANOTHER LINE INSTALLED BELOW THE PRIMARY. THIS MINIMUM CLEARANCE SHALL BE MAINTAINED FOR CONDUCTOR SAG AT MAXIMUM OPERATING TEMPERATURE, NO WIND.

YOU MAY SUBTRACT 2 FT. FROM DIMENSION "A" IF THE FOLLOWING 2 CONDITIONS ARE MET:

1. BOTH TOP AND BOTTOM CIRCUITS ARE OPERATED AND MAINTAINED BY THE SAME COMPANY.
2. EMPLOYEES WILL NOT BE WORKING ABOVE THE INTERMEDIATE POLE WHILE THE UPPER LINE IS ENERGIZED.

3					FINAL SAG CLEARANCE DIAGRAM FOR OTHER STRUCTURES	Progress Energy
2						
1						
0	7/24/02	HOYT	ROBESON	WOOLSEY		PGN / DWG. 09.01–03
REVISED		BY	CK'D	APPR.		



NOTE: ALL VOLTAGES ARE ø–G.

IF WIRE CROSSINGS ARE INVOLVED, SEE "MINIMUM WIRE CROSSING CLEARANCES" IN THIS SECTION. DIMENSIONS GIVEN ARE MINIMUMS. ADDITIONAL CLEARANCE SHOULD BE PROVIDED IF POSSIBLE. BRIDGE CROSSINGS HERE ARE NOT OVER NAVIGABLE WATERWAYS.

DOT OR HIGHWAY PERMITS MAY DICTATE CLEARANCE HEIGHTS.

*THESE CLEARANCES ARE TO THE ROADWAY SURFACE OF THE BRIDGE.

3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

MINIMUM FINAL SAG CLEARANCES FROM BRIDGES

Progress Energy

PGN DWG. 09.01–04

NATURE OF SURFACE UNDERNEATH WIRES CONDUCTORS, OR CABLES	INSULATED COMMUNICATION CONDUCTORS AND CABLES; MESSENGERS; GROUNDED GUYS; NEUTRAL CONDUCTORS, (FT.) NESC MINIMUM REQUIRED	SERVICE & SECONDARY CABLE, NON-INSULATED COMMUNICATION CONDUCTORS, 0 TO 750 V (FT.) NESC MINIMUM REQUIRED	OPEN WIRE SERVICE / SECONDARY CONDUCTORS, 0 TO 750 V (FT.) NESC MINIMUM REQUIRED	OVERHEAD PRIMARY CONDUCTORS, OVER 750V TO 22kV (FT.) NESC MINIMUM REQUIRED
1. ROADS, STREETS, AND OTHER AREAS SUBJECT TO TRUCK TRAFFIC	15.5	16	16.5 (SEE NOTE 6)	18.5 (SEE NOTE 6)
2. DRIVEWAYS, PARKING LOTS, AND ALLEYS	15.5	16	16.5	18.5
3. OTHER LAND TRAVERSED BY VEHICLES, SUCH AS CULTIVATED, GRAZING, FOREST, ORCHARD, ETC.	15.5	16	16.5	18.5
4. SPACES AND WAYS SUBJECT TO PEDESTRIANS OR RESTRICTED TRAFFIC ONLY	9.5	12.0	12.5	14.5
5. WATER AREAS NOT SUITABLE FOR SAILBOATING OR WHERE SAILBOATING IS PROHIBITED	14.0	14.5	15.0	17.0
6. WATER AREAS SUITABLE FOR SAILBOATING INCLUDING LAKES, PONDS, RESERVOIRS, TIDAL WATERS, RIVERS, STREAMS, AND CANALS WITH AN UNOBSTRUCTED SURFACE AREA OF:				
A. LESS THAN 20 ACRES	17.5	18.0	18.5	20.5
B. OVER 20 TO 200 ACRES	25.5	26.0	26.5	28.5
C. OVER 200 TO 2000 ACRES	31.5	32.0	32.5	34.5
D. OVER 2000 ACRES	37.5	38.0	38.5	40.5
7. PUBLIC OR PRIVATE LAND AND WATER AREAS POSTED FOR RIGGING OR LAUNCHING SAILBOATS	CLEARANCE ABOVE GROUND SHALL BE 5 FT. GREATER THAN IN 6 ABOVE, FOR THE TYPE OF WATER AREAS SERVED BY THE LAUNCHING SITE.			
WHERE WIRES, CONDUCTORS, OR CABLES RUN ALONG AND WITHIN THE LIMITS OF HIGHWAYS OR OTHER ROAD RIGHT-OF-WAY BUT DO NOT OVERHANG THE ROADWAY				
8. ROADS, STREETS, OR ALLEYS	15.5	16.0	16.5	18.5
9. ROADS IN RURAL DISTRICTS WHERE IT IS UNLIKELY THAT VEHICLES WILL BE CROSSING UNDER THE LINE	13.5	14.0	14.5	16.5

NOTES:

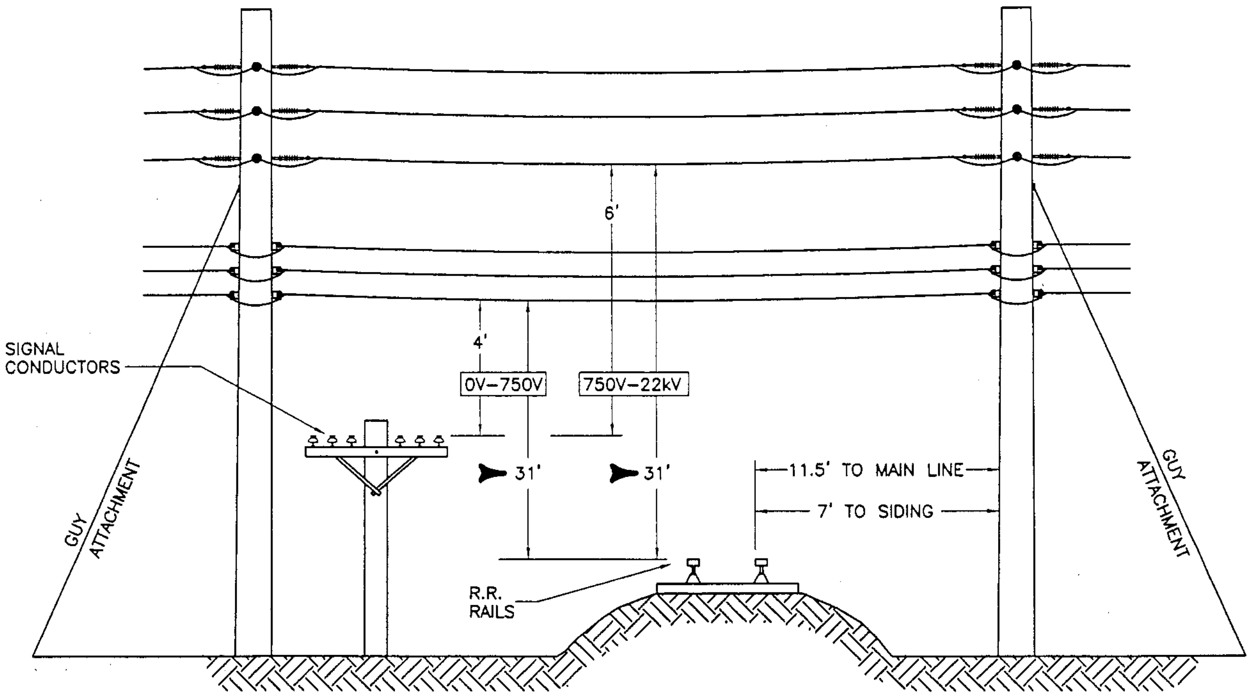
1. THE ABOVE MINIMUM CLEARANCES IN THE TABLE MUST BE MET USING THE FOLLOWING ICE AND WIND CONDUCTOR LOADING. THE VALUES CAN BE FOUND IN THE SAG AND TENSION TABLES FOR EACH COMPANY:
   FLORIDA: CONDUCTOR TEMPERATURE 170°F, NO WIND DISPLACEMENT
   CAROLINAS: USE THE FOLLOWING LOADING CONDITION THAT PRODUCES THE GREATEST SAG.
   -CONDUCTOR TEMPERATURE 120°F AND NO WIND DISPLACEMENT, OR
   -32°F WITH 1/4" ONCE, NO WIND DISPLACEMENT.
2. 8 FT. FOR DOWN GUYS OVER PATHWAYS, 10 FT. OR MORE PREFERRED.
3. SEE NESC RULE 234.I WHERE CONDUCTORS RUN ALONG OR ARE CLOSER THAN 20 FT. HORIZONTALLY TO TRACK RAILS. CONSIDER SWING DUE TO WIND (NESC RULE 234.A.2). ALSO, RAILROADS REQUIRE 50 FT. MINIMUM VERTICAL CLEARANCE WHEN LINE CROSSES RAILS WITHIN 1000 FT. OF RAILROAD, BRIDGE OR TRESTLE.
4. REFER TO NATIONAL ELECTRICAL SAFETY CODE (NESC) RULE 232 FOR MINOR EXCEPTIONS AND REFINEMENTS. ALSO REFER TO SERVICE CLEARANCE DWGS. 09.02-04 & 09.02-05 FOR MORE DETAILS ON SERVICE CLEARANCES.
5. WHERE HEIGHT OF ATTACHMENT TO BUILDING DOES NOT PERMIT TRIPLEX SERVICE DROPS TO MEET THIS VALUE, THE CLEARANCE MAY BE REDUCED TO 12 FT.
6. FOR NORTH CAROLINA AND SOUTH CAROLINA D.O.T. MAINTAINED HIGHWAYS, THE MINIMUM VERTICAL CLEARANCE OF ALL CONDUCTORS AND CABLES MUST BE MAINTAINED AT 18 FT. FOR FLORIDA D.O.T. MAINTAINED HIGHWAYS, A 24 FT. MINIMUM CLEARANCE IS REQUIRED ON ALL LIMITED ACCESS ROADS AND 18 FEET ON ALL OTHER ROADS.
7. FOR BRIDGES, THE MINIMUM VERTICAL CLEARANCE (ABOVE BRIDGE CLEARANCE AS ESTABLISHED BY THE U.S. COAST GUARD) FOR CABLES WITH A NOMINAL SYSTEM VOLTAGE OF 115 KV AND BELOW IS 20 FEET.

REVISED		BY	CK'D	APPR.
3	11/5/03	ROBESON	NUNNERY	WOOLSEY
2	4/4/03	ROBESON	SIMPSON	WOOLSEY
1	10/18/02	CECCONI	ROBESON	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY

STANDARD FINAL SAG CLEARANCES

Progress Energy

PGN DWG. 09.02-01



NOTES:

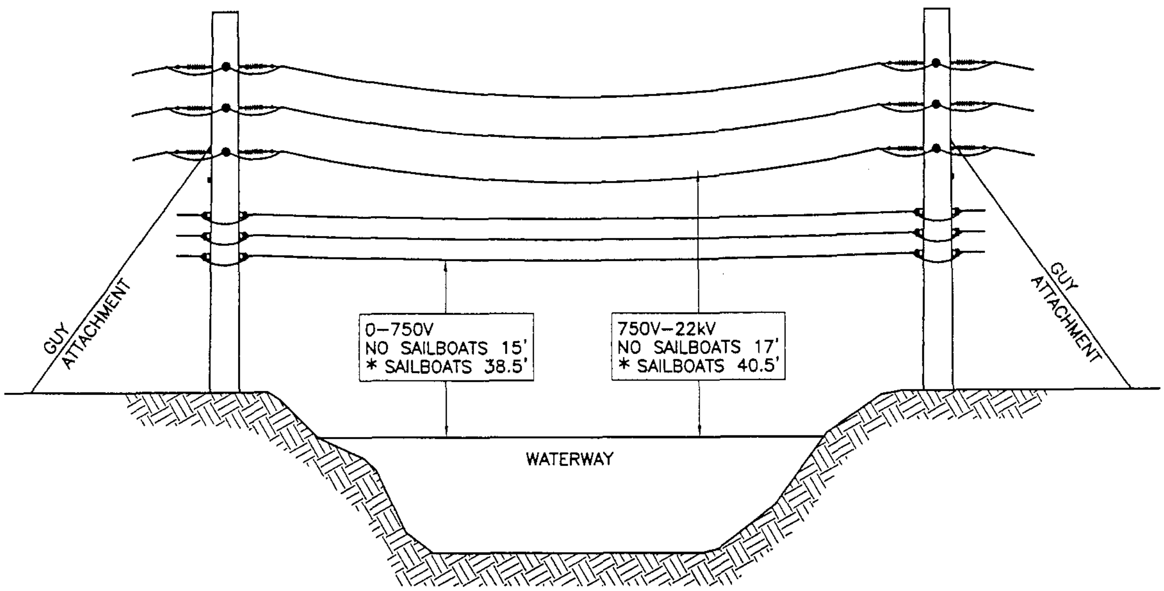
1. ABOVE 22,000 VOLTS, CLEARANCE SHALL BE INCREASED BY 0.4 INCH FOR EACH 1,000 VOLTS IN EXCESS.
2. LOCAL RAILROAD(S) MUST BE CONTACTED FOR VERIFICATION OF HORIZONTAL CLEARANCES.

3				
2				
1	4/3/03	ROBESON	SIMPSON	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

MINIMUM FINAL SAG CLEARANCES
RAILROAD AND SIGNAL CROSSINGS

Progress Energy

PGN DWG. 09.02–02



DOUBLE DEADENDS ARE REQUIRED FOR ANY WATERWAY CROSSING.

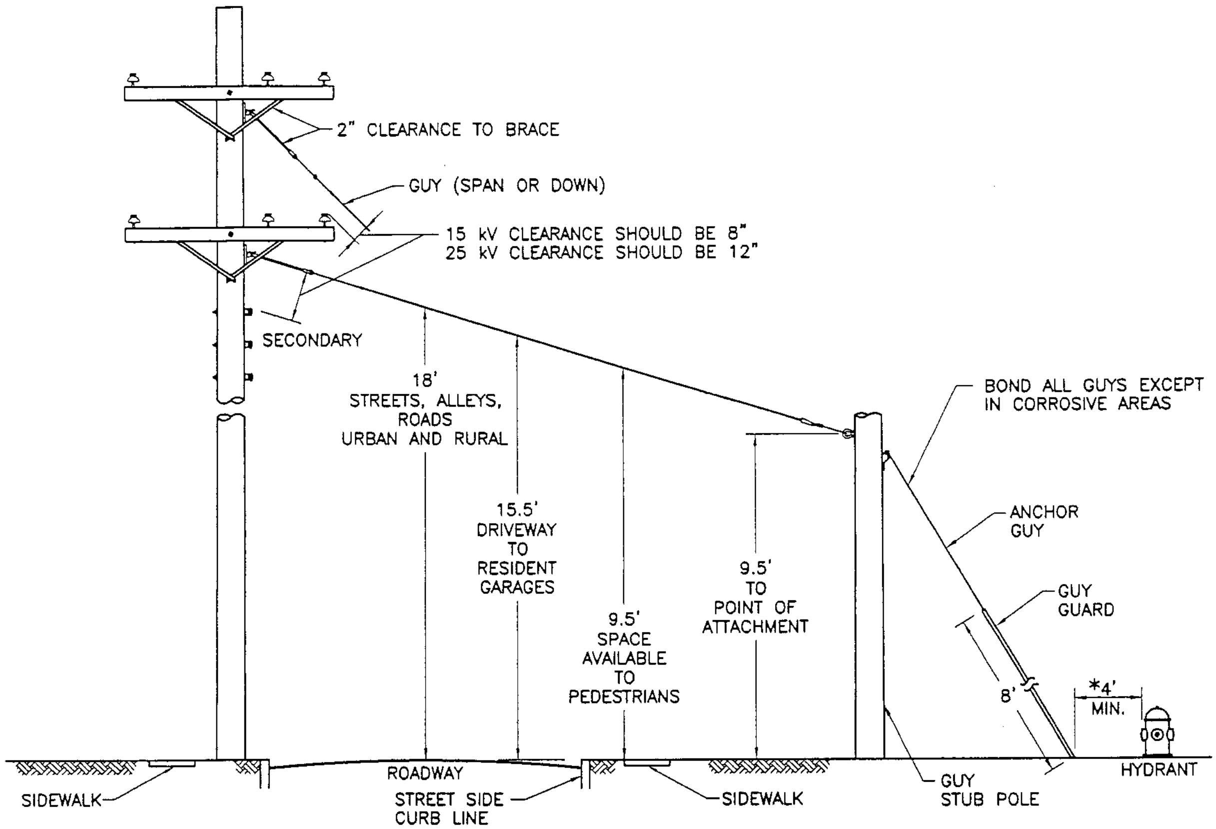
SPECIAL CROSSING PERMIT CLEARANCES SHALL TAKE PRECEDENCE OVER THESE CLEARANCES.

* WHERE THE US ARMY CORPS OF ENGINEERS, OR THE STATE, OR SURROGATE THEREOF HAS ISSUED A CROSSING PERMIT, CLEARANCES OF THAT PERMIT SHALL GOVERN.

* THESE SAILBOAT CLEARANCES OVER NAVIGABLE WATERS PROVIDED NO BRIDGE CROSSINGS ARE ALSO INVOLVED. WHERE THERE IS ALSO A BRIDGE CROSSING, THESE CORPS OF ENGINEERS' CLEARANCES MUST BE MAINTAINED OVER THE BRIDGE RATHER THAN WATER.

<u>NOTE:</u> CONSULT ENGINEERING FOR MANUAL GUYING REQUIREMENTS.

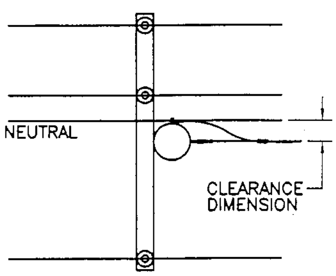
3					MINIMUM FINAL SAG CLEARANCES OVER WATERWAYS	Progress Energy
2						
1						
0	7/24/02	HOYT	ROBESON	WOOLSEY		PGN DWG. 09.02–06
REVISED		BY	CK'D	APPR.		



* WHERE CONDITIONS DO NOT PERMIT A CLEARANCE OF NOT LESS THAN 3' IS ALLOWED.

MINIMUM CLEARANCE SPECIFICATION FOR THE INSTALLATION OF GUYS ON THE COMPANY'S DISTRIBUTION SYSTEM

1. GUY CLEARANCES FROM SUPPLY CONDUCTORS ATTACHED TO THE SAME STRUCTURE



TYPE OF GUY	** MINIMUM CLEARANCES IN ALL DIRECTIONS TO CONDUCTORS		
	TO SECONDARY	15 kV	25 kV
SPAN GUY PARALLEL TO SUPPLY CONDUCTORS	12"	15"	18"
ANCHOR GUYS PARALLEL TO SUPPLY CONDUCTORS	6"***	8"	12"
OTHER GUYS (i.e. SPAN GUY NOT PARALLEL)	6"	9"	12"

** USE OF A GUY INSULATOR DOES NOT REDUCE THIS MINIMUM CLEARANCE REQUIREMENT EXCEPT WHERE DOWN GUYS ARE INSULATED FROM SECONDARIES USING SECONDARY SPOOLS.

*** 6" CLEARANCE FROM MULTIPLEX TO ANCHOR GUYS IF PRACTICAL. IN NO CASE SHALL IT BE LESS THAN 3".

NOTE: THE ABOVE CLEARANCES ARE BETWEEN THE CONDUCTOR AND THE GUY. DOWN GUYS ATTACHED DIRECTLY TO THRU BOLTS ON OPPOSITE SIDE OF POLE FROM DEAD END OR VERTICAL ANGLE ASSEMBLIES WILL MEET THE ABOVE CLEARANCE REQUIREMENTS.

2. GUY CLEARANCES TO BUILDINGS AND OTHER STRUCTURES, VERTICAL GROUND CLEARANCES, CROSSING CLEARANCES, AND CLEARANCES TO CONDUCTORS ON DIFFERENT SUPPORTS ARE COVERED IN CAROLINAS **SECTION 2** OR FLORIDA **SECTION 2.**

3. FOR MINOR EXCEPTIONS, SEE TABLES 232-1, 235-6, AND 239-2 OF THE NESC.

NOTES:

1. THE USE OF GUY INSULATORS DOES NOT NEGATE OR REDUCE ANY OF THE DIMENSIONS ON THIS PAGE.

3					MINIMUM GUY CLEARANCE	Progress Energy
2						
1	3/4/04	ROBESON	NUNNERY	WOOLSEY		PGN DWG. 09.02-07
0	7/24/02	HOYT	ROBESON	WOOLSEY		
REVISED		BY	CK'D	APPR.		

LOWER LEVEL	UPPER LEVEL				
	COMMUNICATION GUYS, SPAN WIRES AND MESSENGERS, COMMUNICATION CONDUCTORS AND CABLES (FT.)	EFFECTIVELY GROUNDED GUYS, SPAN WIRES, NEUTRAL CONDUCTORS AND LIGHTNING PROTECTION WIRES (FT.)	MULTIPLEX SECONDARY AND ALL SERVICES	OPEN WIRE SECONDARY, 0–750V	OPEN SUPPLY CONDUCTORS OVER 750V TO 22 kV (FT.)
EFFECTIVELY GROUNDED GUYS, SPAN WIRES, NEUTRAL CONDUCTORS AND LIGHTNING PROTECTION WIRES	2	2	2	2	4 SEE NOTE 5
COMMUNICATION GUYS, SPAN WIRES AND MESSENGERS; COMMUNICATION CONDUCTORS AND CABLES	2	2	2	4	5 SEE NOTE 3
MULTIPLEX SECONDARY AND ALL SERVICES	2	2	2	4 SEE NOTE 5	4 SEE NOTE 5
OPEN WIRE SECONDARY, 0–750 V	4	2	2	2	4 SEE NOTE 5
OPEN SUPPLY CONDUCTORS, 750 V TO 22 kV	6 SEE NOTE 3, 6	2	4 SEE NOTE 6	4 SEE NOTE 5	4 SEE NOTE 5

NOTES:

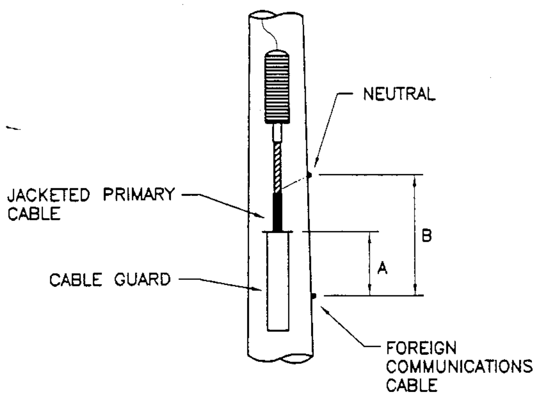
1. NO VERTICAL CLEARANCE IS REQUIRED BETWEEN WIRES ELECTRICALLY INTERCONNECTED AT THE CROSSING.
2. THE ABOVE CLEARANCES ARE FOR ANY LOCATION WHERE THE SUBJECT WIRES CROSS OR COULD BE CLOSEST TOGETHER, REGARDLESS OF SPAN LENGTHS. REFER TO NESC RULE 233.A.1 FOR APPLICABLE WIRE LOADING CONDITIONS TO USE IN DETERMINING WIRE POSITIONS AT CROSSING OR CLOSEST POINT.
3. MAY BE 4 FT. WHERE CROSSING IS MORE THAN 6 FT. HORIZONTALLY FROM A COMMUNICATION STRUCTURE AND VOLTAGE IS LESS THAN 8.7 kV PHASE–TO–GROUND.
4. VOLTAGES ARE PHASE–TO–GROUND FOR EFFECTIVELY GROUNDED WYE AND SINGLE–PHASE SYSTEMS, AND PHASE–TO–PHASE FOR ALL OTHER SYSTEMS.
5. PROGRESS ENERGY PREFERRED CLEARANCES ARE SHOWN.
6. IN GENERAL, CROSSINGS OF LOWER VOLTAGE WIRES ABOVE HIGHER VOLTAGE WIRES IS NOT RECOMMENDED. HIGHER VOLTAGE WIRES SHOULD BE POSITIONED ABOVE LOWER VOLTAGE WIRES WHENEVER POSSIBLE.
7. WHEN CONTEMPLATING UNDERBUILDING BENEATH PROGRESS ENERGY TRANSMISSION LINES, CONTACT THE TRANSMISSION LINE ENGINEERING UNIT.
8. FOR EXCEPTIONS AND REFINEMENTS, REFER TO NATIONAL ELECTRICAL SAFETY CODE RULE 233.
9. THE AREA BETWEEN THE NEUTRAL AND PRIMARY ON THE POLE AND IN THE SPAN IS NOT TO BE VIOLATED BY FOREIGN CONDUCTORS OR CABLES.

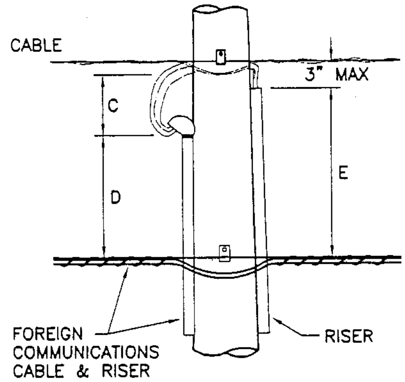
REVISED		BY	CK'D	APPR.
3				
2				
1	12/1/03	NUNNERY	NUNNERY	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY

MINIMUM FINAL SAG WIRE CROSSING CLEARANCES, VERTICAL

Progress Energy

PGN DWG. 09.03–01





DIMENSION (LETTER)	PREFERRED MINIMUM
A	*40 INCHES
B	40 INCHES
C	➤ 16 INCHES
D	➤ 40 INCHES
E	40 INCHES

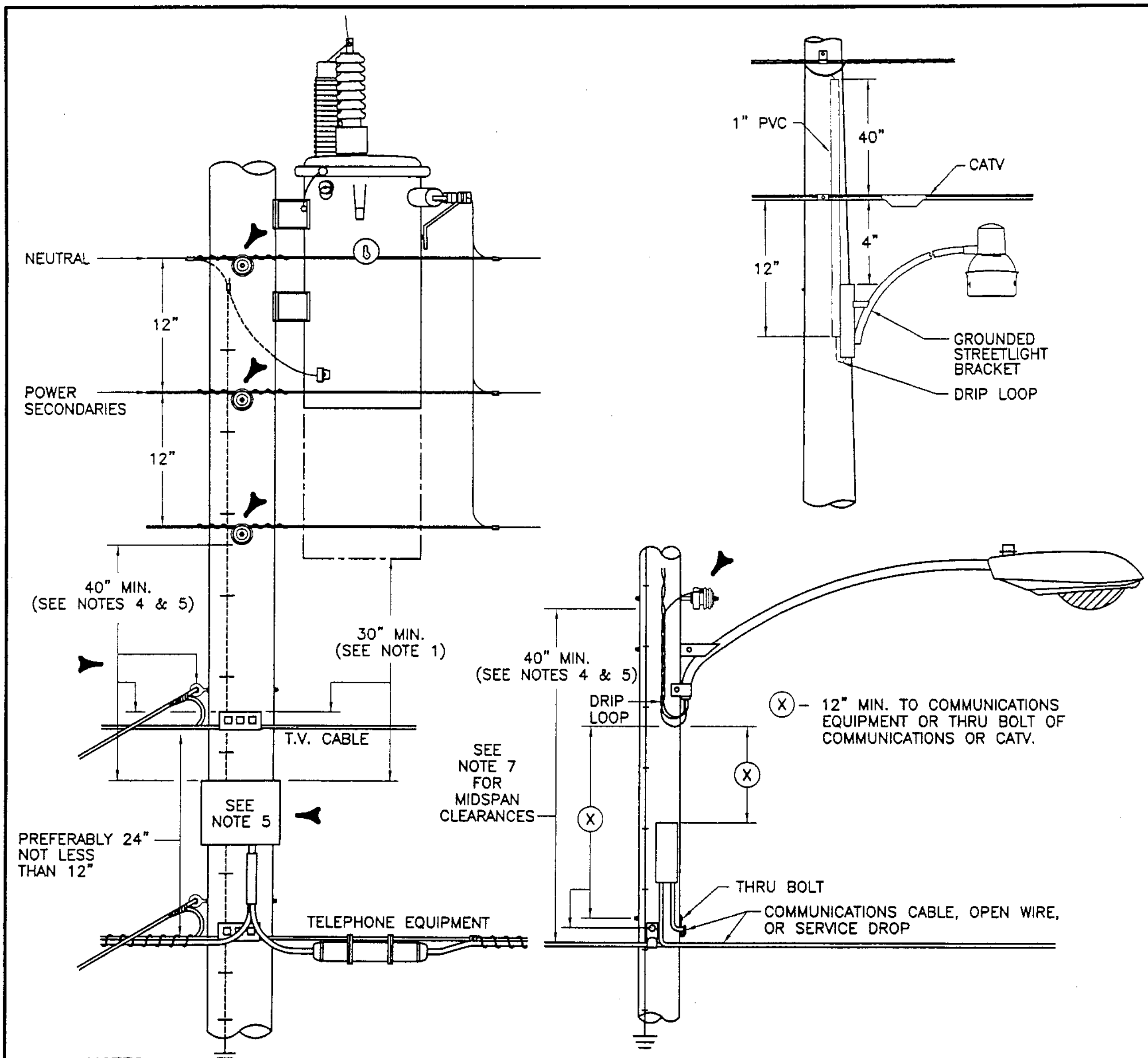
*40 INCH CLEARANCE REQUIRED. ONLY FOR METALLIC CONDUCTOR OR U-GUARD NOT BONDED TO COMMUNICATIONS MESSENGER. SEE OH-UG TRANSITION SECTION FOR NON-METALLIC CONDUIT OR U-GUARD CLEARANCE.

REVISED		BY	CK'D	APPR.
3				
2				
1	9/12/02	HOYT	ROBESON	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY

SEPARATION AT POLE
UNDERGROUND RISERS

Progress Energy

PGN DWG. 09.03-02



NOTES:

1. THIS DIMENSION OF NOT LESS THAN 30" APPLIES BETWEEN CONDUCTORS AND NON-CURRENT CARRYING PARTS OF EQUIPMENT THAT ARE EFFECTIVELY GROUNDED.

2. WHERE T.V. CABLE DOES NOT EXIST, MINIMUM DIMENSIONS APPLY TO TELEPHONE EQUIPMENT.

3. WHERE POWER AND COMMUNICATION LINES ARE BETWEEN THE SAME POLES, THESE CLEARANCES MAY BE INCREASED IF THE COMMUNICATION CONDUCTOR HAS LESS SAG THAN THE POWER CONDUCTORS SO AS TO PROVIDE A MINIMUM OF 30" SEPARATION IN THE SPAN. SEE CAROLINAS DWG. 04.04-08.

4. A 40" MINIMUM CLEARANCE IS REQUIRED BETWEEN CLOSEST METAL PARTS OF COMMUNICATION AND UNGROUNDED POWER EQUIPMENT.

5. ONLY TELEPHONE TERMINAL BOXES AND AMPLIFIERS PERMITTED ABOVE COMMUNICATION CABLES.

6. THE CLEARANCES ON THIS DRAWING APPLY TO BOTH GROUNDED METALLIC COMMUNICATION CABLES AND DIELECTRIC FIBER OPTIC CABLES.

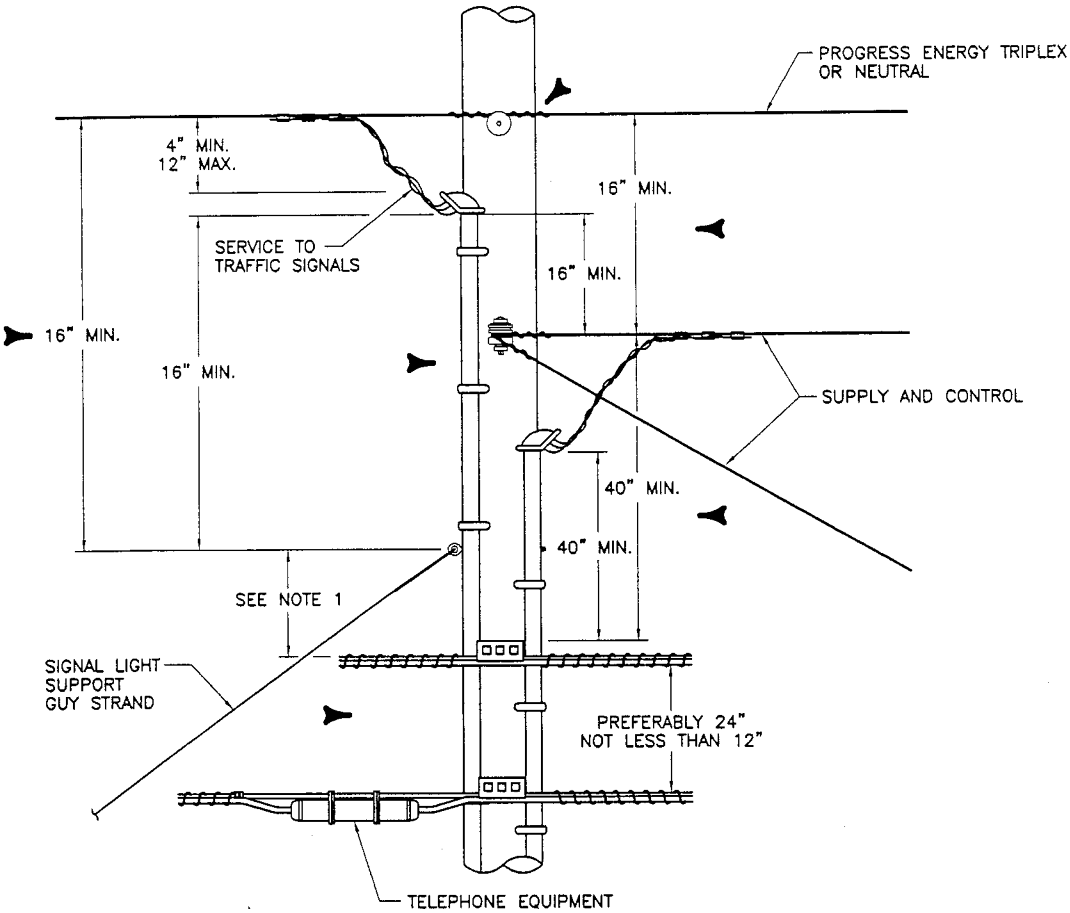
7. MIDSPAN CLEARANCE BETWEEN COMMUNICATION AND SUPPLY NEUTRAL IS TO BE A MINIMUM OF 12". MIDSPAN CLEARANCE TO SUPPLY CONDUCTOR IS TO BE A MINIMUM OF 30".

3	8/30/04	ROBESON	NUNNERY	SPRINGER
2	6/4/04	NUNNERY	NUNNERY	WOOLSEY
1	11/03/03	ROBESON	NUNNERY	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

JOINT USE CONSTRUCTION

Progress Energy

PGN DWG. 09.04-02



FRONT VIEW

NOTES:

1. FOR EFFECTIVELY BONDED SPAN WIRES, THIS CLEARANCE MAY BE 4". FOR UNBONDED SPAN WIRES, THE CLEARANCE MUST BE 20".

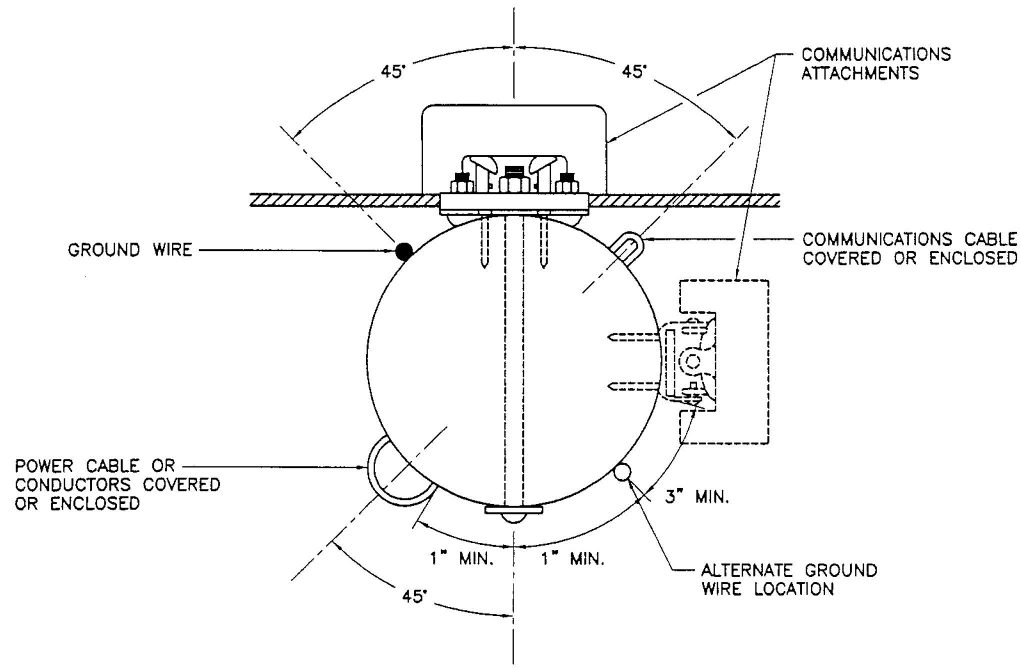
3				
2				
1	4/1/04	ROBESON	NUNNERY	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

JOINT USE CONSTRUCTION
TRAFFIC SIGNAL SUPPORT AND
POWER OPERATING CIRCUIT CLEARANCES

Progress Energy

PGN DWG. 09.04-03

LOCATION OF VERTICAL RUNS

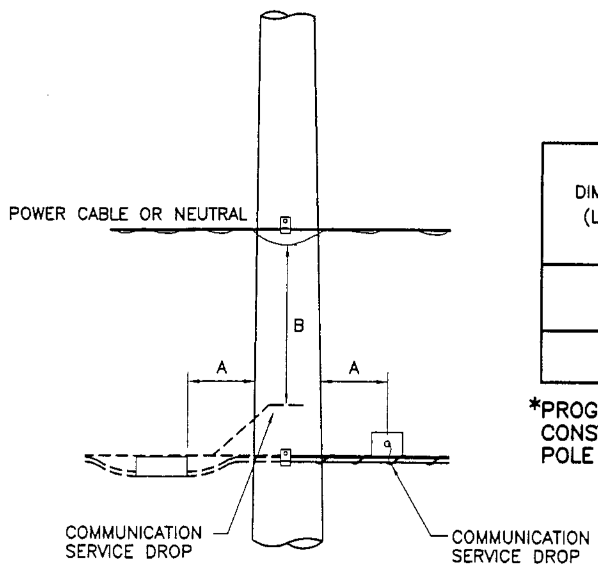


STREET SIDE

NOTES:

1. DO NOT LOCATE GROUNDED EQUIPMENT LESS THAN 1" FROM A BOLT OR STAPLE.

FOREIGN SERVICE DROPS



DIMENSION (LETTER)	NESC REQUIREMENT MINIMUM	PROGRESS ENERGY PREFERRED MINIMUM	NESC APPLICABLE REFERENCE SECTION
A	ALLOWED ON POLE	*12 INCHES	239 F2
B	40 INCHES	40 INCHES	239 F2

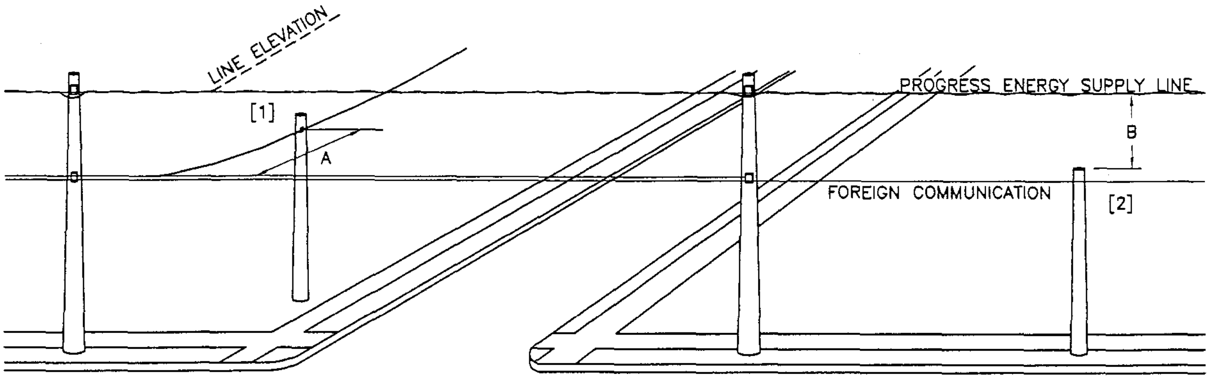
*PROGRESS ENERGY REQUIREMENT – NOT OPTIONAL ON NEW CONSTRUCTION – THIS CLEARANCE TO FACILITATE FUTURE POLE CHANGE OUT AND CLIMBING SPACE.

3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

LOCATION OF VERTICAL RUNS & FOREIGN SERVICE DROPS

Progress Energy

PGN DWG. 09.04–04



DIMENSION (LETTER)	SITUATION	NEC REQUIRED MINIMUM
A	VERTICAL DISTANCE FROM TOP OF POLE [1] TO LEVEL OF PRIMARY OR OPEN WIRE SECONDARY IS 5 FEET OR LESS	5 FEET
	VERTICAL DISTANCE FROM TOP OF POLE [1] TO LEVEL OF THE PRIMARY OR OPEN WIRE SECONDARY IS MORE THAN 5 FEET	3 FEET
B	POLE [2] FOREIGN OWNED AND PROGRESS ENERGY SUPPLY LINE VOLTAGE OVER 22kV ø–N	5.5 FEET
	POLE [2] FOREIGN OWNED AND PROGRESS ENERGY SUPPLY LINE VOLTAGE UNDER 22kV ø–N	4.5 FEET
	POLE [2] OWNED BY PROGRESS ENERGY VOLTAGE <22kV	2.5 FEET
	POLE [2] FOREIGN OR PROGRESS ENERGY OWNED AND PROGRESS ENERGY SUPPLY LINE CLASSIFIED GUY, NEUTRAL OR SECONDARY CABLE, <300V TO GROUND	2 FEET

NOTE: CHART BASED ON CLEARANCES DEFINED IN SECTION 234 OF NESC.

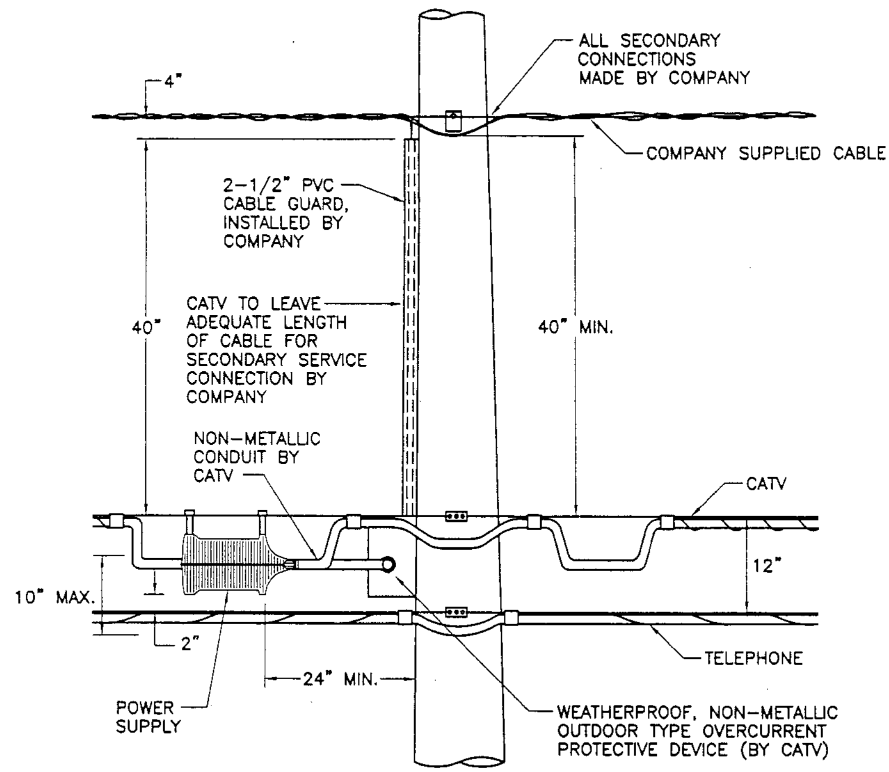
3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

FOREIGN POLE CLEARANCE AT FINAL SAG

Progress Energy

PGN DWG. 09.04–05

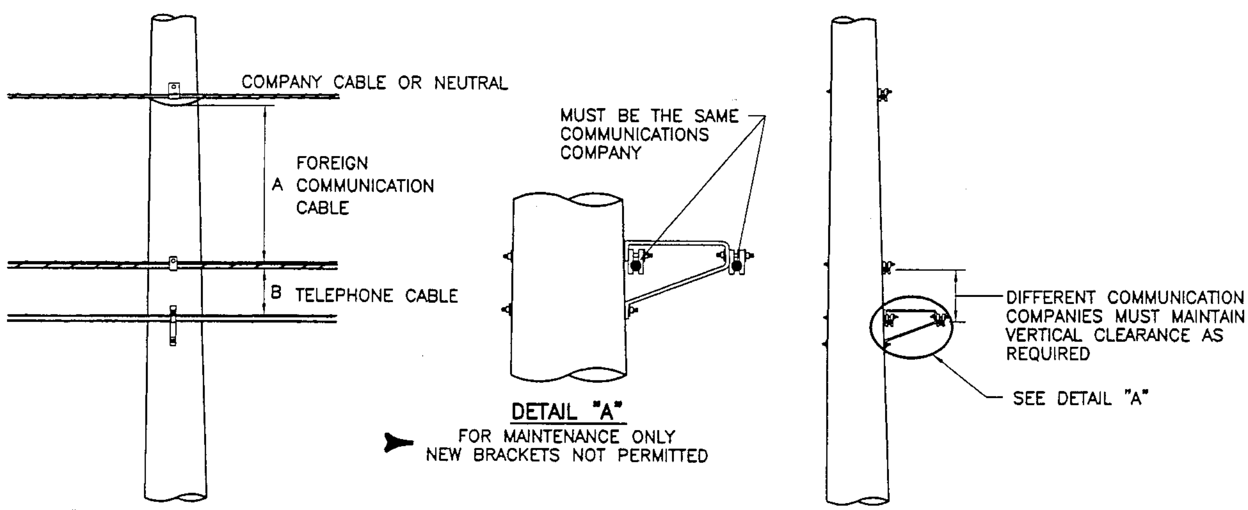
STRAND MOUNTED POWER SUPPLY



MTNC ONLY

DIMENSION (LETTER)	NESC REQUIREMENT MINIMUM	COMPANY PREFERRED MINIMUM	NESC APPLICABLE REFERENCE SECTION
A	40 INCHES	40 INCHES	235 C1
B	3 INCHES	*12 INCHES	239 F1

* COMPANY REQUIREMENT – NOT OPTIONAL



NOTES:

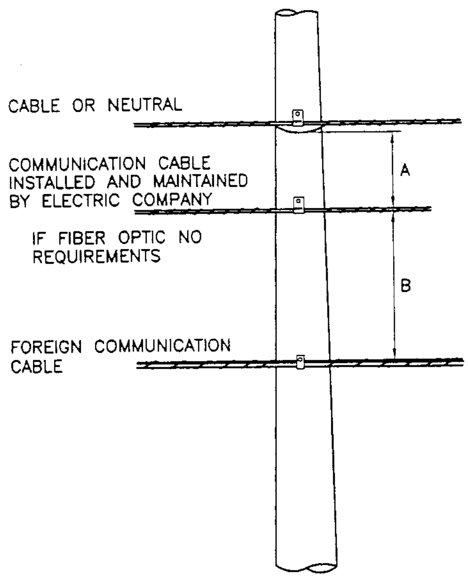
1. EXTENSION BRACKET MUST BE MOUNTED ON EXISTING CABLE SIDE ONLY.
2. EXTENSION BRACKET MAY BE UTILIZED IN TANGENT SITUATIONS ONLY, NOT APPROVED FOR DEAD-END POLES.
3. EXTENSION BRACKET MANUFACTURER'S SPECIFICATIONS MUST RECEIVE COMPANY APPROVAL PRIOR TO UTILIZATION.

REVISED		BY	CK'D	APPR.
3				
2	8/12/04	ROBESON	NUNNERY	SPRINGER
1	2/3/04	ROBESON	NUNNERY	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY

STRAND MOUNTED POWER SUPPLY & FOREIGN COMMUNICATION CABLE EXTENSION BRACKET

Progress Energy

PGN DWG. 09.04–06



DIMENSION (LETTER)	NESC REQUIREMENT MINIMUM
A	*16 INCHES
B	40 INCHES

* NO CLEARANCE IS SPECIFIED BETWEEN NEUTRAL CONDUCTORS AND INSULATED COMMUNICATION CABLES LOCATED IN THE SUPPLY SPACE AND SUPPORTED BY AN EFFECTIVELY GROUNDED MESSENGER.

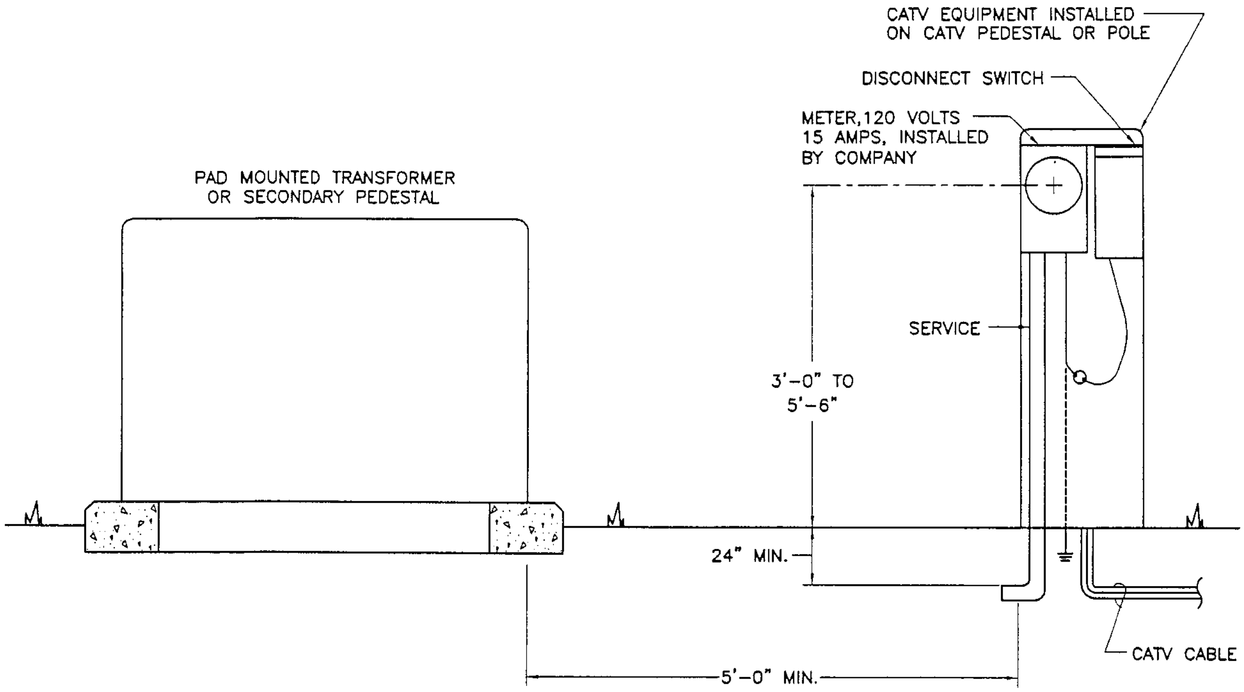
NO CLEARANCE IS SPECIFIED BETWEEN SUPPLY CONDUCTORS AND FIBER-OPTIC SUPPLY CABLES THAT ARE COMPLETELY DIELECTRIC (INCLUDING THE MESSENGER).

REVISED		BY	CK'D	APPR.
3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY

COMMUNICATION CABLE INSTALLED AND MAINTAINED BY ELECTRIC COMPANY

Progress Energy

PGN DWG. 09.04-09



NOTES:

1. COMPANY PROVIDE AND INSTALL:

   A. UNDERGROUND SERVICE FROM TRANSFORMER OR PEDESTAL TO METER SOCKET.
   B. 30 AMP, 240 VOLT METER

2. CATV COMPANY PROVIDE AND INSTALL:

   A. METER POLE OR PEDESTAL-120 VOLT
   B. SERVICE EQUIPMENT BEYOND METER (IF REQUIRED)
   C. SERVICE EQUIPMENT GROUND
   D. METER SOCKET, 100 AMP

3. ALL EQUIPMENT AND ATTACHMENTS MUST BE EFFECTIVELY GROUNDED.

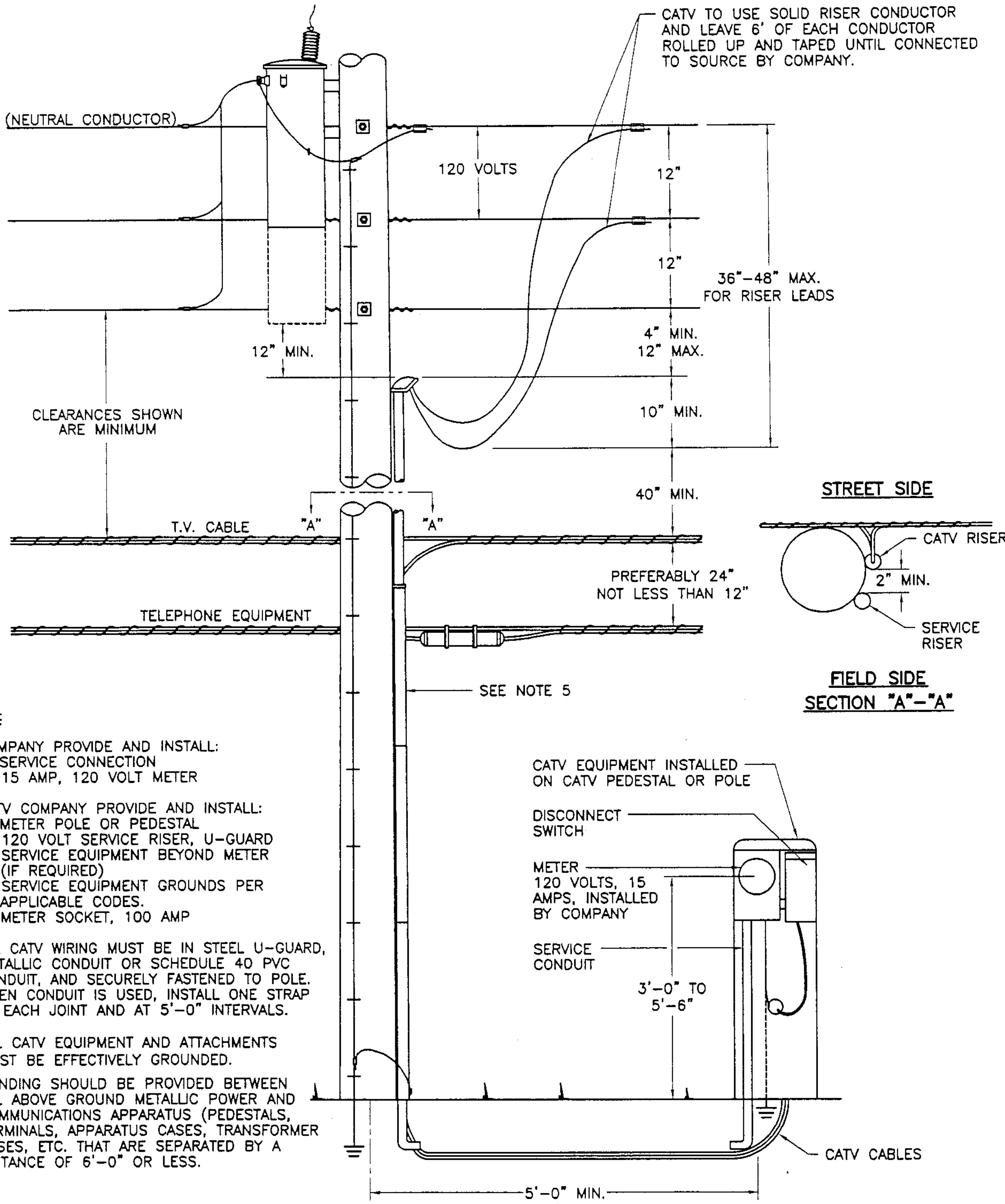
4. BONDING SHOULD BE PROVIDED BETWEEN ALL ABOVE GROUND METALLIC POWER AND COMMUNICATIONS APPARATUS (PEDESTALS, TERMINALS, APPARATUS CASES, TRANSFORMER CASES, ETC.) THAT ARE SEPARATED BY A DISTANCE OF 6' OR LESS.

3				
2				
1				
0	9/1/04	ROBESON	NUNNERY	SPRINGER
REVISED		BY	CK'D	APPR.

120 VOLT UNDERGROUND SERVICE-CATV (PADMOUNTED TRANSFORMER OR SECONDARY PEDESTAL)

Progress Energy

CAR CAROLINAS DWG. 09.04-12



NOTES:

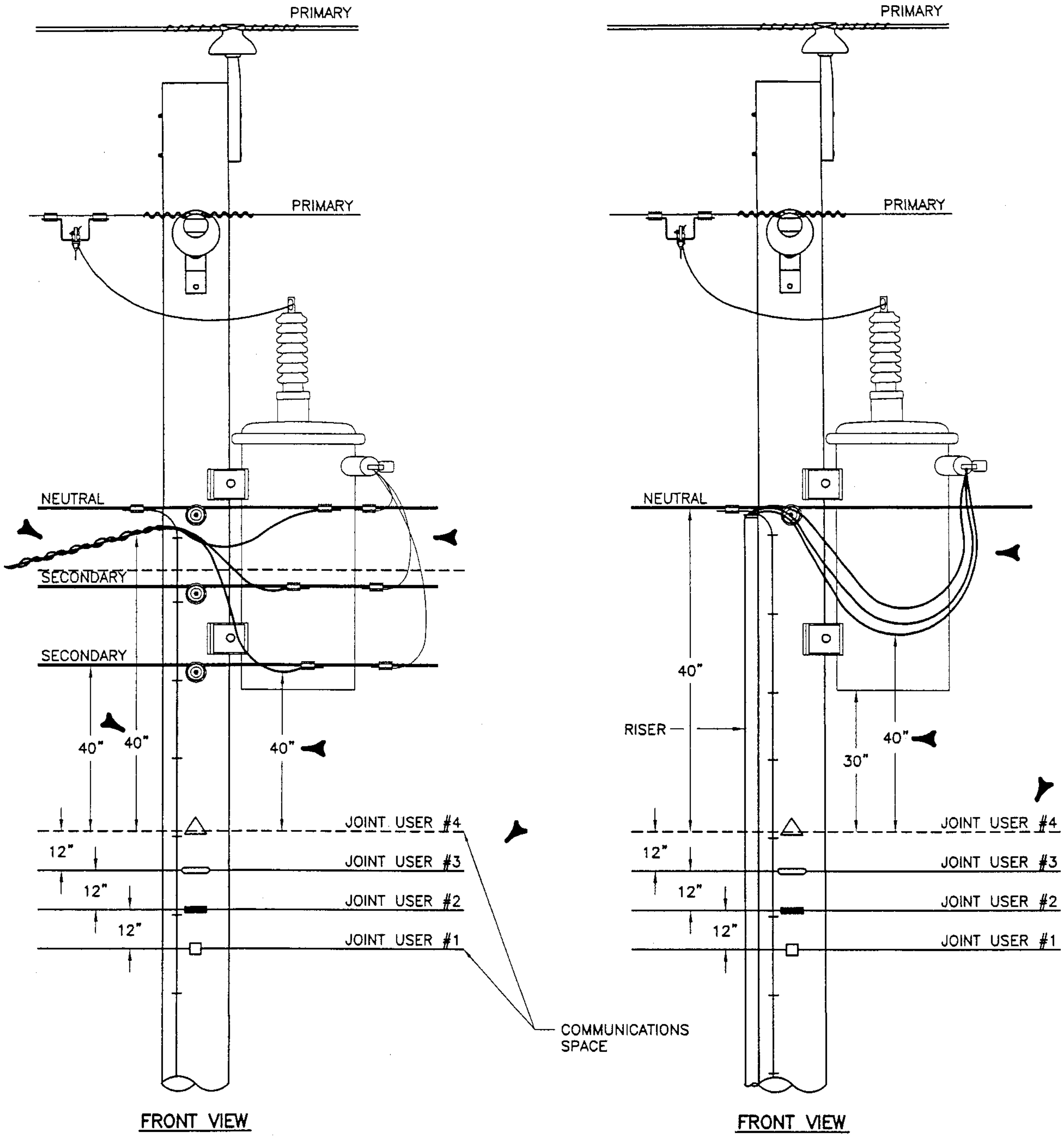
1. COMPANY PROVIDE AND INSTALL:
   A. SERVICE CONNECTION
   B. 15 AMP, 120 VOLT METER
2. CATV COMPANY PROVIDE AND INSTALL:
   A. METER POLE OR PEDESTAL
   B. 120 VOLT SERVICE RISER, U-GUARD
   C. SERVICE EQUIPMENT BEYOND METER (IF REQUIRED)
   D. SERVICE EQUIPMENT GROUNDS PER APPLICABLE CODES.
   E. METER SOCKET, 100 AMP
3. ALL CATV WIRING MUST BE IN STEEL U-GUARD, METALLIC CONDUIT OR SCHEDULE 40 PVC CONDUIT, AND SECURELY FASTENED TO POLE. WHEN CONDUIT IS USED, INSTALL ONE STRAP AT EACH JOINT AND AT 5'–0" INTERVALS.
4. ALL CATV EQUIPMENT AND ATTACHMENTS MUST BE EFFECTIVELY GROUNDED.
5. BONDING SHOULD BE PROVIDED BETWEEN ALL ABOVE GROUND METALLIC POWER AND COMMUNICATIONS APPARATUS (PEDESTALS, TERMINALS, APPARATUS CASES, TRANSFORMER CASES, ETC. THAT ARE SEPARATED BY A DISTANCE OF 6'–0" OR LESS.

3				
2				
1				
0	9/1/04	ROBESON	NUNNERY	SPRINGER
REVISED		BY	CK'D	APPR.

CATV INSTALLATION
120 VOLT UNDERGROUND SERVICE
(PREFERRED INSTALLATION)

Progress Energy

CAR CAROLINAS DWG. 09.04–13



ADDITIONAL MIN. CLEARANCES AT THE POLE	
LIGHT BRACKET	12"
SPAN GUY	12"
DOWN GUY	12"

MINIMUM CLEARANCES MIDSPAN	
PRIMARY	30"
NEUTRAL	30"
SECONDARY	30"
SERVICE DROP	30"
SPAN GUY	12"

NOTES:

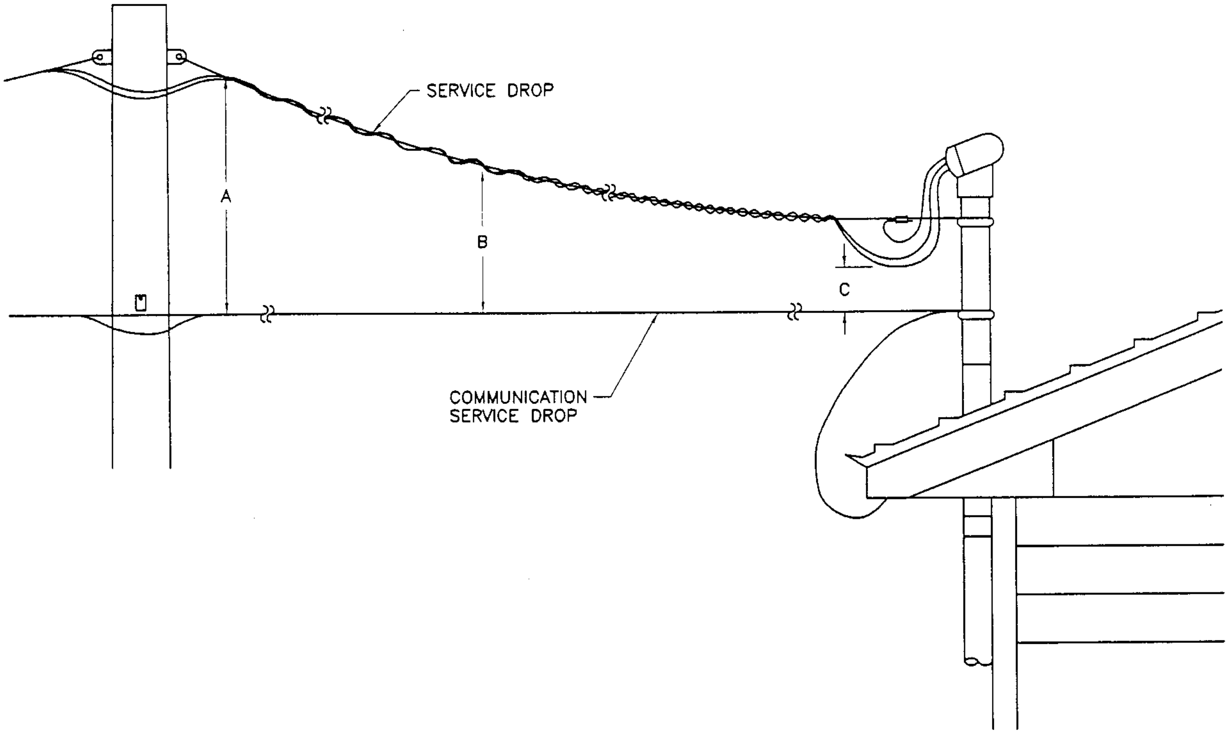
1. PROGRESS ENERGY FIBER OPTIC CABLE LOCATED INSIDE THE SUPPLY SPACE MUST HAVE 40" MINIMUM CLEARANCE.

REVISED		BY	CK'D	APPR.
3				
2	8/26/04	ROBESON	NUNNERY	SPRINGER
1	4/27/04	BUNCH	NUNNERY	WOOLSEY
0	2/26/03	ROBESON	NUNNERY	WOOLSEY

CLEARANCE REQUIREMENTS

Progress Energy

PGN DWG. 09.04-14



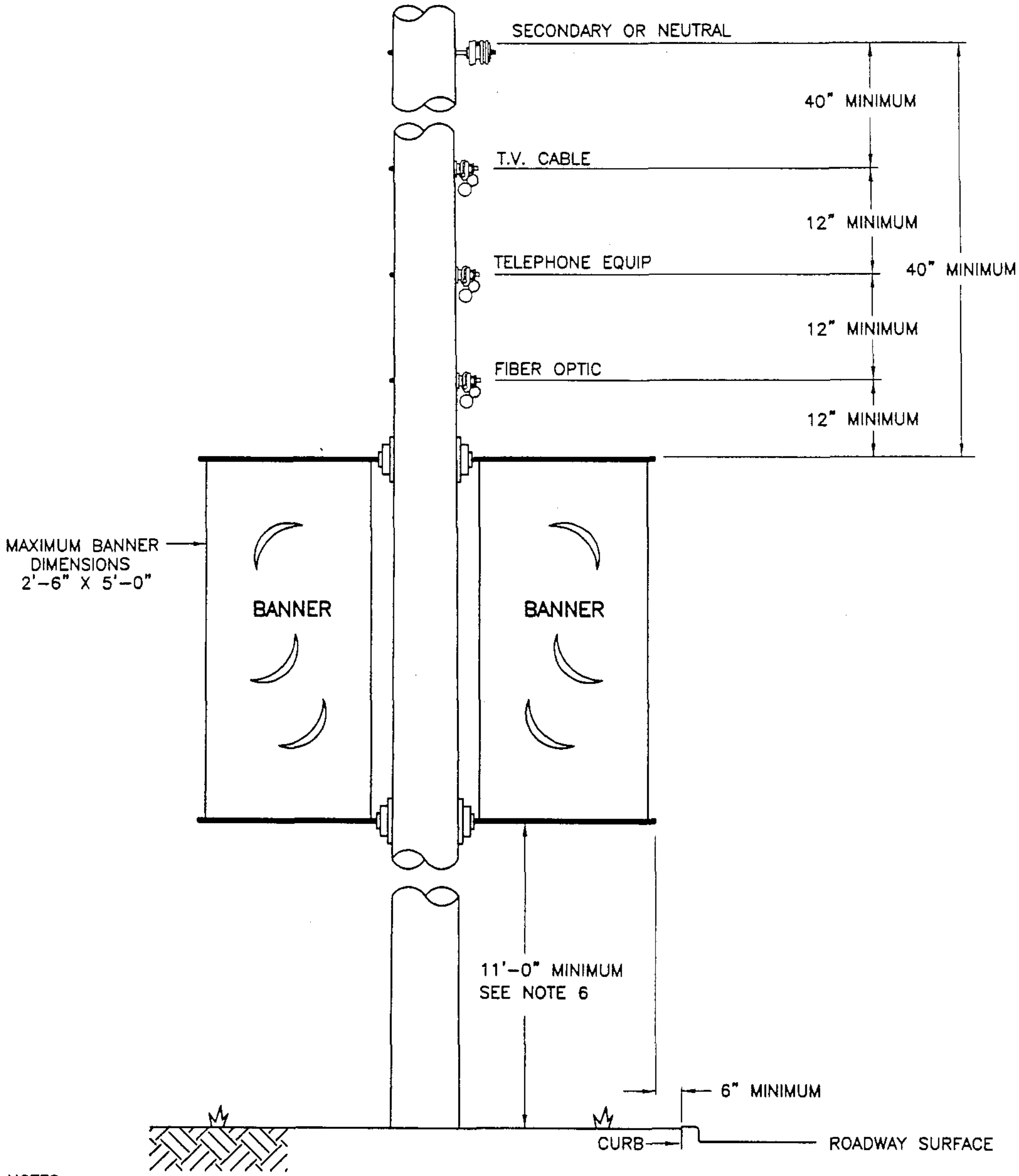
DIMENSION (LETTER)	*NESC MINIMUM REQUIREMENT	PROGRESS ENERGY PREFERRED MINIMUM REQUIREMENT	NESC APPLICABLE REFERENCE SECTION
A	40"	40"	235-5
B	12"	12"	235 C1 EXCEPTION 3
C	12"	12"	235 C1 EXCEPTION 3

3			
2			
1			
0 8/31/04	ROBESON	NUNNERY	SPRINGER
REVISED	BY	CK'D	APPR.

SERVICE DROP CLEARANCE
TO COMMUNICATION CABLES

Progress Energy

PGN DWG. 09.04-16



NOTES:

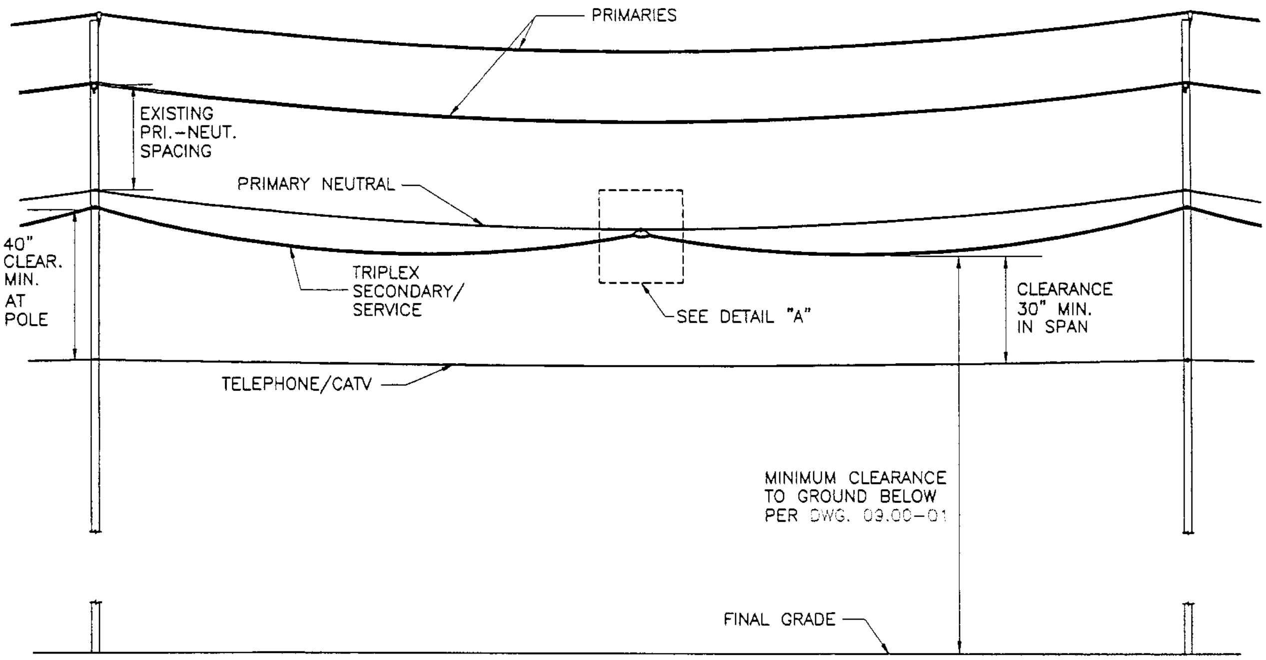
1. POLE MUST BE INSPECTED FOR STRUCTURAL INTEGRITY PRIOR TO BANNER ATTACHMENT.
2. BANNERS SHOULD NOT BE ATTACHED TO POLES WITH YELLOW OR WHITE INSPECTION TAGS.
3. BANNER AGREEMENT MUST BE COMPLETED PRIOR TO BANNER ATTACHMENT TO COMPANY DISTRIBUTION POLES.
4. BANNERS ATTACHED TO POLES SHOULD BE PERPENDICULAR TO POWER LINES.
5. SEE SECTION 09 FOR ADDITIONAL CLEARANCES.
6. BANNERS THAT EXTEND OVER ROADWAY SHOULD HAVE 18'-0" VERTICAL CLEARANCE FROM ROAD SURFACE.
7. THE BANNERS MUST HAVE HALF CIRCLE AIR POCKETS CUT INTO THEM.
8. COMPANY SHALL NOT BE RESPONSIBLE FOR REMOVING AND/OR REBANDING TOWN'S BANNERS WHENEVER THE POLES ARE REPLACED.
9. CUSTOMER AGREES TO INDEMNIFY, DEFEND, AND SAVE HARMLESS COMPANY FROM ALL CLAIMS, LOSSES, INJURIES, DAMAGES AND OTHER DEMANDS MADE AGAINST IT AND ALL COSTS AND EXPENSES INCURRED BY COMPANY ARISING OUT OF THIS AGREEMENT UNLESS SAME SHALL HAVE RESULTED FROM SOLE NEGLIGENCE OF COMPANY.
10. SEE DWGS. 30.01-04 AND 30.01-05 FOR BANNER ATTACHMENTS TO STREET LIGHT POLES.

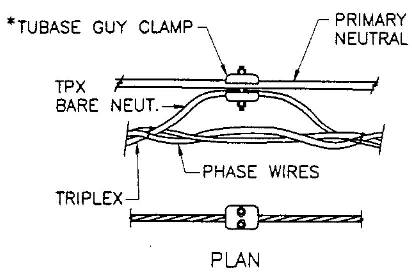
3				
2				
1				
0	9/1/04	ROBESON	NUNNERY	SPRINGER
REVISED		BY	CK'D	APPR.

BANNER INSTALLATION ON DISTRIBUTION POLES

Progress Energy

CAR CAROLINAS DWG. 09.04-25





DETAIL "A"
(SEE CHART FOR SIZE & CN)

PRIMARY NEUT. SIZE	TUBASE GUY CLAMP CN	TUBASE GUY CLAMP SIZE
4/0 ACSR	10045714	7/16"
1/0 ACSR	10045706	3/8"
#2 ACSR	10045607	5/16"

NOTES:

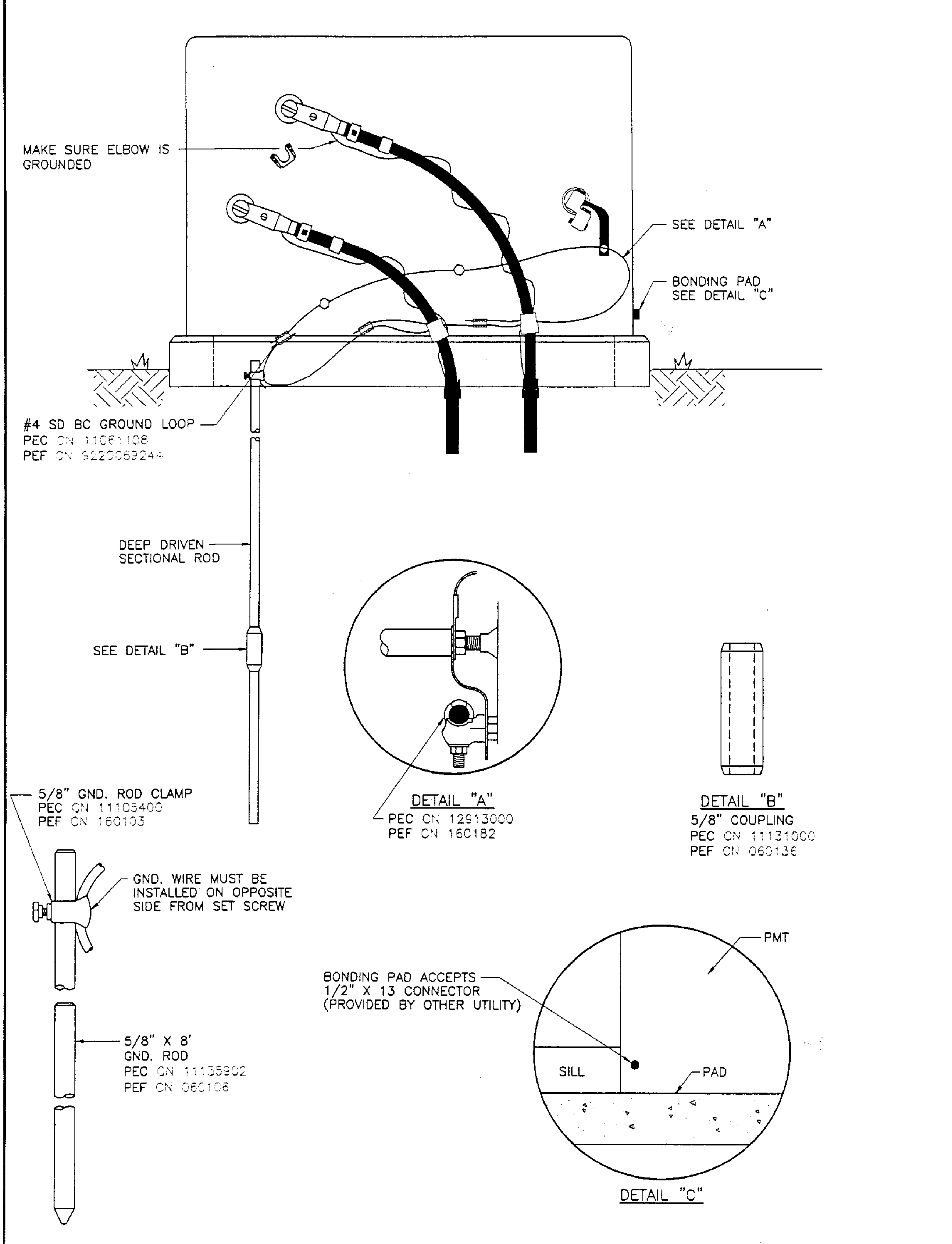
1. THE PREFERRED METHOD IS TO INSTALL THE TRIPLEX BENEATH THE PRIMARY NEUTRAL, CLEAR-SPANNING FROM POLE TO POLE.
2. THE TRIPLEX AT ITS LOWEST POINT MUST BE AT LEAST 30" ABOVE THE TELEPHONE/CATV LINES BELOW. IF THERE ARE NO TELEPHONE/CATV LINES, THE TRIPLEX AT ITS LOWEST POINT MUST HAVE THE APPROPRIATE MINIMUM GROUND CLEARANCE GIVEN BY DWG. 09.00-01.
3. IF THE SAG OF THE TRIPLEX ENCROACHES THE MINIMUM CLEARANCE TO THE TELEPHONE/CATV LINES OR GROUND BELOW, THE TRIPLEX SHOULD BE ATTACHED TO THE PRIMARY NEUTRAL, AS SHOWN IN DETAIL A ABOVE, AS OFTEN AS NECESSARY TO ACHIEVE THE REQUIRED MINIMUM CLEARANCES.
4. ONLY #2 AND #4 TRIPLEX MAY BE ATTACHED TO THE PRIMARY NEUTRAL FOR ITS SUPPORT. THE LARGER SIZE TRIPLEXES MUST BE CLEAR-SPANNED BETWEEN POLES AND NOT SUPPORTED BY THE PRIMARY NEUTRAL.

3			
2			
1			
0 6/15/04	NUNNERY	NUNNERY	WOOLSEY
REVISED	BY	CK'D	APPR.

OVERHEAD TRIPLEX SECONDARIES

Progress Energy

CAR CAROLINAS DWG. 04.04-08

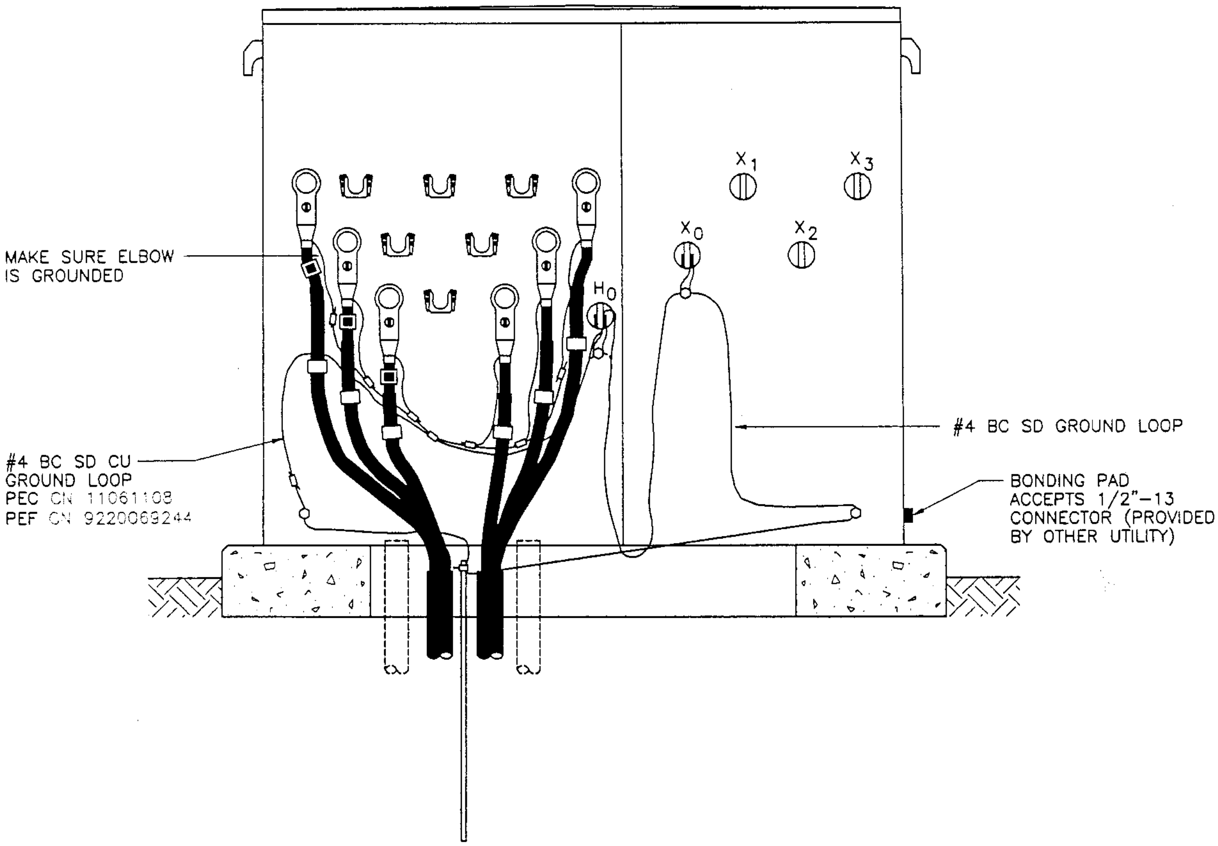


3				
2	4/14/04	SIMPSON	SIMPSON	WOOLSEY
1	7/21/03	CECCONI	NUNNERY	WOOLSEY
0	7/23/02	CECCONI	NUNNERY	WOOLSEY
REVISED	BY	CK'D	APPR.	

GROUNDING DETAILS FOR SINGLE PHASE LOW–PROFILE PADMOUNTED TRANSFORMERS

Progress Energy

PGN DWG. 27.01–03



NOTES:

1. THE DRAWING ABOVE SHOWS A SEPARATE H0 AND X0 GROUNDING BUSHING. SOME CAROLINAS AND FLORIDA DESIGNS HAVE A COMBINED H0–X0 GROUNDING BUSHING.

2. GROUND WIRE IS TO BE BONDED TO TANK GROUND PADS IN BOTH COMPARTMENTS THROUGH THE GROUND STRAP AT THE H0 AND X0 BUSHINGS, AND TO THE PRIMARY CONCENTRIC NEUTRAL WITH A COPPER CONNECTOR.

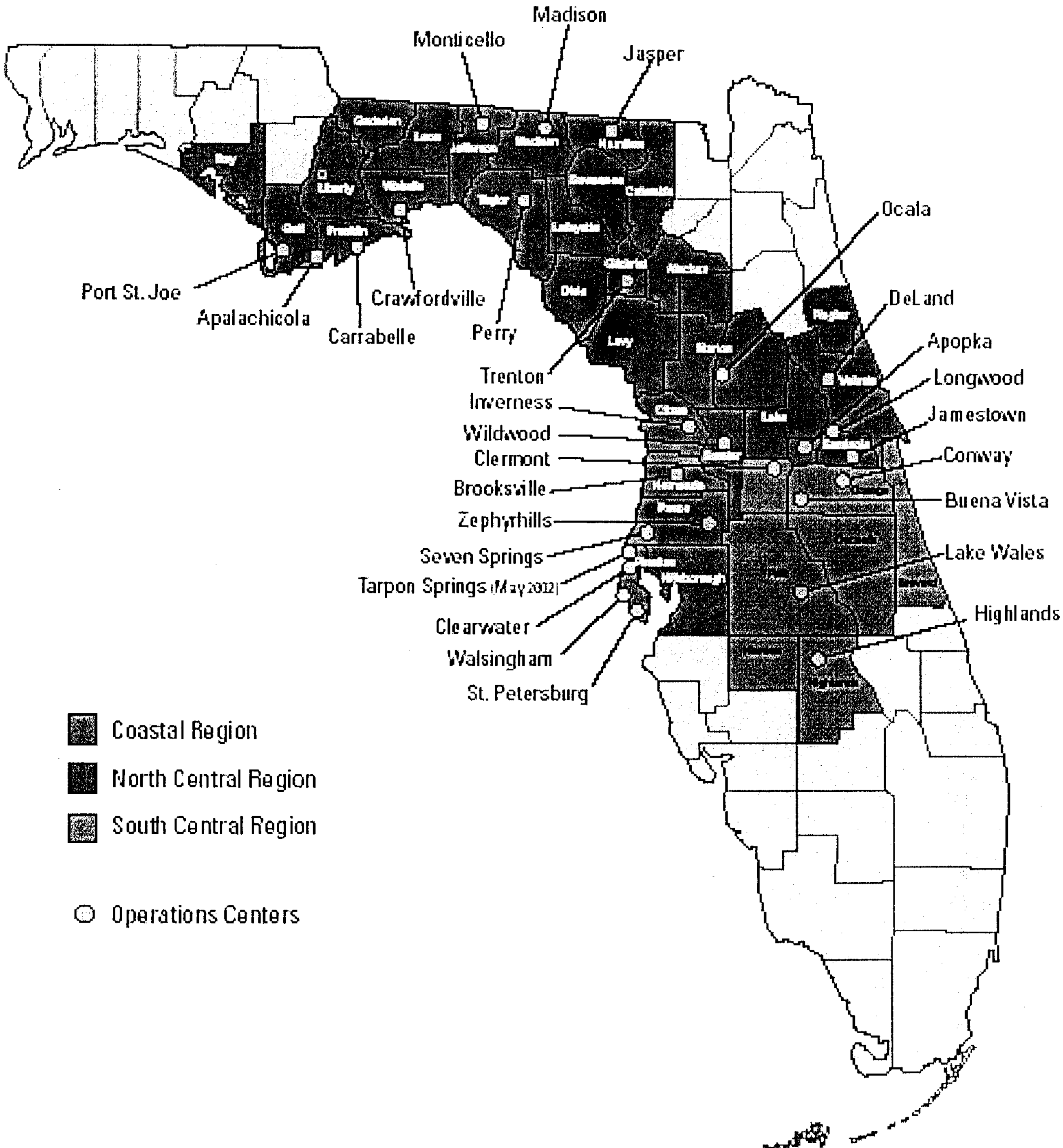
3. FOR TRANSFORMERS WITH A SEPARATE H0 AND X0 BUSHING USED TO PROVIDE 480Y 3 WIRE SERVICES, THE GROUNDING STRAP SHOULD BE REMOVED FROM THE X0 BUSHING. DO NOT REMOVE THE GROUNDING STRAP ON THE H0 BUSHING.

3	4/1/04	SIMPSON	SIMPSON	WOOLSEY
2	7/21/03	CECCONI	NUNNERY	WOOLSEY
1	10/22/02	CECCONI	NUNNERY	WOOLSEY
0	7/23/02	CECCONI	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

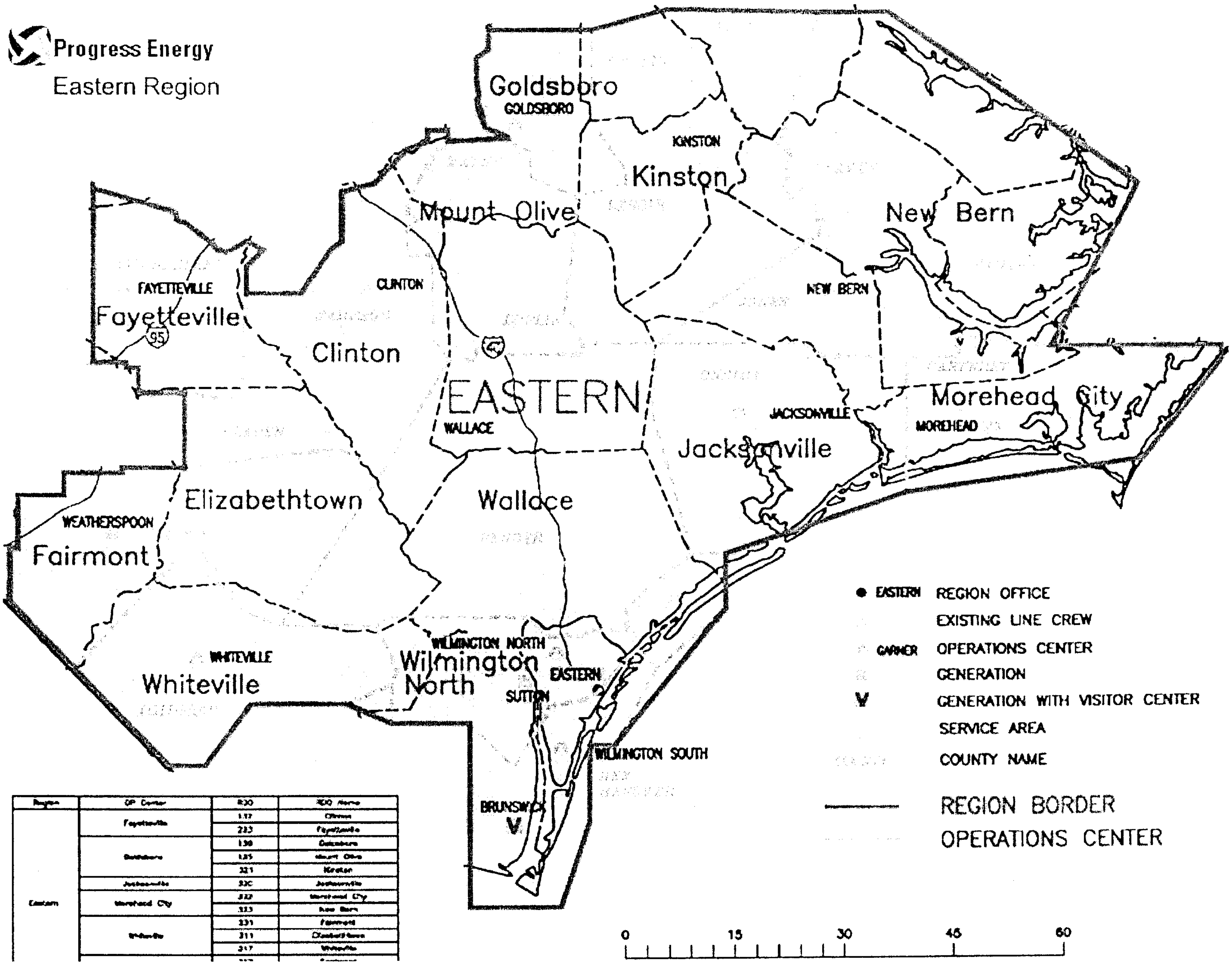
GROUND DETAILS FOR THREE PHASE LOOP FEED TRANSFORMERS

Progress Energy

PGN DWG. 27.01–04

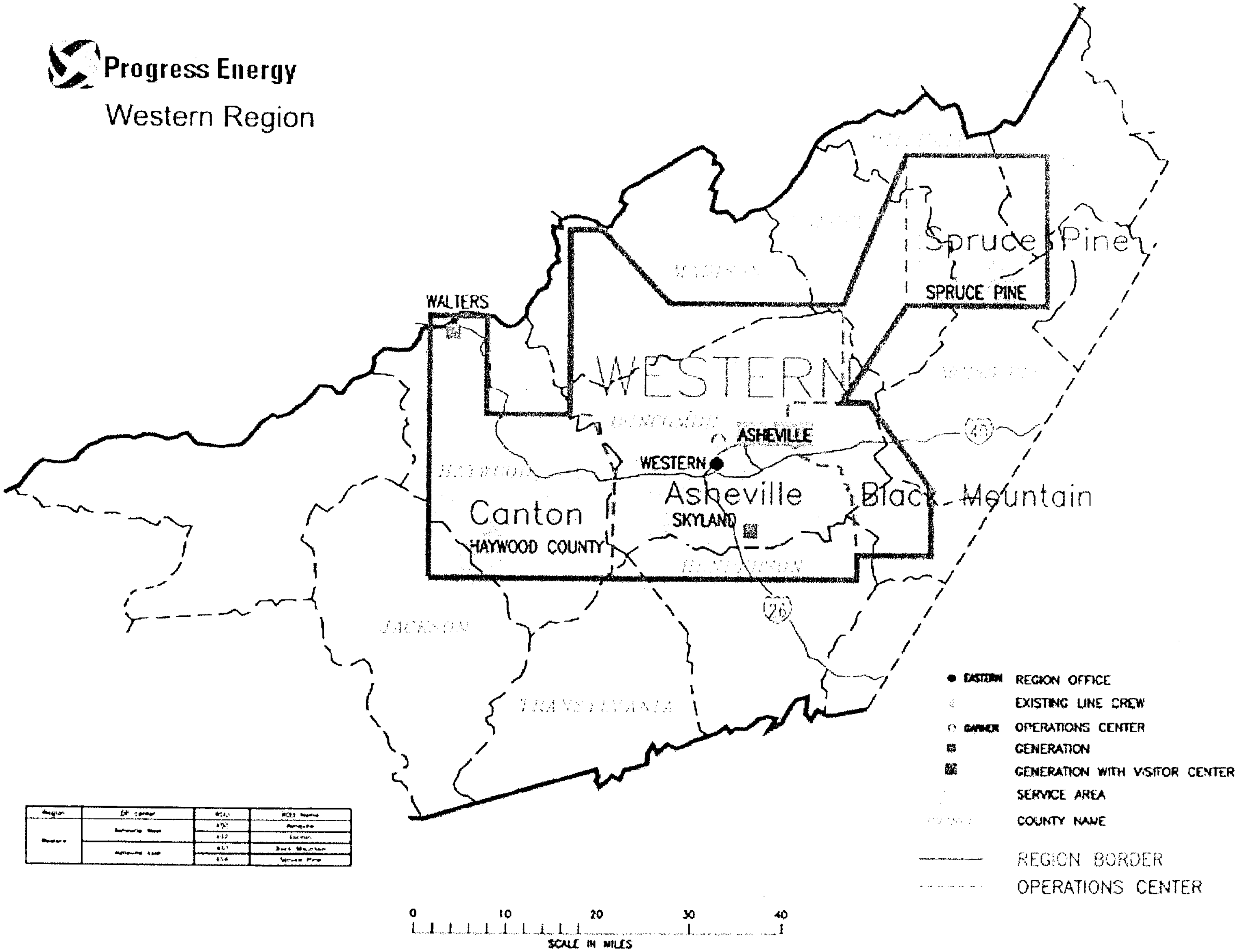


Madison
Monticello
Jasper
Ocala
DeLand
Apopka
Longwood
Jamestown
Conway
Buena Vista
Lake Wales
Highlands
Port St. Joe
Apalachicola
Carrabelle
Crawfordville
Perry
Trenton
Inverness
Wildwood
Clermont
Brooksville
Zephyrhills
Seven Springs
Tarpon Springs (May 2012)
Clearwater
Walsingham
St. Petersburg
Coastal Region
North Central Region
South Central Region
Operations Centers

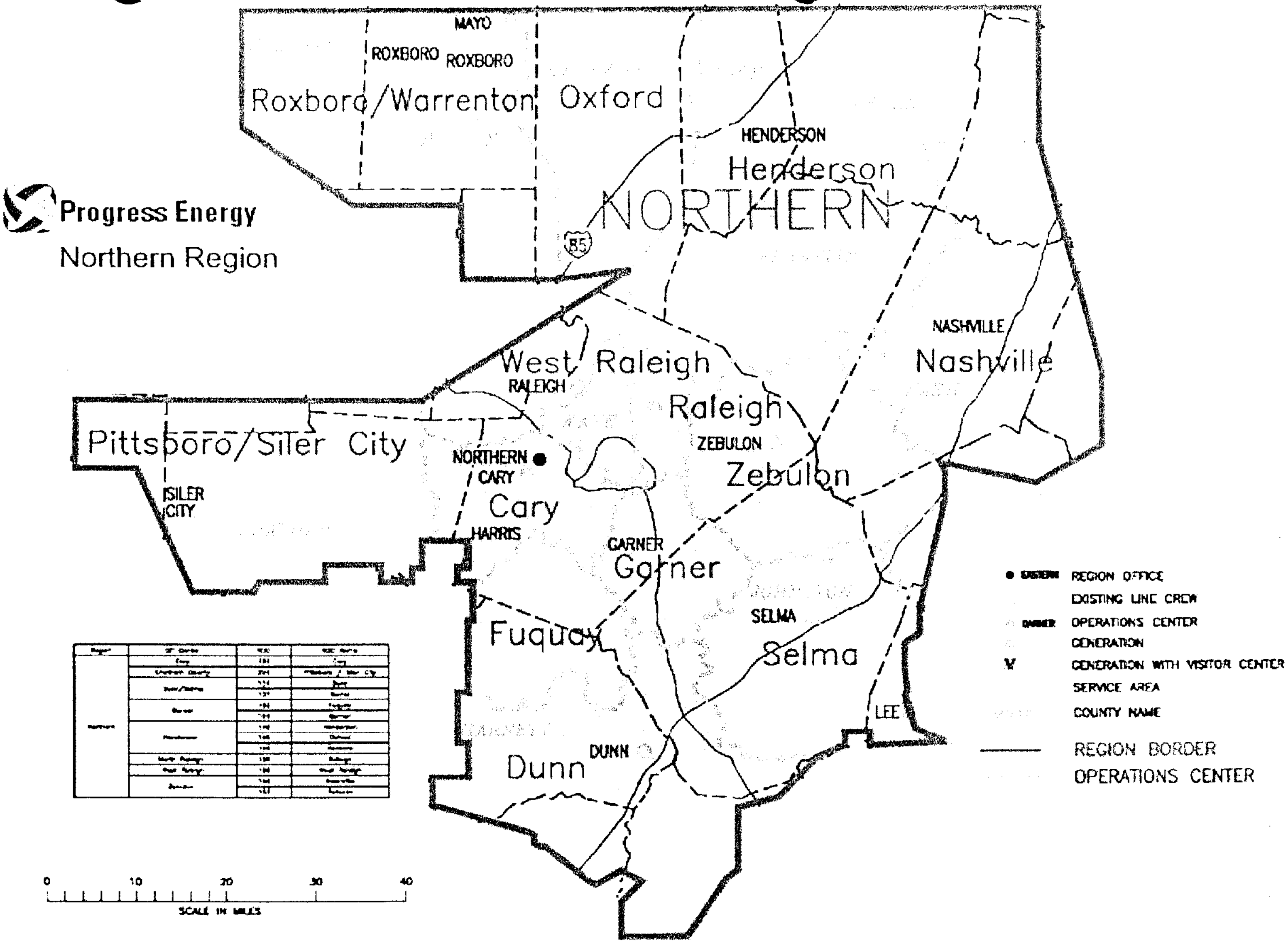

Progress Energy
Eastern Region
Goldsboro
GOLDSBORO
KINSTON
Kinston
Mount Olive
New Bern
FAYETTEVILLE
Fayetteville
95
CLINTON
Clinton
NEW BERN
EASTERN
WALLACE
JACKSONVILLE
MOREHEAD
Morehead City
Jacksonville
Elizabethtown
Wallace
WEATHERSPOON
Fairmont
WHITEVILLE
Whiteville
WILMINGTON NORTH
Wilmington North
EASTERN
SUTTON
WILMINGTON SOUTH
BRUNSWICK
V
EASTERN REGION OFFICE
EXISTING LINE CREW
GARNER OPERATIONS CENTER
GENERATION
V GENERATION WITH VISITOR CENTER
SERVICE AREA
COUNTY NAME
REGION BORDER
OPERATIONS CENTER
0
15
30
45
60

Progress Energy

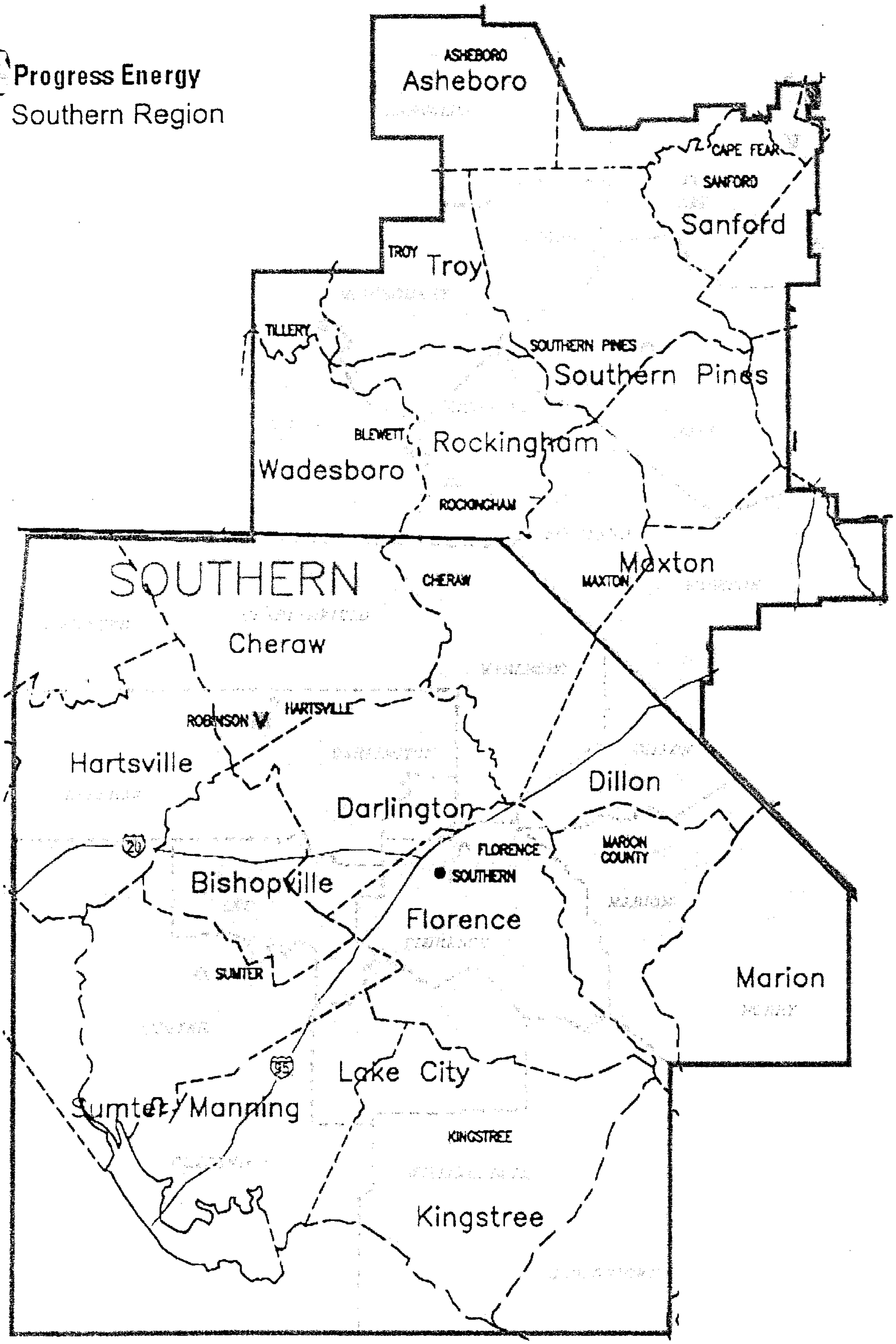
Western Region



Region	OP Center	[illegible]	[illegible] Name
Western	Asheville West	[illegible]	Asheville
		[illegible]	Canton
	Asheville East	[illegible]	Black Mountain
		[illegible]	Spruce Pine


Progress Energy
Northern Region
MAYO
ROXBORO
ROXBORO
Roxboro/Warrenton
Oxford
HENDERSON
Henderson
NORTHERN
85
NASHVILLE
Nashville
West Raleigh
RALEIGH
Raleigh
ZEBULON
Zebulon
Pittsboro/Siler City
NORTHERN
CARY
Cary
SILER
CITY
HARRIS
GARNER
Garner
SELMA
Selma
Fuquay
LEE
DUNN
Dunn
REGION OFFICE
EXISTING LINE CREW
OPERATIONS CENTER
GENERATION
V
GENERATION WITH VISITOR CENTER
SERVICE AREA
COUNTY NAME
REGION BORDER
OPERATIONS CENTER
0
10
20
30
40
SCALE IN MILES

Progress Energy
Southern Region



Region	OP Center	ROO	ROO Name
	Florence	530	Florence
		522	Dillon
		525	Marion
	Hartsville	521	Darlington
		531	Bishopville
		532	Cheraw
		533	Hartsville
		733	Maxton

● EASTERN REGION OFFICE
EXISTING LINE CREW
GARNER OPERATIONS CENTER
GENERATION
V GENERATION WITH VISITOR CENTER