Progress Energy

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May 3, 2010

VIA HAND DELIVERY

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

100262-EI

Re: 2010 – 2012 Storm Hardening Plan; Undocketed

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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ECR 4
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SSC 1
ADM ___
OPC ___
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FPSC-COMMISSION CLERK

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition to Approve Progress Energy Florida's Rule 25-6.0342 Storm Hardening Plan.	Docket No. ________ Filed: May 3, 2010

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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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

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Attorney for Progress Energy Florida, Inc.

Progress Energy

Storm Hardening Plan
2010 – 2012

May 3, 2010

FPSC Rule 25-6.0342, F.A.C.

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**.

25-6.0342(3)(a): *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.

25-6.0342(3)(b): *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.*

New Construction:

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.

PEF has extensive experience with the performance of Grade C and Grade B construction standards as defined by the NESC. That experience, which includes several hurricane seasons and other severe weather events, indicates that properly constructed and maintained distribution lines meeting all provisions of the NESC perform satisfactorily and provide a prudent and responsible balance between cost and performance. In PEF's urban areas, such as Pinellas County and the greater Orlando area, span lengths between poles are shorter due to road crossings and density of service points. In fact, PEF estimates that over 74% of its distribution system meets or exceeds Grade B construction standards.

PEF has not adopted extreme wind standards for all new distribution construction because of the following reasons:

1. Section 250C of the 2007 version of the NESC does not call for the extreme wind design standard for distribution poles which are less than sixty feet in height. Based on the fact that PEF's distribution poles are less than sixty feet, the extreme wind standard outlined in figure 250-2(d) does not apply.
2. All credible research, which includes extensive studies by the NESC rules committee, demonstrates that applying extreme winds standards would not benefit distribution poles. See Exhibit 4 filed in Docket No. 060172-EU, August 31, 2006 Workshop.
3. Utility experience from around the country further indicates that electrical distribution structures less than sixty feet in height are damaged in extreme wind events by trees, tree limbs, and other flying debris. Thus, applying the extreme wind standard to distribution poles would result in large increases in cost and design complexity without a commensurate benefit.
4. 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. In 2004, approximately 96% of PEF's pole failures were attributable to flying debris and/or super extreme wind events such as tornadoes and micro-bursts.

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 distribution work, including expansions, rebuilds, or relocations of existing facilities. 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, for the reasons discussed in the new construction section above, has not adopted the extreme wind standard for any of its distribution level critical infrastructure. 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. PEF's current level of construction, around critical facilities and around all other facilities, has performed well during weather events 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.

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."

While no current data or research supports the application of the extreme wind standard to distribution pole construction, PEF is analyzing the extreme wind standard by using its prioritization model for implementation purposes in selected locations throughout PEF's service territory. Since the submittal of the 2007 Storm Hardening plan, PEF constructed several pilot projects using the extreme winds standards. To date, there has not been a significant weather event that allowed PEF to assess the performance of these projects. In conjunction with wind measuring devices, PEF will study the performance of the extreme wind standard at these various sites when a weather event allows for such analysis. From this process, PEF expects to continue to learn and adjust its extreme weather strategy based on information that it will collect and gather from other utilities in Florida and throughout the nation as new standards and applications are applied and tested.

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. 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 and should not be used.

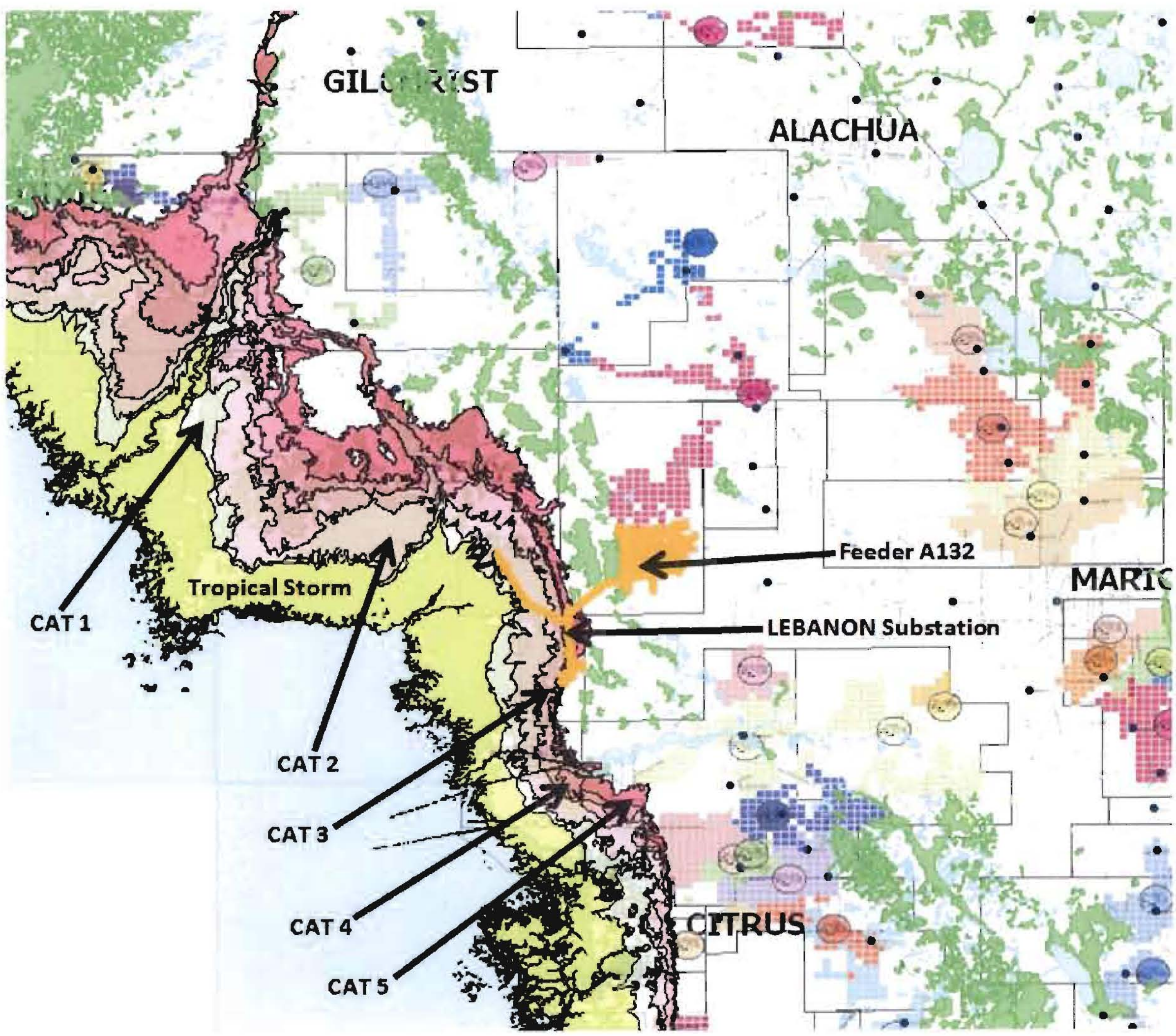
In areas where underground equipment may be exposed to minor storm surge and/or shorter term water intrusion, PEF has used its prioritization model (discussed in detail below) to identify areas where certain mitigation projects will be put into place to test whether flood mitigation techniques and devices 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 after a significant weather event, 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.

St. George Island in Franklin County was one of the areas where PEF used its submersible underground strategy to retrofit its existing facilities using the submersible standards listed above. St George Island is a good example of an area that would be susceptible to surges during a severe storm. The project was completed in 2007.

PEF also utilizes Geo Media software to determine the optimum location for submersible underground facilities. The flood zones were provided by the state and overlaid onto PEF's land base computer system along with other facilities. This method allows PEF to visually determine which geographic areas would most benefit from submersible facilities. See example below.



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 for the 2007-2009 Storm Hardening plan, PEF engaged industry expert Davies Consulting ("DCI") in developing a comprehensive prioritization model that has helped 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. Since 2007, the model has been improved and enhanced to better reflect the changes in PEF's overall storm hardening strategy. The structure of the model was adjusted to use more consistent scoring criteria to evaluate the pilot projects. New software technology such as Geomedia was incorporated into the model. As more data becomes available, PEF will continue to adjust its prioritization model as appropriate.

Using the same evaluation framework for the 2010-2012 Storm Hardening plan, PEF prioritized its proposed projects based on various components that will be discussed in more details below.

Under the foregoing components of the evaluation framework, the prioritization 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 AL or #6 Cu 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 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 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 coastal and inland heavily treed environments.

- Feeder ties
  - Tying radial feeders together to provide switching capabilities to reduce outage duration. This hardening alternative will mitigate long outages that would have otherwise occurred as a result of the inability to transfer load/customers to an alternate source.

Feeder ties as a hardening alternative is a newly added category to PEF's Storm Hardening approach. Although the concept of storm hardening is generally thought of as outage prevention, it is inevitable that outages will still occur during a severe storm as a result of vegetation and flying debris. Feeder ties will help mitigate the duration of such outages. Tying multiple feeders together will give PEF the ability to minimize duration by serving customers from an alternate source while repairs are being made on the affected segment. Based on PEF's experience in the 2004 -2005 hurricane seasons as well as the recent tropical storms, feeder ties are crucial for a distribution system as it provides the opportunity to maximize the number of customers restored in the shortest timeframe possible. Regardless of what caused the outage during a severe storm, a radial feeder will be out for as long as it takes to make the necessary repairs. On the other hand, a feeder tie would allow PEF to restore as many customers as possible, thereby minimizing the number of customers that are without power for the length of the repair.

The development of the prioritization model begins with compiling a list of desired projects submitted by engineers and field personnel most familiar with the specific region. Each project is then evaluated based on the following criteria:

- Major Storm Outage Reduction 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, easements, costs, etc.
- Overall Reliability
  - Captures the overall potential reliability benefits that the project provides on a day to day basis in terms of reduced customer interruptions and outage duration.
- Financial Cost
  - Provides the financial value of the proposed project based on cost per customer and cost per foot of newly installed wire/cable.

The prioritization model is set up to address the following hardening project questions:

- How many customers are served from the upstream protective device?
- What will be the impact of this project on the restoration time during a major storm?
- At what level of hurricane will the area served by this feeder flood due to storm surges?
- What is the tree density in the area served by this feeder or section?
- What level of tree damage will this project mitigate during a major storm?
- How many critical infrastructure components (lift stations, shelters, hospitals, police, etc…) does this project address?
- How valuable will the project be perceived by the community?
- What are the major obstacles/risks for completing the project? i.e. easements, permits, etc.
- What type of investment is required by joint users (telecoms and cable) to complete this project?
- What is the 3-year average number of CEMI4 customers on this feeder?
- What is the 3-year average number of CMI on this feeder?
- What is the change in the annual CAIDI that this project will result in (on the feeder or section)?
- Will this project reduce the number of momentary customer interruptions on this section?
- What is the 3-year average number of CELID CI on this feeder?
- What is the construction Cost per customer

Each answer to the questions listed above is assigned a numerical value and subsequently weighted to produce an overall rating for each specific hardening project. The prioritization model is based on a structured methodology for evaluating the benefits associated with various hardening options. The model allows for the ranking of the overall list of projects. It enables PEF to strategically determine the order in which these projects are constructed, based on their order of ranking.

PEF is using the prioritization model to ensure a systematic and analytical approach to deploying storm hardening options within its service territory. For proven hardening options that

PEF is already using as part of its construction standards and policies, the prioritization 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 its prioritization 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 that took place between 2007 and 2009 are discussed later.

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. As a result, all areas of PEF's service territory are impacted by PEF's storm hardening efforts. Based on PEF's recent storm experience and/or through the prioritization model, the following projects were completed between 2007 and 2009:

Distribution:

Op Center	Project Name	Sub Category
Monticello	St Geroge Is - Plantation	Submersible UG
Apopka	US 441 west of Hwy 19	OH to UG Conversion
Inverness	Homosassa - Riverhaven	Submersible UG
Inverness	US 98 - Brooksville	Small Wire Upgrade
St-Petersburg	Coquina Key	Small Wire Upgrade
Monticello	A192 - Luraville	Small Wire Upgrade
Clearwater	Indigo	Small Wire Upgrade
Ocala	US 301 - Citra	Small Wire Upgrade
SE Orlando	Sprint Earth Station & Cocoa Water Wells	Small Wire Upgrade
Lake Wales	Highland Park	Small Wire Upgrade
Lake Wales	Hibiscus Feeder Tie	Small Wire Upgrade
Inverness	R448 - Dunnellon	Back lot to Front lot conversion
SE Orlando	Holden Ave E) Orange Blossom Trail	Small Wire Upgrade
Buena Vista	Calle De Sol	Back lot to Front lot conversion
Jamestown	SR-408 @ Woodbury Rd	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
SE Orlando	OH Crossing of Turnpike 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 (K1025 @ K1025 & K1028 @ K128)	OH to UG Conversion
SE Orlando	Florida Turnpike @ Orange Blossom Trail	OH to UG Conversion
Ocala	Ranch Hand Dr	Small Wire Upgrade
Monticello	Carrabelle Beach	Extreme Wind
Inverness	Willinston Reconductor	Small Wire Upgrade
Lake Wales	Cabbage Island	Extreme Wind
Seven Springs	Banana St	Small Wire Upgrade
Monticello	Monticello N69 Reconductor	Small Wire Upgrade
Jamestown	Feeder Tie loop Lockwood Blvd	Feeder Tie
Inverness	Florida Highlands	Extreme Wind

SE Orlando	Holden Ave - Orange Blossom Trail	Small Wire Upgrade
Lake Wales	Hibiscus Feeder Tie	Small Wire Upgrade
Inverness	Homosassa-Riverhaven	Submersible UG
Longwood	Reconductor, O'Brien/Spring Lake Rd	Feeder Tie
Lake Wales	Walnut St Feeder Tie	Feeder Tie
Lake Wales	Lake Marion Feeder Tie	Feeder Tie
Clermont	Turnpike Crossing @ Blackstill Lake Rd	OH to UG Conversion
Jamestown	Bithlo	Feeder Tie
Jamestown	Black Hammock	Feeder Tie
SE Orlando	Rio Pinar / Old Cheney	Feeder Tie
Deland	Veterans Pkwy	Feeder Tie
Jamestown	Econ Trail	Feeder Tie
Jamestown	Bedford Rd	Feeder Tie
St Petersburg	Jungle Prada	Small Wire Upgrade
Monticello	Crawfordville Reconductor	Small Wire Upgrade
Monticello	Cape San Blas	Extreme Wind Upgrade
Highlands	Sebring Airport	Feeder Tie
Walsingham	Feeder X132	Extreme Wind Upgrade
Walsingham	Feeder X142	Extreme Wind Upgrade

The list below is a sampling of the proposed 2010 – 2012 Storm Hardening projects

Op Center	Project Name	Sub Category
South East Orlando	Millinockett	Feeder Tie
Lake Wales	Lake Marion	Feeder Tie
South East Orlando	Simmons Road	Extreme Wind Upgrade
Apopka	Marden Road	Small Wire Upgrade
Jamestown	Willow Run	OH to UG Conversion
Zephyrhills	Eiland Blvd.	Feeder Tie
Buena Vista	Celebration Blvd.	Feeder Tie
Seven Springs	Sun coast Parkway	Feeder Tie

Monticello	N67 Feeder Relocation From Abrams to SR 59 On US 90	Back lot to Front lot conversion
Monticello	N67 Old Lloyd Road Single Phase to Three Phase	Small Wire Upgrade
Monticello	SR 65 Line Relocation	Back lot to Front lot conversion
St Petersburg	22nd St. S Reconductor	Feeder Tie
St Petersburg	Connecticut Ave. Reconductor (NE area improvement)	Feeder Tie
St Petersburg	22nd Ave. S Reconductor	Feeder Tie
St Petersburg	Shore Acres Bridge Reconductor (NE area improvement)	Feeder Tie
St Petersburg	21st/22nd Alley Reconductor (NE area improvement)	Feeder Tie
Ocala	Feeder Tie Addition between A38 and A204	Feeder Tie
St Petersburg	Cordova Blvd. NE to Snell Isle NE Reconductor (NE area improvement)	Feeder Tie
Inverness	Feeder Tie Addition between A68 and A49	Feeder Tie
St Petersburg	62nd Street Reconductor (NE area improvement)	Feeder Tie
Apopka	Reconductor Wekiva Pines Blvd., Sorrento	Back lot to Front lot conversion
St Petersburg	34th Ave NE/Monterey Blvd/Almedo/Rivera Dr Reconductor (NE area improvement)	Feeder Tie
Ocala	Martin A38 - CR 316 E of CR 200A	Small Wire Upgrade
Monticello	Madison N2, N3 Feeder Tie	Feeder Tie
St Petersburg	15th Ave S Reconductor	Feeder Tie
St Petersburg	1st St. N Reconductor (NE area improvement)	Feeder Tie
St Petersburg	Denver St. NE/Venetian Blvd	Feeder Tie

South East Orlando	South Canoe Creek crossing	OH to UG Conversion
South East Orlando	Friairs crossing	OH to UG Conversion
South East Orlando	Southeast Canoe Creek crossing	OH to UG Conversion
Lake Wales	Mountain Lake subdivision Reconductor	Small Wire Upgrade
Clermont	CR455 crossing	OH to UG Conversion
Clermont	Buck Hill crossing	OH to UG Conversion
Clermont	Old SR 50 crossing	OH to UG Conversion
Longwood	I4-Crossing at Oglesby Av.	OH to UG Conversion
Longwood	I4-Crossing at Dartmouth Av.	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, Pasadena Feeder X220 was selected as a storm hardening candidate for 2009. X220 is a mainly an overhead feeder along Pasadena Avenue running from the substation south to the Palms of Pasadena Hospital. Engineering was initiated, and pole foreman was used for pole size selection and pole spacing. It was calculated that a 100 foot spacing and pole classes H1, 0, 1, and 2 would be required to meet the extreme wind loading criteria. Class H poles are normally transmission poles, and have a large ground or butt circumference. The general distribution guidelines for pole spacing are between 175 to 220 feet.

The Town of Pasadena was contacted by our Public Affairs Department, given the project scope information, and was made aware of the positive impacts of the project. The city was adamantly opposed to the storm hardening of X220 due to the larger class poles, closer pole spacing, and the perceived overall aesthetic impact. Due to the overwhelming negative reaction of the town, this project was cancelled. On the other hand, the San Blass Extreme wind project in Monticello was well received by the community. The project was discussed with the County Manager and the County Commissioner for the District. This project was also discussed with a local civic club where many of the members were residents in the project area. This project was completed in 2009. 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
Oldsmar to Curlew - 115 kV Line Rebuild	Rebuild	Pinellas	Likely
Hudson to Heritage Pines Tap - 115 kV Line Rebuild	Rebuild	Pasco	Possible
Brooksville West to Brooksville - 115 kV Line Rebuild	Rebuild	Hernando	Unlikely
HG-203 255585-1-52-01 Hillsborough SR39 (Alexander St. N.)	Governmental	Polk	Unlikely

Coastal Transmission Area	Project Type	County	Third Party Impact
Northeast - 40th Street (NF) 230kV Line - Relocate Poles	Governmental	Pinellas	Possible
LSP 71-74 PID 921321 Pinellas Trail 97th Way	Governmental	Pinellas	Likely
ECTW-236 to ECTW-254 403725-1-52-01 Pinellas SR-595	Governmental	Pinellas	Likely
LSP 230kV relocation Pinellas County #865 Park St/Starkey Rd	Governmental	Pinellas	Likely
BWX-115kV-Sunshine Grove Road-Hernando County	Governmental	Hernando	Likely
LSP -12 922252 Pinellas County Starkey Rd	Governmental	Pinellas	Likely
ZNR 44, 57, 58 CIP 6360 Pasco Co Zephyrhills Bypass West Gap	Governmental	Pasco	Possible
TZ-69kV-Relocation-Keystone Road Widening-Pinellas County	Governmental	Pinellas	Likely
NP-4 thru NP-7 FIN: 256931-2-52-01 Gandy to 4th St	Governmental	Pinellas	Possible

Southern Transmission Area	Project Type	County	Third Party Impact
Gifford - New 230/69 kV Substation and Boggy Marsh to Gifford - 69 kV Line Rebuild	Rebuild	Orange	Unlikely
Dundee to Intercession City 230 kV - Rebuild & Add 2nd Circuit	Rebuild	Polk	Highly unlikely
Boggy Marsh to Gifford - 69 kV Line Rebuild	Rebuild	Lake	Likely
Intercession City to Barnum City - 69 kV Line Rebuild	Rebuild	Osceola	Likely
Fern Park to Altamonte - 69 kV Line Rebuild 2.39 miles	Rebuild	Seminole	Likely
Turner Plant to Barwick Tap - 115 kV Line Rebuild 4.14 miles	Rebuild	Volusia	Possible

Southern Transmission Area	Project Type	County	Third Party Impact
Rio Pinar to Vista Tap - 69 kV Line Rebuild	Rebuild	Orange	Possible
Spring Lake to Keller Road - 69 kV Line Rebuild	Rebuild	Seminole	Likely
Deleon Springs, Deland West to Spring Garden Tap, 9.65 miles - T1	Rebuild	Volusia	Possible
Holopaw - Poinsett; 230kV 18.17 mile rebuild	Rebuild	Osceola	Highly unlikely
Intercession City - Cane Island; Upgrade 230kV line to 3000A	Rebuild	Osceola	No
Turner - Orange City; 115kV Rebuild 11 miles	Rebuild	Volusia	Possible
WCA 69kV Relocation for Chapman Rd From SR 426 to SR 434	Governmental	Seminole	Likely
WCE 283 - 285 406146-1-52-01 Orange County SR50 & SR91 Relocation	Governmental	Orange	Likely
SCP Relocation-Bee Line Expansion of John Young Bridge	Governmental	Orange	Possible
EP-69kV-SR 414 (Maitland Blvd. Extension – OOCEA	Governmental	Orange	Possible
WCE-291A & B 406146-1-52-01 Phase II Remington & SR50	Governmental	Orange	Likely
WEWC / WF 417545-1-52-01, Seminole, SR 417 Bridge Modification @ SR426	Governmental	Seminole	Possible
WCE-69kV Relocate FDOT SR 50 Avalon Rd to SR 429	Governmental	Orange	Likely
WR and RW 69kV Relocation for Econ Trail	Governmental	Orange	Likely
CLA 69kV relocation SR 436 at Red Bug Lake RD 419369-1-52-01	Governmental	Orange	Likely
WO 69kV Relocation for I-4 Widening	Governmental	Orange	Possible
SLE 69kV relocation for Kennedy Blvd widening (Orange County)	Governmental	Orange	Likely
SLM 69kV relocations for Kennedy Blvd widening (Orange County)	Governmental	Orange	Likely
WO 69kV relocation for Kennedy Blvd widening	Governmental	Orange	Likely

Southern Transmission Area	Project Type	County	Third Party Impact
(Orange County)			
FTO-141 415030-1-38-01 Seminole County SR 426 / CR 419 widening	Governmental	Seminole	Likely
ASW-17,18,19 242592-2-52-01 Seminole County SR400 / I-4	Governmental	Seminole	Unlikely
CET-54 Lake County Hartwood Marsh Rd Phase II	Governmental	Orange	Likely
SLE-21 to SLE-27 240231-3-52-01 Seminole SR434 Sound Wall	Governmental	Orange	Likely
PS, SB, and SES County Rd 437 & Wolf Branch Rd Lake County # 08052	Governmental	Lake	Possible
ICLB-92 To 103 & LF-3, LF-6 To 32 Osceola Old Lake Wilson	Governmental	Osceola	Likely
NLA-23 to NLA-29 69kV 412994-3-52-01 CSXT Comm Rail Longwood	Governmental	Seminole	Possible
TMS 69kV Relocation Taft-Vineland Rd from SOBT to Orange Ave	Governmental	Orange	Likely
BMF 69kV SR 530 Orange County FDOT FIN# 239304-1	Governmental	Orange	Possible
DLM-11 Relocation for County Project #:64051 Lake Mabel Loop Widening	Governmental	Polk	Possible
CLC 137-139,149, 153, 157,159 238429-7-52-01 Lake State Rd 50	Governmental	Lake	Likely
CEB 238423-1-52-01 Lake State Rd 25, Lake Louisa to State 50	Governmental	Lake	Likely
ASL-58 FPID#242592-3-32-01 Seminole State Rd 400 (I-4)	Governmental	Seminole	Unlikely

Northern Transmission Area	Project Type	County	Third Party Impact
HB-98 69 kV Croft Avenue Citrus County	Governmental	Citrus	Possible
St. George Island Tap - Rebuild Radial 69kV Line	Rebuild	Franklin	Highly unlikely
Holder - Second 230/69 kV Transformer & 69 kV	Rebuild	Citrus	Unlikely

Northern Transmission Area	Project Type	County	Third Party Impact
Line; Rebuild Dunnellon Tap to Holder			
Williston to Cara Tap - 69 kV Line Rebuild, 8.84 miles	Rebuild	Levy	Unlikely
Bell Tap to Bell (CFEC) - Rebuild 69kV Line	Rebuild	Gilchrist	Unlikely
High Springs to Hull Road 69 kV Line Rebuilds (Part 2) - High Springs to Alachua Co-op Tap, 5.09 miles T2	Rebuild	Alachua	Possible
Fort White to Luraville - 69kV Line Rebuild (Ft. White to O'Brien) 10.12 miles, FP-1, T1	Rebuild	Columbia	Unlikely
River Junction to Woodruff - 115 kV Line Rebuild, 1.84 miles, T1	Rebuild	Gadsden	Possible
Woodruff to Interconnect - 115 kV Line Rebuild, 1.41 miles, T4	Rebuild	Gadsden	Unlikely
Port St. Joe to Apalachicola - 69 kV Line Rebuild (Double Circuit), 20 miles	Rebuild	Gulf	Possible
High Springs to Hull Road 69 kV Line Rebuilds (Part 1) - Hull Road to GE Alachua, 16.5 miles T1	Rebuild	Alachua	Possible
Perry to Luraville - 69kV Line Overload (Smith Tap to Luraville) 5.69 miles, FP-3, T2	Rebuild	Taylor	Unlikely
River Junction to Atwater - 115 kV Line Rebuild, 7.14 miles, T2	Rebuild	Gadsden	Unlikely
Rebuild IS line 2.62 miles from Chiefland #1 tap to 450-1	Rebuild	Levy	Unlikely
Martin West to Cara Tap - 69kV Line Rebuild (Reddick to Proctor Tap) 3.73 miles, T3	Rebuild	Marion	Unlikely
High Springs to Hull Road 69 kV Line Rebuilds (Part 3) - Alachua to GE Alachua, 4.37 miles T3	Rebuild	Alachua	Possible
Quincy to Havana - 115 kV Line Rebuild, 9.067 miles, T1	Rebuild	Gadsden	Unlikely
Apalachicola to Eastpoint - 69 kV Line Rebuild (Double Circuit Capability)	Rebuild	Franklin	Unlikely

Northern Transmission Area	Project Type	County	Third Party Impact
High Springs to Hull Road 69 kV Line Rebuilds (Part 4) - Alachua Co-op Tap to Alachua, 2.31 miles T4	Rebuild	Alachua	Possible
Havana to Bradfordville West - 115 kV Line Rebuild, 10.53 miles, T2	Rebuild	Gadsden	Unlikely
Rebuild Jasper-Burnham-West Lake Tap 115kV Rebuild; 14.69 miles (ADAGE Bio Mass)	Rebuild	Hamilton	Unlikely
PP-119, 120, & 121 SR429 - Vick Rd. Ext. (429-200B) 69kv	Governmental	Orange	Likely
LC # 238395-4-52-01 Lake SR500 Dr. MLK to Lake Ella Rd.	Governmental	Marion	Likely
LC # 238395-5-52-01 Lake SR500 Lake Ella to Avenda Central	Governmental	Marion	Likely
CSB 121-161 Citrus CR486 Service Rd to North Ottawa Ave. T2008-07	Governmental	Citrus	Likely
CLT & CC Citrus 405270-3-52-01 State Rd 589 Suncoast Parkway II – Section 1	Governmental	Citrus	Highly unlikely
CRCF,CCF,IT,CLT,CC Citrus 405270-5-52-01 Suncoast Parkway II-Section 3	Governmental	Sumter	Highly unlikely
CSB-93 405270-4-52-01 Citrus Suncoast Pkwy II N.Card-CR486	Governmental	Citrus	Possible
City of Leesburg Beautification CFLE-90 to CFLE-113-2	Governmental	Lake	Likely
CFLE-95-98 238394-2-52-01 Lake SR500 Perkins to Griffin	Governmental	Lake	Likely
OLR-69kV-CR. 470 widening Lake Co.	Governmental	Lake	Possible
WCE-310 Relocated State Rd 50 FIN 238429-4-52-01 Orange	Governmental	Orange	Likely
WA 69 kV Relocation- SR15/600 Interchange @ SR436- #404418-1	Governmental	Seminole	Likely

Northern Transmission Area	Project Type	County	Third Party Impact
BCF 69kV_CR-468 Four lane curb and Gutter expansion	Governmental	Sumter	Possible
JH-City of Tallahassee Jackson Bluff Hydro Spillway FERC2891	Governmental	Liberty	Unlikely
LE - Transfer LE to Double Circuit on CFS Structures	Governmental	Lake	Possible
DR-90 to DR-98 238720-1-52-01 Marion SR40-SR45/US41 to CR328	Governmental	Marion	Likely
OCF-31 to 42 238677-1-52-01 Marion SR35 (Baseline Rd)	Governmental	Marion	Possible
WHX 425588-1-52-01 Jefferson SR20 (US-27) @ Gamble Inter	Governmental	Jefferson	Possible
DR-36 to DR-94 238648-1 Marion SR45	Governmental	Marion	Likely
WO 33-9 relocation for FDOT # 239496-2 Forest City Rd.	Governmental	Orange	Likely
CFS-230kV-CR44A and Estes Road-Lake County Public Works	Governmental	Lake	Possible
LE-217 Project 08007 Lake CR44 Deceleration Lane & Shoulder Imp.	Governmental	Lake	Likely
IO-564 Marion County SE 31st Street	Governmental	Marion	Likely
CS FPID #220495-2-52-01, Wakulla County, SR 369	Governmental	Wakulla	Possible
AND 69kV FPID# 411256-3-52-01, Marion County, SR 35	Governmental	Wakulla	Likely
AND-98-26 411257-3-52-01 Sumter SR35 from CR 232 to NE 110th	Governmental	Sumter	Likely

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 September 3, 2008, and again on September 3, 2009, 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 September 3, 2008, and again on September 3, 2009 and has subsequently interacted with any affected joint attacher in an effort to identify any cost or impact to those attachers.

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 during 2008 and 2009 on storm hardening and maintenance:

Progress Energy Florida Storm Hardening and Maintenance Costs

Description	2008	2009
Vegetation Management (Distribution & Transmission)	$18,530,738	$27,515,055
Joint Use Pole Inspection Audit	$484,000	$527,744
Transmission Pole Inspections	$2,421,856	$2,171,157
Other Transmission Inspections and Maintenance	$16,182,029	$13,910,179
Transmission Hardening Projects	$111,722,405	$99,822,011
Distribution Pole Inspections	$1,716,293	$2,913,211
Distribution Hardening Projects	$16,631,322	$19,052,230
Total	**$167,688,643**	**$165,911,587**

<u>25-6.0342(4)(e)</u>: *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.

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

Please see **Attachment A** and **Attachment C**.

<u>25-6.0342(5)</u>: *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 C**. 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**.

25-6.0342(6): *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 September 3, 2008, and again on September 3, 2009, 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 September 3rd of 2008 and 2009 and has subsequently interacted with any affected joint attacher in an effort to identify any costs, impacts to those attachers, or concerns. 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

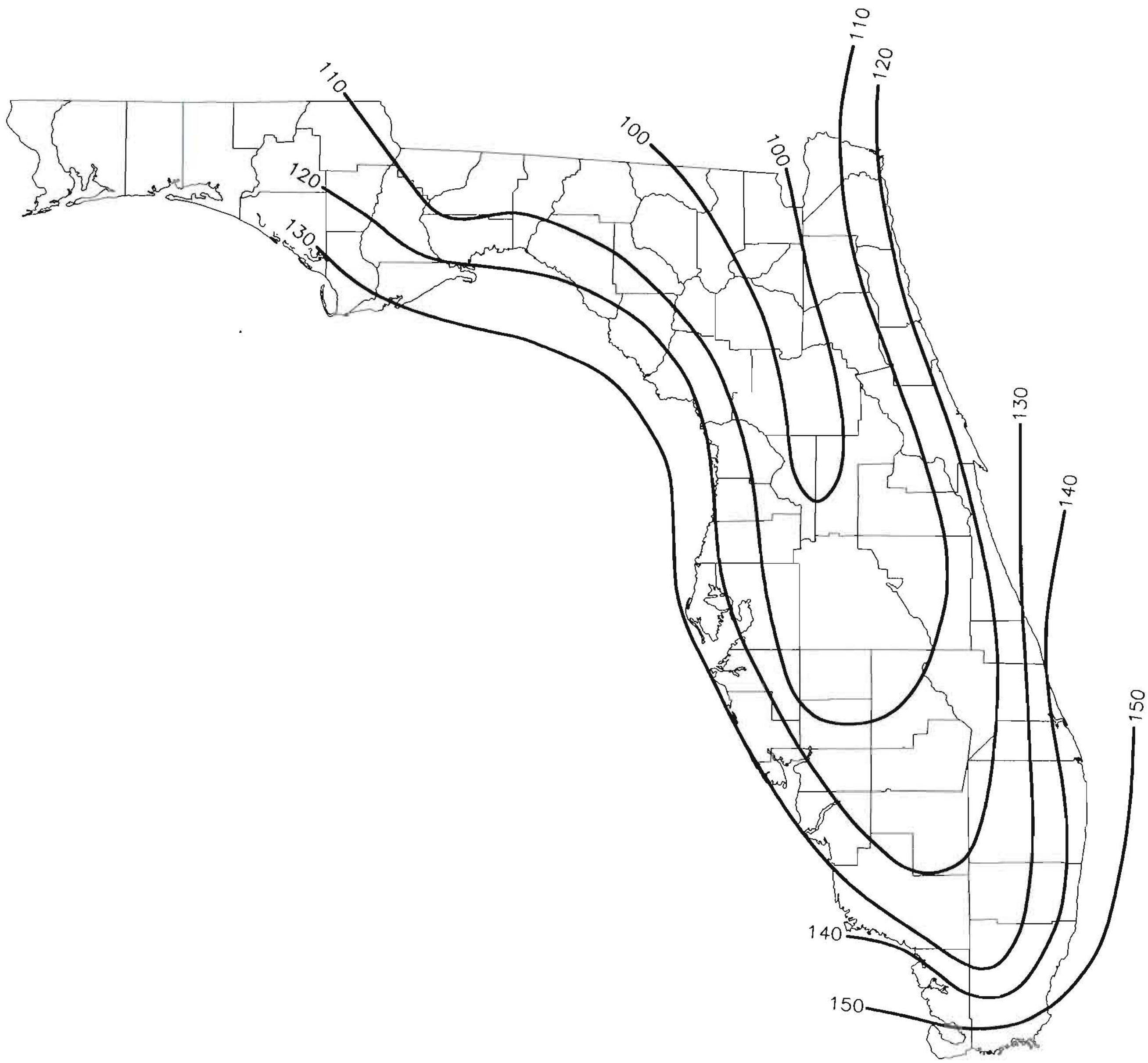
IF A STRUCTURE OR ANY SUPPORTED FACILITY IS GREATER THAN 60 FT ABOVE GROUND, THEN THE STRUCTURE AND SUPPORTS MUST BE DESIGNED TO MEET THE REQUIREMENTS OF EXTREME ICE AND CONCURRENT WIND LOADING. THIS IS IN ADDITION TO THE REQUIREMENTS OF COMBINED ICE AND WIND DISTRICT LOADING. THE EXTREME ICE AND CONCURRENT 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

<u>POLEFOREMAN</u>

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.

3				
2				
1				
0	2/10/09	CECCONI	GUINN	HOYT
REVISED		BY	CK'D	APPR.

POLEFOREMAN

Progress Energy

FLA

DWG. 01.00-06

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

POLEFOREMAN –
OUTPUT EXAMPLE

Progress Energy

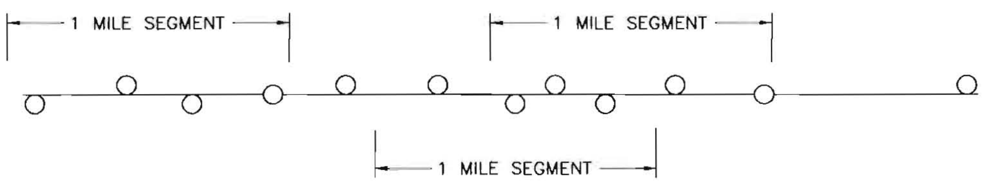
PGN DWG. 01.00–07

GROUNDING ELECTRODES FOR DISTRIBUTION LINES

THE OVERHEAD DISTRIBUTION LINE DESIGN STANDARD IN THE CAROLINAS AND FLORIDA IS CONSIDERED TO BE A MULTI-GROUNDED SYSTEM PER THE NESC. THE NESC REQUIRES THE NEUTRAL OF A MULTI-GROUNDED SYSTEM TO BE CONNECTED TO A MAN MADE ELECTRODE (GROUND ROD) AT EACH TRANSFORMER AND AT A SUFFICIENT NUMBER OF ADDITIONAL ELECTRODES TO TOTAL NOT LESS THAN 4 GROUNDS IN EACH MILE OF THE ENTIRE LINE, NOT INCLUDING GROUNDS AS INDIVIDUAL SERVICES (CUSTOMER'S GROUND ROD).

THE INTENT OF THIS NESC RULE IS TO ENSURE THE GROUNDING ELECTRODES ARE DISTRIBUTED AT APPROXIMATELY 1/4 MILE INTERVALS OR SMALLER, ALTHOUGH SOME INTERVALS MAY EXCEED 1/4 MILE. IN ANY MILE INTERVAL OF A GIVEN LINE, A MINIMUM OF 4 GROUNDS SHOULD BE FOUND EVENLY DISTRIBUTED THROUGHOUT THE MILE INTERVAL.

IN URBAN AND OTHER CONGESTED AREAS WHERE THERE ARE MANY TRANSFORMERS INSTALLED, THE 4 GROUNDS PER MILE REQUIREMENT IS MORE THAN SUFFICIENTLY MET. HOWEVER, IN RURAL AREAS, ESPECIALLY SINGLE-PHASE LINES WHERE VERY FEW IF ANY TRANSFORMERS, ARRESTER STATIONS OR CAPACITOR BANKS ARE INSTALLED, ADDITIONAL ELECTRODES AT 1/4 MILE INTERVALS MAY NEED TO BE INSTALLED TO MEET THE MINIMUM OF 4 PER MILE.



○ GROUND ROD LOCATION

ILLUSTRATION OF 4 GROUND RODS IN EACH RANDOMLY SELECTED MILE OF LINE

3					GROUNDING ELECTRODES FOR OVERHEAD DISTRIBUTION LINES
2					
1					
0	2/20/09	ROBESON	GUINN	HOYT	
REVISED		BY	CK'D	APPR.	

Progress Energy

PGN DWG. 01.01-01A

EQUIPMENT GROUNDING/BONDING

WHERE EQUIPMENT GROUNDING IS REQUIRED, ALL EQUIPMENT TANKS, HANGERS, AND OTHER HARDWARE MUST BE SOLIDLY BONDED TOGETHER AND THEN CONNECTED TO THE SYSTEM NEUTRAL.

- EQUIPMENT PROTECTED BY A FUSE (i.e. OH TRANSFORMERS, OH CAPACITOR BANKS) WILL REQUIRE A #6 SD BC GROUND WIRE, CONNECTED TO THE SYSTEM NEUTRAL. THE GROUND WIRE DOWN THE POLE IS ALSO #6 SD BC, CONNECTED TO THE SYSTEM NEUTRAL AND THE GROUND RODS.
- ALL PAD-MOUNTED TRANSFORMERS AND UNDERGROUND PRIMARY ENCLOSURES, SINGLE AND THREE-PHASE, REQUIRE A #4 SD BC LOOPED GROUND TO MATCH THE NEUTRAL OF #1/0 UG PRIMARY CABLE.
- EQUIPMENT THAT WILL BE SUBJECT TO OPERATING ON THE SUBSTATION BREAKER (i.e. REGULATORS, PAD-MOUNTED SWITCHGEAR, PAD-MOUNTED CAPACITORS, PRIMARY METERING ENCLOSURES, RECLOSERS, ETC.) WILL REQUIRE #2 SD BC GROUND. (THE GROUND WIRE DOWN THE POLE TO THE GROUND RODS IS #6 SD BC.)
- BULK FEEDER (TERMINAL) POLES REQUIRE THE GROUND BRAID STRAPS (PROVIDED IN THE TERMINATOR KIT) BE RUN TO THE SYSTEM NEUTRAL AND CONNECTED. (THE GROUND WIRE DOWN THE POLE TO THE GROUND RODS IS #6 SD BC.)

WHERE EQUIPMENT OR MATERIAL IS NOT GROUNDED, IT MUST BE SEPARATED FROM OTHER GROUNDED EQUIPMENT BY A MINIMUM OF 4". SPECIAL INSTRUCTIONS MAY BE GIVEN THAT REQUIRE ADDITIONAL SEPARATION. THIS WILL MINIMIZE RADIO AND TV INTERFERENCE.

CONCRETE POLES OR POLES SET IN CONCRETE

A DRIVEN GROUND CONNECTED TO THE SYSTEM NEUTRAL IS REQUIRED ON ALL CONCRETE POLES CARRYING PRIMARY CONDUCTORS. ALSO, ALL PRIMARY HARDWARE ON CONCRETE POLES SHALL BE BONDED TO THE SYSTEM NEUTRAL WITH #6 SD BC. SEE DWG. 02.02-07.

OTHER DISTRIBUTION POLES

- METAL POLES WITHOUT PRIMARY AND EMBEDDED DIRECTLY IN EARTH DO NOT NEED A GROUND BUT MUST BE BONDED TO THE NEUTRAL AT THE POLE.
- WOOD POLES SUPPORTING ONLY SECONDARY DO NOT REQUIRE A GROUND.
- UNDERGROUND-FED STREET AND AREA LIGHT POLES THAT HAVE A METAL U-GUARD OR CONDUIT MUST HAVE THE METAL U-GUARD BONDED TO THE NEUTRAL AT THE POLE.

GUYS - SEE SECTION 02

USE OF TRANSMISSION STATIC LINE GROUNDS

WHEN A DISTRIBUTION GROUND IS REQUIRED ON AN EXISTING WOOD, STEEL OR CONCRETE TRANSMISSION UNDERBUILD POLE, THE EXISTING TRANSMISSION STATIC LINE GROUNDING CONDUCTOR AND GROUND ROD SHOULD BE USED WHERE ONE EXISTS, EXCEPT AS NOTED BELOW. IN GENERAL, A SEPARATE DISTRIBUTION GROUNDING CONDUCTOR TO THE GROUND IS NEITHER REQUIRED NOR DESIRABLE ON A TRANSMISSION LINE STRUCTURE DUE TO EXPENSE AND CREATING POTENTIAL RADIO INTERFERENCE.

FOR LIGHT DUTY, DIRECT-EMBEDDED STEEL POLES, A DISTRIBUTION GROUND CAN BE ATTACHED DIRECTLY TO A GROUND CLAMP INSTALLED BY FIELD DRILLING THE POLE.

FIELD DRILLING OF SPECIAL DESIGN STEEL POLES ON CONCRETE FOUNDATION IS NOT PERMITTED. THEREFORE, IF DISTRIBUTION IS UNDERBUILT AND NEEDS A GROUND, AN INTERMEDIATE DISTRIBUTION POLE MUST BE SET FOR THE EQUIPMENT AND GROUND. NEW SPECIAL DESIGNED STEEL TRANSMISSION STRUCTURES CAN BE FACTORY-EQUIPPED WITH A GROUNDING NUT OR PAD FOR DISTRIBUTION GROUNDING ATTACHMENTS IF DISTRIBUTION UNDERBUILD IS PLANNED AND SPECIFIED PRIOR TO THE POLE FABRICATION.

PEF CONDITIONS

DISTRIBUTION NEUTRALS ARE NOT TO BE BONDED TO STATIC LINE GROUNDS ON STEEL TRANSMISSION POLES EMBEDDED IN EARTH. NEUTRALS 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.

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.

GROUNDS

STANDARDS PROCEDURES BULLETIN

THIS BULLETIN DESCRIBES THE PROCEDURE FOR USING GROUND ROD ELECTRODES ON OVERHEAD AND UNDERGROUND DISTRIBUTION LINES ON THE SYSTEM. THE GROUND RESISTANCE AT A POLE IS TO BE LOW ENOUGH TO MINIMIZE HAZARDS TO PERSONNEL AND TO PERMIT PROMPT OPERATION OF CIRCUIT PROTECTIVE DEVICES. ON A MULTI-GROUNDED SYSTEM, THE RESISTANCE OF THE SYSTEM NEUTRAL IS AFFECTED BY THE RESISTANCE OF THE POLE GROUNDS AND ALSO BY THE NUMBER OF GROUNDS INSTALLED ALONG THE LINE. ON A GROUNDED-WYE SYSTEM, MULTIPLE GROUNDS AT DIFFERENT LOCATIONS ALONG THE DISTRIBUTION SYSTEM ARE MORE IMPORTANT THAN THE RESISTANCE OF ONE PARTICULAR GROUND ROD INSTALLATION. THUS IT IS IMPORTANT TO CONSIDER THE OVERALL GROUNDING SYSTEM WHEN EVALUATING THE RESISTANCE LEVEL OF A SINGLE GROUND ELECTRODE.

GROUND RESISTANCE CAN VARY CONSIDERABLY WITH SOIL AND WEATHER CONDITIONS. THE AMOUNT OF MOISTURE IN THE SOIL WILL AFFECT A RESISTANCE LEVEL AS WILL THE TEMPERATURE OR THE CHEMICAL CONTENT OF THE SOIL. THE USE OF DEEP DRIVEN ROD ELECTRODES WILL MINIMIZE THE VARIATIONS IN RESISTANCE DUE TO WEATHER CONDITIONS AND IN SOME AREAS WILL INCREASE THE PROBABILITY OF PENETRATING A LOW RESISTANCE SOIL LAYER.

WHERE DISTRIBUTION EQUIPMENT IS INSTALLED (i.e. TRANSFORMERS, CAPACITOR BANKS, RECLOSERS, ETC.) A DRIVEN ROD SHALL BE INSTALLED AS FOLLOWS:

ONE DEEP-DRIVEN GROUND CONSISTING OF 3 – 8' RODS (INSTALLED ONE ON TOP OF THE OTHER TO PROVIDE 1 VERTICAL ELECTRODE 24' IN LENGTH). A SINGLE GROUND IS PREFERABLE OVER MULTIPLE GROUNDS. IF A SPECIFIC LOW RESISTANCE VALUE IS SPECIFIED, ADDITIONAL ROD SECTIONS SHOULD BE ADDED TO A SINGLE GROUND UP TO A MAXIMUM OF 100 FEET.

WHEN STREET LIGHT INSTALLATIONS REQUIRE A DRIVEN GROUND, 1 – 8' ROD WILL BE INSTALLED AND INTERCONNECTED WITH THE NEUTRAL CONDUCTOR.

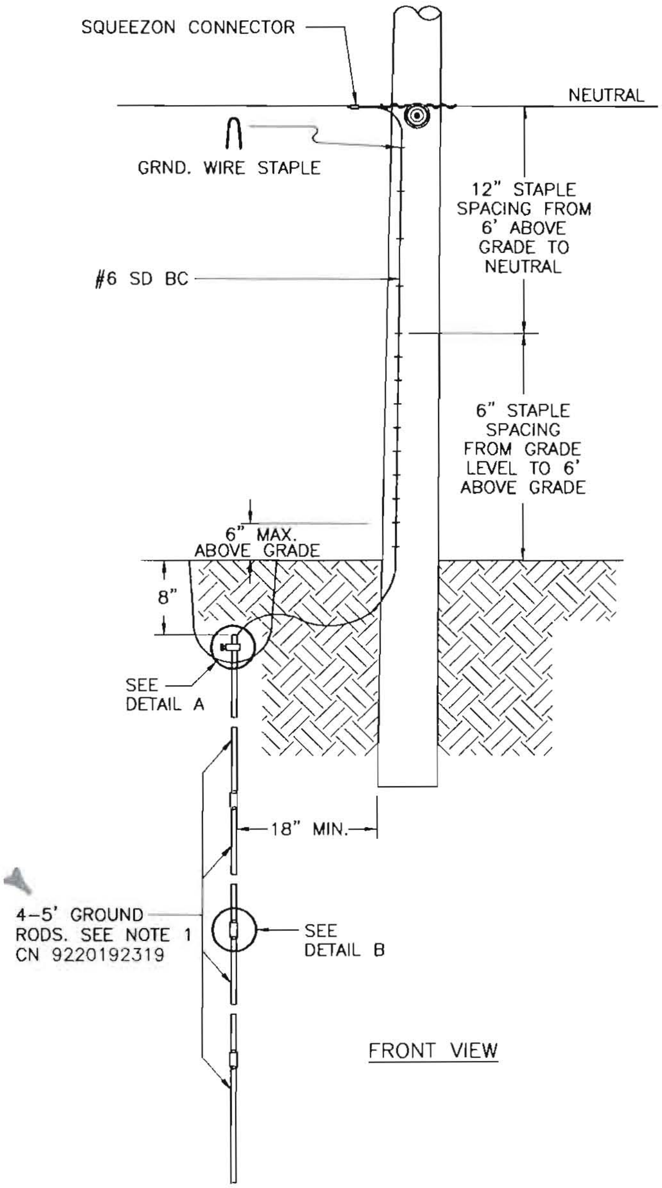
GROUNDING COMPATIBLE UNITS	DESCRIPTION/APPLICATION
G	GROUND ROD
GO	OVERHEAD EQUIPMENT GROUND
GHPC	CONCRETE POLE GROUND
GU	PAD-MOUNTED EQUIPMENT GROUND
GB	BONDING GROUND FOR JOINT USE
CGU	PAD-MOUNTED EQUIPMENT W/ SS RODS

3				
2				
1				
0	2/18/09	CECCONI	GUINN	HOYT
REVISED		BY	CK'D	APPR.

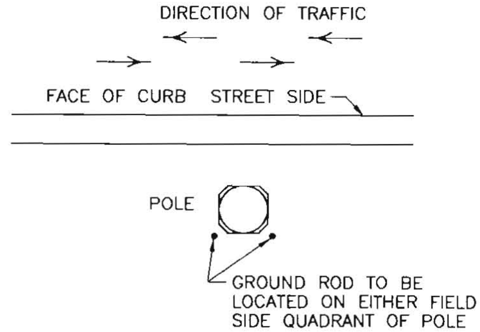
GROUND ROD ELECTRODE FOR DISTRIBUTION LINES

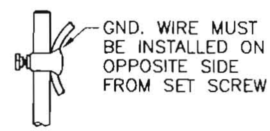
Progress Energy

FLA DWG. 01.01-01C

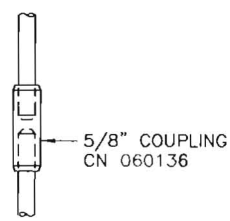


FRONT VIEW





DETAIL 'A'



DETAIL B

NOTES:

1. WHERE DENSE SOIL DOES NOT PERMIT DRIVING FOUR RODS, TWO OR THREE IS ACCEPTABLE. NESC REQUIRES A MINIMUM OF EIGHT FEET SO WE SHALL ALWAYS DRIVE TWO RODS MINIMUM.
2. THE GROUNDING CONDUCTOR SHALL BE ATTACHED TO THE POLE. USE #6 SOLID BARE COPPER FOR THE DRIVEN GROUND CONDUCTOR.
3. FOR ALL DISTRIBUTION GROUNDS, USE COPPER WIRE AND BRONZE CLAMPS. THE AREA OF THE ROD AT THE CLAMP SHALL BE WIRE BRUSHED. SECTIONAL COPPER-CLAD RODS SHALL NOT BE DRIVEN CLOSE TO KNOWN STEEL PIPES OR CONDUITS.
4. RUN GROUND FROM ROD TO NEUTRAL POSITION AND CONNECT TO SYSTEM NEUTRAL.

3				
2				
1	2/28/10	CECCONI	GUINN	ELKINS
0	2/20/09	CECCONI	GUINN	HOYT
REVISED	BY	CK'D	APPR.	

EQUIPMENT POLE GROUNDING DETAIL

Progress Energy

FLA

DWG. 01.01-05

REVISED		BY	CK'D	APPR.
3				
2				
1	12/4/09	CECCONI	GUINN	ELKINS
0	2/27/09	CECCONI	GUINN	HOYT

SECTION 2 – POLES, GUYS AND ANCHORS

TABLE OF CONTENTS

Progress Energy

FLA DWG. 02.00–00A

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. SEE DWG. 09.02-03 FOR CLEARANCES TO 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.

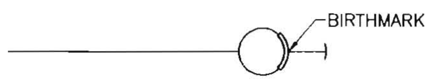
CARE AND CONSIDERATION OF PROPERTY OWNER'S INCONVENIENCE SHOULD BE TAKEN INTO ACCOUNT IN DETERMINING BOTH POLE AND GUY LOCATIONS.

ORIENTATION

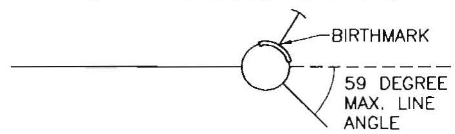
WHEN SETTING NEW POLES ON DEADENDS OR ANGLES OF UP TO 59 DEGREES, THE POLE'S BIRTHMARK SHOULD BE FACING THE ANCHOR. ON ANGLED POLES EXCEEDING 59 DEGREES, THE BIRTHMARK SHOULD FACE THE ANCHORS THAT SUPPORT THE LARGEST STRAIN AND CONDUCTOR TENSION. WHEN TENSIONS ARE EQUAL, TURN THE BIRTHMARK TOWARD EITHER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

FOR TANGENT CONSTRUCTION, FACE THE BIRTHMARK IN LINE WITH THE PRIMARY CONDUCTORS AND IN THE DIRECTION OF THE SHORTER SPAN. THE POLE MANUFACTURER PLACES THE BIRTHMARK ON THE INSIDE FACE OF A WOOD POLE'S NATURAL CONCAVE SURFACE. FOLLOWING THE ORIENTATION RULES ABOVE TAKES ADVANTAGE OF THE NATURAL STRENGTH CHARACTERISTICS OF THE POLE AND IMPROVES AESTHETICS.

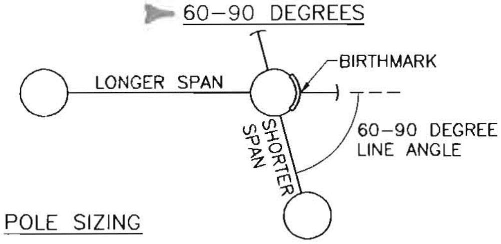
DEAD END CONSTRUCTION



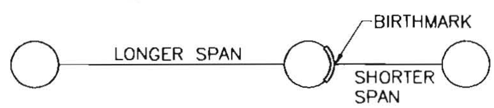
BISECT GUY LINE
ANGLE TO 59 DEGREES



LINE ANGLE
60-90 DEGREES



TANGENT CONSTRUCTION



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.

HOLES IN POLES

HOLES IN POLES ARE NOT TO BE LOCATED LESS THAN 4 INCHES APART IN ANY SECTION UNLESS DESIGNATED ON A SPECIFICATION DRAWING OR APPROVED BY DISTRIBUTION STANDARDS.

STANDARD CONCRETE POLES				SIZE POLES ACCORDING TO DISTRIBUTION ENGINEERING MANUAL
HEIGHT	TYPE	COMP. UNIT	CN	
15'	0	PC15	034150	LIGHTING
18'	II	PP	328732	TERMINAL POLE, SUBSTATION PILASTER
30'	I	PC301	034301	SECONDARY POLES
35'	I	PC351	034351	SECONDARY POLES
35'	III	PC353	034353	SINGLE-PHASE PRIMARY
40'	III	PC403	034403	SINGLE-PHASE PRIMARY
45'	III	PC453	034453	THREE-PHASE AND DOUBLE CIRCUITS
50'	IV	PC502	034502	POLES W/ LARGE EQUIPMENT
55'	IV	PC552	034552	POLES W/ LARGE EQUIPMENT

REVISED		BY	CK'D	APPR.
3				
2				
1	11/13/09	CECCONI	GUINN	ELKINS
0	2/25/09	CECCONI	GUINN	HOYT

POLES — GENERAL

Progress Energy

FLA DWG. 02.02-02

STANDARD STOCKED WOOD POLES								
				TANGENT CONSTRUCTION – MAXIMUM SPAN LIMITATIONS LIMITATIONS ON USE (BASED ON 2007 NESC – LIGHT LOADING DISTRICT)				
HEIGHT	CLASS	COMP. UNIT	CATALOG NUMBER	CONDUCTORS	CONFIGURATION	GRADE	JOINT USE	MAX. SPAN (FEET)
30	6	P30	030306	LIGHTING BRACKETS SHOWN ON DWG. 30.02–25	–	–	–	–
				SECONDARY/SERVICE SPANS PER DWG. 04.00–01	–	–	–	–
35	5	P35	030355	1 PH, #1/0 AAAC PRI AND NEUTRAL	TANGENT	C	NONE	600
40	5	P40	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	P45	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 AAC 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 AAC PRI, #1/0 AAAC NEUTRAL	VERTICAL	C	ONE–1 IN CABLE	250
				DOUBLE CIRCUIT 6#795 AAC 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.

3				
2				
1				
0	11/14/08	CECCONI	GUINN	HOYT
REVISED	BY	CK'D	APPR.	

STANDARD POLE SIZING – WOOD

Progress Energy

FLA 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, STREET LIGHT 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.

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.

3				
2				
1				
0	2/18/09	CECCONI	GUINN	HOYT
REVISED		BY	CK'D	APPR.

DISTRIBUTION LINE POLE MAINTENANCE

Progress Energy

FLA 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.

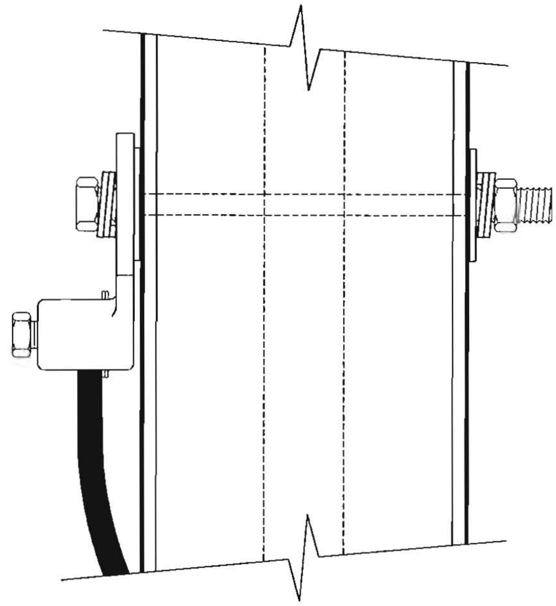
4. USE 35KV POST INSULATORS ON CONCRETE POLES.

REVISED		BY	CK'D	APPR.
3				
2				
1	8/1/05	CECCONI	GUINN	HOYT
0	4/23/02	YOUNTS	SIMPSON	CRANE

PILASTER AND CONCRETE POLE CONSTRUCTION

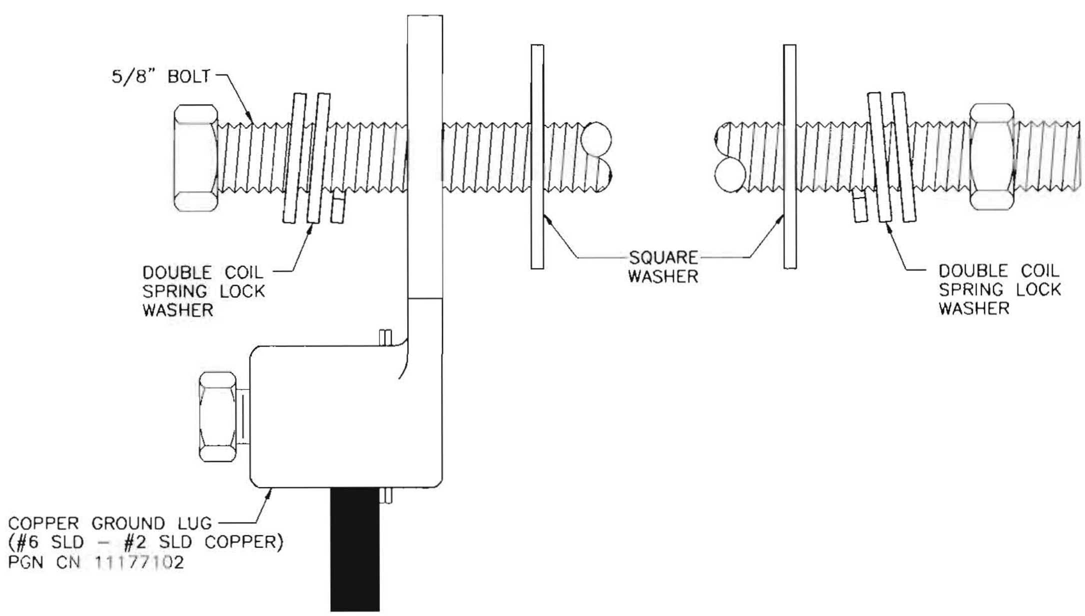
Progress Energy

FLA DWG. 02.02-06



CONCRETE AND STEEL POLES, AND EQUIPMENT HARDWARE GROUND

(ALL HARDWARE)



EXPANDED GROUNDING DETAIL

NOT TO SCALE

3					BONDING/GROUNDING CONNECTION TO CONCRETE AND STEEL POLES, AND EQUIPMENT	Progress Energy	
2							
1							
0	9/1/05	CECCONI	GUINN	HOYT		PGN	DWG. 02.02–07
REVISED		BY	CK'D	APPR.			

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
15	457				
18			992		
30		1350			
35		1832			
35				3173	
40				3961	
45				4600	
50					6913
55					8383

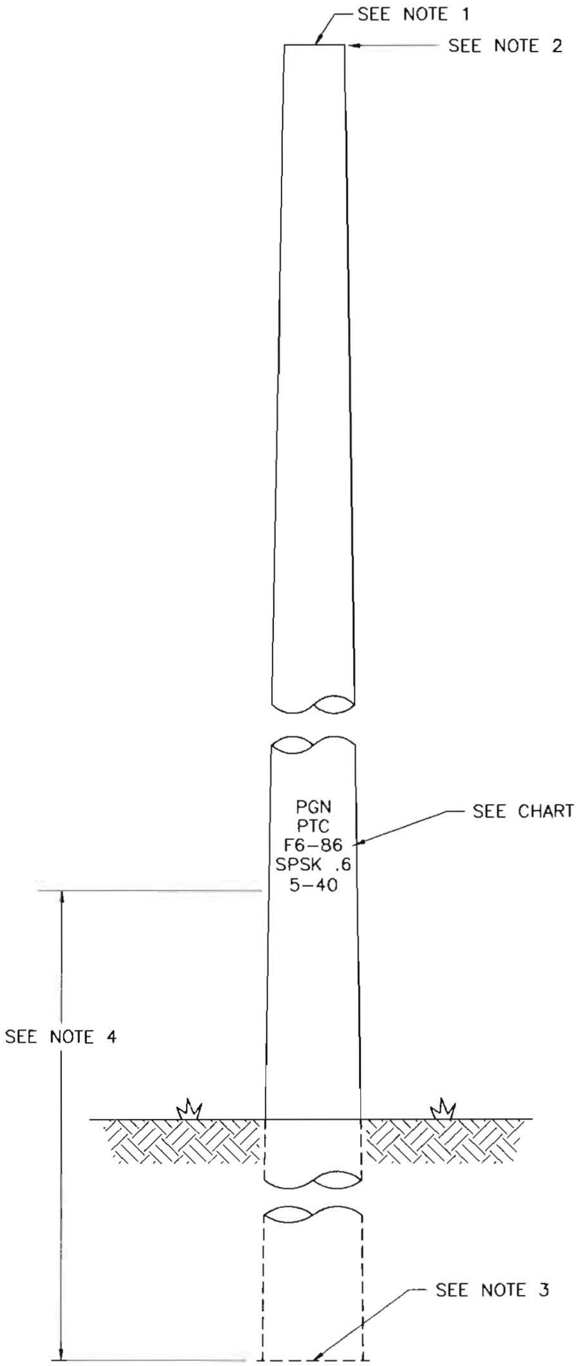
** AVERAGE FIGURES AND VARIATIONS MUST BE ACCEPTED
*** AVERAGE LOAD AT 2' FROM TOP THAT WILL BREAK POLE

REVISED		BY	CK'D	APPR.
3				
2	8/20/08	CECCONI	GUINN	HOYT
1	8/12/04	CECCONI	NUNNERY	SPRINGER
0	4/23/02	YOUNTS	SIMPSON	CRANE

AVERAGE SIZE AND WEIGHT OF CCA TREATED AND CONCRETE POLES

Progress Energy

PGN DWG. 02.02-08



CODE	DESCRIPTION
PGN	PROGRESS ENERGY
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. PROGRESS ENERGY COMPLIES 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				
1				
0	2/25/09	GUINN	GUINN	HOYT
REVISED		BY	CK'D	APPR.

STANDARD FRAMING AND BRANDING FOR DISTRIBUTION CCA POLES

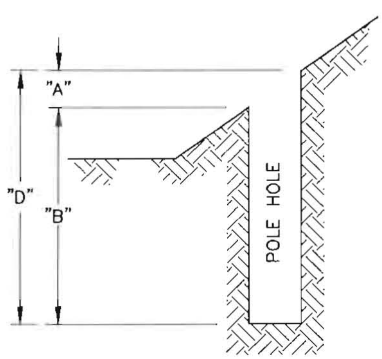
Progress Energy

FLA

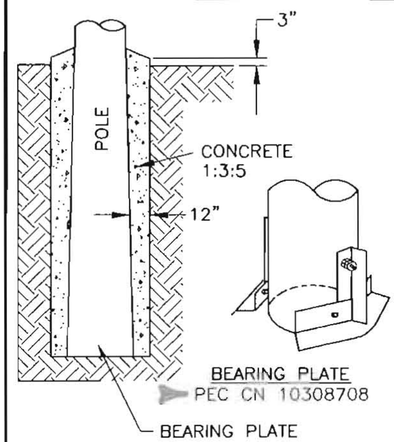
DWG. 02.02-10

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						

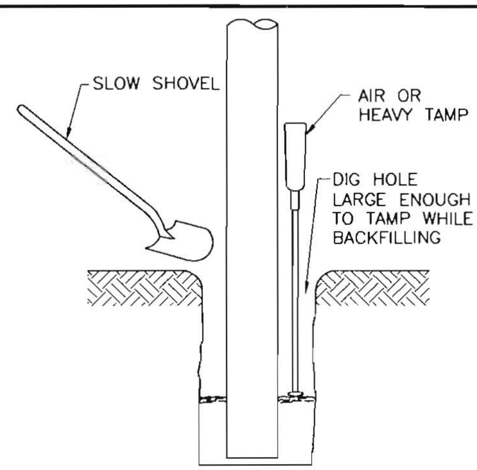
MAKE "D" EQUAL TO SETTING DEPTH IN LEVEL GROUND 'B" PLUS "A"



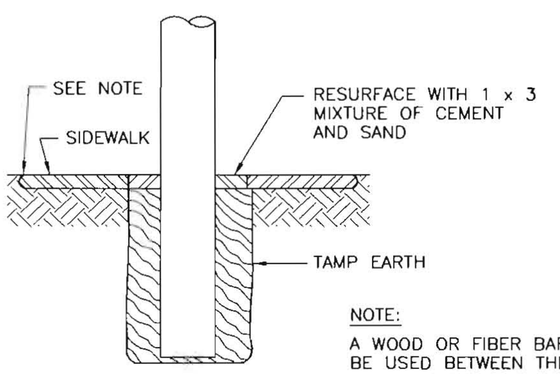
SETTING DEPTH FOR SLOPES



SETTING FOR EXCEPTIONAL STABILITY



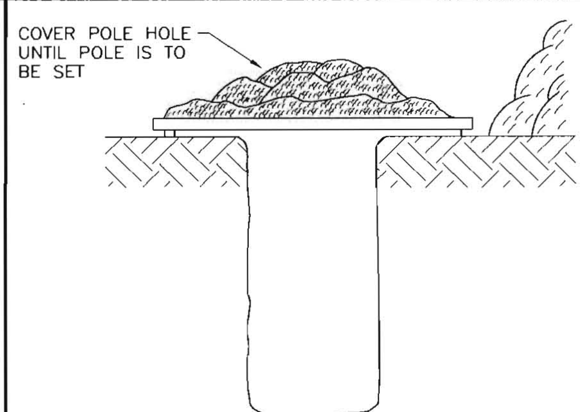
BACKFILLING



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

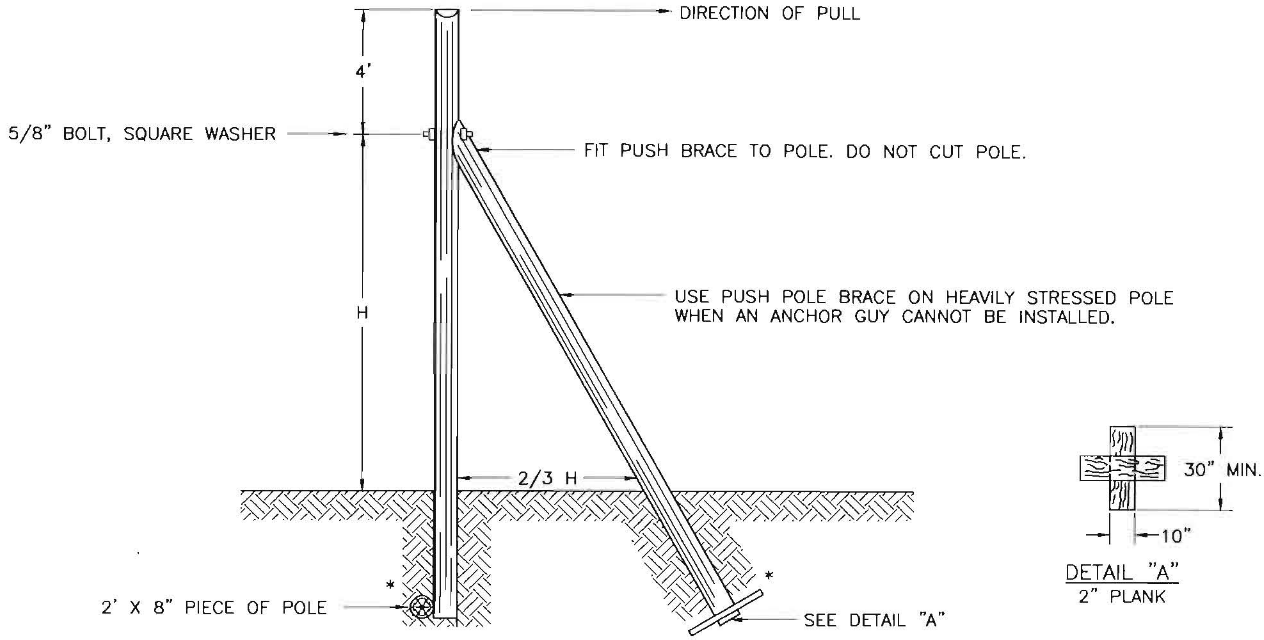
3				
2				
1	7/15/03	YOUNTS	SIMPSON	WOOLSEY
0	4/23/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

POLE SETTING DEPTH IN LEVEL GROUND AND INSTALLATION METHODS

Progress Energy

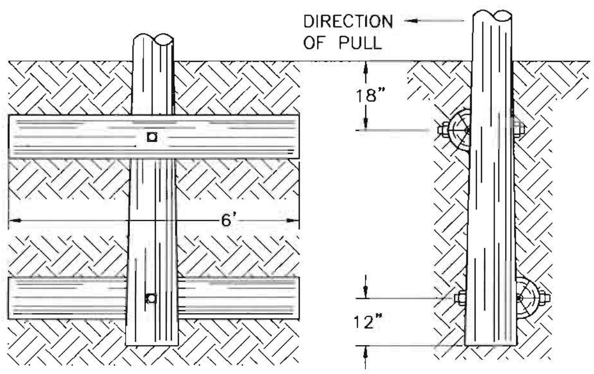
PGN DWG. 02.02–14

METHOD OF INSTALLING PUSH POLE BRACE



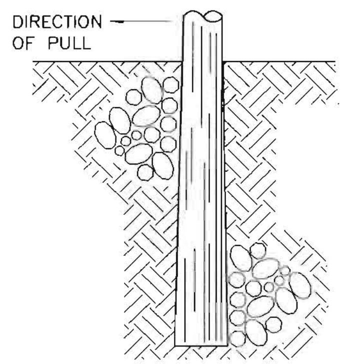
*TO BE INSTALLED IF REQUIRED BY SOIL CONDITIONS.

METHOD OF BRACING MEDIUM STRESSED POLE



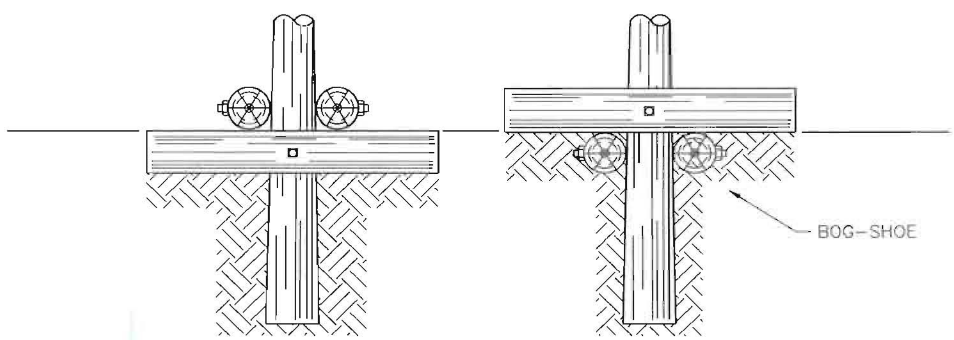
THIS METHOD OF BRACING MAY BE USED FOR REINFORCING A MEDIUM STRESSED POLE WHERE AN ANCHOR GUY CANNOT BE INSTALLED.

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.

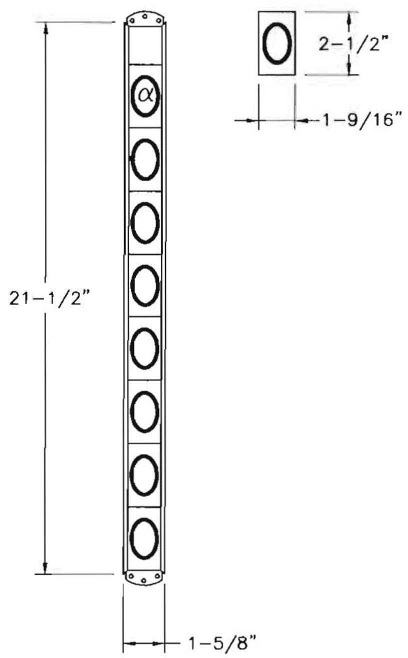
3					
2					
1					
0	4/24/02	YOUNTS	SIMPSON	CRANE	
REVISED		BY	CK'D	APPR.	

POLE BRACING

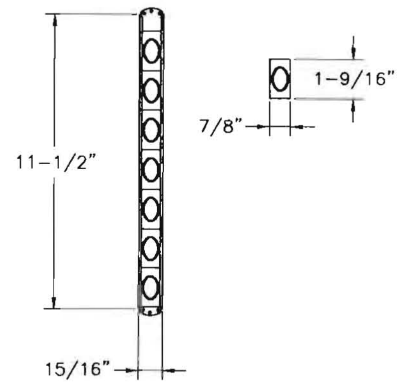
Progress Energy

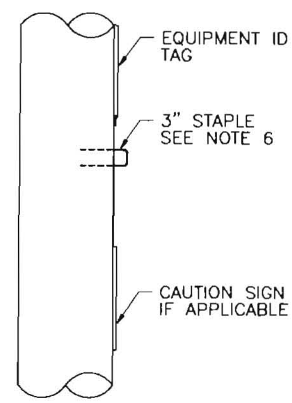
PGN | DWG. 02.02-16

POLES WITH SWITCHES
(DISCONNECTS, SOLID BLADE CUTOUTS, FUSED CUTOUTS)



POLES WITHOUT SWITCHES





SECTION A-A

NOTES:

1. IDENTIFY POLE WITH ONE 7 DIGIT EQUIPMENT ID NUMBER ASSIGNED BY GIS.

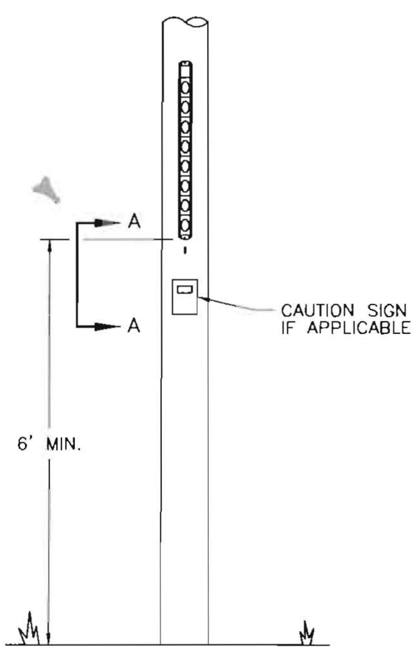
2. ON OH SOLID SWITCH POLES, ADD THE ALPHA CHARACTER REPRESENTING THE AREA TO THE BEGINNING OF THE 7 DIGIT EQUIPMENT ID NUMBER.

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.

6. ON POLES WITH SWITCHES, DRIVE A 3 INCH STAPLE INTO THE POLE JUST BELOW THE EQUIPMENT ID NUMBER. LEAVE ONLY A SMALL GAP BETWEEN STAPLE AND POLE, LARGE ENOUGH TO PUT A ZIP TIE THROUGH. ON A CONCRETE POLE INSTALL A METAL BAND AROUND THE POLE JUST BELOW THE SWITCH TAG. THIS WILL BE THE DESIGNATED LOCATION FOR HANGING TAGS REQUIRED BY SWITCHING AND TAGGING.



FRONT VIEW

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 ON ROAD SIDE OF POLE

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

REVISED		BY	CK'D	APPR.
3				
2	2/22/08	CECCONI	CECCONI	HOYT
1	7/15/03	YOUNTS	SIMPSON	WOOLSEY
0	4/23/02	YOUNTS	SIMPSON	CRANE

POLE NUMBERS AND LABELS

Progress Energy

FLA

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. REFER TO SECTION 3, OVERHEAD PRIMARY CONSTRUCTION, TO SEE THE EXACT NUMBER AND POSITION GUY WIRES. USE SPAN TABLES (DWGS. 02.04-32, 02.04-34; 02.04-36, 02.04-44, 02.04-46 AND 02.04-48) TO DETERMINE TENSION IN GUY WIRE BASED ON DIFFERENT LEAD TO HEIGHT RATIOS FOR EACH CONDUCTOR.

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 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. ALL DOWN GUYS SHALL HAVE TRAFFIC GUARDS INSTALLED.

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.

GUY INSULATOR INSTALLATIONS:

1. ALL GUYS ABOVE THE NEUTRAL POSITION MUST HAVE A GUY INSULATOR OF SUFFICIENT LENGTH TO PREVENT THE TRANSFER OF VOLTAGE TO THE BOTTOM OF THE DOWN GUY IN CASE THE DOWN GUY SAGS DOWN INTO A BARE ENERGIZED CONDUCTOR OR AN ENERGIZED BARE CONDUCTOR SAGS DOWN INTO THE DOWN GUY.

2. THE INSULATOR SHALL EXTEND 24 INCHES BELOW ANY SUCH BARE ENERGIZED CONDUCTOR OR PART.

3. ALL GUYS SHALL BE BONDED TO THE SYSTEM NEUTRAL (EXCEPTION IS MADE IN COASTAL AREAS TO PREVENT CORROSION, SEE COASTAL SECTION FOR MORE INFORMATION).

4. BONDING CONDUCTOR SHALL BE #4 SD AL (#6 SD BC ACCEPTABLE ON EXISTING GUYS).

5. TPX/QPX CONDUCTORS ARE NOT CONSIDERED BARE ENERGIZED CONDUCTORS.

6. OPEN WIRE SECONDARIES ARE CONSIDERED BARE ENERGIZED CONDUCTORS. GUYED OPEN WIRE SECONDARY REQUIRES A GUY INSULATOR.

7. THE NEUTRAL IS NOT CONSIDERED A BARE ENERGIZED CONDUCTOR FOR THE APPLICATION OF GUY INSULATORS.

8. THE PRIMARY AND SECONDARY BUSHINGS OF A TRANSFORMER ARE BARE ENERGIZED PARTS.

9. AN UNDERGROUND PRIMARY CABLE TERMINATOR IS CONSIDERED A BARE ENERGIZED CONDUCTOR TO THE BOTTOM OF THE TERMINATOR.

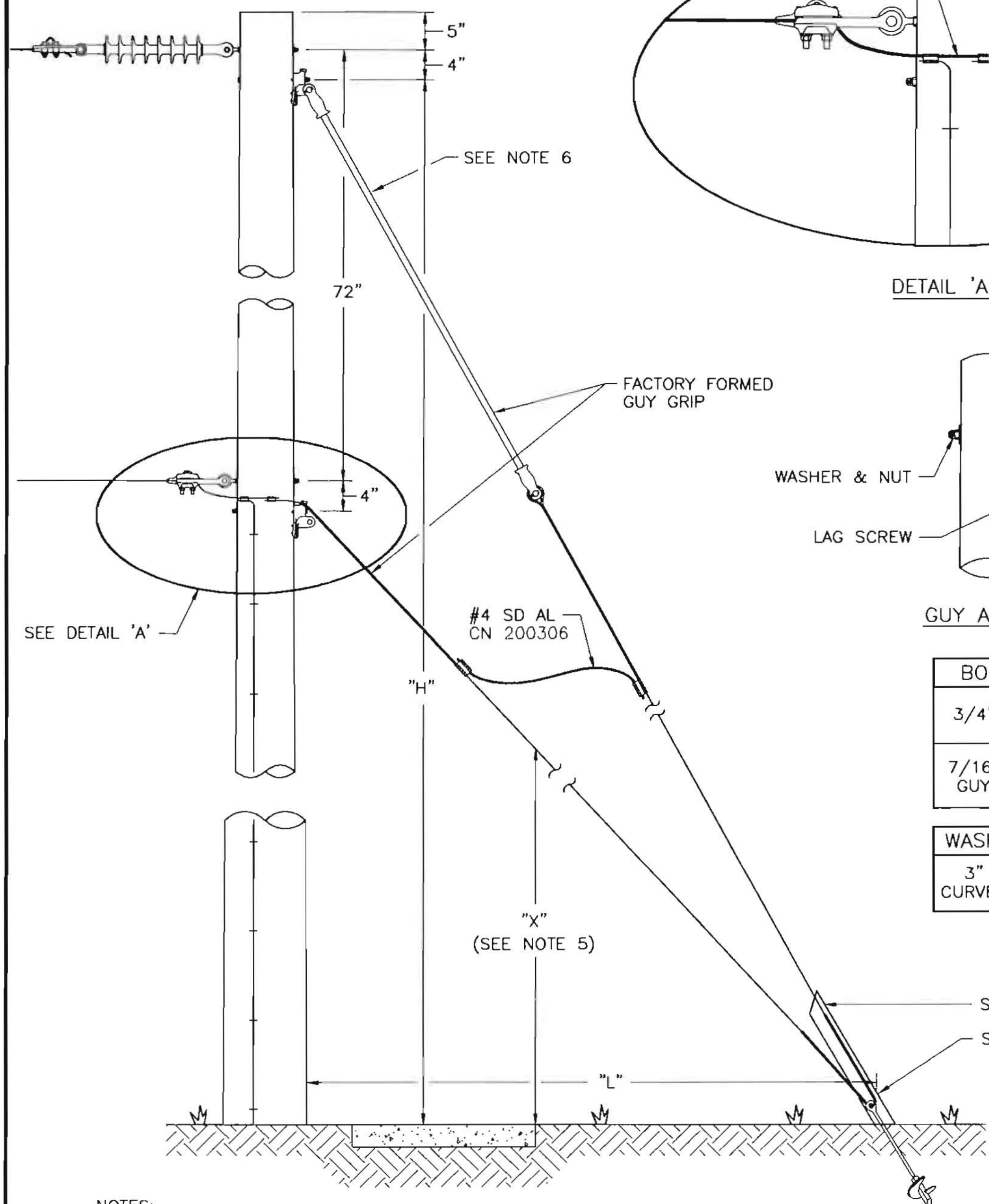
10. GUY INSULATORS MUST BE LOCATED TO ENSURE A MINIMUM OF 8" CLEARANCE EXISTS FOR 12 KV AND 12" CLEARANCE EXISTS FOR 25 KV FROM THE GUY INSULATOR TO THE PRIMARY VOLTAGE ENERGIZED CONDUCTOR OR PART.

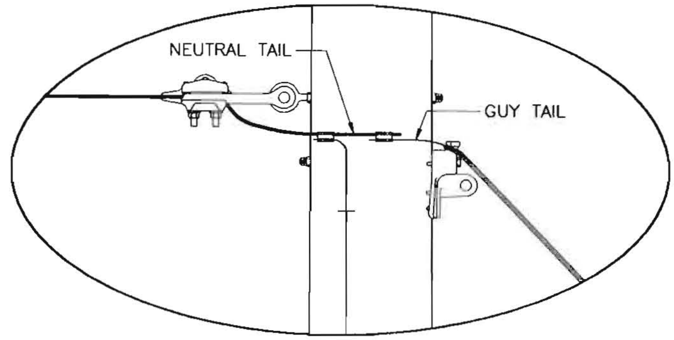
3				
2				
1	1/4/10	GUINN	GUINN	ELKINS
0	2/25/09	CECCONI	GUINN	HOYT
REVISED		BY	CK'D	APPR.

GUYING – GENERAL CONSTRUCTION NOTES

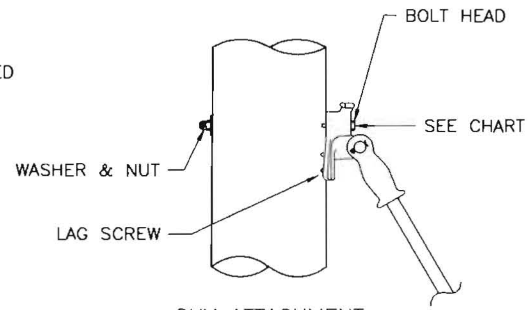
Progress Energy

FLA DWG. 02.04-02





DETAIL 'A'



GUY ATTACHMENT

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.
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 SUBJECT TO PEDESTRIAN TRAFFIC ONLY, "X" MUST BE A MINIMUM OF 9.5'. FOR RESIDENTIAL DRIVEWAYS, "X" MUST BE A MINIMUM OF 15.5'. FOR OTHER VEHICULAR TRAFFIC, "X" MUST BE A MINIMUM OF 18' (FL DOT). A 24' CLEARANCE IS REQUIRED FOR ALL LIMITED ACCESS ROAD CROSSINGS.
6. ALL GUYS ABOVE NEUTRAL POSITION MUST HAVE A GUY INSULATOR (LINK) OF SUFFICIENT LENGTH TO EXTEND BEYOND THE LOWEST BARE ENERGIZED COMPONENT BY 24".
7. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

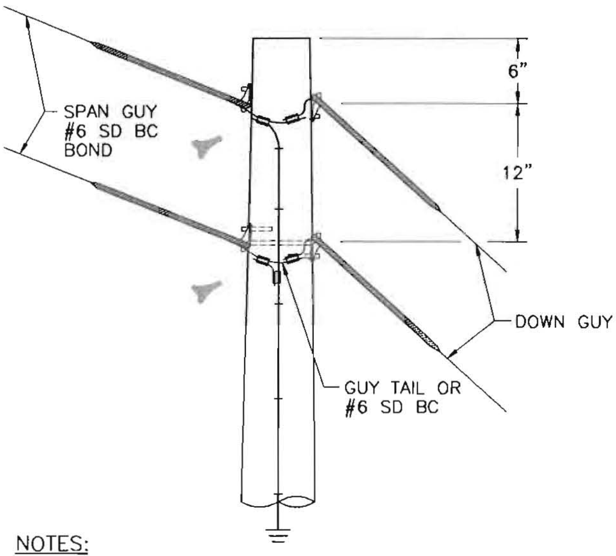
3				
2				
1	8/17/09	CECCONI	GUINN	ELKINS
0	7/31/09	ROBESON	GUINN	ELKINS
REVISED		BY	CK'D	APPR.

GUYING — CONSTRUCTION

Progress Energy

FLA DWG. 02.04-04

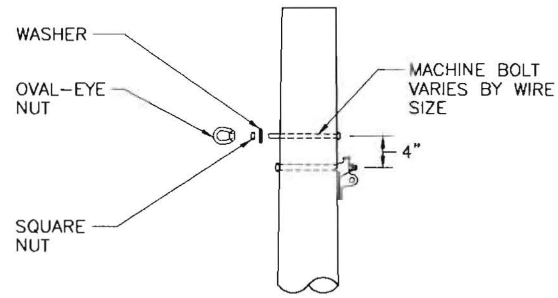
STUB POLE GUY ATTACHMENT

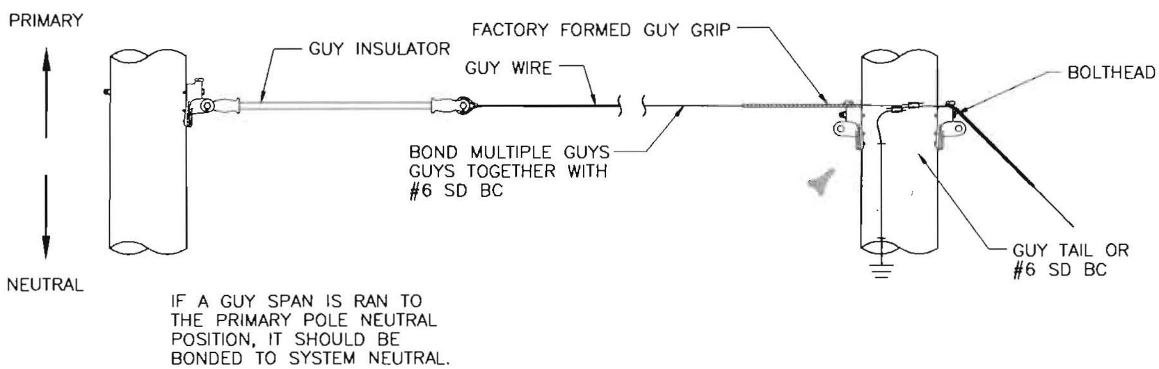


NOTES:

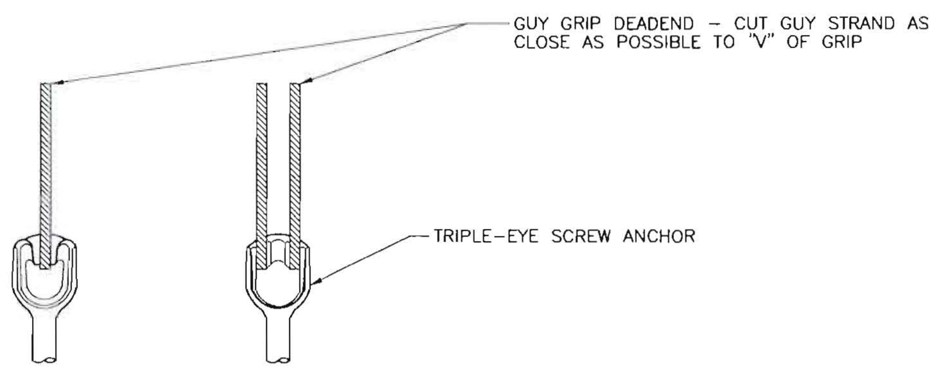
1. INSERT MACHINE BOLT WITH THREADED END OF BOLT ON SPAN GUY SIDE OF POLE
2. ADDITIONAL SPAN GUYS ARE 12" APART
3. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

SPAN OR DOWN GUY ATTACHMENT– CONCRETE POLE





SPAN GUY



REVISED		BY	CK'D	APPR.
3	12/20/07	CECCONI	GUINN	HOYT
2	10/6/06	GUINN	GUINN	HOYT
1	4/12/04	NUNNERY	NUNNERY	WOOLSEY
0	4/25/02	YOUNTS	SIMPSON	CRANE

GUYING ATTACHMENTS

Progress Energy

PGN DWG. 02.04–06

	5/16 HIGH STRENGTH GUY WIRE		7/16 UTILITIES GRADE GUY WIRE	
	COMPATIBLE UNIT	CATALOG NUMBER	COMPATIBLE UNIT	CATALOG NUMBER
GUY STRAND CN	G5	210504 (500 FT. COILS)	G7	210206 (REELS)
GUY GRIP		152160		152162
GUY GRIP COLOR CODE		BLACK		GREEN
78" INSULATOR	FL7	115737	FL7	115737
120" INSULATOR	FL1	115761	FL1	115761
GUY SPLICE		120315		10053502
GUY WIRE HOLDING STRENGTH (POUNDS) – SEE NOTE 1				
GUY WIRE	7200		15,000	

NOTES:

1. RATING OF 5/16 IS 90% OF RATED BREAKING STRENGTH PER NESC. RATING OF 7/16 IS LIMITED TO 15,000 LBS DUE TO USE OF 15,000 LB GUY INSULATORS.
2. USE GUY STRAIN INSULATORS (STICKS) RATED AT 15,000 LBS. FOR ALL GUYS.

3				
2				
1				
0	2/25/09	GUINN	GUINN	HOYT
REVISED		BY	CK'D	APPR.

GUY STRAND, GUY GRIPS AND GUY SPLICES

Progress Energy

FLA 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, 1P=10" PISA

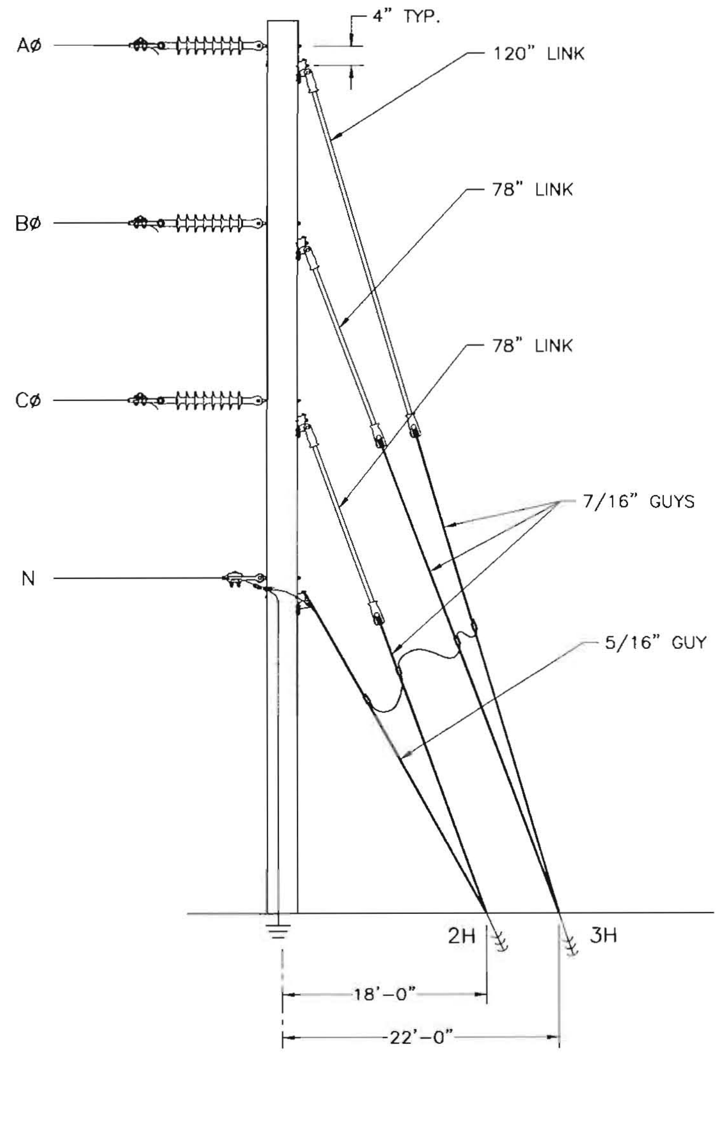
ANCHOR LEAD LENGTH IN FEET

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

SAMPLE FORMAT

EQUALS



NOTES:

1. GUYING AND ANCHORING SHOULD NOT BE CHANGED WITHOUT APPROVAL FROM ENGINEERING.
2. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

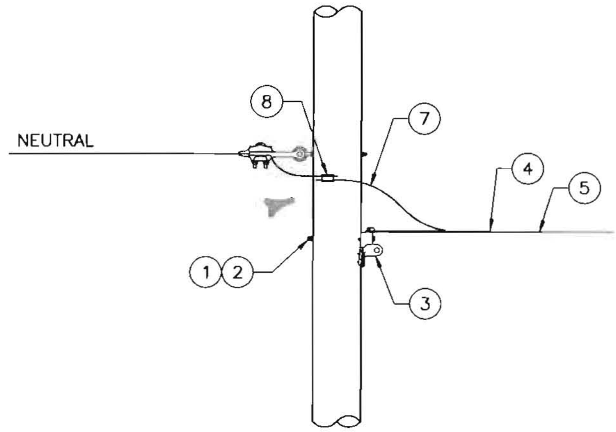
5	2/27/09	CECCONI	GUINN	HOYT
4	10/4/07	BURLISON	GUINN	HOYT
3	11/30/06	CECCONI	GUINN	HOYT
0	4/25/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

FORMAT FOR GUY ASSEMBLY ORDER INFORMATION

Progress Energy

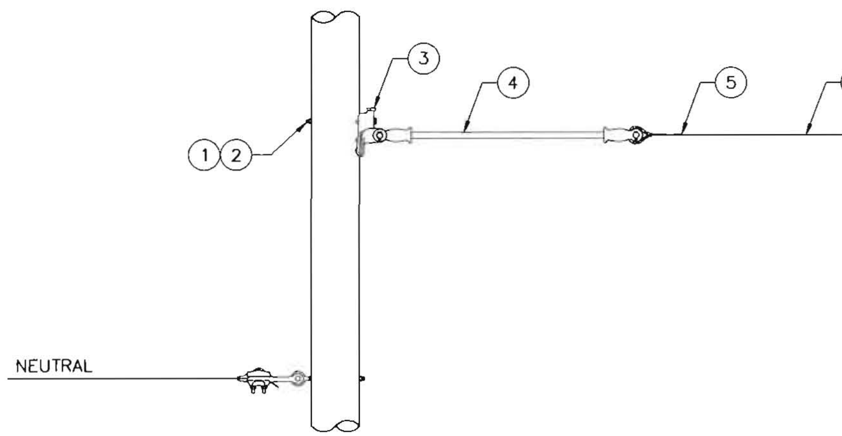
FLA DWG. 02.04-12

GUY, SPAN – WITHOUT FIBERGLASS LINK



BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
GSO (GUY WIRE SIZE)	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	–	–	200306	3	WIRE, #4 SD AL, BARE (FEET)
	8	–	–	153111	1	CONNECTOR, 2/0 STR. TO 2 STR. MAX

GUY, SPAN – WITH FIBERGLASS LINK



BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
GS (SIZE OF LINK) (GUY WIRE SIZE)	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)

3	2/25/10	GUINN	GUINN	ELKINS
2	3/18/04	NUNNERY	NUNNERY	WOOLSEY
1	2/24/03	YOUNTS	SIMPSON	WOOLSEY
0	4/24/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

SPAN GUYS

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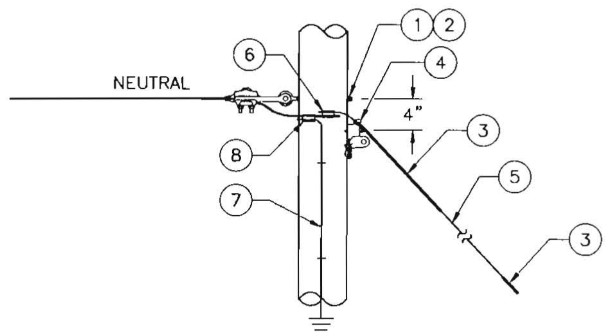
DWG. 02.04–14

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

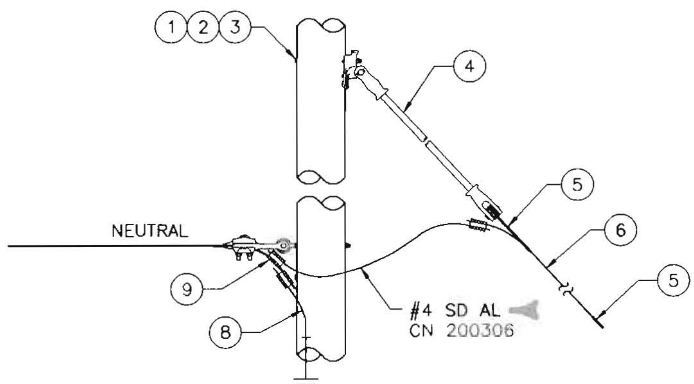


BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
–	1	–	1	–	1	BOLT W/NUT (VARIES W/GUY WIRE SIZE)
	2	–	1	–	1	WASHER (VARIES WITH GUY WIRE SIZE)
	3	–	2	–	1	GRIP, GUY (VARIES WITH GUY WIRE SIZE)
	4	–	1	152180	1	HOOK, GUY
	5	–	50	–	1	WIRE, GUY (VARIES WITH SIZE)
	6	–	1	153109	1	CONNECTOR, 2 STR. TO 2 STR. MAX
	7	–	3	190404	1	WIRE, #6 SD CU BARE (FEET)
	8	–	1	153111	1	CONNECTOR, 2/0 STR. TO 2 STR. MAX

NOTES:

1. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

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



BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
–	1	–	1	–	1	BOLT W/NUT (VARIES W/GUY WIRE SIZE)
	2	–	1	–	1	WASHER (VARIES WITH GUY WIRE SIZE)
	3	–	2	152180	1	HOOK EYE PLATE, GUY
	4	–	1	–	1	LINK, FBG, (SIZE VARIES W/CODE NO.)
	5	–	50	–	2	GRIP, GUY (VARIES WITH SIZE)
	6	–	1	–	50	WIRE, GUY (VARIES WITH SIZE)
	7	–	3	153109	1	CONNECTOR, 2 STR. TO 2 STR. MAX
	8	–	1	190404	3	WIRE, #6 SD CU, BARE (FEET)
	9	–	1	153111	1	CONNECTOR, 2/0 STR. TO 2 STR. MAX

NOTES:

1. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

REVISED	DATE	BY	CK'D	APPR.
5	2/25/10	GUINN	GUINN	ELKINS
4	12/21/07	CECCONI	GUINN	HOYT
3	6/30/06	GUINN	GUINN	HOYT
0	4/23/02	YOUNTS	SIMPSON	CRANE

DOWN GUYS

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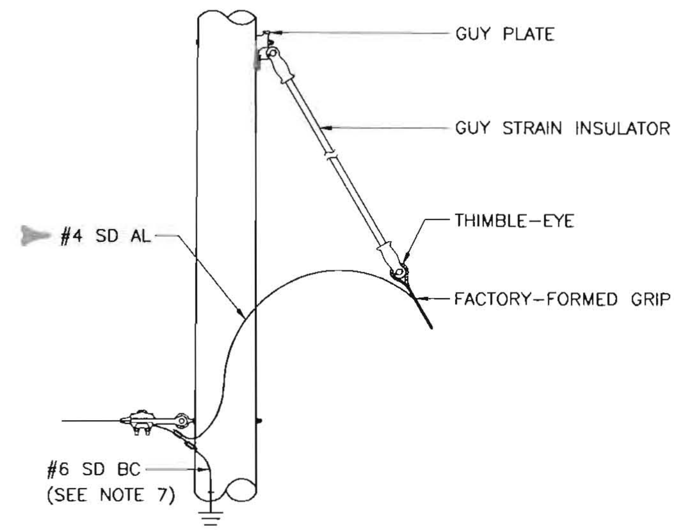
DWG. 02.04–16



FIBERGLASS GUY STRAIN INSULATORS (LINKS), ARE USED TO INCREASE THE POLE'S 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:

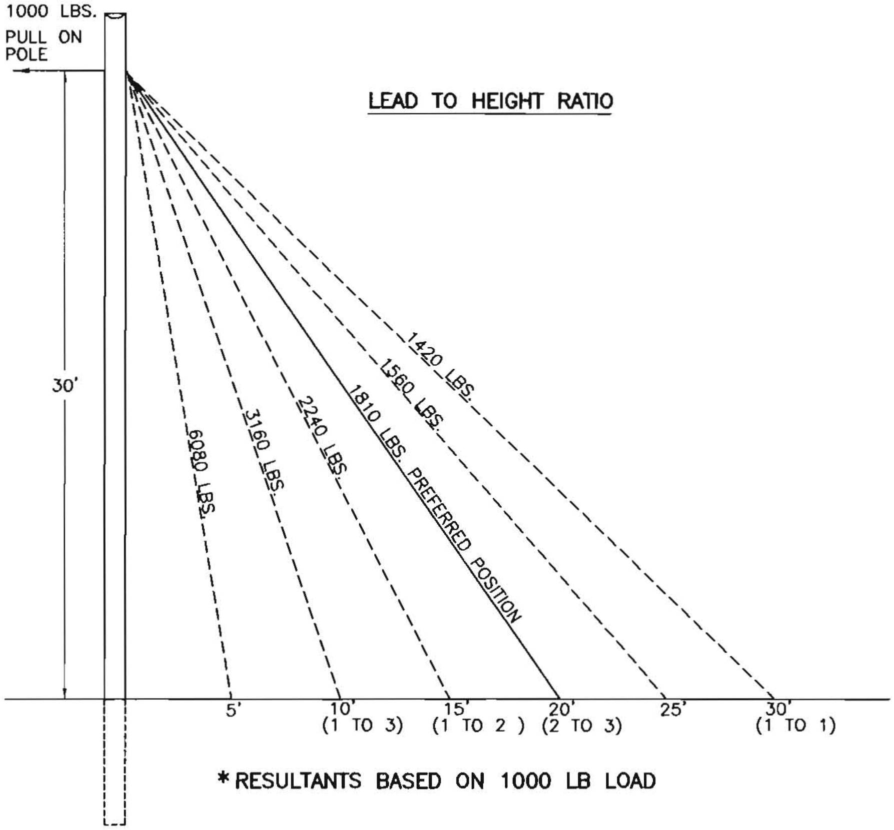
1. ALL GUYS INSTALLED ABOVE THE NEUTRAL POSITION, IN PRIMARY CONSTRUCTION, SHALL BE INSTALLED WITH GUY STRAIN INSULATORS SUCH THAT A TWO FOOT SECTION OF THE GUY STRAIN INSULATOR EXTENDS BELOW THE LOWEST ENERGIZED COMPONENT ON THE POLE.
2. POLES WITH GUYED OPEN-WIRE SECONDARY CONDUCTORS ONLY (NON-INSULATED) MUST CONTAIN A GUY INSULATOR.
3. POLES WITH GUYED INSULATED SECONDARY CONDUCTORS ONLY (TPX, QPX) 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 INSULATOR IS VOLTAGE IMPULSE RATED ONLY. UNDER NO CIRCUMSTANCES IS IT TO BE IN CONTACT WITH AN ENERGIZED CONDUCTOR. IT MAY BE TEMPORARILY USED IN SERIES WITH A POLYMER DEAD END DURING CONSTRUCTION TO GAIN CLEARANCES BUT MUST BE REMOVED FOR THE PERMANENT INSTALLATION.
7. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

8	1/22/10	GUINN	GUINN	ELKINS
7	3/4/09	GUINN	GUINN	HOYT
6	12/20/07	CECCONI	GUINN	HOYT
0	4/23/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

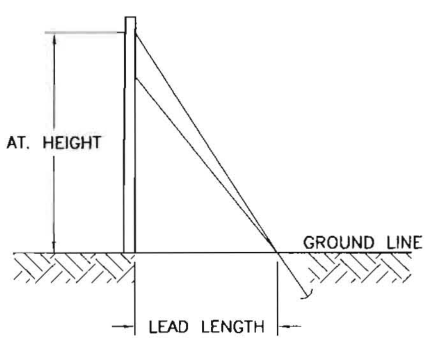
GUY STRAIN INSULATORS

Progress Energy

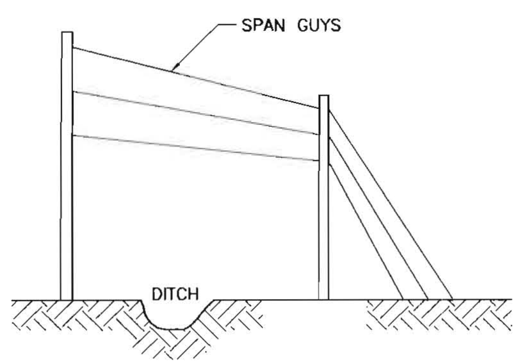
PGN DWG. 02.04-18



MULTIPLE GUYS



MULTIPLE GUYS AND GUY STUBS



NOTES:

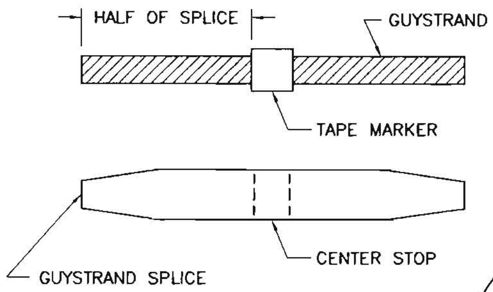
1. WHEN MULTIPLE GUYS ARE REQUIRED ON THE SAME ANCHOR, THE LEAD LENGTH IS NOT TO EXCEED THE GUY ATTACHMENT HEIGHT OF THE HIGHEST GUY. UNLESS OTHERWISE SPECIFIED, GUY LEAD LENGTH SHOULD BE 2/3 THE HEIGHT (1.5 TO 1 RATIO). THE MAXIMUM LEADS WILL BE 1:1.
2. IF LEAD LENGTH MUST BE GREATER THAN 1:1, A GUY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

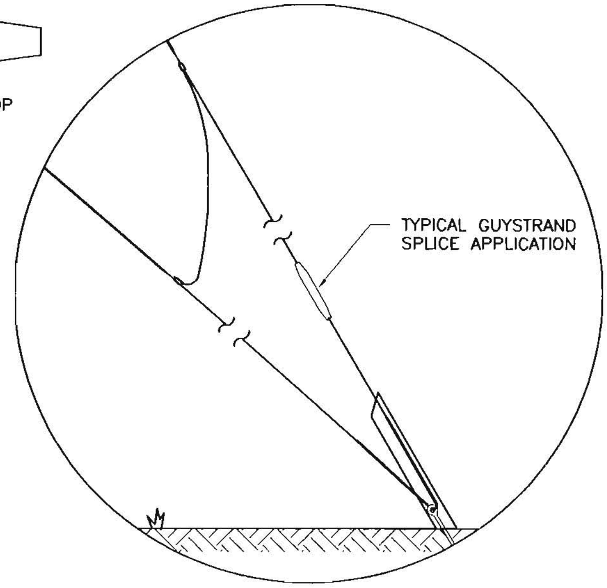
3				
2				
1				
0	4/23/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

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:

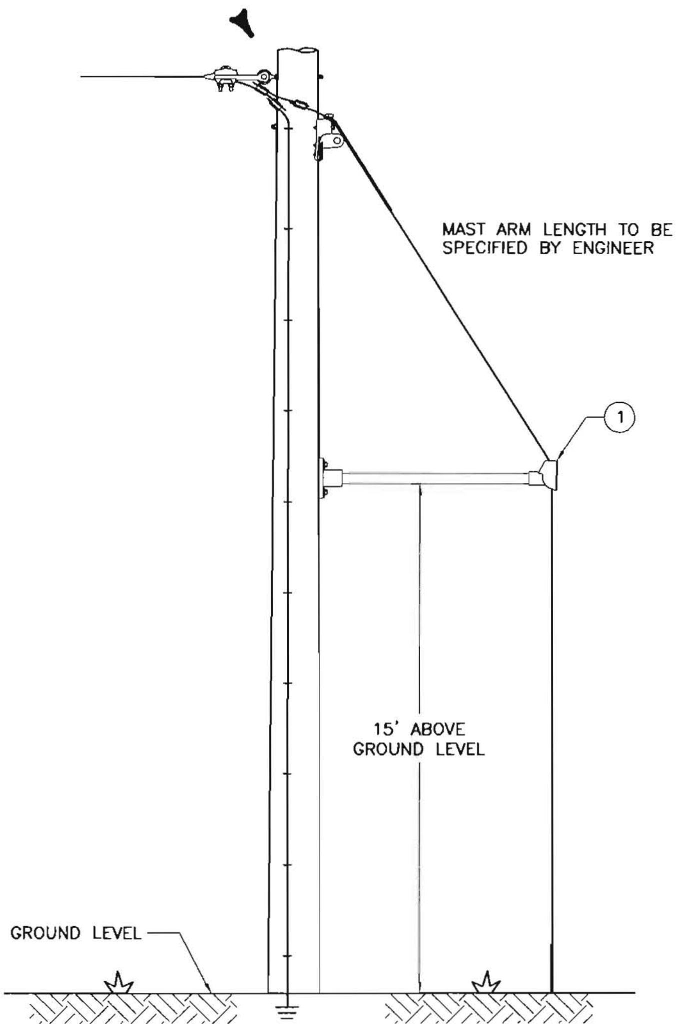
1. GUYSTRAND SPLICES ARE DESIGNED TO PROVIDE A QUICK AND ECONOMICAL MEANS OF REPAIRING BROKEN OR DAMAGED GUYSTRAND, OR FOR OTHER APPLICATIONS WHERE THE ENTIRE GUY MAY OTHERWISE HAVE TO BE REPLACED.
2. STRAIGHTEN STRAND AND TAPE TO INSURE STRAND STAYING IN LAY WHEN CUTTING. REMOVE TAPE AFTER CUTTING. 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.

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

GUYSTRAND SPLICE INSTALLATION

Progress Energy

PGN DWG. 02.04-22



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

FLORIDA BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
–	1	GM05	1	013308	1	WASHER, 2-1/4" SQUARE
				014114	3	SCREW, LAG 1/2" X 4"
				152106	1	BOLT, 5/8" X 10" GALVANIZED WITH NUT
				152160	2	GRIP, GUY, 5/16" DIA.
				152171	1	GUARD, GUY, 8', 1-1/2", POLYETHLENE
				152174	1	CLAMP, GUY, MAST ARM
				152175	1	FLANGE, GUY, MAST ARM
				152180	1	PLATE, GUY, HOOK
				153109	1	CONNECTOR, 2 STR. TO 2 STR. MAX
				153111	1	CONNECTOR, 2/0 STR. TO 2 STR.
				200306	3	TIEWIRE, #4 SLD SD AL
				210504	40	WIRE, GUY 5/16" (FEET)
				380208	5	CONDUIT, STEEL, W/C 2"

NOTES:

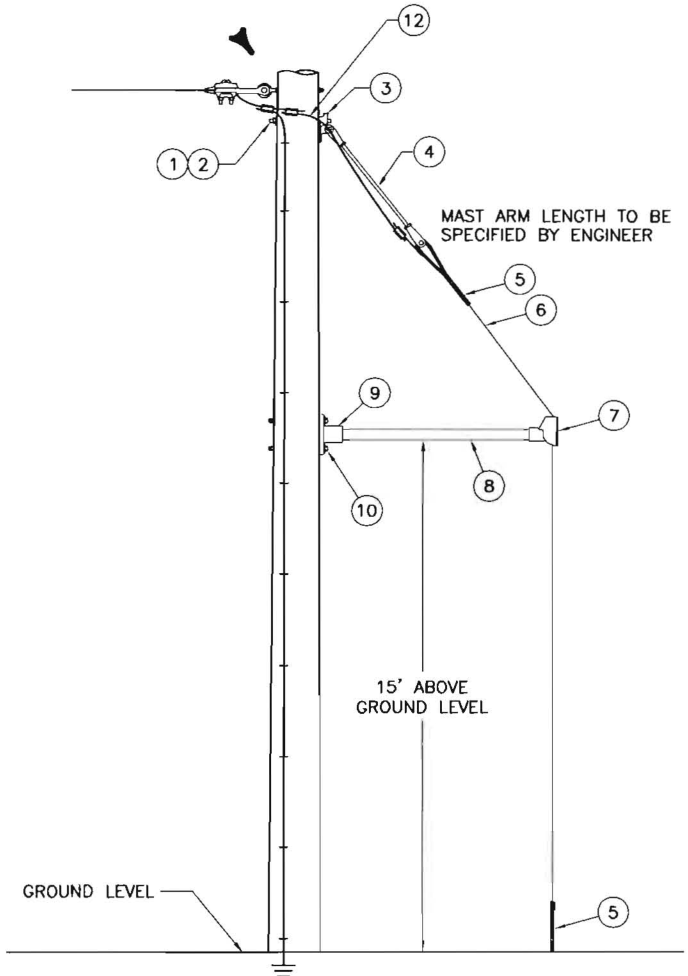
1. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

REVISED		BY	CK'D	APPR.
5	12/21/07	CECCONI	GUINN	HOYT
4	11/27/06	BURLISON	GUINN	HOYT
3	3/18/04	NUNNERY	NUNNERY	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

FLORIDA BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
GM_5	1	–	1	152106	1	BOLT, 5/8" X 10" GALVANIZED WITH NUT
	2	–	1	013308	1	WASHER, 2-1/4" SQUARE
	3	–	1	050492	1	HOOK EYE PLATE GUY
	4	–	1	–	1	LINK, FIBERGLASS (VARIES WITH SIZE)
	5	–	1	050225	2	GRIP, GUY 5/16"
	6	–	1	210504	40	WIRE, GUY 5/16"
	7	–	1	050411	1	CLAMP, MAST ARM GUY
	8	–	1	383208	1	PIPE, STEEL-MAST ARM, 2" GALVANIZED
	9	–	1	050412	1	FLANGE, MAST ARM GUY
	10	–	1	014114	2	SCREW, LAG 1/2" X 4"
	11	–	1	153109	1	CONNECTOR, 2 STR. TO 2 STR. MAX
	12	–	1	190404	3	WIRE, #6 SD CU, BARE (FEET)
	13	–	1	153111	1	CONNECTOR, 2/0 STR. TO 2 STR. MAX

NOTES:

1. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

REVISED		BY	CK'D	APPR.
5	12/21/07	CECCONI	CUINN	HOYT
4	11/27/06	BURLISON	CUINN	HOYT
3	3/18/04	NUNNERY	NUNNERY	WOOLSEY
0	4/23/02	YOUNTS	SIMPSON	CRANE

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

Progress Energy

FLA DWG. 02.04–28

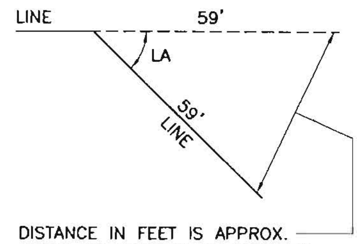
EXAMPLE:

PROBLEM DATA:

GRADE 'C' CONSTRUCTION
THREE-PHASE VERTICAL CONSTRUCTION
795 AAC PRIMARY
1/0 AAAC NEUTRAL
SPAN: 200 FT.
LINE ANGLE: 30 DEGREES
SOIL CLASS: 6
GUY LEAD TO HEIGHT RATIO: 2 TO 3

LEAD TO HEIGHT IS GIVEN IN THIS EXAMPLE
DWG. 02.04-30B SHOWS LEAD TO HEIGHT TABLE.

HOW TO DETERMINE LINE ANGLE



DISTANCE IN FEET IS APPROX. EQUAL TO NUMBER OF DEGREES IN LINE ANGLE (LA). IF YOU ARE ONLY ABLE TO STEP OUT 30 FT. THEN MULTIPLY THE DISTANCE BY 2.

DETERMINING GUY WIRE TENSION:

SEE CHART ON DWG. 02.04-32. USING THE PROBLEM DATA ON ABOVE, DETERMINE THE TENSION IN THE GUY WIRE.

TENSION 795 AAC: 6055 LBS
TENSION 1/0 AAAC NEUTRAL: 2096 LBS

IF EACH CONDUCTOR IS GUYED, A 5/16" GUY WIRE CAN BE USED.

IF THE TOP TWO PHASES ARE GOING TO ONE ANCHOR, THEN THE PULL ON THE ANCHOR WOULD BE 6055 LBS X 2 = 12,110 LBS.

WITH THE BOTTOM PHASE AND NEUTRAL GOING TO ONE ANCHOR, THE PULL ON THE ANCHOR WOULD BE 6055 LBS + 2096 LBS = 8,151 LBS.

IF A REDUCED TENSION NEUTRAL IS USED, THE TENSION WOULD BE HALF OF THE NORMAL TENSION. THEN THE TOTAL LOAD ON ANCHOR A2 BELOW WOULD BE 6055 LBS + 1048 LBS = 7103.

KEY	RATING @ 90% OF ULTIMATE
5/16	7,200
7/16	15,000*

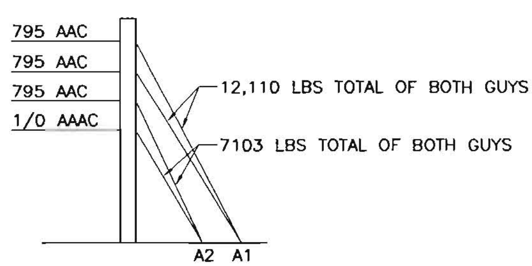
*LIMITED TO 15,000 INTENTIONALLY. 90% OF ULTIMATE IS 16,200.

SELECTING AN ANCHOR:

SEE ANCHOR HOLDING STRENGTH TABLE ON DWG. 02.06-02. THE VALUES ON THIS TABLE ARE THE MANUFACTURER'S RATED STRENGTH FOR THE VARIOUS SOIL TYPES WITH A 1.5 SAFETY FACTOR.

THE REQUIRED ANCHOR FOR THE TOP TWO PHASES (A1) IS A DOUBLE HELIX (MINIMUM).

THE REQUIRED ANCHOR FOR THE BOTTOM PHASE AND NEUTRAL (A2) IS A 10" PISA (MINIMUM).



3				
2				
1				
0	2/25/09	CECCONI	GUINN	HOYT
REVISED		BY	CK'D	APPR.

EXAMPLE GUYING PROBLEM

Progress Energy

FLA DWG. 02.04-30A

DETERMINING LEAD TO HEIGHT RATIO:

IF YOU HAVE A 20 FT. LEAD AND 36 FT. HT. 20 / 36 = .56 USE THE 1/2 RATIO CHART.

IF YOU HAVE A 12 FT. LEAD AND 40 FT. HT. 12 / 40 = .30 THIS EXCEEDS THE 1/2 RATIO IN OUR GUY TABLES, A POLEFOREMAN EVALUATION IS NEEDED.

HEIGHT (FT.)	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00	24.00	26.00	28.00	30.00
50.00	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60
48.00	0.17	0.21	0.25	0.29	0.33	0.38	0.42	0.46	0.50	0.54	0.58	0.63
46.00	0.17	0.22	0.26	0.30	0.35	0.39	0.43	0.48	0.52	0.57	0.61	0.65
44.00	0.18	0.23	0.27	0.32	0.36	0.41	0.45	0.50	0.55	0.59	0.64	0.68
42.00	0.19	0.24	0.29	0.33	0.38	0.43	0.48	0.52	0.57	0.62	0.67	0.71
40.00	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75
38.00	0.21	0.26	0.32	0.37	0.42	0.47	0.53	0.58	0.63	0.68	0.74	0.79
36.00	0.22	0.28	0.33	0.39	0.44	0.50	0.56	0.61	0.67	0.72	0.78	0.83
34.00	0.24	0.29	0.35	0.41	0.47	0.53	0.59	0.65	0.71	0.76	0.82	0.88
32.00	0.25	0.31	0.38	0.44	0.50	0.56	0.63	0.69	0.75	0.81	0.88	0.94
30.00	0.27	0.33	0.40	0.47	0.53	0.60	0.67	0.73	0.80	0.87	0.93	1.00
28.00	0.29	0.36	0.43	0.50	0.57	0.64	0.71	0.79	0.86	0.93	1.00	1.07
26.00	0.31	0.38	0.46	0.54	0.62	0.69	0.77	0.85	0.92	1.00	1.08	1.15
24.00	0.33	0.42	0.50	0.58	0.67	0.75	0.83	0.92	1.00	1.08	1.17	1.25
22.00	0.36	0.45	0.55	0.64	0.73	0.82	0.91	1.00	1.09	1.18	1.27	1.36
20.00	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.30	1.40	1.50
18.00	0.44	0.56	0.67	0.78	0.89	1.00	1.11	1.22	1.33	1.44	1.56	1.67
16.00	0.50	0.63	0.75	0.88	1.00	1.13	1.25	1.38	1.50	1.63	1.75	1.88
	LEAD (FT)											

- RATIO LESS THAN 0.33 REQUIRES POLEFOREMAN EVALUATION
- USE 1/3 (0.33 – 0.49)
- USE 1/2 (0.50 – 0.66)
- USE 2/3 (.0.67 – 0.99)
- USE 1/1 RATION GREATER THAN 1.0

REVISED	BY	CK'D	APPR.
3			
2			
1			
0 2/24/09	CECCONI	CUINN	HOYT

EXAMPLE GUYING PROBLEM

Progress Energy

FLA DWG. 02.04–30B

TABLE A

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

LINE ANGLE DEGREES	4 BC 6 BC 4 ACSR	2 BC 2 ACSR 2AAAC	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
POLE HEIGHT	40	40	45	45	45	45	50	45	
POLE WIND FORCE>	96	96	121	121	121	121	149	142	
WIND FORCE/FT>	0.1928	0.237	0.2985	0.3105	0.4423	0.5408	0.5948	0.7695	
SPAN GUY									
10	417	436	602	628	747	879	1048	1477	SPAN GUY
20	596	618	885	933	1124	1352	1623	2426	
30	772	797	1163	1233	1494	1816	2187	3359	
40	944	971	1433	1524	1854	2268	2737	4268	
50	1109	1139	1694	1806	2201	2705	3267	5146	
60	1268	1300	1944	2076	2534	3122	3775	5987	
DE	1041	1059	1642	1770	2188	2747	3335	5506	
LEAD TO HEIGHT = 1 TO 1									
10	590	616	851	889	1057	1243	1483	2088	
20	843	874	1251	1320	1589	1912	2295	3431	
30	1092	1127	1644	1743	2112	2569	3093	4750	
40	1335	1373	2027	2156	2622	3208	3870	6035	1
50	1569	1611	2396	2554	3113	3825	4621	7276	
60	1793	1838	2750	2935	3583	4415	5339	8467	1
DE	1472	1498	2323	2503	3094	3884	4717	7786	
LEAD TO HEIGHT = 2 TO 3 (PREFERRED)									
10	752	786	1085	1133	1347	1585	1890	2662	
20	1075	1114	1595	1683	2026	2437	2926	4373	
30	1392	1437	2096	2222	2693	3274	3943	6055	
40	1701	1751	2584	2748	3342	4089	4934	7694	3
50	2000	2053	3055	3256	3968	4876	5890	9277	
60	2285	2343	3505	3742	4567	5629	6806	10794	
DE	1876	1910	2961	3191	3944	4952	6013	9925	2
LEAD TO HEIGHT = 1 TO 2									
10	933	974	1346	1405	1671	1965	2344	3302	
20	1333	1382	1979	2087	2513	3023	3629	5425	
30	1727	1782	2600	2757	3340	4061	4891	7510	2
40	2110	2171	3205	3409	4145	5072	6119	9543	
50	2480	2547	3789	4039	4922	6048	7306	11507	
60	2834	2906	4348	4641	5665	6982	8441	**13388	
DE	2327	2369	3672	3958	4892	6142	7458	12311	1
LEAD TO HEIGHT = 1 TO 3									
10	1319	1378	1904	1987	2363	2779	3315	4670	
20	1886	1954	2798	2951	3554	4275	5132	7671	
30	2442	2520	3677	3898	4723	5743	6916	10621	
40	2984	3071	4532	4821	5862	7173	8654	**13496	3
50	3508	3602	5358	5711	6961	8553	10332	***16274	
60	4008	4110	6149	6564	8012	9873	11938	***18934	
DE	3291	3350	5193	5597	6919	8685	10547	***17410	1

** AVOID ON DOUBLE CIRCUIT DESIGN, MAY REQUIRE INCREASE IN POLE CLASS

*** SPECIAL DESIGN: REQUIRES A POLEFOREMAN EVALUATION

KEY	RATING @ 90% OF ULTIMATE
5/16	7200
7/16	15,000*

*LIMITED TO 15K INTENTIONALLY 90% OF ULTIMATE IS 16200

NOTES:

1. FOR A 1/0 AAAC REDUCED TENSION NEUTRAL, USE 1/2 THE TENSION VALUE SHOWN IN THE TABLE ABOVE FOR THE 1/0 AAAC.

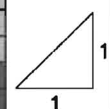
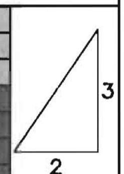
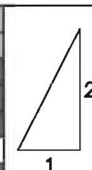
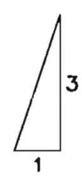
3				
2				
1				
0	2/24/09	CECCONI	GUINN	HOYT
REVISED		BY	CK'D	APPR.

SHORT SPAN GUYING TABLES
– SPANS 200' OR LESS –
GRADE C

Progress Energy

FLA DWG. 02.04–32

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

SPAN LIMIT	400	400	400	400	400	250	400	250	
LINE ANGLE DEGREES	4 BC 6 BC 4 ACSR	2 BC 2 ACSR 2AAAC	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
POLE HEIGHT	40	40	45	45	45	45	50	45	
POLE WIND FORCE>	96	96	121	121	121	121	149	142	
WIND FORCE/FT>	0.1928	0.237	0.2985	0.3105	0.4423	0.5408	0.5948	0.7695	
SPAN GUY									
10	499	544	735	745	905	1086	1242	1775	SPAN GUY
20	692	752	1045	1057	1283	1576	1800	2752	
30	881	954	1349	1363	1653	2055	2347	3709	
40	1064	1151	1644	1660	2012	2521	2878	4640	
50	1241	1341	1929	1946	2357	2968	3389	5538	
60	1410	1521	2200	2219	2686	3395	3876	6395	
DE	1124	1209	1807	1819	2207	2856	3256	5680	
LEAD TO HEIGHT = 1 TO 1									
10	705	770	1039	1054	1279	1536	1756	2511	
20	978	1063	1478	1496	1814	2229	2546	3892	
30	1246	1350	1908	1928	2337	2907	3319	5246	
40	1505	1628	2325	2348	2845	3565	4070	6562	
50	1755	1896	2727	2753	3334	4198	4793	7832	
60	1993	2151	3111	3138	3799	4801	5482	9045	
DE	1590	1710	2556	2573	3121	4038	4605	8033	
LEAD TO HEIGHT = 2 TO 3 (PREFERRED)									
10	899	981	1325	1343	1631	1958	2239	3200	
20	1247	1355	1884	1906	2313	2841	3246	4961	
30	1588	1721	2432	2458	2980	3705	4231	6687	
40	1919	2075	2964	2993	3627	4544	5188	8365	
50	2237	2417	3477	3509	4250	5351	6110	9984	
60	2541	2742	3966	4001	4843	6120	6988	11530	
DE	2027	2179	3258	3280	3978	5148	5870	10240	
LEAD TO HEIGHT = 1 TO 2									
10	1115	1217	1643	1666	2023	2429	2777	3970	
20	1547	1681	2337	2365	2868	3524	4026	6153	
30	1969	2134	3016	3048	3696	4596	5248	8294	
40	2380	2574	3677	3713	4499	5636	6435	10376	
50	2775	2998	4312	4352	5271	6637	7578	12383	
60	3152	3401	4919	4962	6007	7591	8667	**14301	
DE	2514	2703	4041	4068	4934	6385	7281	12702	
LEAD TO HEIGHT = 1 TO 3									
10	1578	1722	2324	2357	2861	3435	3927	5614	
20	2188	2377	3305	3344	4056	4984	5693	8702	
30	2785	3018	4266	4311	5227	6499	7422	11730	
40	3366	3641	5199	5251	6362	7971	9101	**14674	
50	3924	4239	6099	6155	7454	9386	10717	***17513	
60	4457	4810	6957	7018	8495	10736	12257	***20224	
DE	3555	3823	5715	5753	6978	9030	10296	***17963	

** AVOID ON DOUBLE CIRCUIT DESIGN, MAY REQUIRE INCREASE IN POLE CLASS
*** SPECIAL DESIGN: REQUIRES A POLEFOREMAN EVALUATION

KEY	RATING @ 90% OF ULTIMATE
5/16	7200
7/16	15,000*

*LIMITED TO 15K INTENTIONALLY
90% OF ULTIMATE IS 16200

NOTES:

1. FOR A 1/0 AAAC REDUCED TENSION NEUTRAL, USE 1/2 THE TENSION VALUE SHOWN IN THE TABLE ABOVE FOR THE 1/0 AAAC.

3				
2				
1				
0	2/24/09	CECCONI	GUINN	HOYT
REVISED		BY	CK'D	APPR.

MEDIUM SPAN GUYING TABLES
– SPANS 400' OR LESS –
GRADE C

Progress Energy

FLA DWG. 02.04–34

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

SPAN LIMIT	500	500	600	600	500	500	500	
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
POLE HEIGHT	40	40	40	45	45	45	50	
POLE WIND FORCE>	96	96	96	121	121	121	149	
WIND FORCE/FT>	0.1928	0.1935	0.237	0.2985	0.3105	0.4423	0.5948	
SPAN GUY								
10	541	552	612	818	803	983	1340	SPAN GUY
20	741	765	846	1159	1117	1362	1893	
30	938	973	1074	1493	1425	1732	2433	
40	1128	1174	1295	1817	1724	2090	2956	
50	1312	1368	1507	2128	2011	2434	3459	
60	1486	1553	1710	2425	2285	2761	3938	
DE	1172	1239	1362	1988	1838	2214	3227	
LEAD TO HEIGHT = 1 TO 1								
10	765	781	866	1157	1135	1390	1896	1 / 1
20	1049	1081	1196	1639	1580	1926	2677	
30	1326	1375	1518	2111	2016	2449	3440	
40	1596	1661	1831	2569	2438	2955	4181	
50	1855	1935	2132	3010	2845	3442	4892	
60	2102	2196	2418	3430	3231	3905	5569	
DE	1657	1752	1926	2811	2599	3131	4564	
LEAD TO HEIGHT = 2 TO 3 (PREFERRED)								
10	975	996	1104	1475	1447	1772	2417	3 / 2
20	1337	1379	1524	2090	2015	2455	3412	
30	1691	1753	1936	2691	2570	3122	4386	
40	2034	2117	2334	3275	3108	3767	5329	
50	2364	2467	2718	3837	3626	4388	6236	
60	2679	2800	3082	4373	4119	4977	7099	
DE	2112	2233	2455	3583	3314	3992	5818	
LEAD TO HEIGHT = 1 TO 2								
10	1209	1235	1369	1830	1795	2198	2997	2 / 1
20	1658	1710	1891	2592	2499	3045	4233	
30	2097	2175	2401	3338	3187	3872	5440	
40	2523	2626	2895	4062	3855	4673	6610	
50	2933	3059	3371	4759	4498	5442	7735	
60	3323	3473	3823	5423	5109	6174	8805	
DE	2620	2770	3045	4445	4110	4951	7217	
LEAD TO HEIGHT = 1 TO 3								
10	1710	1747	1936	2587	2538	3109	4239	3 / 1
20	2345	2418	2674	3665	3534	4306	5986	
30	2966	3075	3395	4720	4508	5476	7693	
40	3568	3713	4095	5745	5452	6609	9346	
50	4147	4327	4767	6730	6361	7697	10939	
60	4699	4911	5407	7670	7226	8731	12452	
DE	3705	3917	4306	6286	5813	7002	10206	

KEY	RATING @ 90% OF ULTIMATE
5/16	7200
7/16	15,000*

*LIMITED TO 15K INTENTIONALLY
90% OF ULTIMATE IS 16200

NOTES:

1. FOR A 1/0 AAAC REDUCED TENSION NEUTRAL, USE 1/2 THE TENSION VALUE SHOWN IN THE TABLE ABOVE FOR THE 1/0 AAAC.

REVISED		BY	CK'D	APPR.
3				
2				
1				
0	2/24/09	CECCONI	CUINN	HOYT

LONG SPAN GUYING TABLES
– SPANS 600' OR LESS –
GRADE C

Progress Energy

FLA DWG. 02.04–36

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

LINE ANGLE DEGREES	4 BC 6 BC 4 ACSR	2 BC 2 ACSR 2AAAC	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
POLE HEIGHT	40	40	40	45	45	45	50	50	
POLE WIND FORCE>	96	96	96	121	121	121	149	149	
WIND FORCE/FT>	0.1928	0.237	0.2985	0.3105	0.4423	0.5408	0.5948	0.7695	
SPAN GUY									
10	609	636	881	920	1095	1290	1540	2178	SPAN GUY
20	878	909	1305	1378	1660	2000	2402	3603	
30	1142	1178	1722	1827	2215	2696	3248	5002	
40	1399	1439	2128	2265	2755	3375	4073	6366	
50	1648	1691	2520	2687	3277	4030	4869	7685	
60	1885	1932	2895	3092	3776	4657	5632	8947	
DE	1561	1589	2463	2655	3282	4120	5003	8258	
LEAD TO HEIGHT = 1 TO 1									
10	861	899	1245	1301	1549	1825	2177	3081	1 / 1
20	1242	1286	1846	1948	2348	2828	3396	5095	
30	1615	1666	2435	2583	3133	3813	4594	7074	
40	1979	2035	3009	3202	3897	4773	5760	9003	
50	2330	2392	3564	3800	4634	5699	6886	10858	
60	2666	2733	4095	4373	5340	6586	7984	12653	
DE	2207	2247	3484	3755	4641	5827	7075	11679	
LEAD TO HEIGHT = 2 TO 3 (PREFERRED)									
10	1098	1146	1588	1659	1974	2326	2776	3927	3 / 2
20	1583	1639	2353	2483	2993	3605	4330	6495	
30	2059	2123	3104	3293	3993	4861	5856	9018	
40	2522	2594	3836	4082	4967	6084	7342	11477	
50	2970	3049	4543	4845	5908	7265	8778	**13853	
60	3399	3484	5220	5574	6807	8395	10153	***16130	
DE	2814	2865	4441	4786	5916	7428	9019	**14888	
LEAD TO HEIGHT = 1 TO 2									
10	1362	1422	1969	2057	2448	2885	3443	4871	2 / 1
20	1963	2034	2918	3080	3712	4472	5370	8056	
30	2554	2634	3850	4085	4953	6030	7263	11185	
40	3129	3218	4758	5064	6161	7547	9107	**14235	
50	3684	3782	5635	6009	7328	9012	10888	***17183	
60	4216	4321	6474	6914	8443	10413	12593	***20006	
DE	3490	3553	5508	5936	7338	9213	11187	***18466	
LEAD TO HEIGHT = 1 TO 3									
10	1926	2011	2785	2909	3463	4080	4869	6889	3 / 1
20	2776	2876	4127	4356	5250	6324	7595	11392	
30	3611	3725	5445	5777	7005	8527	10272	***15818	
40	4425	4551	6729	7161	8713	10673	12880	***20132	
50	5210	5348	7969	8498	10363	12744	***15398	***24301	
60	5962	6111	9156	9777	11941	**14726	***17809	***28293	
DE	4936	5025	7790	8395	10378	**13029	***15820	***26115	

** AVOID ON DOUBLE CIRCUIT DESIGN, MAY REQUIRE INCREASE IN POLE CLASS

*** SPECIAL DESIGN: REQUIRES A POLEFOREMAN EVALUATION

KEY	RATING @ 90% OF ULTIMATE
5/16	7200
7/16	15,000*

*LIMITED TO 15K INTENTIONALLY 90% OF ULTIMATE IS 16200

NOTES:

1. FOR A 1/0 AAAC REDUCED TENSION NEUTRAL, USE 1/2 THE TENSION VALUE SHOWN IN THE TABLE ABOVE FOR THE 1/0 AAAC.

3				
2				
1				
0	2/24/09	CECCONI	GUINN	HOYT
REVISED	BY		CK'D	APPR.

SHORT SPAN GUYING TABLES
– SPANS 200' OR LESS –
GRADE B

Progress Energy

FLA DWG. 02.04–44

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

SPAN LIMIT	400	400	400	400	400	250	400	250	LEAD TO HEIGHT
LINE ANGLE DEGREES	4 BC 6 BC 4 ACSR	2 BC 2 ACSR 2AAAC	1/0 ACSR 1/0 AAAC	1/0 STR CU	2/0 STR CU	336 AAC	4/0 STR CU	795 AAC	
POLE HEIGHT	40	40	45	45	45	45	50	45	
POLE WIND FORCE>	96	96	121	121	121	121	149	142	
WIND FORCE/FT>	0.1928	0.237	0.2985	0.3105	0.4423	0.5408	0.5948	0.7695	
SPAN GUY									
10	727	793	1073	1088	1320	1588	1815	2607	SPAN GUY
20	1016	1104	1538	1556	1888	2323	2653	4073	
30	1300	1408	1994	2015	2443	3042	3474	5510	
40	1576	1704	2437	2461	2982	3741	4271	6907	
50	1841	1988	2865	2891	3501	4413	5038	8255	
60	2094	2259	3272	3301	3996	5054	5770	9543	
DE	1686	1813	2711	2729	3310	4283	4884	8521	
LEAD TO HEIGHT = 1 TO 1									
10	1028	1122	1517	1538	1867	2246	2567	3688	1 / 1
20	1437	1561	2175	2201	2670	3285	3752	5760	
30	1838	1992	2820	2850	3455	4302	4913	7792	
40	2228	2410	3447	3481	4218	5290	6040	9768	
50	2603	2812	4051	4088	4951	6241	7125	11674	
60	2962	3195	4627	4668	5651	7148	8161	**13495	
DE	2385	2564	3834	3860	4681	6058	6907	12050	
LEAD TO HEIGHT = 2 TO 3 (PREFERRED)									
10	1310	1430	1933	1961	2380	2863	3272	4701	3 / 2
20	1832	1990	2773	2805	3403	4187	4783	7342	
30	2344	2539	3595	3633	4404	5484	6263	9932	
40	2840	3072	4394	4437	5376	6744	7700	12452	
50	3319	3585	5164	5211	6312	7956	9083	**14882	
60	3775	4073	5899	5950	7203	9112	10403	***17203	
DE	3040	3269	4887	4920	5967	7722	8805	***15361	
LEAD TO HEIGHT = 1 TO 2									
10	1625	1773	2398	2432	2952	3551	4059	5830	2 / 1
20	2273	2469	3439	3480	4221	5194	5933	9107	
30	2907	3149	4459	4506	5463	6803	7768	12320	
40	3523	3810	5450	5503	6669	8365	9550	***15445	
50	4116	4446	6405	6464	7829	9868	11268	***18459	
60	4683	5052	7317	7380	8934	11302	12903	***21338	
DE	3771	4055	6062	6102	7401	9578	10921	***19053	
LEAD TO HEIGHT = 1 TO 3									
10	2299	2508	3392	3439	4175	5022	5740	8246	3 / 1
20	3214	3491	4864	4921	5969	7345	8390	12879	
30	4111	4454	6306	6373	7726	9620	10986	***17423	
40	4982	5389	7708	7783	9431	11829	**13506	***21842	
50	5822	6288	9058	9161	11071	**13956	***15933	***26105	
60	6622	7145	10347	10437	12635	***15983	***18248	***30177	
DE	5333	5734	8573	8630	10467	**13545	***15445	***26945	

** AVOID ON DOUBLE CIRCUIT DESIGN, MAY REQUIRE INCREASE IN POLE CLASS
*** SPECIAL DESIGN: REQUIRES A POLEFOREMAN EVALUATION

KEY	RATING @ 90% OF ULTIMATE
5/16	7200
7/16	15,000*

*LIMITED TO 15K INTENTIONALLY
90% OF ULTIMATE IS 16200

NOTES:

1. FOR A 1/0 AAAC REDUCED TENSION NEUTRAL, USE 1/2 THE TENSION VALUE SHOWN IN THE TABLE ABOVE FOR THE 1/0 AAAC.

REVISED		BY	CK'D	APPR.
3				
2				
1				
0	2/24/09	CECCONI	CUINN	HOYT

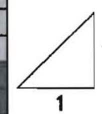
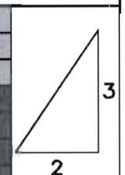
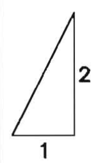
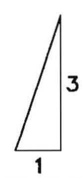
MEDIUM SPAN GUYING TABLES
– SPANS 400' OR LESS –
GRADE B

Progress Energy

FLA DWG. 02.04–46

TABLE C

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

SPAN LIMIT	500	500	600	600	500	500	500	
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
POLE HEIGHT	40	40	40	45	45	45	50	
POLE WIND FORCE>	96	96	96	121	121	121	149	
WIND FORCE/FT>	0.1928	0.1935	0.237	0.2985	0.3105	0.4423	0.5948	
SPAN GUY								
10	787	805	892	1194	1170	1432	1956	SPAN GUY
20	1089	1123	1242	1706	1642	2001	2785	
30	1383	1435	1584	2206	2105	2556	3595	
40	1669	1738	1917	2693	2553	3094	4381	
50	1945	2030	2236	3161	2985	3611	5137	
60	2207	2307	2540	3607	3396	4103	5856	
DE	1757	1858	2043	2982	2757	3321	4641	
LEAD TO HEIGHT = 1 TO 1								
10	1113	1138	1262	1689	1654	2026	2766	
20	1539	1589	1757	2412	2323	2829	3938	
30	1956	2030	2241	3120	2976	3615	5085	
40	2361	2458	2710	3808	3611	4376	6196	
50	2750	2870	3162	4470	4221	5107	7265	
60	3121	3263	3592	5101	4802	5802	8282	
DE	2485	2627	2889	4217	3899	4697	6846	
LEAD TO HEIGHT = 2 TO 3 (PREFERRED)								
10	1419	1451	1608	2153	2109	2582	3526	
20	1962	2025	2239	3075	2961	3607	5020	
30	2494	2588	2856	3978	3794	4608	6482	
40	3010	3134	3455	4854	4603	5578	7899	
50	3506	3659	4031	5698	5381	6510	9261	
60	3978	4160	4579	6503	6122	7397	10556	
DE	3168	3349	3683	5375	4971	5988	8727	
LEAD TO HEIGHT = 1 TO 2								
10	1760	1800	1995	2670	2616	3203	4373	
20	2434	2512	2777	3814	3672	4473	6227	
30	3093	3210	3543	4934	4706	5715	8040	
40	3733	3887	4286	6021	5709	6919	9797	
50	4348	4538	5000	7068	6674	8075	11487	
60	4935	5159	5680	8066	7593	9174	**13095	
DE	3929	4154	4568	6667	6165	7427	10825	
LEAD TO HEIGHT = 1 TO 3								
10	2490	2545	2821	3776	3699	4529	6185	
20	3442	3553	3928	5393	5194	6326	8806	
30	4374	4539	5010	6977	6656	8083	11370	
40	5279	5497	6061	8515	8074	9785	**13855	
50	6149	6418	7071	9996	9430	11419	***16245	
60	6979	7297	8033	11407	10739	12974	***18519	
DE	5557	5875	6460	9428	8719	10503	***15309	

** AVOID ON DOUBLE CIRCUIT DESIGN, MAY REQUIRE INCREASE IN POLE CLASS
*** SPECIAL DESIGN: REQUIRES A POLEFOREMAN EVALUATION

KEY	RATING @ 90% OF ULTIMATE
5/16	7200
7/16	15,000*

*LIMITED TO 15K INTENTIONALLY
90% OF ULTIMATE IS 16200

NOTES:

1. FOR A 1/0 AAAC REDUCED TENSION NEUTRAL, USE 1/2 THE TENSION VALUE SHOWN IN THE TABLE ABOVE FOR THE 1/0 AAAC.

REVISED	BY	CK'D	APPR.
3			
2			
1			
0 2/24/09	CECCONI	GUINN	HOYT

LONG SPAN GUYING TABLES
– SPANS 600' OR LESS –
GRADE B

Progress Energy

FLA DWG. 02.04–48

ANCHOR HOLDING POWER – POUNDS (BASED ON SAFETY FACTOR OF 1.5)

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 COARSE 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
8" SCREW ANCHOR	–	–	–	–	7330	6000	4000
10" SCREW ANCHOR	–	–	–	–	8665	6665	4665
10" PISA*	–	18,330	16,000	14,000	11,665	8665	6665
2 HELIX ANCHOR	–	27,330	24,000	21,330	18,000	15,330	12,665
3 HELIX ANCHOR	–	38,665	34,000	30,665	26,000	21,330	17,330

*USED IN INVERNESS

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 SECTION 12 FOR COASTAL AND CONTAMINATED AREA APPLICATIONS.
6. ANCHOR HOLDING STRENGTH IS BASED ON MANUFACTURER TEST DATA. THE ANCHOR CAPACITIES IN IN THE TABLE ABOVE HAVE A SAFETY FACTOR OF 1.5 IN CONSIDERATION OF STRENGTH LOSS DUE TO POSSIBLE LIFETIME MINOR ANCHOR DETERIORATION OR SOIL INCONSISTENCIES.

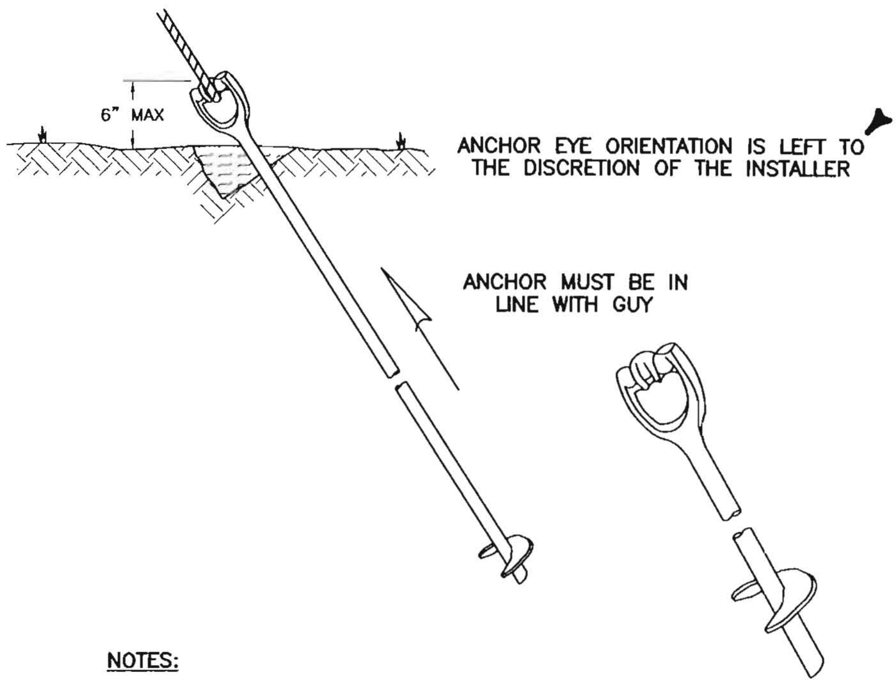
3				
2				
1				
0	2/26/09	CECCONI	GUINN	HOYT
REVISED		BY	CK'D	APPR.

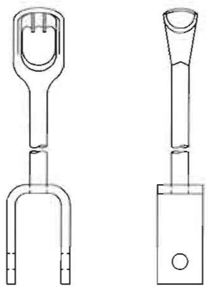
ANCHOR HOLDING STRENGTHS AND CONSTRUCTION NOTES

Progress Energy

FLA DWG. 02.06–02

SCREW ANCHOR

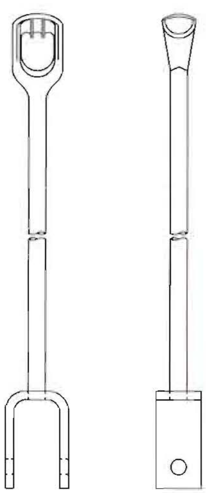




24" EXTENSION
PEC CN 10013613

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.



SINGLE HELIX SCREW ANCHOR

FLORIDA BILL OF MATERIALS		
COMPATIBLE UNIT	CATALOG NUMBER	DESCRIPTION
AN08	040108	ANCHOR SCREW, 8", SINGLE HELIX
AN10	040110	ANCHOR SCREW, 10" SINGLE HELIX

CAROLINAS BILL OF MATERIALS		
COMPATIBLE UNIT	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"

6' EXTENSION

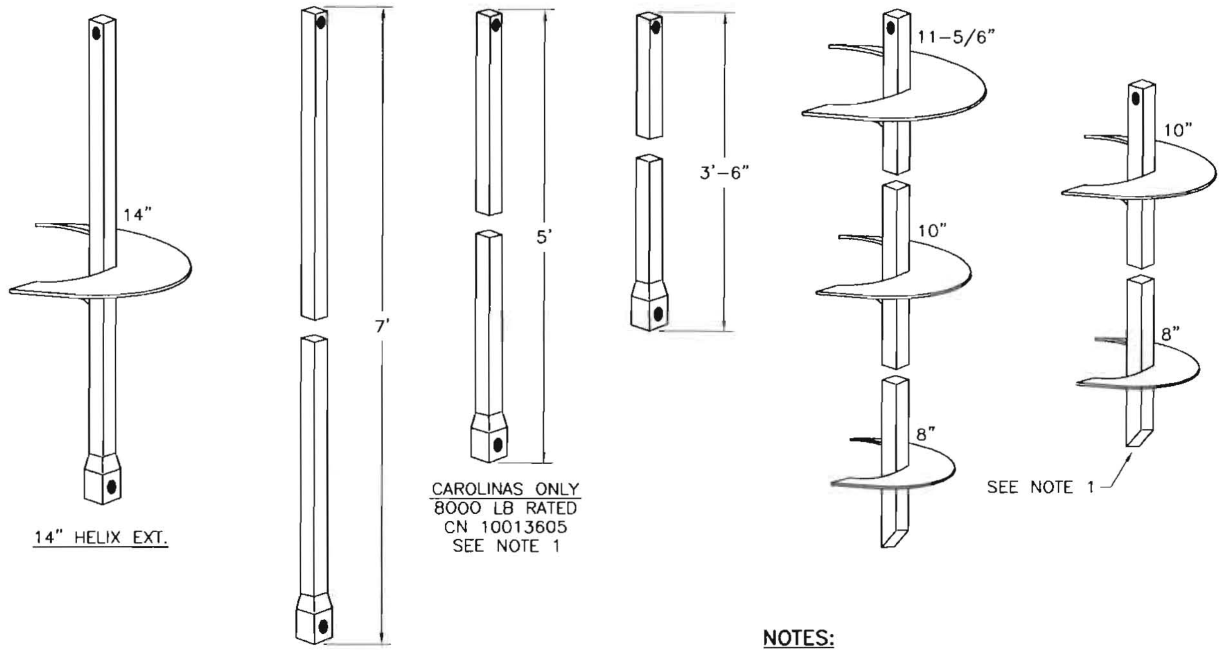
PEC CN	PEF CN
10012508	40216

REVISED		BY	CK'D	APPR.
3				
2	8/7/08	DANNA	GUINN	HOYT
1	7/15/03	YOUNTS	SIMPSON	WOOLSEY
0	4/25/02	YOUNTS	SIMPSON	CRANE

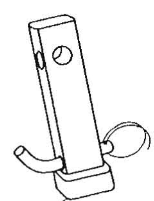
SCREW ANCHORS (NO WRENCH)

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'

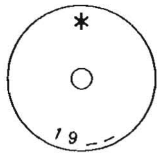
3				
2	8/16/06	SIMPSON	SIMPSON	HOYT
1	7/15/03	YOUNTS	SIMPSON	WOOLSEY
0	4/23/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

DOUBLE AND TRIPLE HELIX
SQUARE SHAFT ANCHORS

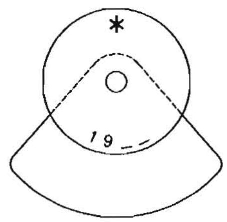
Progress Energy

PGN DWG. 02.06-08

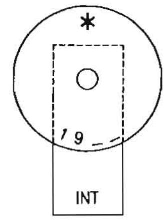
1. GROUND LINE TREATED.



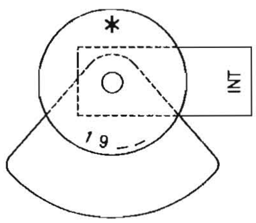
2. GROUND LINE TREATED AND FUMIGANT TREATED.



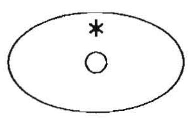
3. GROUND LINE TREATED AND INTERNAL TREATED.



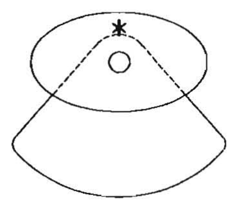
4. GROUND LINE TREATED. WOODFUMED AND INTERNAL TREATED OR WOODFUMED AND INTERNAL TREATED ONLY.



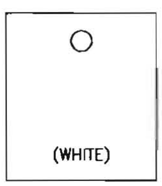
5. VISUAL BUT NOT GROUND LINE TREATED (VISUAL OR SOUND AND BORE).



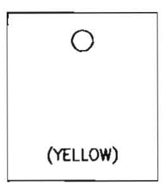
6. FUMIGANT TREATED ONLY.



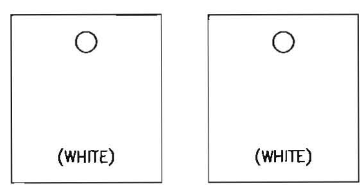
7. REJECT-POLE DOES NOT MEET STRENGTH REQUIREMENTS AND SHOULD BE REPLACED.



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).

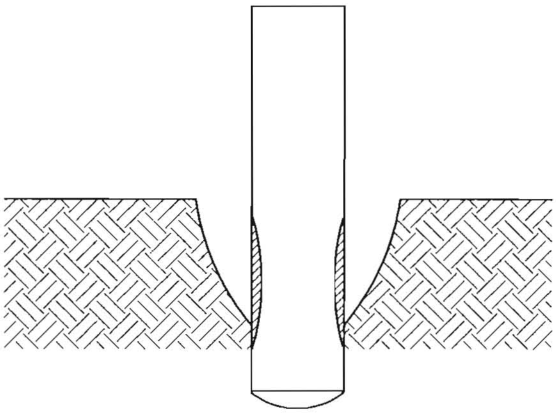
12. REFER TO POLE GROUNDLINE INSPECTION AND TREATMENT SPECIFICATION FOR RELATED INFORMATION.

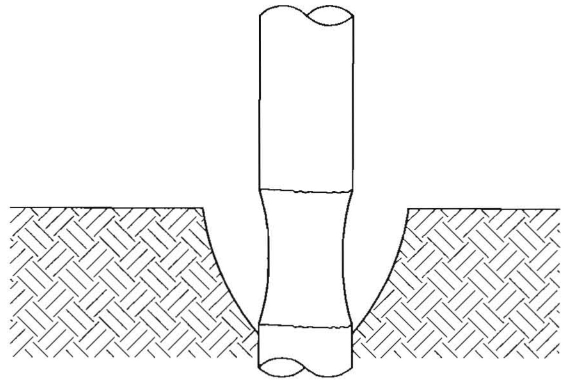
3				
2				
1	6/30/06	CECCONI	GUINN	HOYT
0	4/25/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

POLE REINFORCING (O&M)

Progress Energy

PGN DWG. 02.08–06

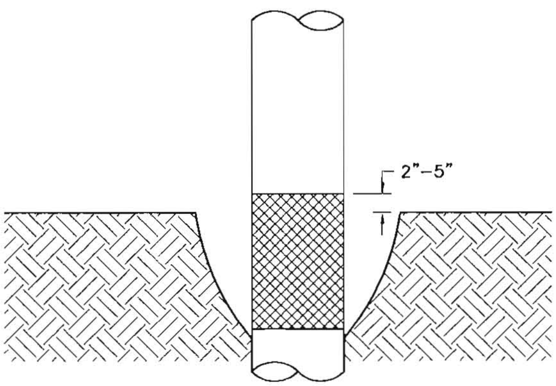


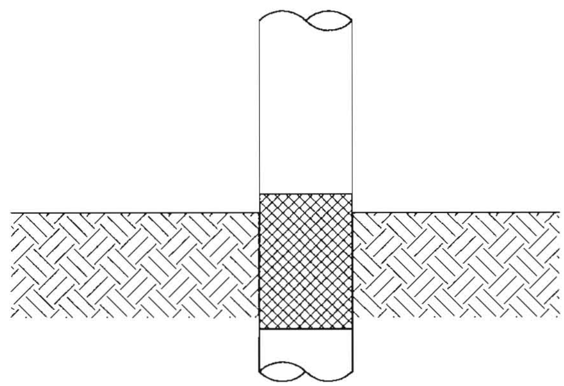


A. 1. EXISTING POLES:
EXCAVATE 18" DEEP, SOUND AND PROD–TEST POLE TO EVALUATE INTERIOR STRENGTH. (ONCE A POLE IS EXCAVATED IT MUST BE TREATED OR REJECTED. A POLE SHOULD BE REJECTED WHEN EXTERNAL ROT REDUCES THE CIRCUMFERENCE OF THE POLE 3" OR MORE.)

2. REINSTALLED POLES:
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.

NOTES:

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.

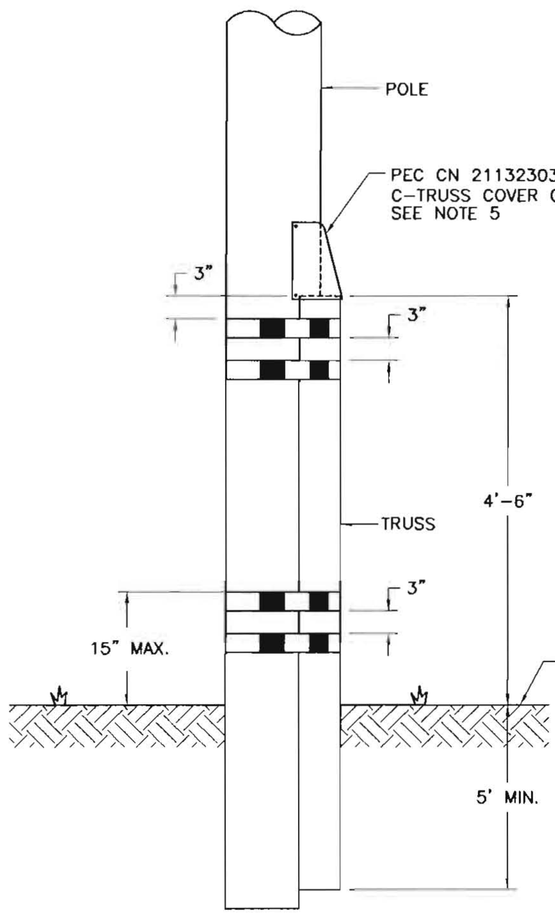
REVISED		BY	CK'D	APPR.
3				
2				
1	11/7/03	CECCONI	SIMPSON	WOOLSEY
0	4/23/02	YOUNTS	SIMPSON	CRANE

POLE REINFORCING (O&M)

Progress Energy

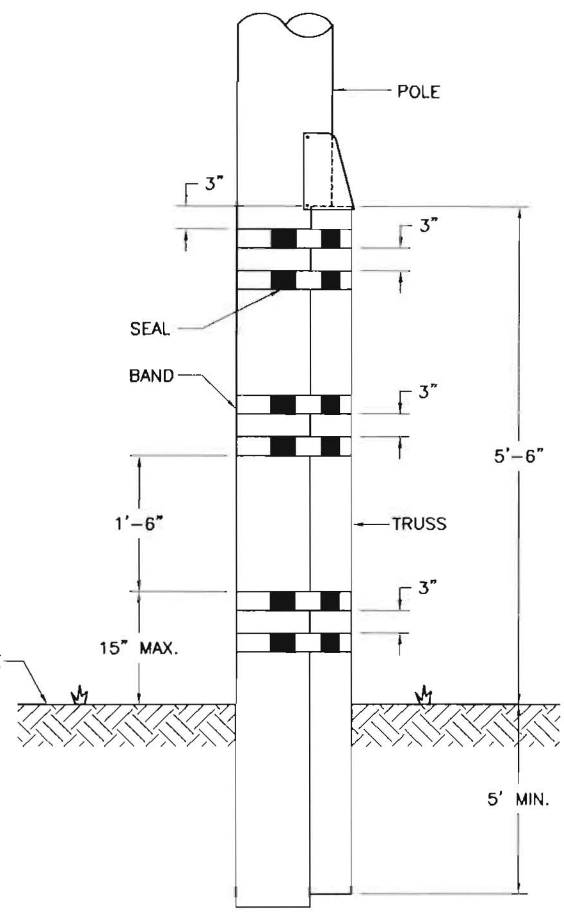
PGN DWG. 02.08-10

DECAY REQUIREMENTS MET
AT 15" ABOVE GROUND LINE



DETAIL "A"

DECAY REQUIREMENTS MET
AT 26" ABOVE GROUND LINE



DETAIL "B"

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.

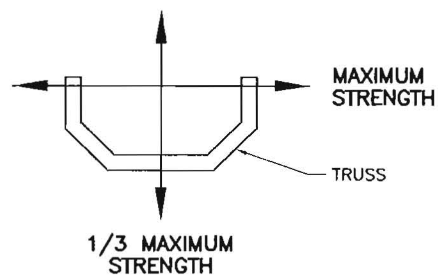
3				
2				
1				
0	3/22/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

POLE REINFORCING (O&M)

Progress Energy

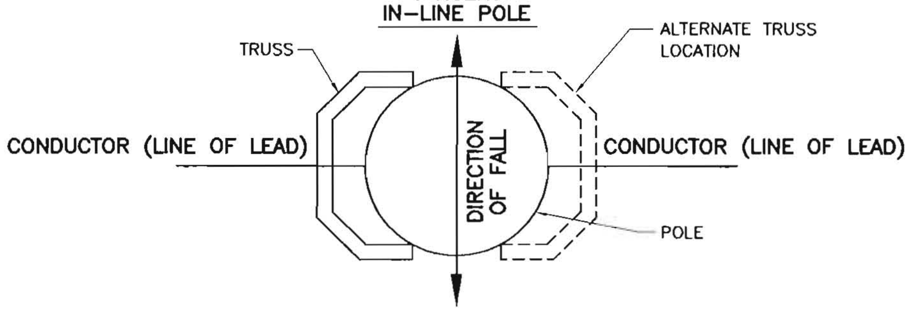
PGN DWG. 02.08–12

TRUSS STRENGTH



DETAIL "A"

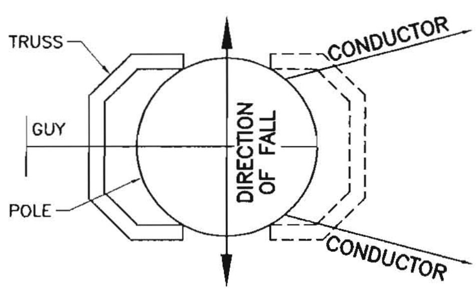
TANGENT IN-LINE POLE



(PLACE TRUSS IN THE LINE OF LEAD)

DETAIL "B"

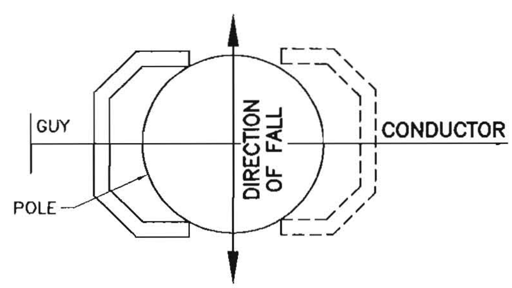
ANGLE OR CORNER POLE



(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)

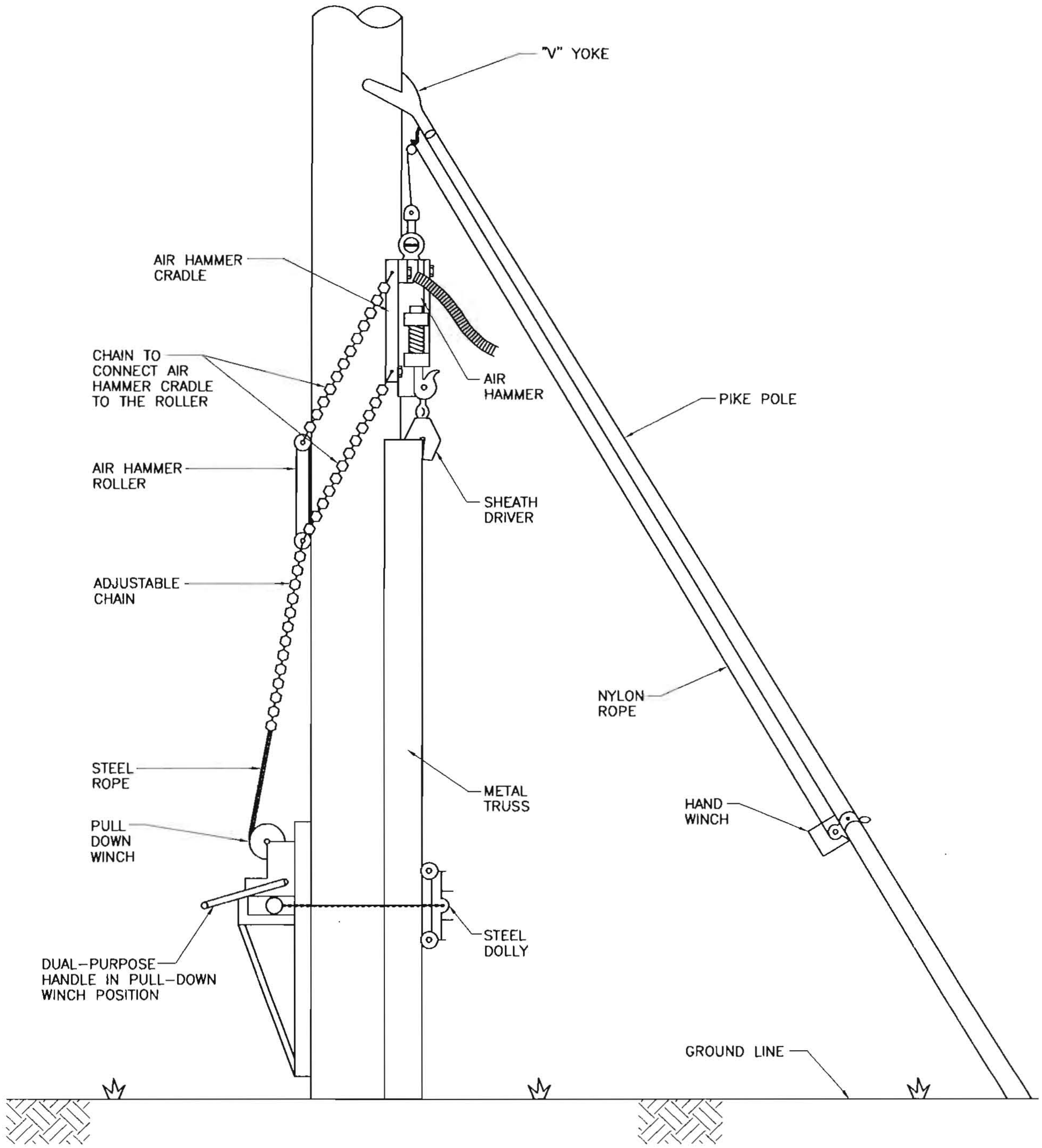
DETAIL "D"

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					POLE REINFORCING	Progress Energy
2					ORIENTATION OF TRUSS (O&M)	
1						
0	4/23/02	YOUNTS	SIMPSON	CRANE		PGN
REVISED		BY	CK'D	APPR.		DWG. 02.08-14

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



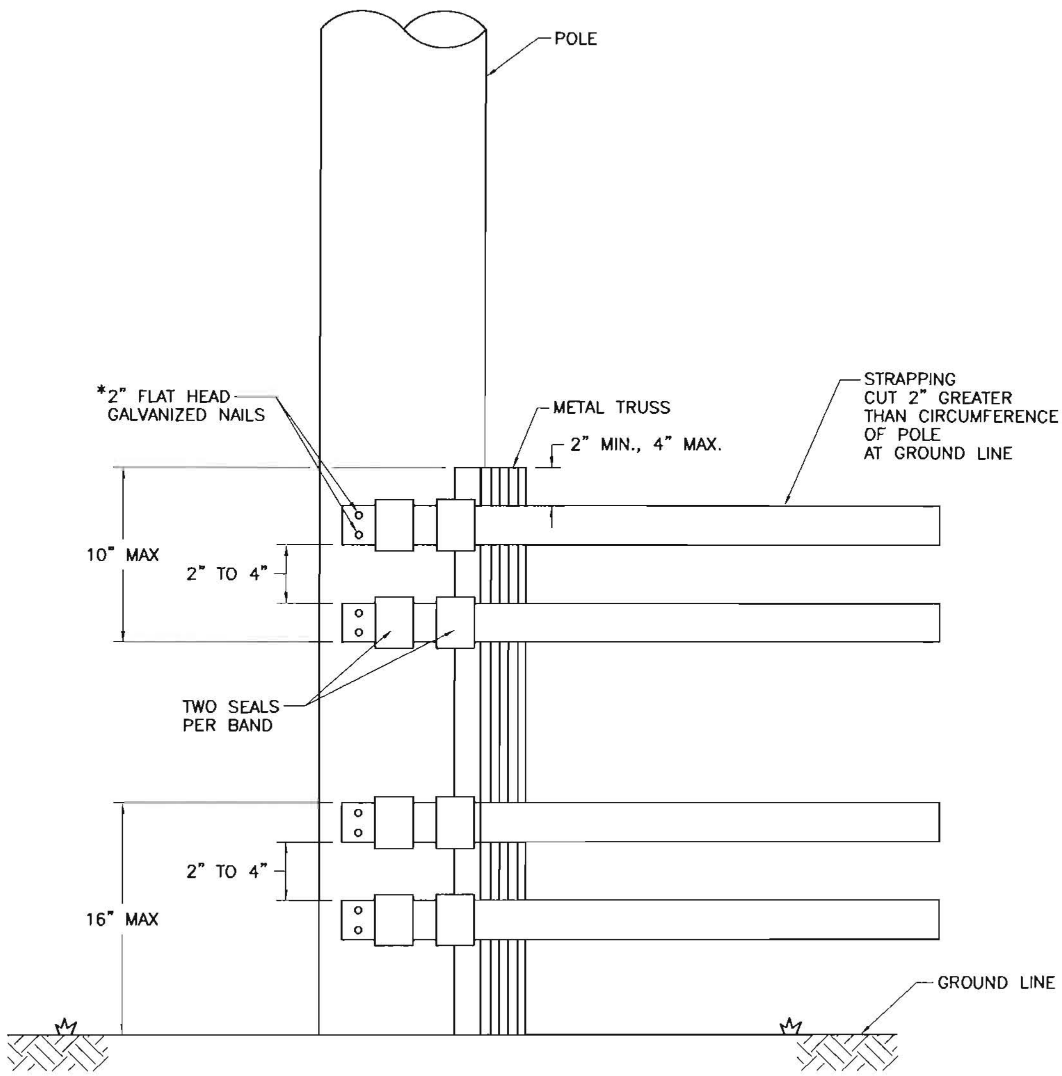
3				
2				
1				
0	4/23/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

POLE REINFORCING – SETUP DETAIL (O&M)

Progress Energy

PGN DWG. 02.08–16

NAILING STRAPPING TO POLE – PLACING SEALS ON STRAPPING



NOTES:

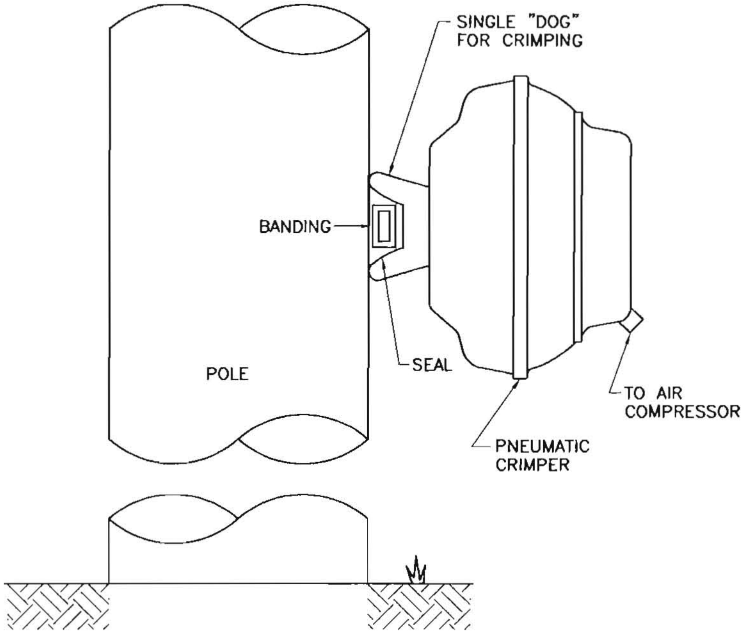
1. NAILS TO HOLD BANDS ARE NOT NECESSARY WHEN USING A PNEUMATIC TENSIONER.

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

POLE REINFORCING
STRAPPING PLACEMENT (O&M)

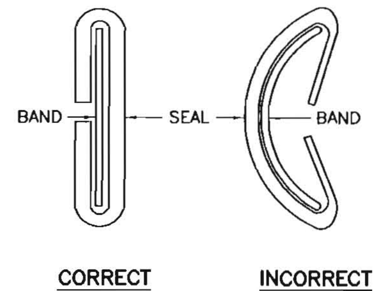
Progress Energy

PGN DWG. 02.08–18



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

SEAL AND BAND INSTALLATION



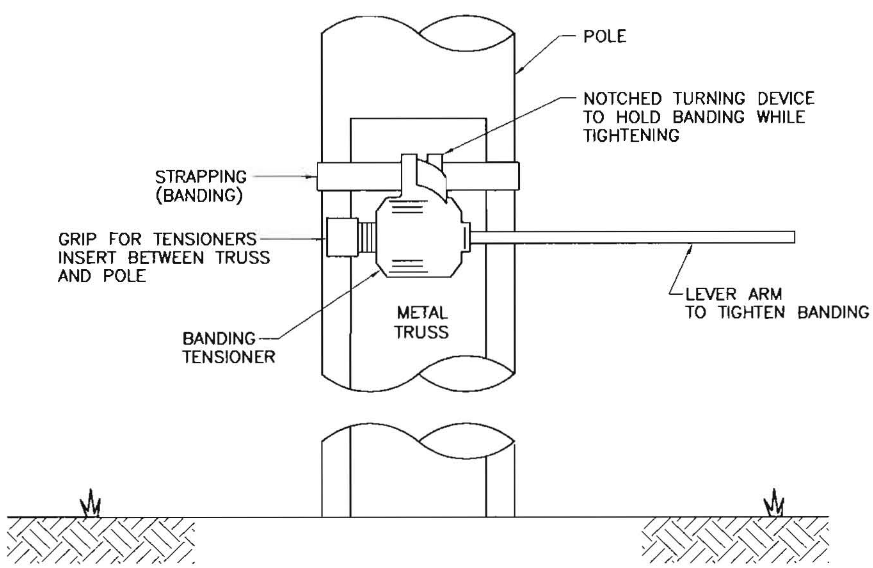
CRIMPING SEALS

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)

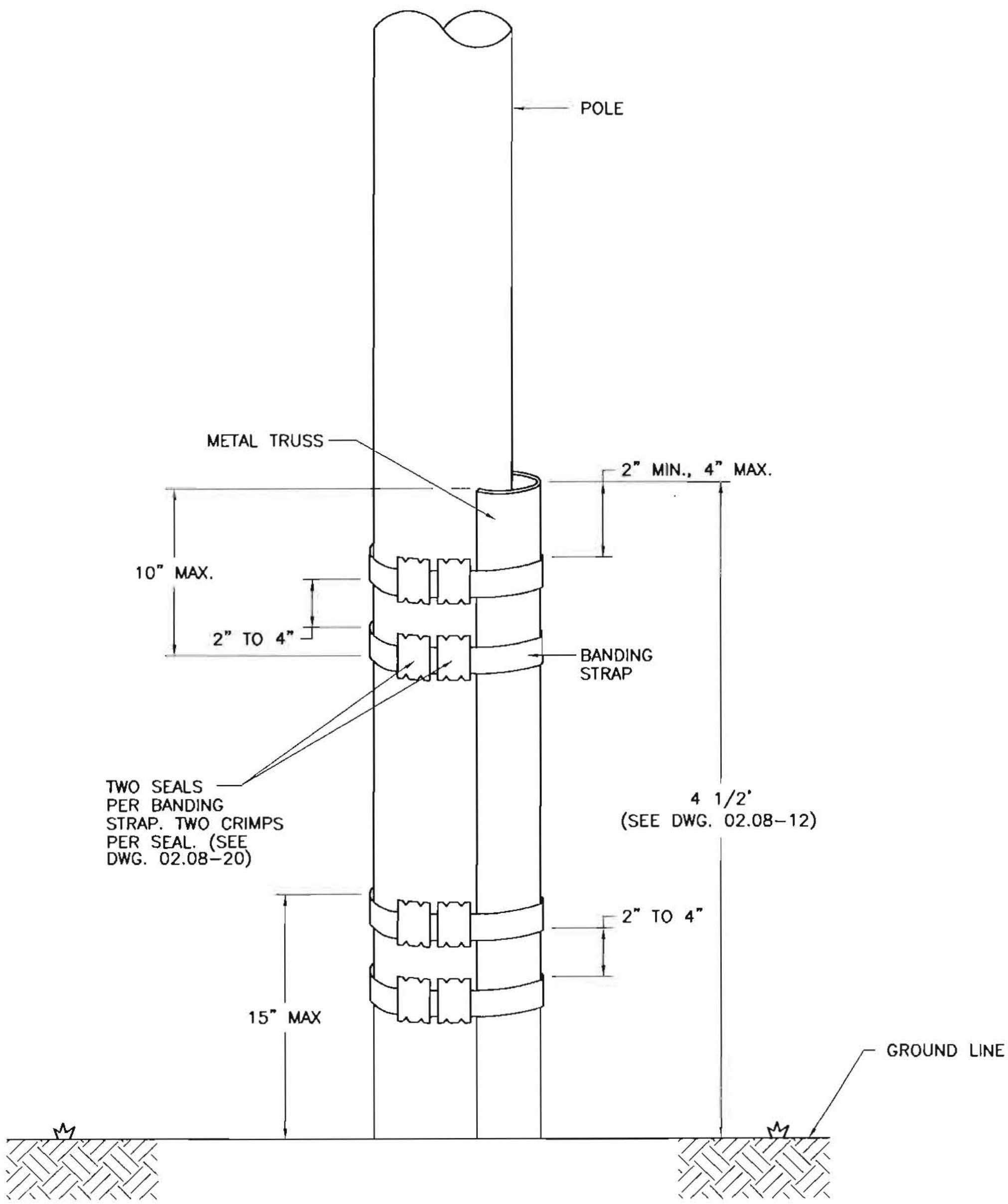
3				
2				
1				
0	4/25/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

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

03.00 GENERAL CONSTRUCTION NOTES

03.01 DISTRIBUTION PHASING

03.02 CONNECTORS

03.03 BOLTED CONNECTORS AND CLAMPS

03.04 HAND TIES/ PREFORMED TIES/ ARMOR RODS

03.06 INSULATORS

03.08 SINGLE–PHASE CONSTRUCTION

3				
2				
1				
0	1/22/10	CECCONI	GUINN	ELKINS
REVISED	BY	CK'D	APPR.	

SECTION 3 – PRIMARY CONSTRUCTION OVERHEAD
TABLE OF CONTENTS

Progress Energy

FLA DWG. 03.00-00B

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.

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

VERTICAL PHASE OVER PHASE SPACING IN THE SPAN:

THE STANDARD PHASE OVER PHASE SPACING AT THE POLE SHALL BE 42" FOR 25KV AND 36" FOR 12KV. THESE VALUES ARE INCREASED ON SOME SPECIFICATIONS AS NOTED TO ACCOMMODATE EQUIPMENT.

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.

CONDUCTORS:

1. OVERHEAD CONDUCTORS WILL BE BARE ON ALL CIRCUITS EXCEPT SERVICES. SERVICES WILL BE MULTIPLEX OR COVERED SOFT DRAWN WIRE.
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.
5. WHEN COVERED RISER WIRE IS SUPPORTED BY A PORCELAIN INSULATOR, THE INSULATION SHOULD BE REMOVED AT THE INSULATOR AND TIED WITH BARE TIE WIRE.

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.

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

PRIMARY TO NEUTRAL STATEMENT

72" NEUTRAL SPACING IS PREFERRED TO ACCOMMODATE MAINTENANCE AND SHOULD BE OBTAINED ON NEW CONSTRUCTION OR UPDGRADE INVOLVING POLE REPLACEMENT. ON EXISTING POLES WITH 60" NEUTRAL SPACING, THE SPACING NEED NOT BE INCREASED TO 72" WHEN ADDING A TAP LINE IF 72" SPACING CANNOT BE OBTAINED WITHOUT REPLACING THE POLE OR CAUSING CONFLICT WITH COMMUNICATION CABLES.

3				
2	7/31/09	BURLISON	GUINN	ELKINS
1	12/2/08	GUINN	GUINN	HOYT
0	7/21/08	GUINN	GUINN	HOYT
REVISED		BY	CK'D	APPR.

PRIMARY CONSTRUCTION

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FLA DWG. 03.00-02

GRADE OF CONSTRUCTION:

THE NORMAL CONSTRUCTION GRADE FOR PROGRESS ENERGY DISTRIBUTION LINE DESIGN IS NESC GRADE C. HOWEVER, SUPPORTS AND STRUCTURES FOR PORTION OF 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. FOR SPECIFIC RAILROAD CROSSING DETAILS, SEE DWG. 03.12-17.

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. THE STRUCTURES AND SUPPORTS ON EACH END OF THE SECTION REQUIRED TO MEET GRADE B MUST BE ABLE TO WITHSTAND BREAKAGE OF A CONDUCTOR ON THE GRADE C SIDE WHEN THERE ARE 8 OR LESS CONDUCTORS. THE CONDUCTOR SELECTED SHOULD BE THE ONE THE CAUSES THE MAXIMUM STRESS IN THE POLE. GENERALLY, THIS REQUIREMENT CAN BE MET BY DOUBLE DEADENDING THE CONDUCTOR AT THESE STRUCTURES AND GUYING THE TOP MOST PRIMARY CONDUCTOR.
2. CROSSARM CONSTRUCTION - USE DOUBLE WOOD ARMS AND PINS.
3. ON VERTICAL TANGENT CONSTRUCTION, USE 35KV HORIZONTAL POST INSULATORS.
4. REFER TO ENGINEERING MANUAL FOR PROPER POLE SIZING AND SECTION 2 OF THE CONSTRUCTION SPECIFICATIONS FOR PROPER GUYING. SIDE GUYING MAY BE USED TO PROVIDE REQUIRED STRENGTH OF STRUCTURES.

WHERE POSSIBLE, UTILIZE POLEFOREMAN TO EVALUATE STRUCTURES IN THE GRADE B SECTION OF LINE. IF THERE ARE ANY QUESTIONS, CONTACT DISTRIBUTION STANDARDS.

TRANSMISSION UNDERBUILT:

DISTRIBUTION UNDERBUILT ON TRANSMISSION LINES MUST BE APPROVED BY TRANSMISSION. THE DISTANCE BETWEEN THE DISTRIBUTION PRIMARY PHASE CONDUCTOR AND THE TRANSMISSION CONDUCTOR IS TO BE SPECIFIED BY THE ENGINEER. THE PRIMARY CONCERN OF UNDERBUILT DISTRIBUTION IS SUFFICIENT BIL. TO OBTAIN PROPER BIL, USE THE FOLLOWING.

1. FOR HORIZONTAL CONSTRUCTION, USE 10' CROSSARMS.
2. FOR VERTICAL CONSTRUCTION ON CONCRETE AND STEEL POLES, USE ONE OF THE FOLLOWING:
   a. 15KV INSULATORS ON 21" FIBERGLASS STANDOFF BRACKETS.
   b. 35KV INSULATORS ON STEEL STANDOFF BRACKETS.
3. FOR VERTICAL CONSTRUCTION ON WOOD POLES, USE ONE OF THE FOLLOWING:
   a. 15KV INSULATORS ON 21" FIBERGLASS STANDOFF BRACKETS.
   b. 15KV INSULATORS ON STEEL STANDOFF BRACKETS WITH THE GROUNDWIRE STOOD OFF ON FIBERGLASS BRACKETS.
4. REFER TO DWG. 02.02-07 FOR BONDING AND GROUNDING ON STEEL AND CONCRETE POLES
5. WHERE MOUNTING HOLES ARE NOT PROVIDED, DRILLING IS PREFERRED FOR AT LEAST THE TOP HOLE OF A TWO-HOLE BRACKET. THE BOTTOM HOLE MAY BE BANDED. IF THIS IS NOT PRACTICAL, BAND ADDITIONAL REQUIRED ATTACHMENTS TO THE POLE WITH STAINLESS STEEL BANDING.

LOCKWASHERS:

BOLTS UNDER TENSION, SUCH AS DEADENDS AND GUYS, REQUIRE NO LOCKWASHERS.

WHEN BOLTS ARE NOT UNDER TENSION, SUCH AS INSULATORS, BRACKETS, TRANSFORMERS, AREA LIGHTS, ETC., USE LOCKWASHERS AS FOLLOWS:

1. DOUBLE LOCKWASHERS ON WOOD POLES.
2. SINGLE LOCKWASHERS ON STEEL AND CONCRETE POLES.

COASTAL CONSTRUCTION:

USED IN AREAS OF HIGH AIRBORNE CONTAMINATION (i.e. BEACHES, PAPER PLANTS, PHOSPHATE PROCESSING PLANTS, ETC.) AS IDENTIFIED BY ENGINEERING. SEE SECTION 12 FOR CONSTRUCTION SPECIFICATIONS AND AVAILABLE MATERIAL.

REVISED		BY	CK'D	APPR.
3				
2				
1	9/8/09	GUINN	GUINN	ELKINS
0	4/17/09	GUINN	GUINN	ELKINS

PRIMARY CONSTRUCTION

Progress Energy

FLA DWG. 03.00-04

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.

3				
2	5/17/04	NUNNERY	NUNNERY	WOOLSEY
1	1/28/04	NUNNERY	NUNERY	WOOLSEY
0	4/22/03	CECCONI	ROBESON	WOOLSEY
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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

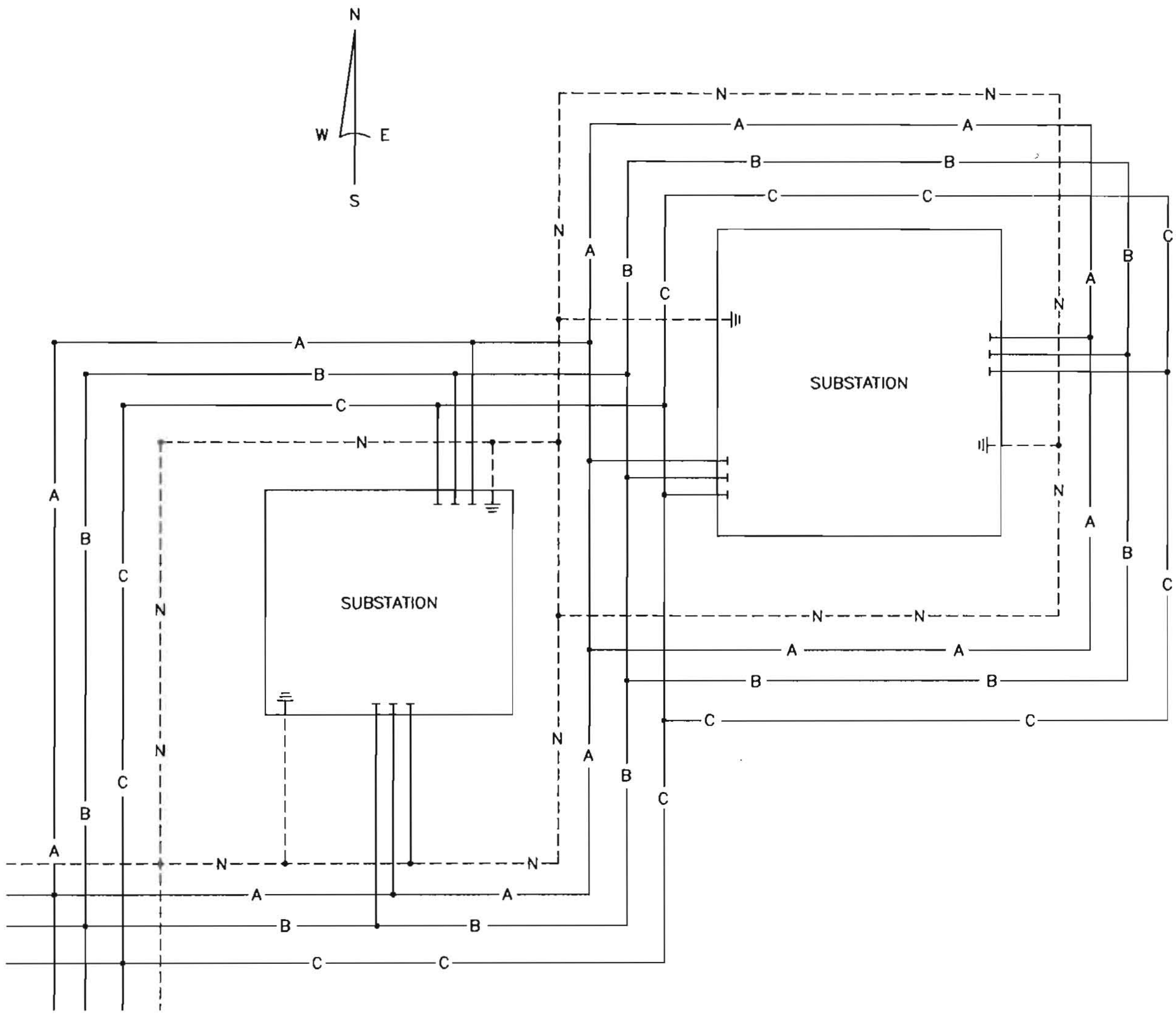
LEAD IS A SOFTER MATERIAL THAN THE PORCELAIN OF THE PIN INSULATORS. THE PORCELAIN THREADS WILL CUT THE LEAD THREADS TO THE PORCELAIN THREAD'S FORM. TAKE CARE NOT TO CROSS–THREAD THE INSULATOR ONTO THE PIN; OTHERWISE, SUFFICIENT INSULATOR–PIN ENGAGEMENT NECESSARY FOR PROPER SUPPORT WILL NOT BE OBTAINED.

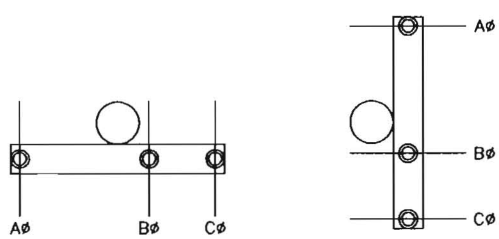
IF TOO MUCH FORCE IS EXERTED IN TURNING THE INSULATOR ON THE PIN, THE INSIDE OF THE LEAD THREAD CAP CAN SHEAR FROM ITS STEEL BASE, ALLOWING THE INSULATOR AND LEAD THREAD CAP TO SPIN FREELY ON THE PIN. THE INSULATOR WILL THEN HAVE TO BE BROKEN TO BE REMOVED. IF THIS OCCURS, NEITHER THE PIN, BRACKET, OR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

3					
2					
1				PIN INSULATOR INSTALLATION	Progress Energy
0	1/28/04	CECCONI	NUNNERY	WOOLSEY	
REVISED		BY	CK'D	APPR.	PGN DWG. 03.00–20





FACING NORTH

FACING WEST

HORIZONTAL CONSTRUCTION
TOP VIEWS

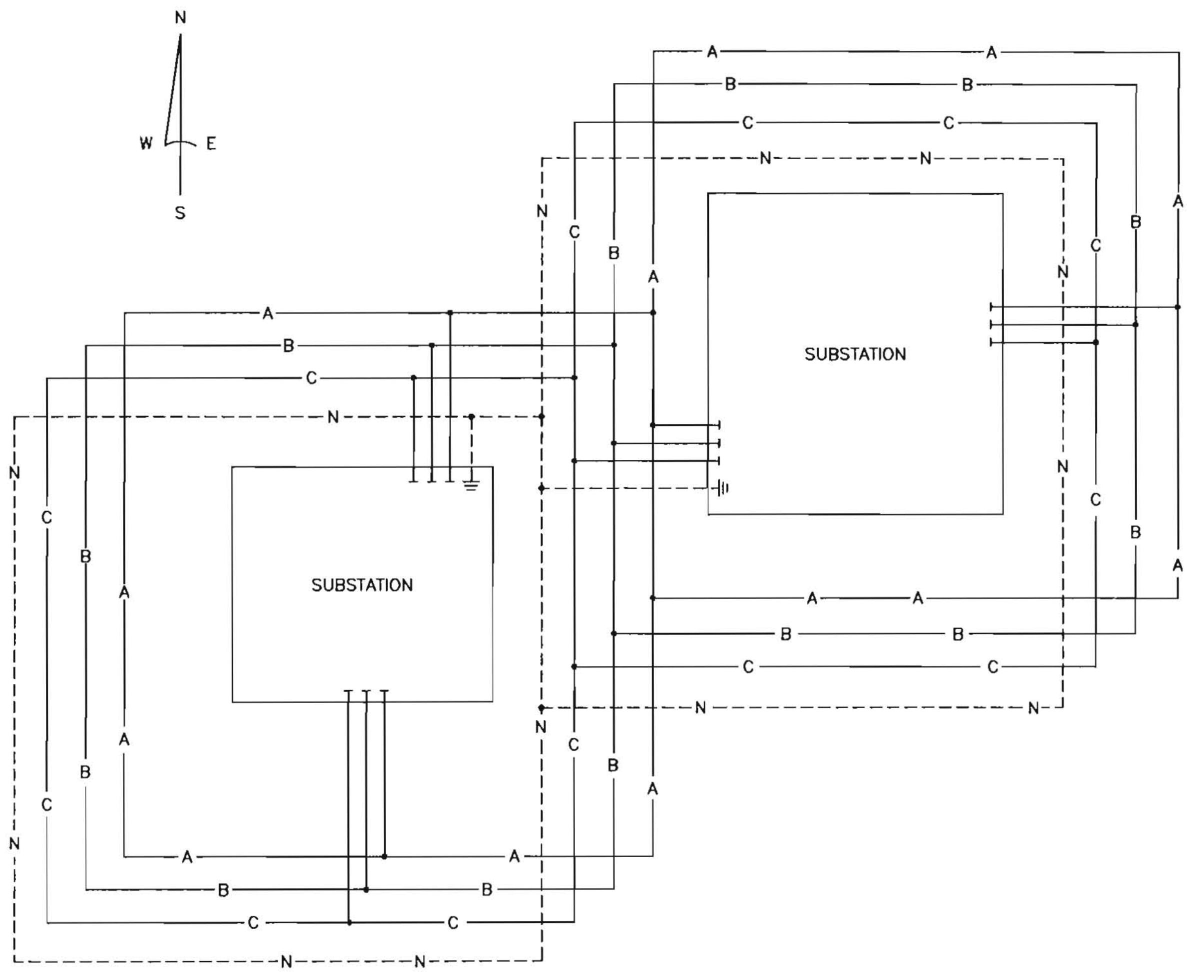
3				
2				
1				
0	5/12/04	NUNNERY	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

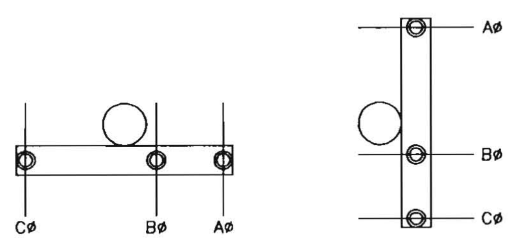
STANDARD DISTRIBUTION PHASING
FOR ALL AREAS EXCEPT ST. PETERSBURG

Progress Energy

FLA FLORIDA DWG. 03.01–04A

ST. PETERSBURG AREA





FACING NORTH

FACING EAST

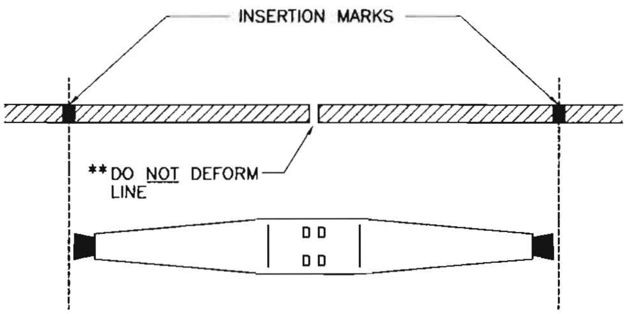
HORIZONTAL CONSTRUCTION
TOP VIEWS

3				
2				
1				
0	5/12/04	NUNNERY	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

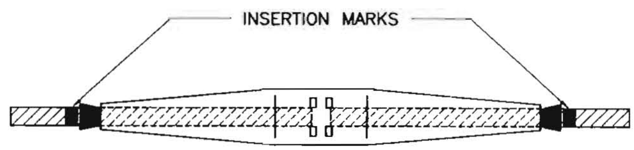
STANDARD DISTRIBUTION PHASING
FOR ST. PETERSBURG AREA ONLY

Progress Energy

FLA FLORIDA DWG. 03.01-04B



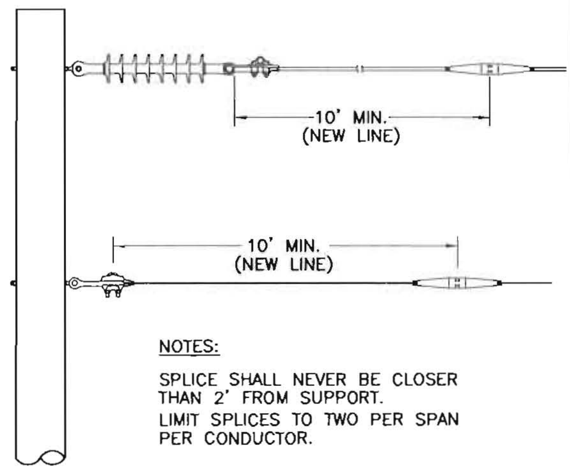
**WIRE BRUSH CONDUCTOR AND CONDUCTOR ENDS CLEAN, BRIGHT AND FREE FROM BURRS. SPLICE MUST ALSO BE CLEAN, FREE FROM DIRT AND JAWS FREE IN HOUSING. MEASURE AND MARK CONDUCTOR FOR INSERTION FROM KNURL TO END OF FUNNEL GUIDE. MARK WITH TAPE OR MARKER.



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.

NOTES:

1. NO AUTOMATIC SPLICE IS TO BE USED UNLESS CONDUCTOR IS UNDER FULL TENSION.
2. USE CABLE CUTTOR OR BOLT CUTTERS TO MAKE A CLEAN WIRE CUT. THE OBJECT IS TO AVOID FLATTENING THE ENDS OF THE CONDUCTOR WHICH CAUSES PARTIAL INSERTION AND FAILURE.
3. SIDE CUTTERS SHOULD NOT BE USED ON SMALLER AAAC OR ACSR CONDUCTORS.



NOTES:

SPLICE SHALL NEVER BE CLOSER THAN 2' FROM SUPPORT.

LIMIT SPLICES TO TWO PER SPAN PER CONDUCTOR.

CONDUCTOR	COLOR CODE	CATALOG NUMBER
#2 AAAC, AAC, ACSR	ORANGE/RED	142423
#4 AAAC, ACSR	–	–
#1/0 AAAC, AAC ACSR	YELLOW	142426
336.4 ACSR (18/1)	GREEN	11144805
#6 SOLID CU	–	11143500
#4 SOLID CU	–	11143609
#2 SOLID CU	–	9220109732
#2 3 STR. CU	–	6714
252 AWA MESSENGER, 1/0	–	9220106228

3				
2				
1				
0	11/30/09	GUINN	GUINN	ELKINS
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AUTOMATIC SPLICE INSTALLATION

Progress Energy

FLA DWG. 03.02–01

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.

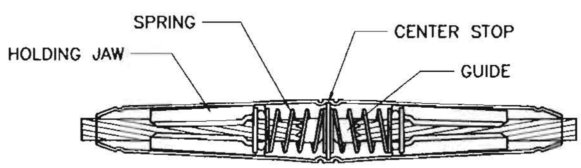
MEASURE AND MARK CONDUCTOR FOR FULL INSERTION. WIRE BRUSH AND SQUARE CUT CONDUCTOR.

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.

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

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 ON "ALUMINUM TO ALUMINUM" AND "ALUMINUM TO COPPER". USE COPPER OR BRONZE CONNECTORS ON "COPPER TO COPPER".

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.

TRANSFORMER BLOCKS FOR THREE-PHASE TRANSFORMERS ARE TIN PLATED. TIN PLATING ELIMINATES THE FORMATION OF ALUMINUM OXIDE ON THE BLOCKS. <u>**DO NOT**</u> WIRE BRUSH TIN PLATED BLOCKS OR OTHER TIN PLATED CONNECTORS THAT YOU MAY ENCOUNTER.

3				
2	1/13/10	ROBESON	GUINN	ELKINS
1	2/13/08	ROBESON	GUINN	HOYT
0	7/7/03	ROBESON	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

INSTALLATION GUIDE FOR CONNECTORS

Progress Energy

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.

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

INSTALLATION GUIDE FOR CONNECTORS

Progress Energy

PGN DWG. 03.02-06

ALUMINUM TO ALUMINUM

1. PREPARE ALUMINUM CONTACT AREAS AND APPLY INHIBITOR COMPOUND. USE GENERAL PURPOSE INHIBITOR (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.

REVISED	DATE	BY	CK'D	APPR.
3				
2				
1				
0	4/14/09	ROBESON	GUINN	HOYT

ALUMINUM TO ALUMINUM FLAT CONNECTIONS

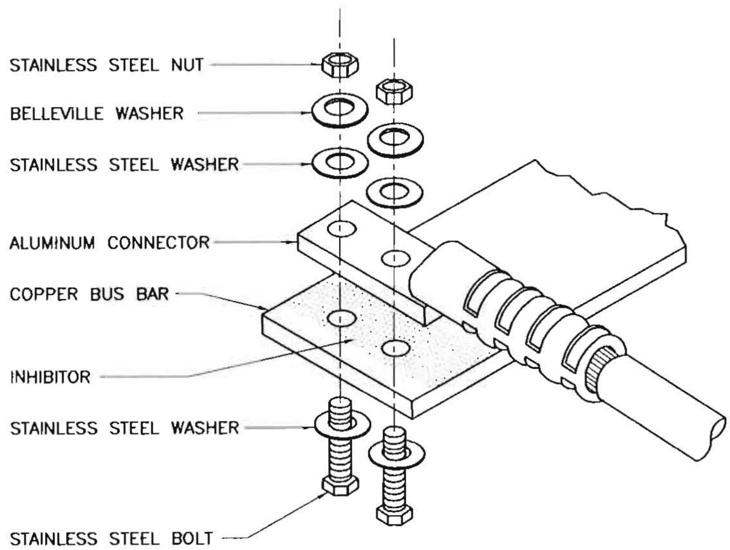
Progress Energy

FLA 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 TO COPPER JOINT IS MADE. USE GENERAL PURPOSE 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.



3				
2				
1	11/30/09	GUINN	GUINN	ELKINS
0	3/30/09	GUINN	GUINN	HOYT
REVISED		BY	CK'D	APPR.

ALUMINUM TO COPPER FLAT CONNECTIONS

Progress Energy

FLA 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.

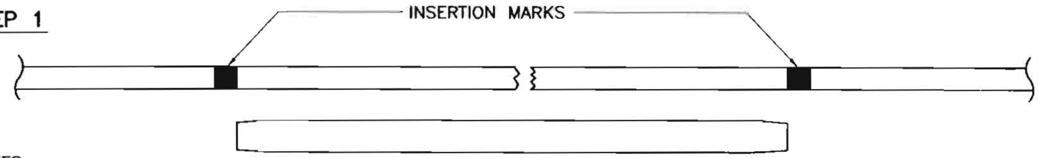
3				
2				
1				
0	4/23/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

OVERHEAD CONDUCTOR SPLICE APPLICATION

Progress Energy

PGN DWG. 03.02–10

STEP 1



NOTES:

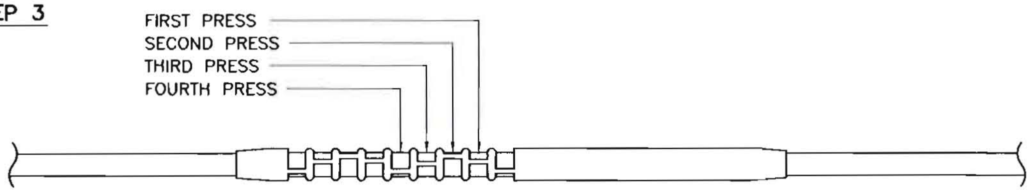
1. SLEEVES ARE MARKED TO INDICATE CONDUCTOR SIZE AND DIE SIZE. REFER TO ALUMINUM OR COPPER TABLE BELOW FOR SLEEVE CATALOG NUMBER.

STEP 2

NOTES:

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

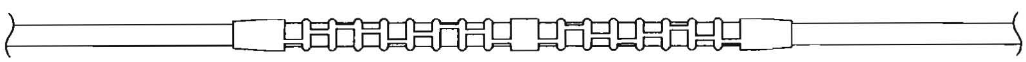
STEP 3



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 FULL TENSION SLEEVES

CONDUCTOR SIZE	SLEEVE CN
#6 ASCR	–
#4 ASCR, AAAC	142411
#2 ASCR, AAAC	142412
1/0 ASCR, AAAC	142414
4/0 ASCR, AAAC	142416
336.4 ASCR, AAC (18/1)	142321
795 AAC	142328

COPPER (FULL TENSION)

CONDUCTOR SIZE	SLEEVE CN
#6 SOLID	142109
#4 SOLID	142111
#2 SOLID	142112
#4 STRANDED	142211
#2 STRANDED	142213
1/0 STRANDED	142214
2/0 STRANDED	142215
3/0 STRANDED	–
4/0 STRANDED	142217

ALUMINUM SEMI-TENSION SLEEVES

CONDUCTOR SIZE	SLEEVE CN
#6 AL	140459
#4 AL	140462
#2 AL	140464
#2 TO #4 AL	9220104365
#1/0 AL	140466

NOTES:

1. SEMI-TENSION SLEEVES ARE RATED AT 40% OF CONDUCTOR STRENGTH. THEY CAN ONLY BE USED IN JUMPERS, TPX SERVICE NEUTRALS AND SLACK SPANS.

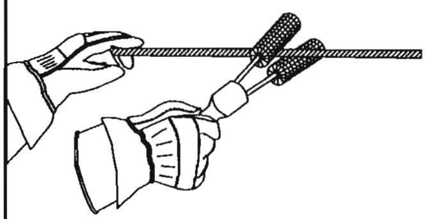
REVISED		BY	CK'D	APPR.
3				
2				
1	10/12/09	ROBESON	GUINN	ELKINS
0	2/20/09	ROBESON	GUINN	HOYT

ONE PIECE COMPRESSION SPLICE FOR OVERHEAD CONDUCTORS

Progress Energy

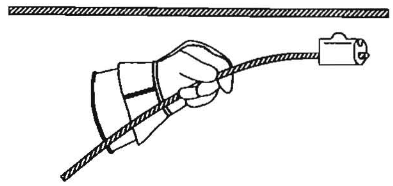
FLA DWG. 03.02-12

STEP 1



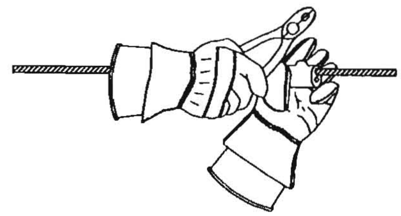
CLEAN BOTH CONDUCTORS THOROUGHLY BY WIRE BRUSHING

STEP 2



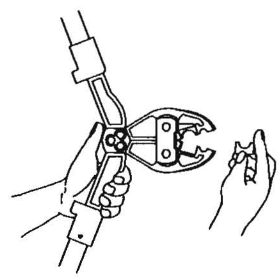
INSERT TAP CONDUCTOR IN TAP SIDE AND BEND TAB OVER CON- DUCTOR IF USING DOUBLE TAB SQUEEZON

STEP 3



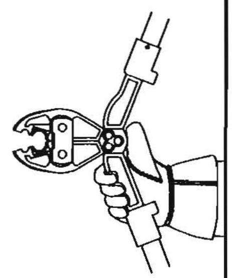
PLACE SQUEEZON ON LINE CON- DUCTOR AND BEND TAB OVER CONDUCTOR

STEP 4



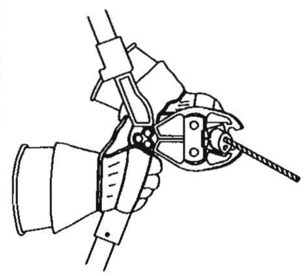
INSERT PROPER DIE TOOL FOR SQUEEZON BEING COMPRESSED

STEP 5



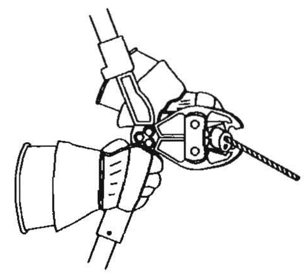
GRIP TOOL WITH THUMB POSITIONED AS SHOWN

STEP 6



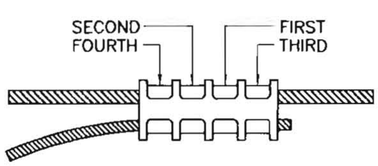
SLIDE TOOL OVER SQUEEZON AND POSITION TOOL TO MAKE CENTER COMPRESSION FIRST

STEP 7



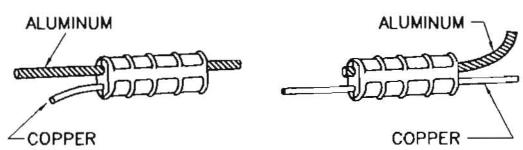
RELEASE THUMB PRES- SURE SO THAT TOOL GRIPS SQUEEZON

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

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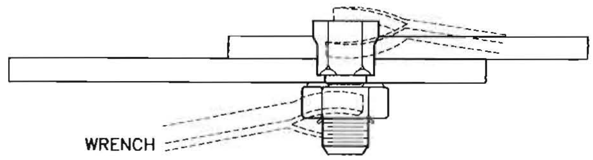
PGN DWG. 03.02-14

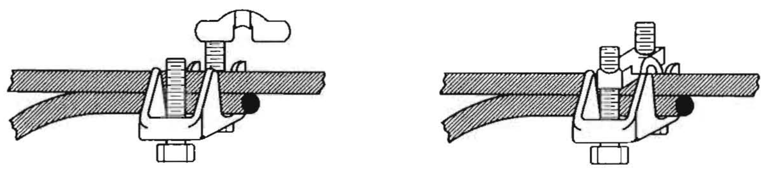
INSTALLATION OF SPLIT BOLT CONNECTION
NO.2 COPPER AND SMALLER



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.

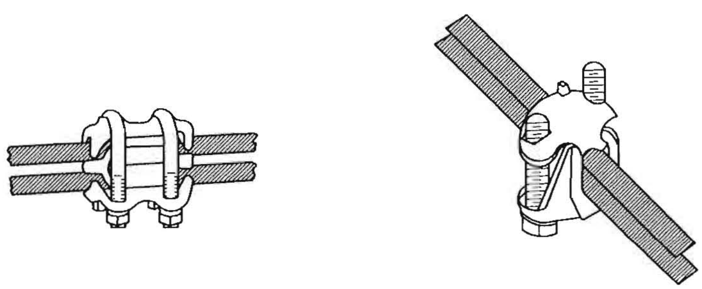
INSTALLATION OF TWO BOLT CONNECTION
1/0 COPPER AND LARGER



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:

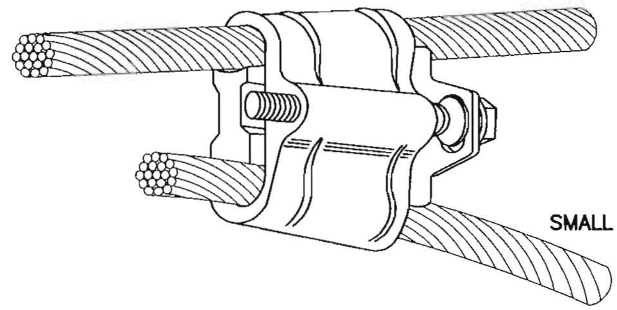
1. BE SURE CONDUCTORS ARE CLEAN AND FREE FROM SCALE.
2. DRAW UP CAP SCREWS EQUALLY UNTIL CONNECTOR IS SECURELY TIGHTENED.

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

SOLDERLESS CONNECTORS

Progress Energy

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.

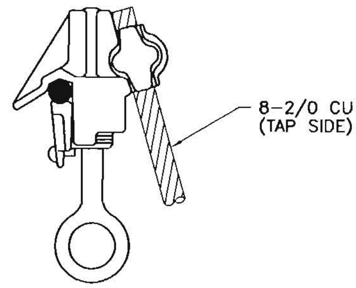
WEDGE CONNECTORS

Progress Energy

FLA FLORIDA DWG. 03.02-21

SMALL HOT LINE CLAMP

CN 130102



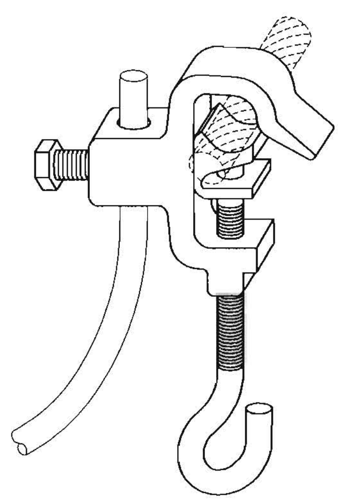
NOTES:

1. USE STIRRUP FOR TAP JUMPERS.

TRANSFORMER AND ARRESTER HOT LINE CLAMP

CU KAT3 (CN 9220184790) – UP TO 4/0 LINE CONDUCTORS

CU KAT7 (CN 9220184794) – 336 – 954 LINE CONDUCTORS



NOTES:

1. CLAMPS ARE APPLIED DIRECTLY ON ALUMINUM OR COPPER CONDUCTORS WITHOUT A STIRRUP. FOR USE ONLY ON ARRESTER AND TRANSFORMER INSTALLATIONS.
2. USE #6 WP CU FOR TRANSFORMERS.
3. WIRE BRUSH CONDUCTOR BEFORE INSTALLING AND TIGHTENING CLAMP.

3				
2				
1				
0	6/12/09	GUINN	GUINN	ELKINS
REVISED		BY	CK'D	APPR.

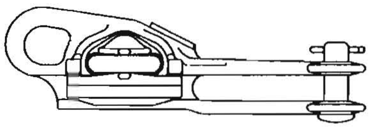
HOT LINE CLAMPS

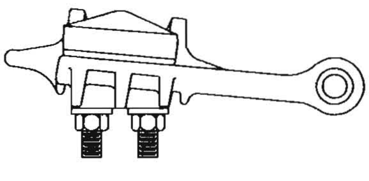
Progress Energy

FLA

DWG. 03.03–03

CN 100708



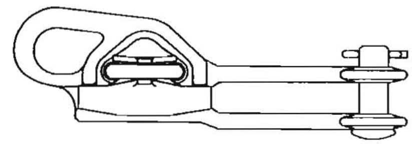


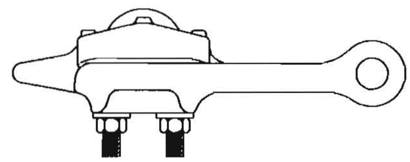
CONDUCTOR RANGE (0.160-0.570)
6-4/0 ACSR
4-4/0 AL
6-4/0 CU

NOTES:

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

CN 101119



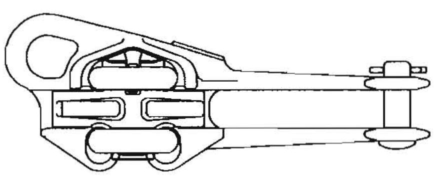


CONDUCTOR RANGE (0.410-0.880)
SEE NOTE 1

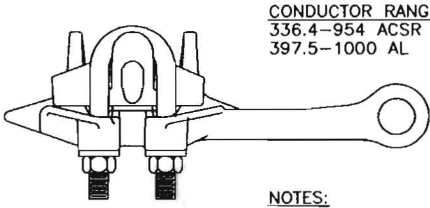
NOTES:

1. FOR USE ON 336.4.

CN 101125

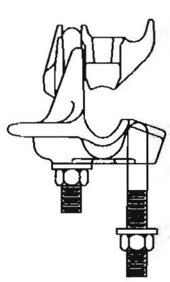


CONDUCTOR RANGE (0.680-1.16)
336.4-954 ACSR
397.5-1000 AL

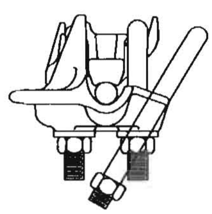


NOTES:

1. FOR USE ON 795 CONDUCTOR.

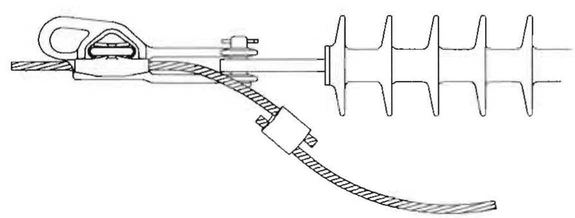


OPEN POSITION



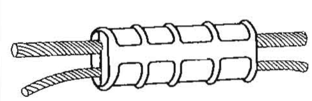
CLOSED POSITION

PREFERRED LOCATION FOR JUMPER CONNECTIONS

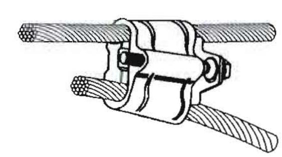


CONNECT JUMPER TO TAIL OF PRIMARY ON BACK SIDE OF DEADEND CLAMP

CONNECTOR DETAILS



SEE DWG. 03.02-14



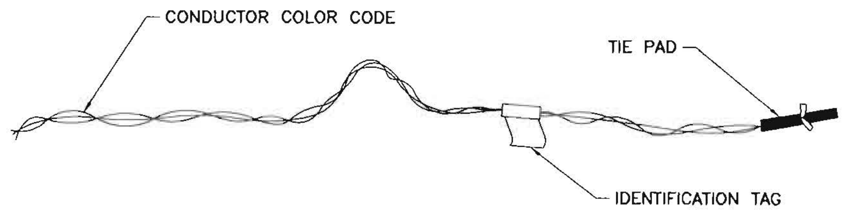
SEE DWG. 03.02-21

REVISED		BY	CK'D	APPR.
3				
2				
1	12/4/09	GUINN	GUINN	ELKINS
0	3/30/09	SIMPSON	SIMPSON	HOYT

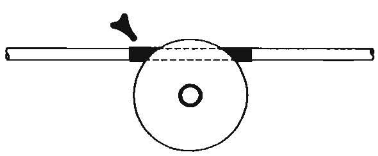
PRIMARY AND NEUTRAL
DEAD END ASSEMBLIES

Progress Energy

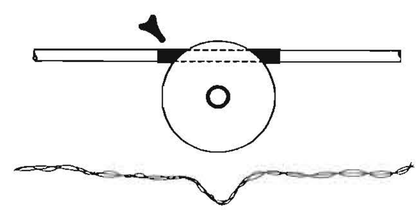
FLA DWG. 03.03-04



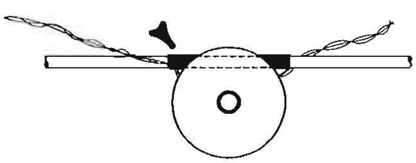
EZ-WRAP SPOOL TIE AS RECEIVED IN THE FIELD



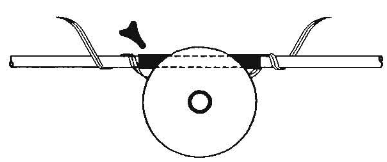
STEP 1: APPLY TIE PAD ON THE CONDUCTOR AND POSITION IT BETWEEN THE CONDUCTOR AND INSULATOR, MAKING SURE THE SLIT DOES NOT FACE THE INSULATOR.



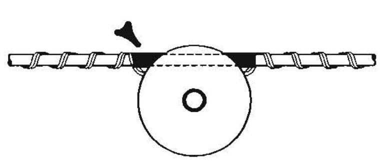
STEP 2: POSITION THE TIE LOOP UNDER THE INSULATOR SO THE LEGS ARE PARALLEL TO THE CONDUCTOR AS SHOWN.



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.



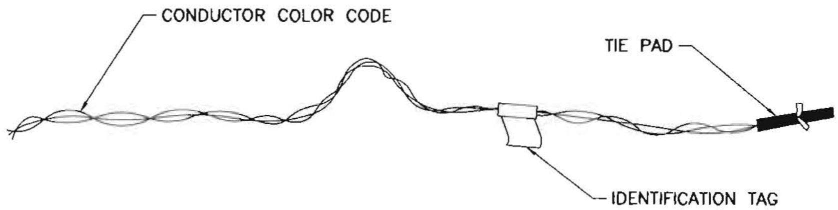
STEP 5: COMPLETED APPLICATION OF EZ-WRAP SPOOL TIE

3				
2	5/8/09	ROBESON	GUINN	ELKINS
1	1/22/09	GUINN	GUINN	HOYT
0	2/4/04	ROBESON	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

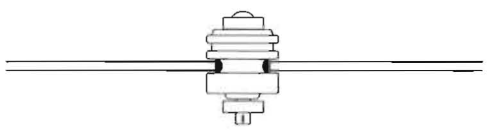
INSTALLATION GUIDE –
EZ-WRAP SPOOL TIE
HORIZONTAL POSITION

Progress Energy

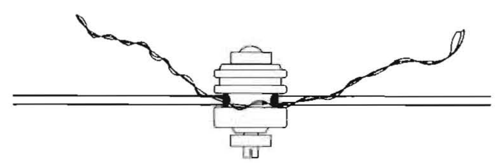
PGN DWG. 03.04–02



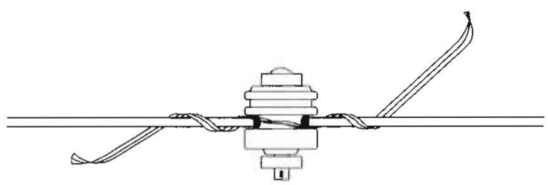
EZ–WRAP SPOOL TIE AS RECEIVED IN THE FIELD



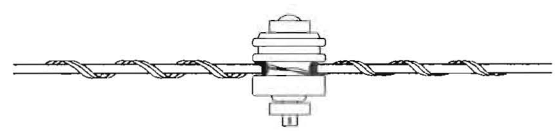
STEP 1: IN MOST CASES THE CONDUCTOR SHOULD BE PLACED BETWEEN THE INSULATOR AND THE STRUCTURE SO IT IS INSIDE THE CLEVIS, AS SHOWN. APPLY THE TIE PAD ON THE CONDUCTOR AND POSITION IT BETWEEN THE CONDUCTOR AND INSULATOR, MAKING SURE THE SLIT DOES NOT FACE THE INSULATOR.



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:

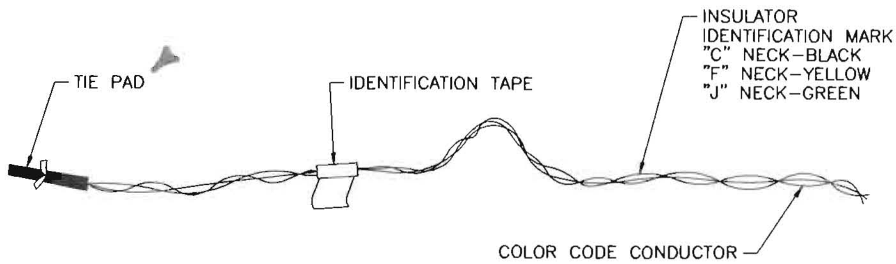
1. IF IT IS NECESSARY TO POSITION THE CONDUCTOR ON THE OUTSIDE OF THE CLEVIS AND INSULATOR, SUCH AS WHEN LINE ANGLES TURN INTO THE POLE, POSITION THE TIE ON THE INSIDE OF THE CLEVIS PRIOR TO APPLICATION. OTHERWISE FOLLOW THE SAME STEPS AS BEFORE.

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

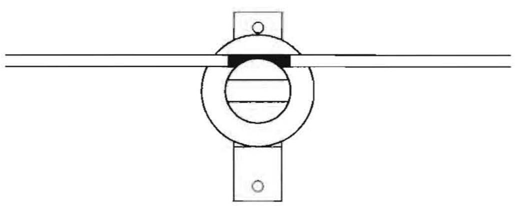
INSTALLATION GUIDE
EZ–WRAP SPOOL TIE
VERTICALLY MOUNTED INSULATORS

Progress Energy

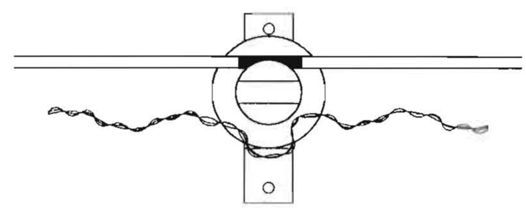
PGN DWG. 03.04–03



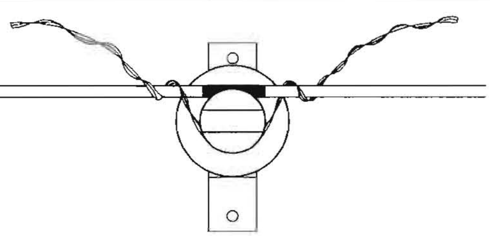
EZ-WRAP SIDE TIE AS RECEIVED IN THE FIELD



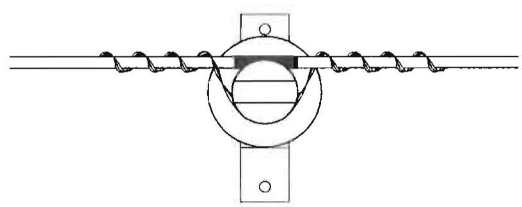
STEP 1: APPLY TIE PAD ON TO CONDUCTOR, SLIT FACING UP SO THAT CONDUCTOR DOES NOT COME INTO DIRECT CONTACT WITH THE INSULATOR.



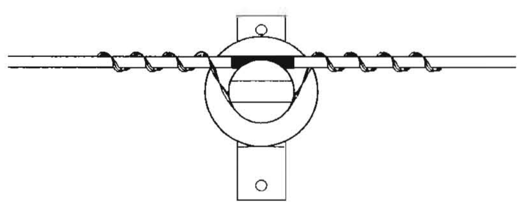
STEP 2: ALIGN THE EZ-WRAP SIDE TIE WITH THE CONDUCTOR. MAKE SURE THE TIE LOOP OF THE EZ-WRAP SIDE TIE IS FACING AWAY FROM THE CONDUCTOR AS SHOWN.



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

3				
2	5/8/09	ROBESON	GUINN	ELKINS
1	2/4/04	ROBESON	NUNNERY	WOOLSEY
0	4/22/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

INSTALLATION GUIDE –
PRIMARY EZ-WRAP SIDE TIES

Progress Energy

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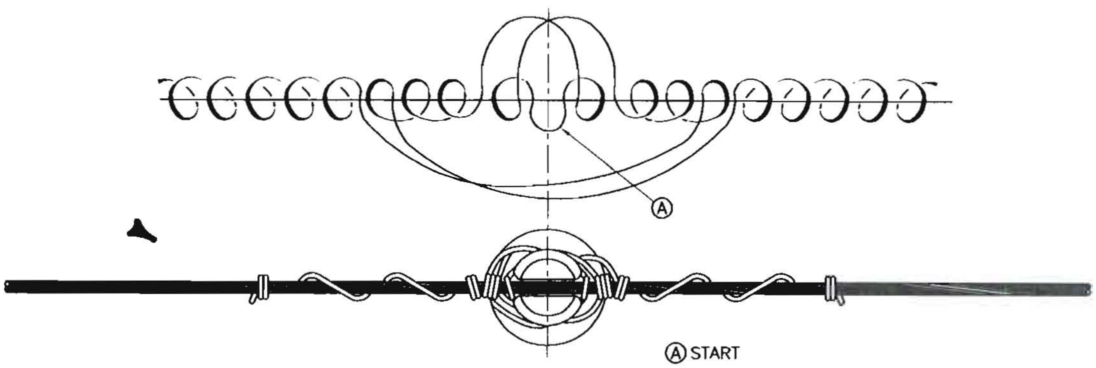
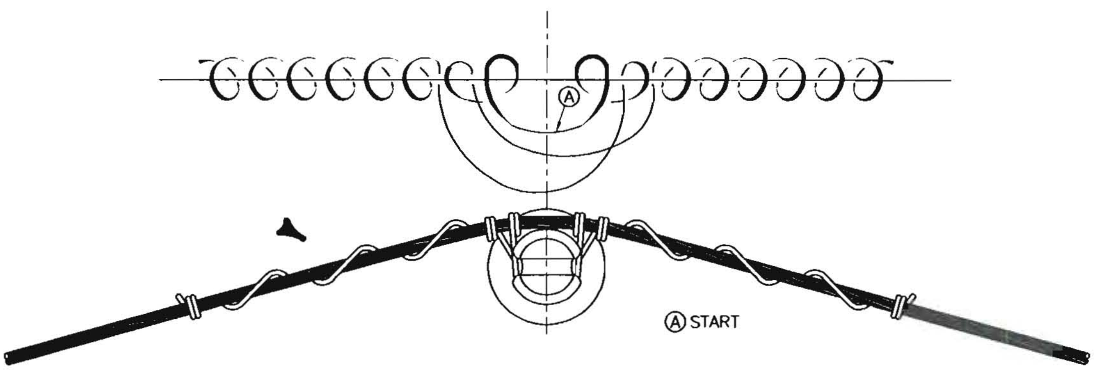
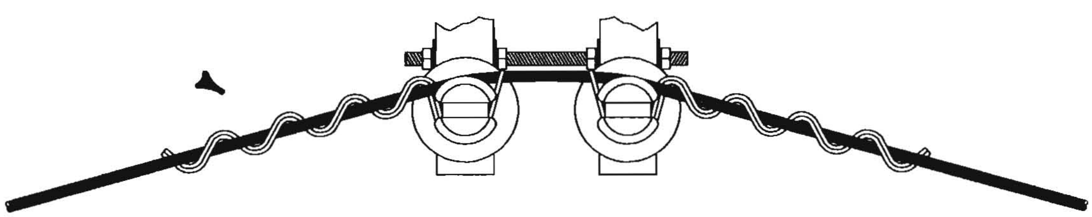
TOP GROOVE TIE



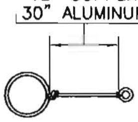
SIDE GROOVE TIE



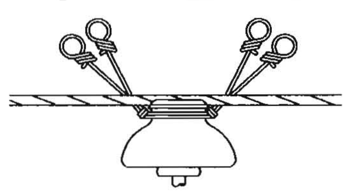
SIDE OR TOP GROOVE – TWO INSULATORS



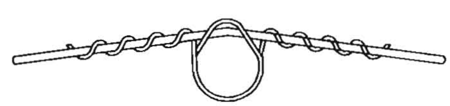
18" COPPER
30" ALUMINUM



SIDE OR TOP HOT TIE



SPOOL TIE



NOTES:

1. FACTORY FORMED TIES ARE THE PREFERRED METHOD FOR ATTACHING PRIMARY CONDUCTORS WHEN ACCESSIBLE BY TRUCK.
2. ON ALL HAND/HOT TIES MAKE FIRST WRAP AS CLOSE TO INSULATOR AS POSSIBLE, AND MAKE A MINIMUM OF 4 WRAPS ON EACH SIDE OF THE INSULATOR.
3. TIE WIRE: CU – #6 SD CU.
   AL – #4 SD AL.

3				
2				
1				
0	10/20/09	GUINN	GUINN	ELKINS
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CONDUCTOR HAND TIES

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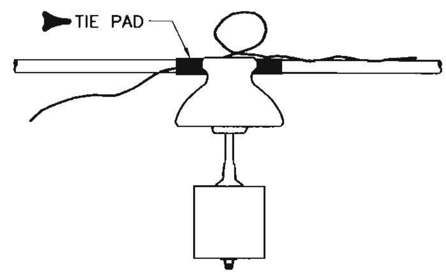
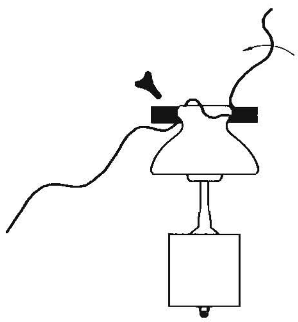
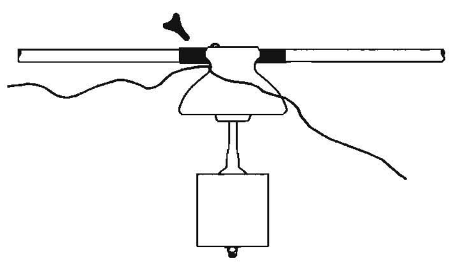


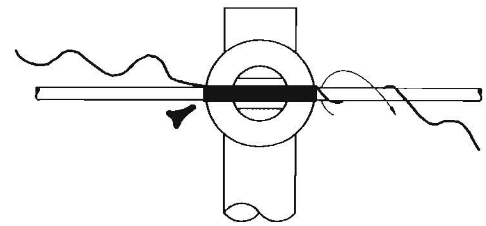
1. POSITION DISTRIBUTION TIE ON INSULATOR AS SHOWN, WITH BOTH LEGS PARALLEL TO THE CONDUCTOR.



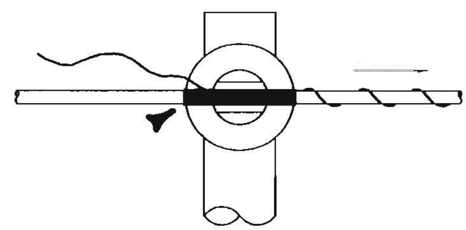
2. ROTATE THE DISTRIBUTION TIE IN A COUNTER-CLOCKWISE DIRECTION, MAKING CERTAIN THAT BOTH LEGS GO UNDER THE CONDUCTOR AS SHOWN.



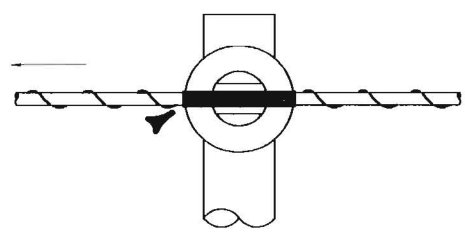
3. CONTINUE TO ROTATE THE LEGS AND THE DISTRIBUTION TIE WILL SEAT ITSELF AS SHOWN.



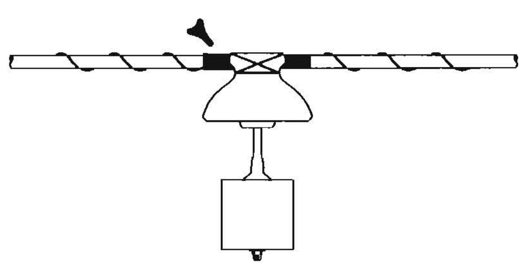
4. START TO WRAP ON ONE LEG OF THE DISTRIBUTION TIE AS SHOWN.



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.

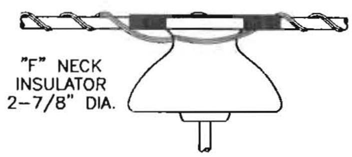
3				
2				
1	5/8/09	ROBESON	GUINN	ELKINS
0	3/9/04	CECCONI	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

TOP TIE

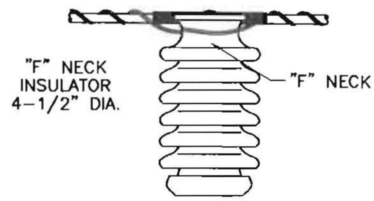
Progress Energy

PGN DWG. 03.04-08

TOP TIE
23 KV PIN INSULATOR

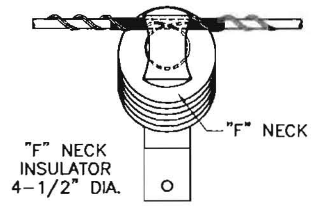


TOP TIE
35 KV ROUND BASE INSULATOR

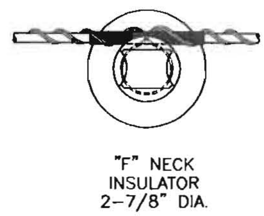


CONDUCTOR SIZE	CATALOG NUMBER	CONDUCTOR COLOR CODE
#4	121411	ORANGE
#2	11148400	RED
1/0	121415	YELLOW
336	121417	PURPLE
795	121418	GREEN

SIDE TIE
35 KV ROUND BASE INSULATOR



SIDE TIE
23 KV PIN INSULATOR

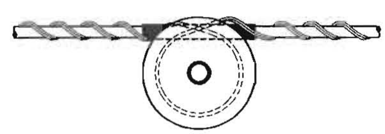


CONDUCTOR SIZE	CATALOG NUMBER	CONDUCTOR COLOR CODE
#4	121423	ORANGE
#2	11158102	RED
1/0	121426	YELLOW
336	121429	PURPLE
795	121434	GREEN

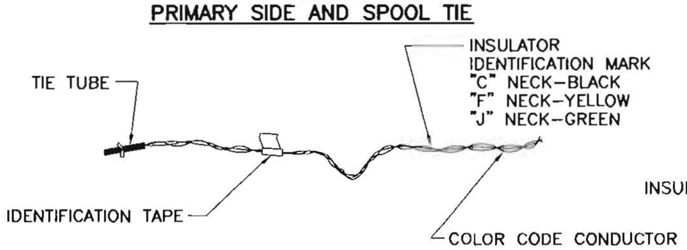
NOTE: 795 WILL NOT FIT IN THE SIDE GROOVE OF THIS PIN INSULATOR

SPOOL TIES (ACSR AND AAAC)

CONDUCTOR SIZE	CATALOG NUMBER	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				
1				
0	4/16/09	ROBESON	GUINN	ELKINS
REVISED		BY	CK'D	APPR.

FACTORY FORMED CONDUCTOR TIES

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FLA 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.

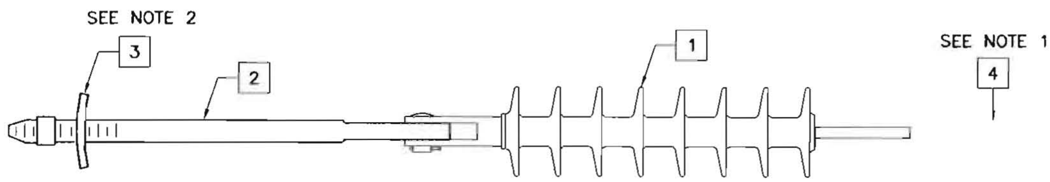
3				
2				
1				
0	6/2/04	ROBESON	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

ARMOR RODS

Progress Energy

PGN DWG. 03.04-11

27 KV POLYMER



BILL OF MATERIALS – DEADEND AND SUSPENSION – 1/0 AAAC AND SMALLER				
COMPATIBLE UNIT	ITEM NO.	CATALOG NUMBER	QTY PER CU	DESCRIPTION
IS	1	080577	1	INSULATOR, POLYMER, 25KV, DEADEND, SILICONE
	2	011708	1	BOLT, OVAL EYE, 5/8X10
	3	013308	1	WASHER, 2-1/4", SQUARE, FLAT, 13/16" HOLE, GALV.
KW_	4	–	1	CLAMP, DE OR SUSP (VARIES WITH CONDUCTOR SIZE)

BILL OF MATERIALS – DEADEND AND SUSPENSION – 4/0 AAAC AND LARGER				
COMPATIBLE UNIT	ITEM NO.	CATALOG NUMBER	QTY PER CU	DESCRIPTION
ID	1	080577	1	INSULATOR, POLYMER, 25KV, DEADEND, SILICONE
	2	011708	1	BOLT, OVAL EYE, 5/8X10
	3	013346	1	WASHER, 2-1/4", SQUARE, FLAT, 13/16" HOLE, GALV.
KW_	4	–	1	CLAMP, DE OR SUSP (VARIES WITH CONDUCTOR SIZE)

NOTES:

1. DEADEND AND SUSPENSION CLAMP NOT SHOWN.
2. USE 2-1/4" SQUARE WASHER ON 1/0 AAAC CONDUCTOR AND SMALLER AND 3" CURVE WASHER FOR CONDUCTORS LARGER THAN 1/0 AAAC.

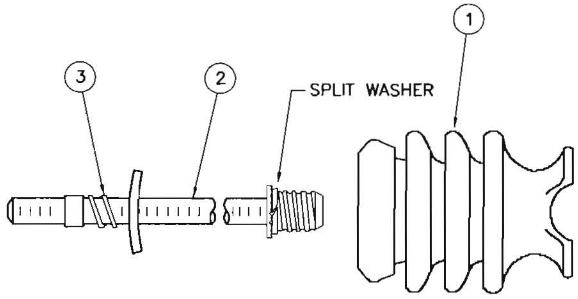
3				
2				
1				
0	4/16/09	GUINN	GUINN	ELKINS
REVISED		BY	CK'D	APPR.

POLYMER DEADEND ASSEMBLY

Progress Energy

FLA DWG. 03.06-02

INSULATOR, POST 15 KV

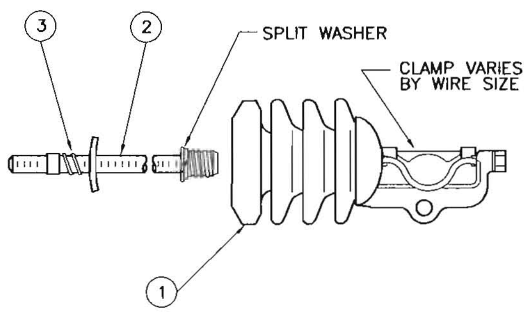


FLORIDA BILL OF MATERIALS				
ITEM NO.	ASSEMBLY	MATERIAL ITEM	QUANTITY	DESCRIPTION
1	IP	080212	1	INSULATOR, POST TIE 3/4 15 KV
2		072366	1	STUD, 5/8" X 10", 3/4" HEAD
3		013264	1	WASHER, SPRING COIL, 5/8"

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).

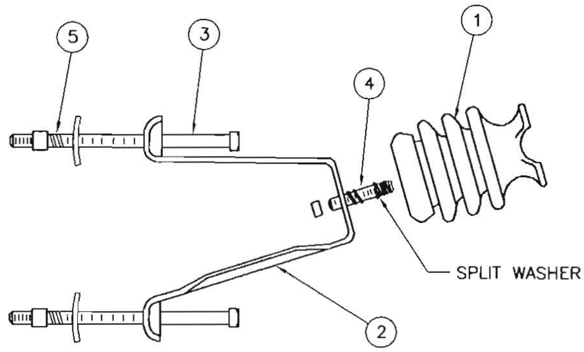
REVISED		BY	CK'D	APPR.
3				
2				
1	12/3/03	ROBESON	NUNNERY	WOOLSEY
0	4/17/03	YOUNTS	SIMPSON	WOOLSEY

INSULATORS

Progress Energy

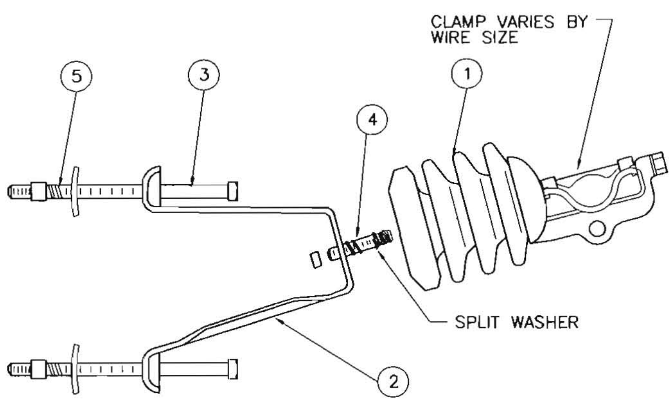
FLA — FLORIDA DWG. 03.06–04

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	GUINN	HOYT
0	4/17/03	YOUNTS	SIMPSON	WOOLSEY

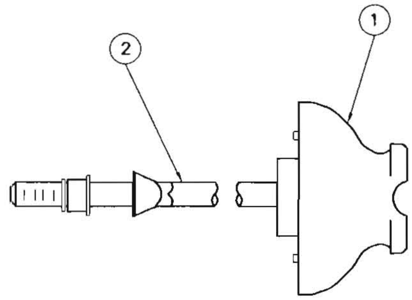
INSULATORS

Progress Energy

FLA

DWG. 03.06-06

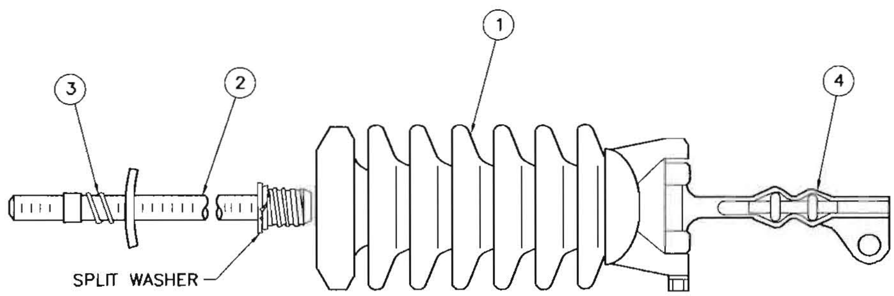
INSULATOR, PIN TYPE, CLASS B



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:

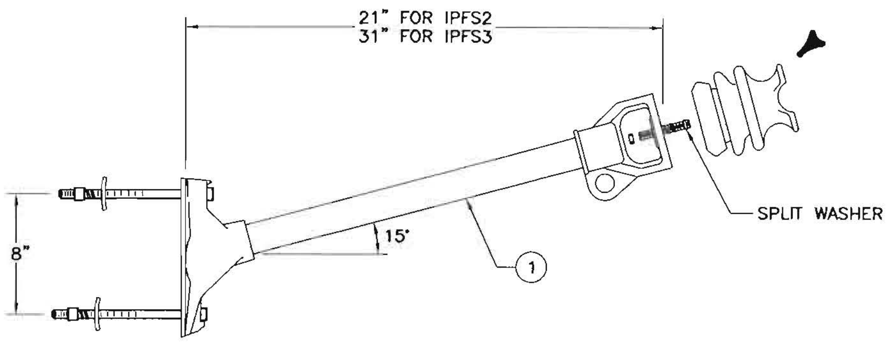
1. 1/0 DEADEND CLAMP TO BE USED ON CONCRETE POLE CONSTRUCTION.

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

INSULATORS

Progress Energy

FLA FLORIDA DWG. 03.06–08



BILL OF MATERIALS					
CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
1	IPFS3	–	013264	2	WASHER, SPRING COIL, STEEL, 5/8", GALV.
			070431	1	BRACKET, FIBERGLASS, STAND-OFF, 31"
			072361	1	STUD, LINE POST, 5/8" X 1-3/4"
			080212	1	INSULATOR, POST, TIE TOP, 15KV, W/O STUD
			152107	2	BOLT, MACHINE, SQ, 5/8" X 12"

BILL OF MATERIALS					
CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
1	IPFS2	–	013264	2	WASHER, SPRING COIL, STEEL, 5/8", GALV.
			070430	1	BRACKET, FIBERGLASS, STAND-OFF, 21"
			072361	1	STUD, LINE POST, 5/8" X 1-3/4"
			080212	1	INSULATOR, POST, TIE TOP, 15KV, W/O STUD
			152107	2	BOLT, MACHINE, SQ, 5/8" X 12"

STANDOFF HORIZONTAL POST INSULATOR BRACKETS ARE AVAILABLE IN 21" AND 31" LENGTHS. THEY MAY BE USED ON TANGENT FLAT CONSTRUCTION WHERE RIGHT-OF-WAY IS AN ISSUE AND THE POLE MUST BE SET OUT OF LINE OR FOR SMALL ANGLES (15° OR LESS) USING A CLAMP TOP INSULATOR THE 21" BRACKET MAY BE USED FOR DISTRIBUTION UNDERBUILD ON STEEL AND CONCRETE TRANSMISSION POLES. DO NOT INSTALL WHERE A DIFFERENCE IN ELEVATION BETWEEN STRUCTURES WILL CREATE AN EXCESSIVE DOWNWARD FORCE ON THE BRACKET. IF THERE ARE ANY QUESTIONS, CONTACT DISTRIBUTION STANDARDS.

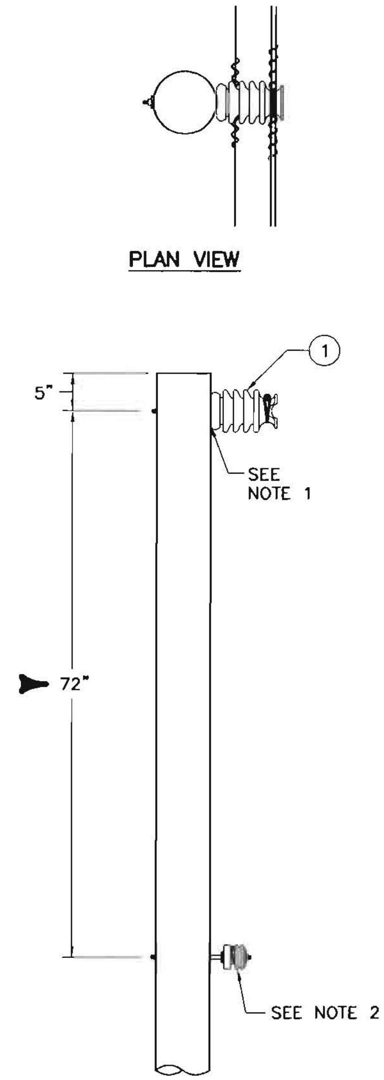
3				
2				
1	2/4/09	BURLISON	GUINN	HOYT
0	10/24/08	BURLISON	GUINN	HOYT
REVISED		BY	CK'D	APPR.

STANDOFF HORIZONTAL POST INSULATOR BRACKETS

Progress Energy

FLA

DWG. 03.06-10



FRONT VIEW
0° – 5° ANGLE

BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
V10(WIRECODE)M	1	IP(WIRECODE)	1	072136	1	INSULATOR, POST, TIE, TOP, 15KV
				072367	1	STUD, LINE POST, 5/8" X 12"
				013264	1	WASHER, SPRING COIL, STEEL, 5/8"
				074305	1	GAINGRID, 4" X 4", NO TEETH, ALUMINUM
				–	1	TIE, E-Z, F-NECK OR TIE WIRE (VARIES W/ CONDUCTOR SIZE)

NOTES:

1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE A SLAB GAIN FOR ALL CONDUCTOR SIZES. WHEN THE CONDUCTOR IS 335.4 KCMIL OR LARGER, USE POLE GAIN EVEN IF SLAB GAIN EXISTS. POLE GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS OR SLACK SPANS.

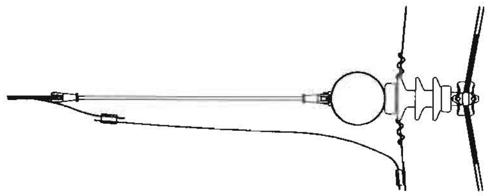
2. TYPICAL INSTALLATION – REFER TO SECTION 04 FOR NEUTRAL/SECONDARY DETAILS.

REVISED		BY	CK'D	APPR.
3				
2				
1	11/30/09	CUINN	CUINN	ELKINS
0	7/24/08	BURLISON	GUINN	HOYT

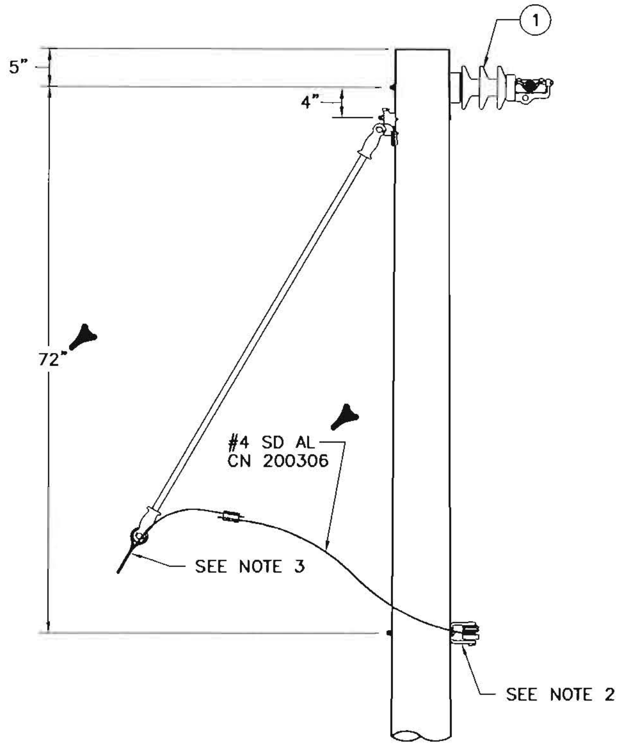
SINGLE-PHASE CONSTRUCTION – TANGENT

Progress Energy

FLA DWG. 03.08-01



PLAN VIEW



FRONT VIEW
6° – 15° ANGLE

BILL OF MATERIALS						
MACRO UNIT	CU/CN ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
V11(WIRECODE)M	1	IC_	1	080232	1	INSULATOR, POST, CLAMP, HORIZONTAL
				072367	1	STUD, LINE POST, 5/8" X 12"
				013264	1	WASHER, SPRING COIL, STEEL, 5/8", GALV.
				074305	1	GAINGRID, 4" X 4", NO TEETH, ALUMINUM
				–	1	CLAMP, LINE POST, ANGLE (VARIES WITH CONDUCTOR SIZE)
				–	1	ROD, ARMOR (VARIES WITH CONDUCTOR SIZE)

NOTES:

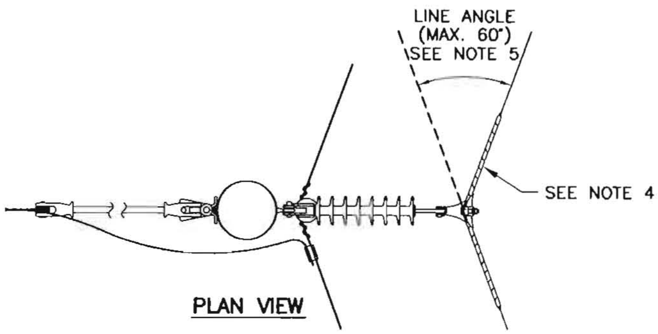
1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE A SLAB GAIN FOR ALL CONDUCTOR SIZES. WHEN THE CONDUCTOR IS 335.4 KCMIL OR LARGER, USE POLE GAIN EVEN IF SLAB GAIN EXISTS. POLE GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS OR SLACK SPANS.
2. TYPICAL INSTALLATION – REFER TO SECTION 04 FOR NEUTRAL/SECONDARY DETAILS.
3. TYPICAL INSTALLATION – REFER TO SECTION 02 FOR GUYING DETAILS.
4. PRIMARY AND NEUTRAL MAY BE FRAMED ON GUY SIDE OF POLE AS AN ALTERNATE METHOD TO FACILITATE TRUCK ACCESSIBILITY.

REVISED		BY	CK'D	APPR.
3				
2				
1	12/4/09	GUINN	GUINN	ELKINS
0	7/28/08	BURLISON	GUINN	HOYT

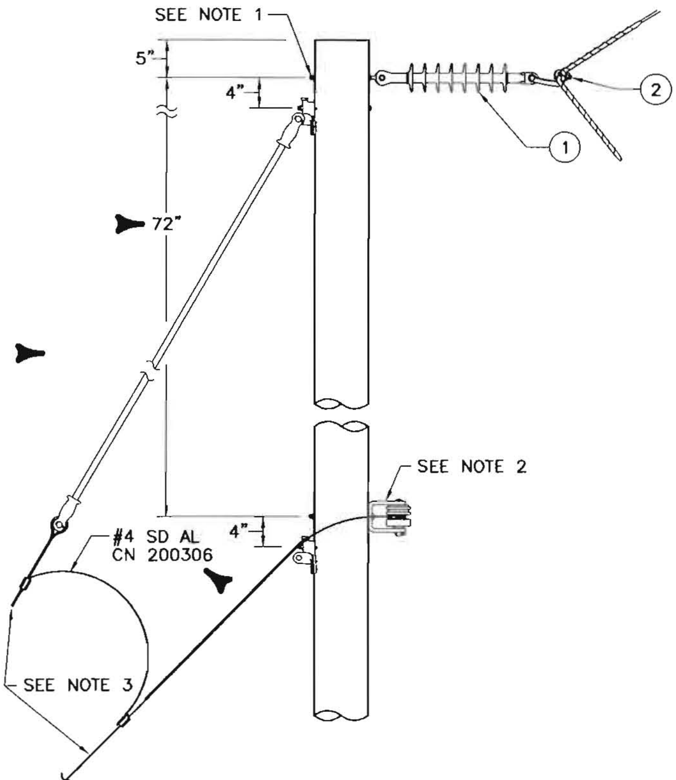
SINGLE–PHASE CONSTRUCTION –
SMALL ANGLE POLES

Progress Energy

FLA DWG. 03.08–02



PLAN VIEW



FRONT VIEW

BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
V12(WIRE)M	1	I_	1	080577	1	INSULATOR, POLYMER, 25KV, DEADEND, SILICONE
				011708	1	BOLT, OVAL EYE, 5/8" X 10"
				013308	1	WASHER (SEE NOTE 1)
	2	KW2_	1	–	1	CLAMP, SUSPENSION (VARIES WITH CONDUCTOR SIZE)
				–	1	ROD, ARMOR (VARIES WITH CONDUCTOR SIZE)

NOTES:

1. USE 2-1/4" SQUARE WASHER ON 1/0 AAAC AND SMALLER CONDUCTOR AND 3" CURVE WASHER FOR CONDUCTORS LARGER THAN 1/0 AAAC.
2. TYPICAL INSTALLATION – SEE SECTION 04 FOR NEUTRAL/SECONDARY DETAILS.
3. TYPICAL INSTALLATION – SEE SECTION 02 FOR GUYING DETAILS.
4. ARMOR ROD REQUIRED FOR ANGLE ASSEMBLY FOR ACSR, AAC AND AAAC CONDUCTORS.
5. FOR 15° – 60° ANGLES.

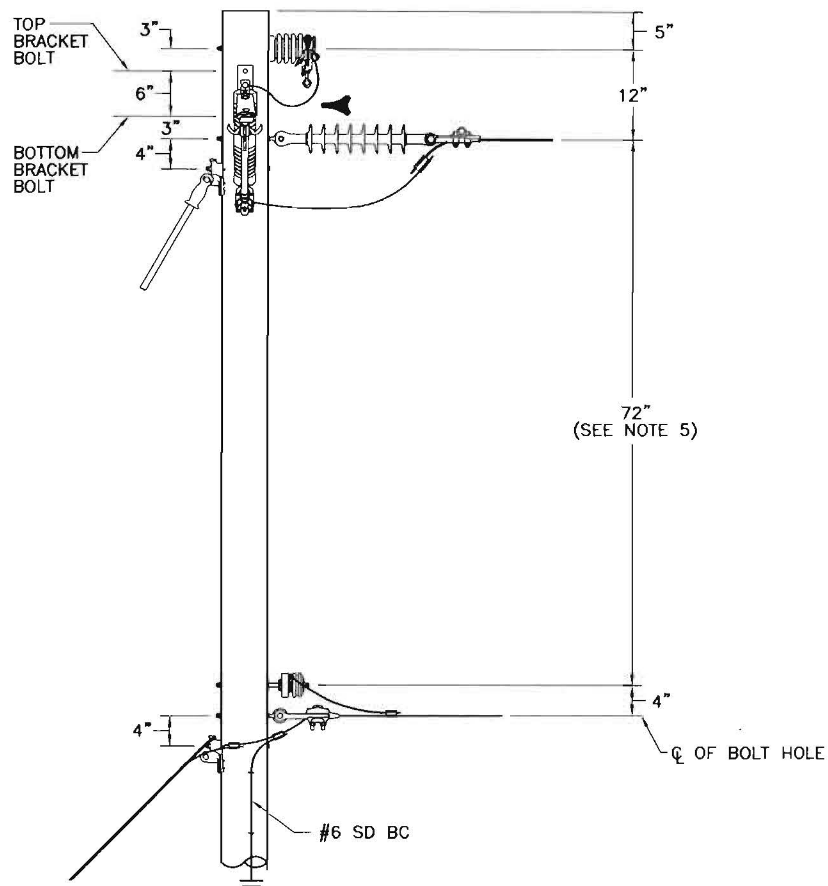
REVISED		BY	CK'D	APPR.
3				
2				
1	11/30/09	GUINN	GUINN	ELKINS
0	7/21/08	BURLISON	GUINN	HOYT

SINGLE-PHASE – DEADENDS AND MEDIUM ANGLES

Progress Energy

FLA

DWG. 03.08-04



FRONT VIEW

0° – 5° ANGLE

12KV

NOTES:

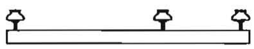
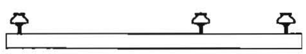
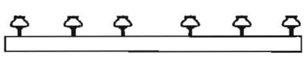
1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE A SLAB GAIN FOR ALL CONDUCTOR SIZES. WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER, USE POLE GAIN EVEN IF SLAB GAIN EXISTS. POLE GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS OR SLACK SPANS.
2. TYPICAL INSTALLATION: SEE SECTION 04 FOR NEUTRAL/SECONDARY DETAILS.
3. TYPICAL INSTALLATION: SEE SECTION 02 FOR GUYING DETAILS.
4. SEE DWG. 03.12–20 FOR BILL OF MATERIALS FOR CUTOUTS.
5. 72" NEUTRAL SPACING IS PREFERRED TO ACCOMMODATE MAINTENANCE AND SHOULD BE OBTAINED ON NEW CONSTRUCTION OR UPGRADE INVOLVING POLE REPLACEMENT. UPGRADES AND ADDITIONS ON EXISTING POLES MAY UTILIZE 60" NEUTRAL SPACING IF 72" SPACING CANNOT BE OBTAINED WITHOUT REPLACING THE POLE OR CAUSING CONFLICT WITH COMMUNICATION CABLES.

3				
2	10/30/09	GUINN	GUINN	ELKINS
1	7/24/09	GUINN	GUINN	ELKINS
0	12/22/08	BURLISON	GUINN	HOYT
REVISED		BY	CK'D	APPR.

SINGLE–PHASE CONSTRUCTION – FUSED TAP

Progress Energy

FLA 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.

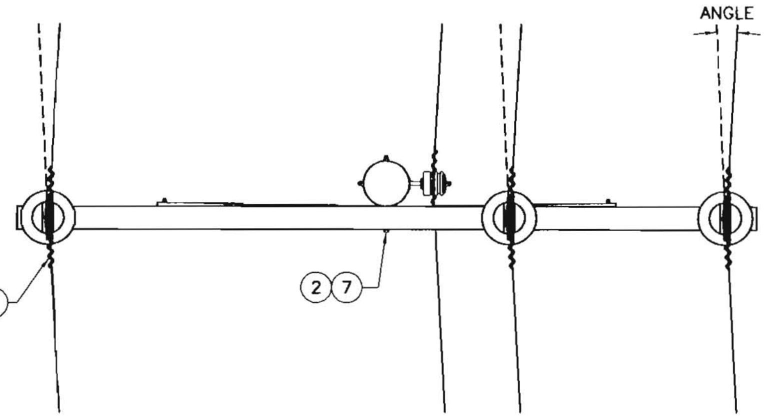
2. USE 10 FOOT CROSSARM FOR ALL HORIZONTAL TRANSMISSION UNDERBUILD.

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

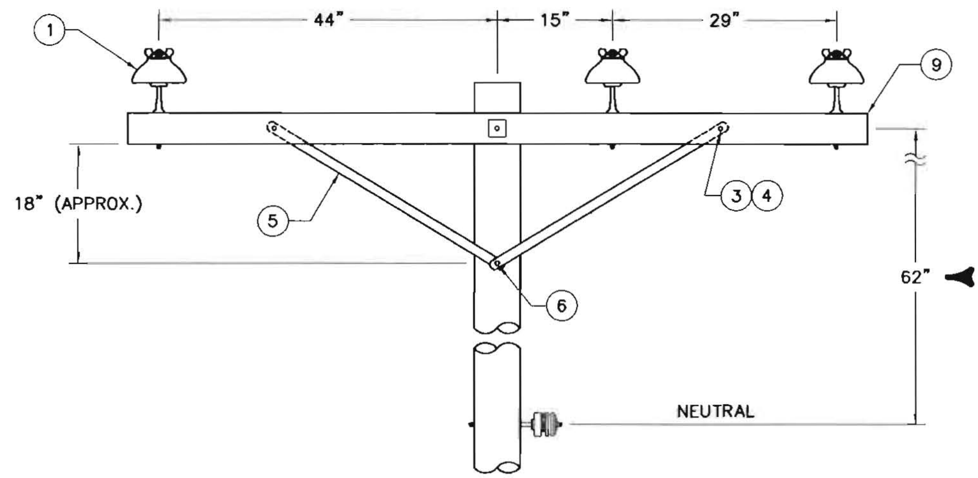
CROSSARMS FOR ALUMINUM
AND COPPER CONDUCTORS

Progress Energy

FLA FLORIDA DWG. 03.11-01



PLAN VIEW



FRONT VIEW

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

NOTES:

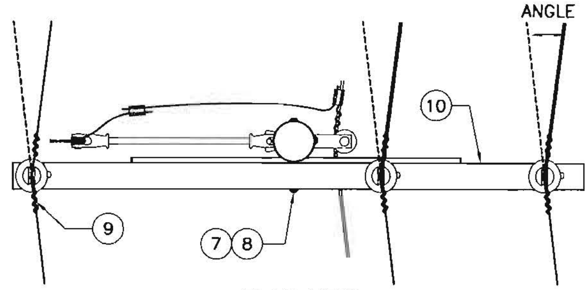
1. PLACE CONDUCTOR IN TOP GROOVE.
2. ARMS SUPPORTING CONDUCTOR LARGER THAN 1/0 AL. OR #2 CU. WILL REQUIRE THE USE OF 60" BOW BRACES.
3. SEE DWG 03.06-08 FOR PIN TYPE INSULATORS.

5	11/30/09	GUINN	GUINN	ELKINS
4	12/31/07	CECCONI	GUINN	HOYT
3	11/27/06	BURLISON	GUINN	HOYT
0	6/13/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

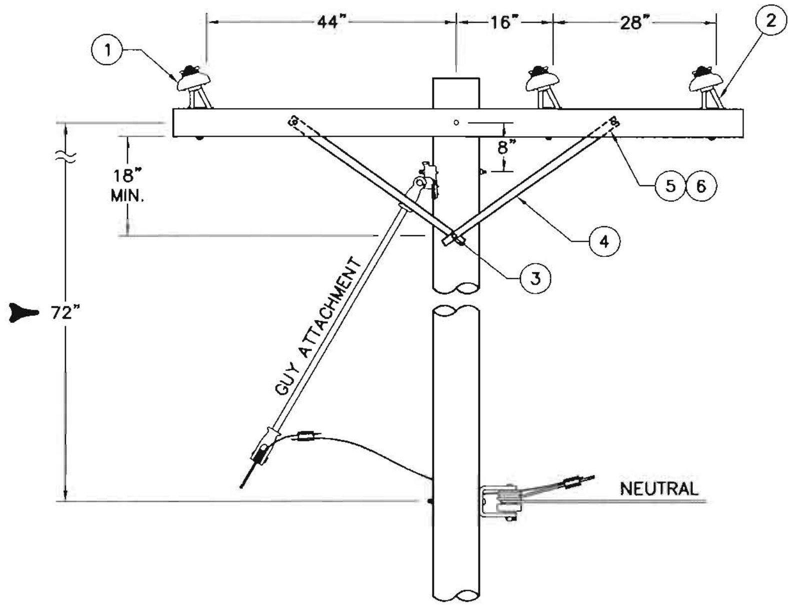
HORIZONTAL CONSTRUCTION – 0 DEGREES TO 5 DEGREES

Progress Energy

FLA | DWG. 03.11–02



PLAN VIEW



FRONT VIEW

BILL OF MATERIALS							
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QUANTITY 2ø	QUANTITY 3ø	DESCRIPTION
–	1	IX	1	072306	2	3	PIN, CROSSARM, CL A OR B
				080304	2	3	INSULATOR, PIN, 23KV, 55–5
				152108	2	3	BOLT, MACHINE, SQ, 5/8" X 16"
	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	BRACE, FLAT, 36" (USE WITH COND. 1/0 AL. & SMALLER)
	4	–	–	071206	1	1	BRACE, BOW 60" (USE WITH COND. 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:

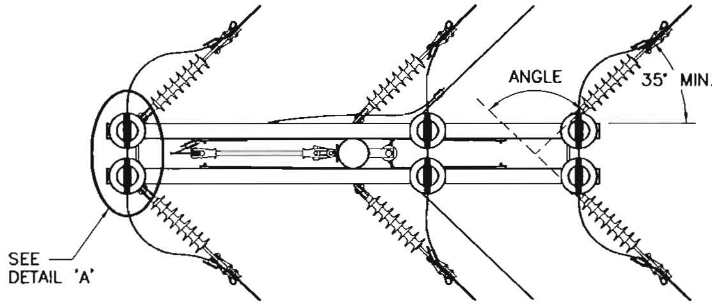
1. PLACE CONDUCTOR IN SIDE GROOVE.
2. SEE DWG 03.06–08 FOR PIN TYPE INSULATORS.

3	2/25/10	GUINN	GUINN	ELKINS
2	12/31/07	CECCONI	GUINN	HOYT
1	11/27/06	BURLISON	GUINN	HOYT
0	6/13/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

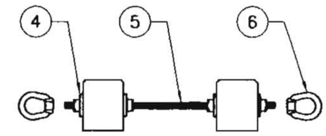
HORIZONTAL CONSTRUCTION – 6 DEGREES TO 15 DEGREES CODE H (# OF PHASES) 1 (WIRE SIZE)

Progress Energy

FLA DWG. 03.11–04

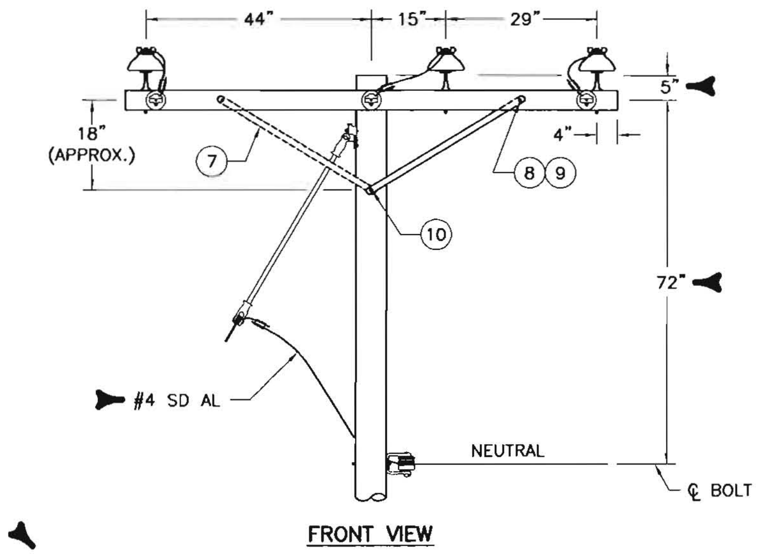


PLAN VIEW

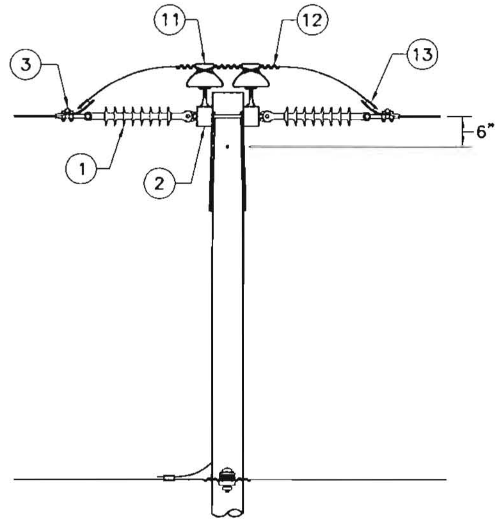


DETAIL "A"

SIDE VIEW
DOUBLE CROSSARM



FRONT VIEW



SIDE VIEW

BILL OF MATERIALS							
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QUANTITY 2ø	QUANTITY 3ø	DESCRIPTION
CODE H (# OF PHASES) 2 (WIRE SIZE)	1	IS	1	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 COND. LARGER THAN 1/0 AL.)
	7	–	–	071306	4	4	BRACE, FLAT, 36" (USE WITH COND. 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	1	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.

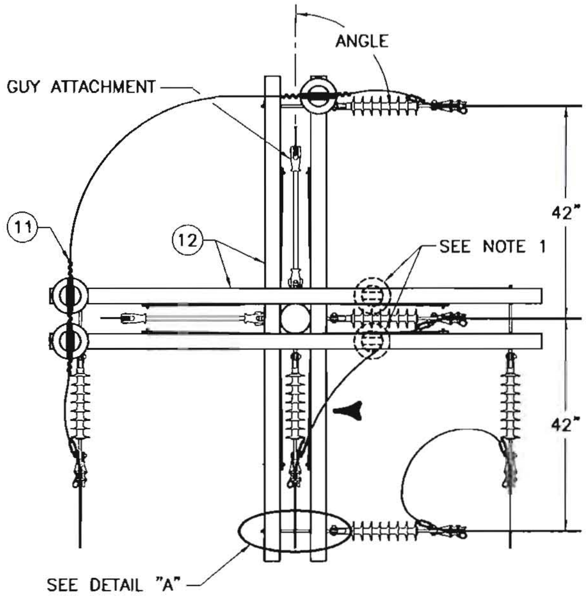
2. SEE DWG. 03.06-08 FOR PIN TYPE INSULATORS.

REVISED		BY	CK'D	APPR.
4	11/30/09	GUINN	GUINN	ELKINS
3	12/31/07	CECCONI	GUINN	HOYT
2	11/27/06	BURLISON	GUINN	HOYT
0	7/4/03	YOUNTS	SIMPSON	WOOLSEY

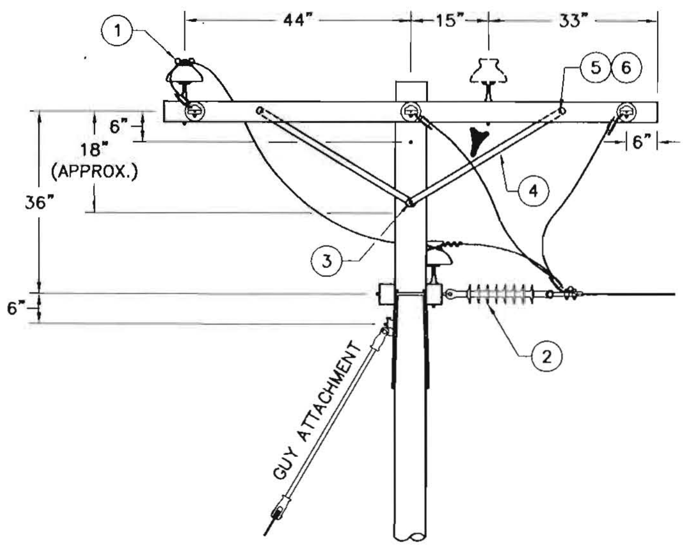
HORIZONTAL CONSTRUCTION –
16 DEGREES TO 59 DEGREES
CODE H (# OF PHASES) 2 (WIRE SIZE)

Progress Energy

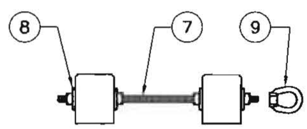
FLA DWG. 03.11-06



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:

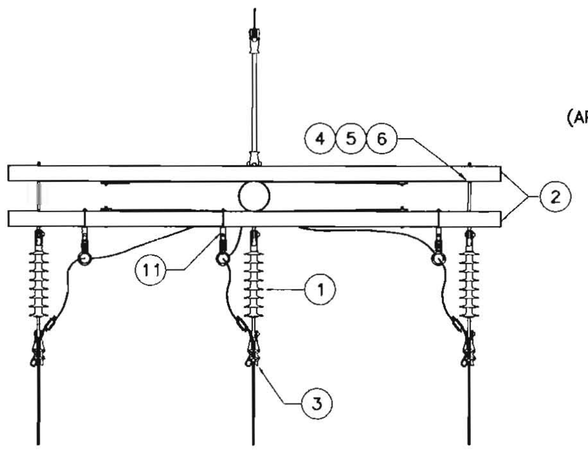
1. USE JUMPER INSULATOR WHEN NECESSARY TO PROVIDE CLEARANCE.
2. SEE DWG. 03.06-08 FOR PIN TYPE INSULATORS.

REVISED		BY	CK'D	APPR.
4	1/23/08	BURLISON	GUINN	HOYT
3	11/27/06	BURLISON	GUINN	HOYT
2	6/30/06	GUINN	GUINN	HOYT
0	7/4/03	YOUNTS	SIMPSON	WOOLSEY

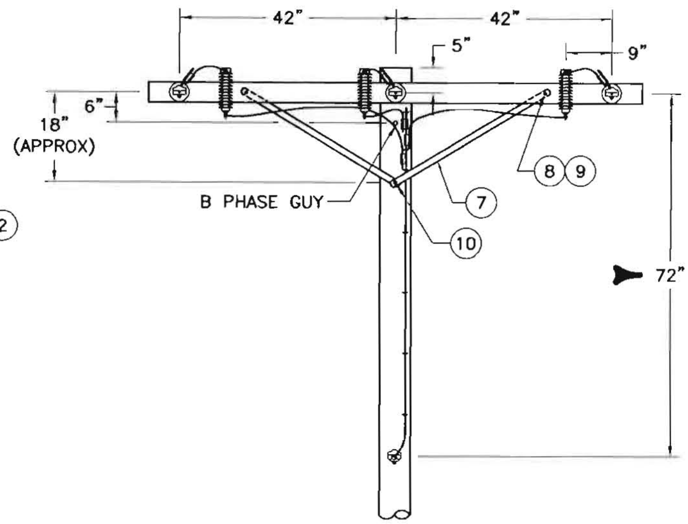
HORIZONTAL CONSTRUCTION –
60 DEGREES TO 90 DEGREES

Progress Energy

FLA DWG. 03.11-10



PLAN VIEW



FRONT VIEW

BILL OF MATERIALS							
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU 2Ø	QTY PER CU 3Ø	DESCRIPTION
CODE H (# OF PHASES) 4 (WIRE SIZE)	1	ID	1/Ø	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 COND. LARGER THAN 1/0 AL.)
	7	–	–	071306	4	4	BRACE, FLAT, 36" (USE WITH COND. 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. ARRESTERS ISSUED SEPARATELY, COMPATIBLE UNIT: AX_.
2. POLE GROUND ISSUED SEPARATELY, COMPATIBLE UNIT: GO.

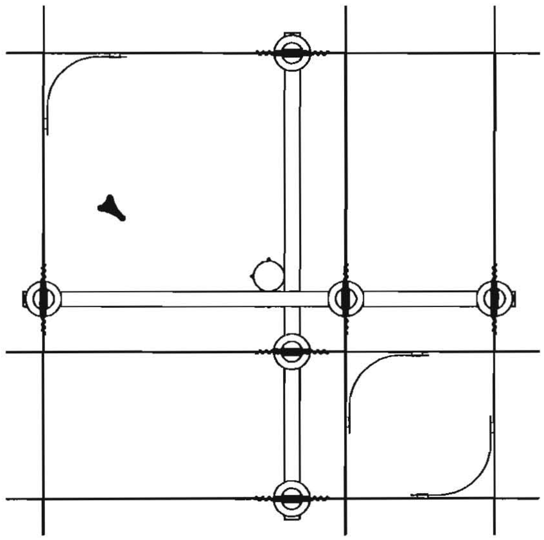
6	11/30/09	GUINN	GUINN	ELKINS
5	12/22/08	GUINN	GUINN	HOYT
4	12/31/07	CECCONI	GUINN	HOYT
0	7/4/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

HORIZONTAL CONSTRUCTION – DEADEND

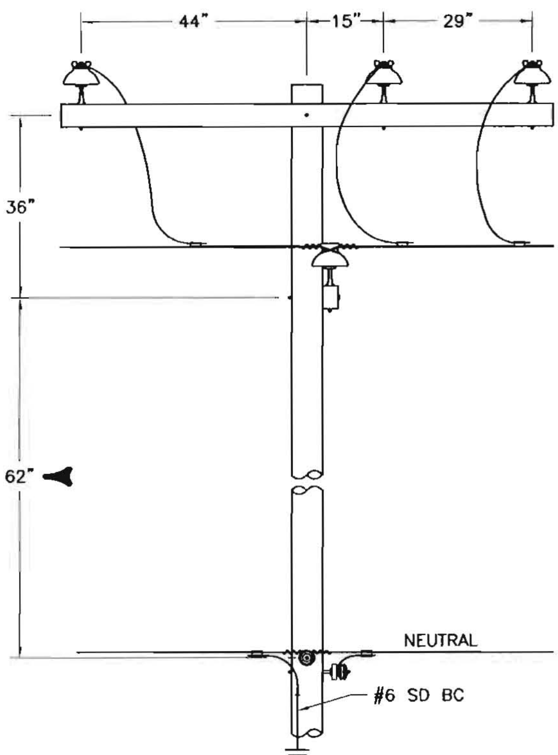
Progress Energy

FLA DWG. 03.11–12

TANGENT CONSTRUCTION

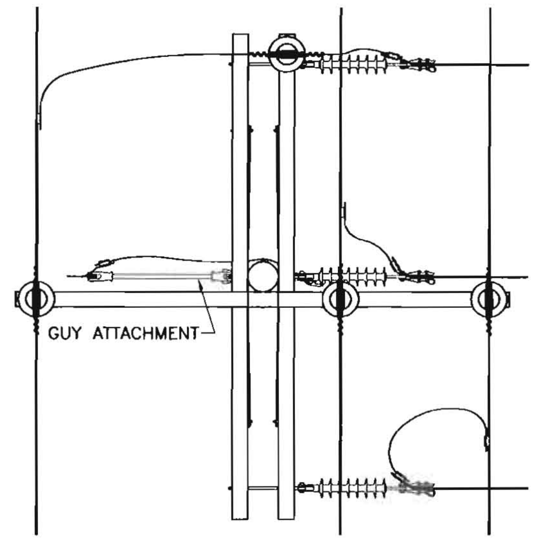


PLAN VIEW

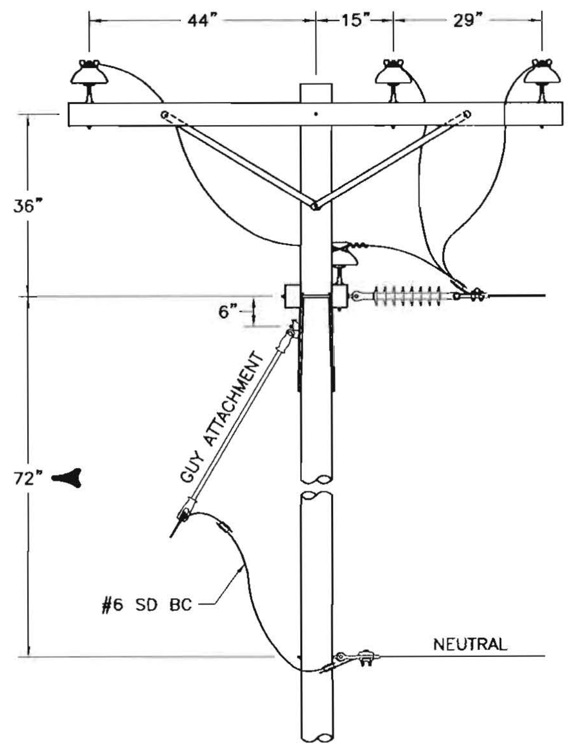


FRONT VIEW

DEADEND CONSTRUCTION



PLAN VIEW



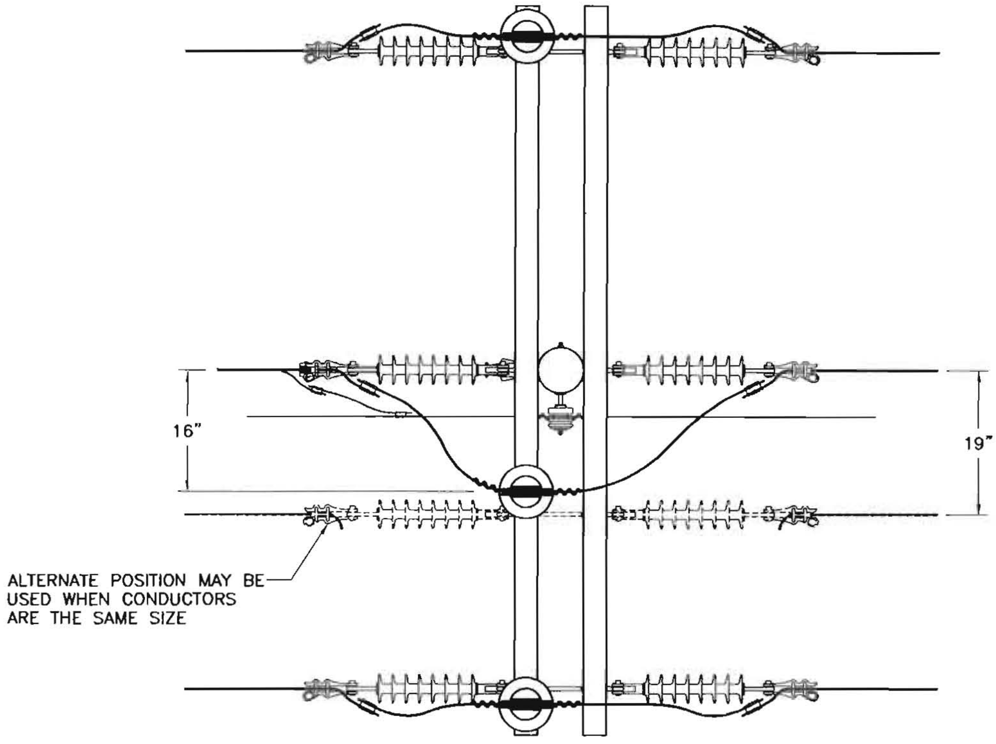
FRONT VIEW

3	10/13/09	BURLISON	GUINN	ELKINS
2	12/31/07	CECCONI	GUINN	HOYT
1	7/31/06	GUINN	GUINN	HOYT
0	7/7/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

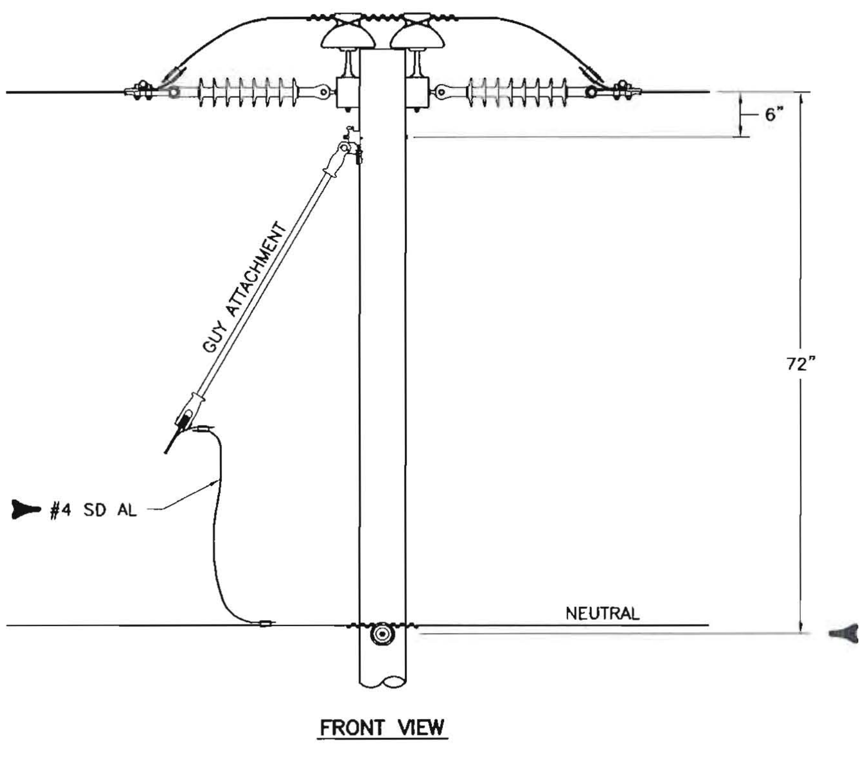
HORIZONTAL TANGENT
WITH HORIZONTAL CONSTRUCTION

Progress Energy

FLA DWG. 03.11-14



PLAN VIEW



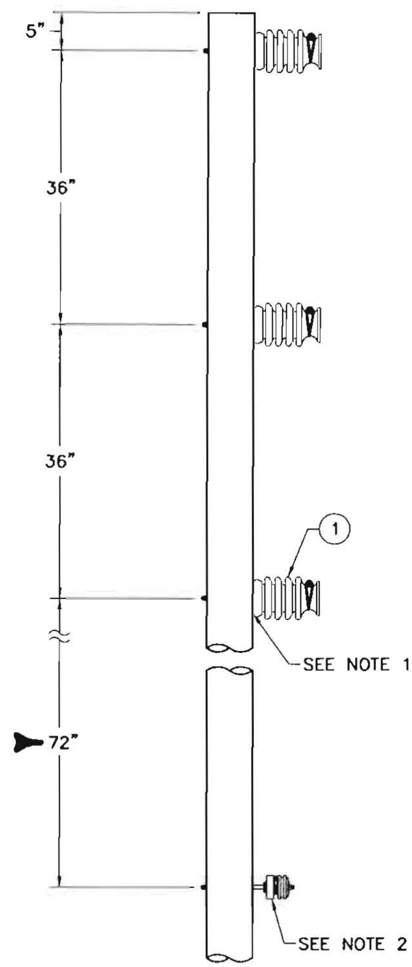
FRONT VIEW

3	11/30/09	GUINN	GUINN	ELKINS
2	12/31/07	CECCONI	GUINN	HOYT
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



FRONT VIEW
12 KV

BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
V(#ø)O(WIRECODE)M	1	IP(WIRECODE)	1/ø	080212	1	INSULATOR, POST, TIE, TOP, 15KV, W/O STUD
				072367	1	STUD, LP, 5/8" X 12"
				013264	1	WASHER, SPRING, COIL, STEEL, 5/8"
				071305	1	GAINGRID, 4" X 4", NO TEETH, AL (SEE NOTE 1)
				–	1	TIE, E-Z, F-NECK OR TIE WIRE (VARIES W/COND. SIZE)

NOTES:

1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE A SLAB GAIN FOR ALL CONDUCTOR SIZES. WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER, USE POLE GAIN EVEN IF SLAB GAIN EXISTS. POLE GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS OR SLACK SPANS.

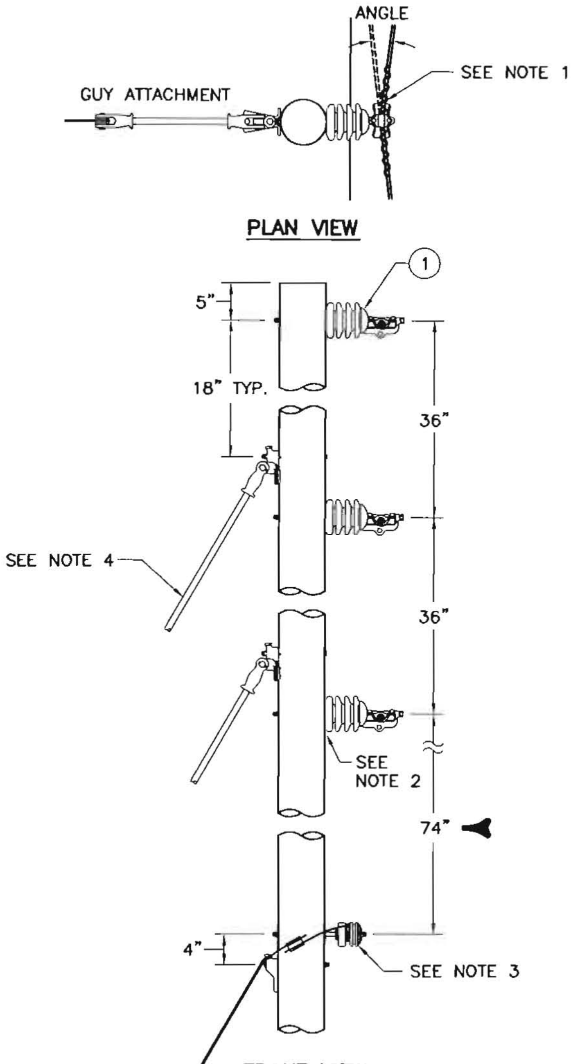
2. TYPICAL INSTALLATION – REFER TO SECTION 04 FOR NEUTRAL/SECONDARY DETAILS.

3				
2				
1	11/30/09	GUINN	GUINN	ELKINS
0	7/21/08	BURLISON	GUINN	HOYT
REVISED		BY	CK'D	APPR.

VERTICAL CONSTRUCTION – TANGENT
795 AAC – 0 DEGREES TO 3 DEGREES,
SMALLER CONDUCTORS – 0 DEGREES TO 5 DEGREES

Progress Energy

FLA DWG. 03.12–02



FRONT VIEW

6 – 15 DEGREES 12KV

BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
V(#ø)1(WIRECODE) M	1	IC_	1	080232	1	INSULATOR, POST, CLAMP
				072367	1	STUD, LP, 5/8" X 12"
				013264	1	WASHER, SPRING, COIL, STEEL, 5/8"
				074305	1	GAINGRID, 4" X 4", NO TEETH, AL
				–	1	CLAMP, LINE, POST, ANGLE (VARIES W/ CONDUCTOR SIZE)
				–	1	ROD, ARMOR (VARIES WITH CONDUCTOR SIZE) SEE NOTE 1

NOTES:

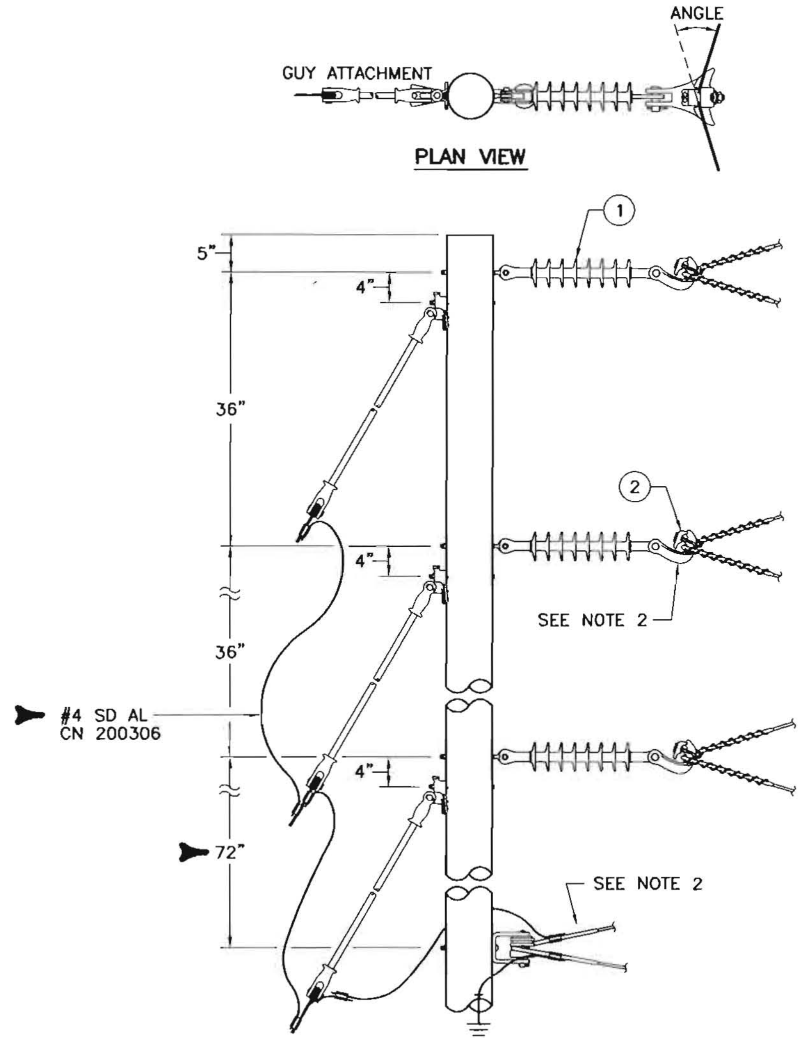
1. ARMOR ROD NOT REQUIRED WHEN USING CUSHION GRIP (795 AAC ONLY).
2. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE A SLAB GAIN FOR ALL CONDUCTOR SIZES. WHEN THE CONDUCTOR IS 335.4 KCMIL OR LARGER, USE POLE GAIN EVEN IF SLAB GAIN EXISTS. POLE GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS OR SLACK SPANS.
3. TYPICAL INSTALLATION – REFER TO SECTION 04 FOR NEUTRAL/SECONDARY DETAILS.
4. TYPICAL INSTALLATION – REFER TO SECTION 02 FOR GUYING DETAILS.

3				
2				
1	11/30/09	GUINN	GUINN	ELKINS
0	3/24/08	BURLISON	GUINN	HOYT
REVISED		BY	CK'D	APPR.

VERTICAL CONSTRUCTION – SMALL ANGLES

Progress Energy

FLA DWG. 03.12–04



FRONT VIEW
16–30 DEGREES FOR 795 AAC
16–60 DEGREES FOR ALL OTHER CONDUCTORS
DOUBLE DEADEND 795 AAC FOR
ANGLES GREATER THAN 30 DEGREES

BILL OF MATERIALS

MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	CUs PER PHASE	CATALOG NUMBER	QTY PER CU	DESCRIPTION
V(#ø)2(WIRE)M	1	IS	1	011708	1	BOLT, OVAL EYE, 5/8" X 10"
				013308	1	WASHER, 2-1/4" SQ., 13/16" HOLE
				080577	1	INSULATOR, POLYMER, 25KV, DEADEND
	2	KW2_	1	–	1	CLAMP, SUSP. (VARIES W/ CONDUCTOR SIZE)
				–	1	ROD, ARMOR (VARIES W/ CONDUCTOR SIZE)
	2	*KW27	1	113506	1	CLEVIS, EYE, 90°, 3-3/16" X 1-1/16"
				9220067202	1	CLAMP, SUSP, CUSHION GRIP, 0.981" TO 1.0"

*795 AAC ONLY

NOTES:

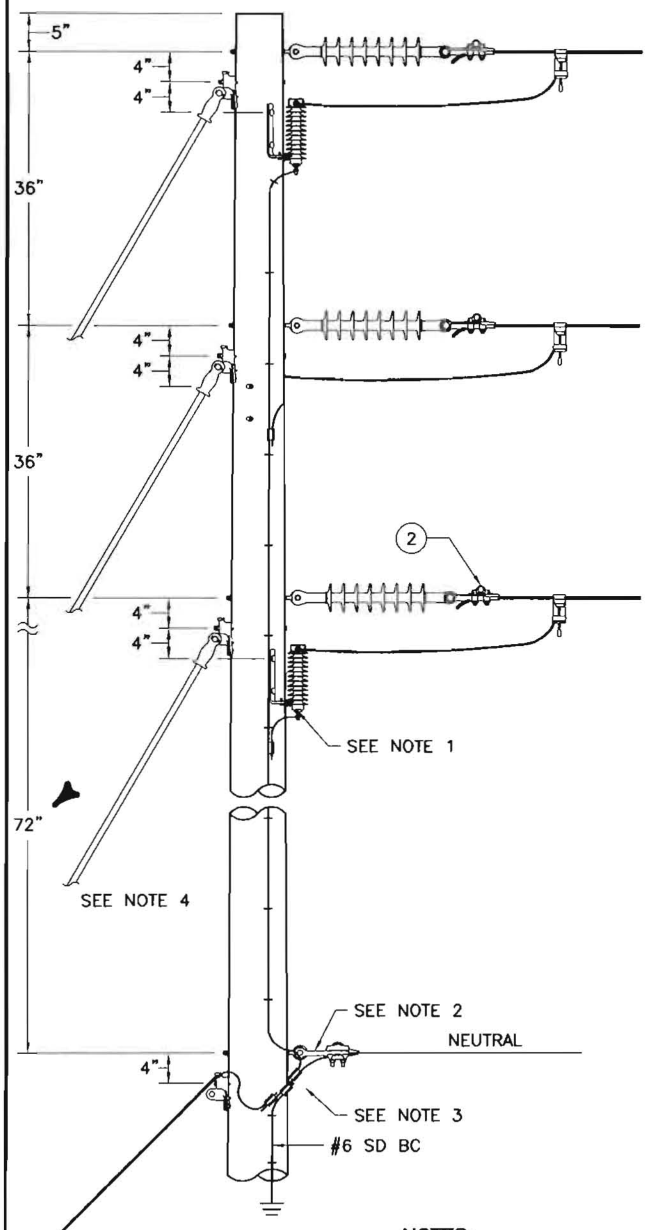
1. USE 3 OR 4 PRIMARY GUYS AS SPECIFIED ON WORK ORDER.
2. ARMOR ROD REQUIRED ON 1/0 AAAC AND 336 AAC. FOR 795 AAC, AN ARMOR ROD OR CUSHION GRIP IS REQUIRED.
3. SEE DWG. 02.04–18 FOR THE APPROPRIATE APPLICATION OF GUY INSULATORS.
4. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

3				
2				
1	11/30/09	GUINN	GUINN	ELKINS
0	7/25/08	BURLISON	GUINN	HOYT
REVISED		BY	CK'D	APPR.

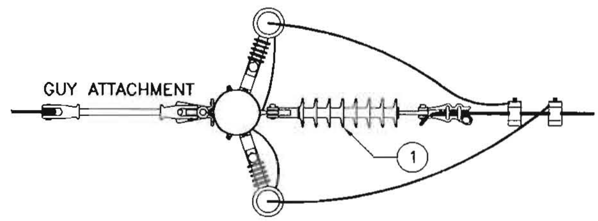
VERTICAL CONSTRUCTION – ANGLE ASSEMBLIES
ANGLES TO 60 DEGREES

Progress Energy

FLA DWG. 03.12–06



FRONT VIEW



PLAN VIEW

NOTES:

1. ARRESTERS ISSUED SEPARATELY – SEE SECTION 08 FOR DETAILS.
2. TYPICAL INSTALLATION – SEE SECTION 04 FOR NEUTRAL/SECONDARY DETAILS.
3. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.
4. TYPICAL INSTALLATION – SEE SECTION 02 FOR GUYING DETAILS.
5. USE 2-1/4" SQUARE WASHER ON 1/0 AAAC AND SMALLER CONDUCTOR. USE 3" CURVE WASHER FOR CONDUCTORS LARGER THAN 1/0 AAAC.

BILL OF MATERIALS

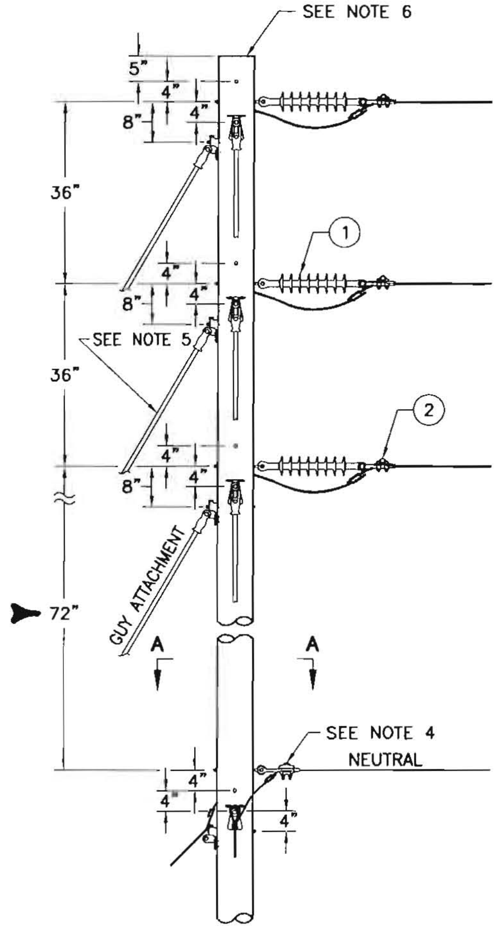
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
V(#ø)4(WIRECODE)M	1	I_	1/ø	080577	1/ø	INSULATOR, POLYMER, 25KV, DE, SILICONE
				011708	1/ø	BOLT, OVAL EYE, 5/8" X 10"
				–	1/ø	WASHER (SEE NOTE 5)
	2	KW4_	1/ø	–	1/ø	CLAMP, DE (VARIES WITH WIRE SIZE)

5	11/30/09	GUINN	GUINN	ELKINS
4	11/7/08	DANNA	GUINN	HOYT
3	11/19/07	CECCONI	SIMPSON	HOYT
0	7/4/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

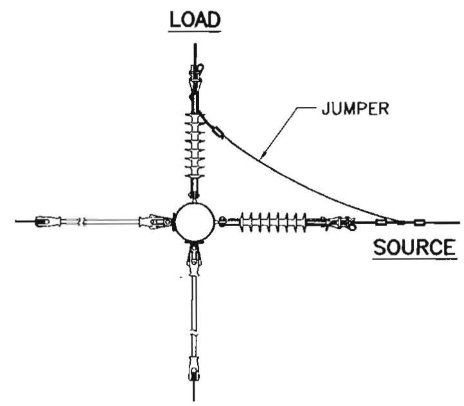
VERTICAL CONSTRUCTION – DEADEND

Progress Energy

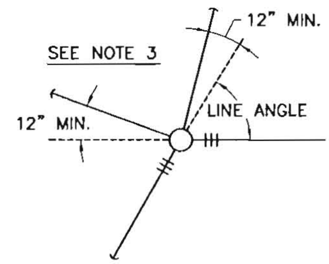
FLA DWG. 03.12–10

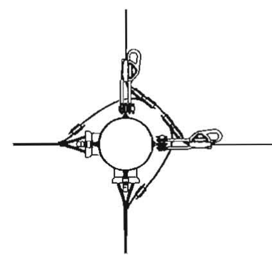


FRONT VIEW



PLAN VIEW





SECTION A–A

BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
V(#ø)(WIRECODE)M	1	I_ (SEE NOTE 1)	2/ø	080577	1	INSULATOR, POLYMER, 25KV, DEADEND
				011708	1	BOLT, OVAL EYE, 5/8" X 10"
				–	1	WASHER (SEE NOTE 1)
	2	KW_	2/ø	–	1	CLAMP (VARIES W/COND. SIZE) SEE DWG. 03.03–04

NOTES:

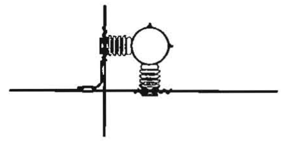
1. USE 2–1/4" SQUARE WASHER ON 1/0 AAAC AND SMALLER CONDUCTOR AND 3" CURVE WASHER FOR CONDUCTORS LARGER THAN 1/0 AAAC.
2. HOTLINE CLAMP AND STIRRUP MAY BE USED FOR SMALL CONDUCTORS. USE SOLID JUMPER FOR LARGE CONDUCTOR (ABOVE 1/0).
3. IF USED FOR LINE ANGLES LESS THAN 60°, OFFSET EACH ANCHOR 12" (SEE ABOVE) OR ADD A BISECTIONAL GUY. CONSIDER BISECTIONAL GUYS WHERE ANGLE PERMITS.
4. TYPICAL INSTALLATION – REFER TO SECTION 04 FOR NEUTRAL/SECONDARY DETAILS.
5. TYPICAL INSTALLATION – REFER SECTION 02 FOR GUYING DETAILS.
6. USE A 45' CLASS 2 POLE FOR 795 AAC CONDUCTOR.

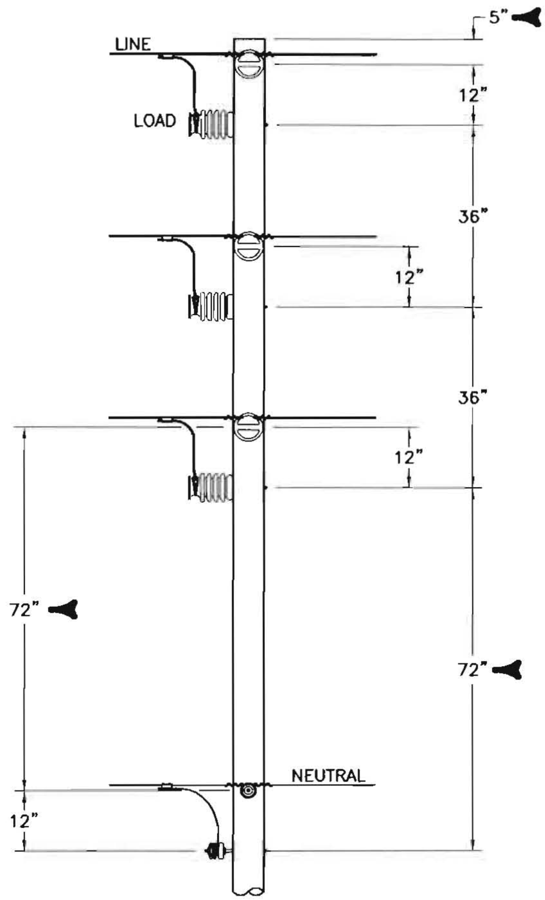
REVISED		BY	CK'D	APPR.
3				
2				
1	11/30/09	GUINN	GUINN	ELKINS
0	7/24/08	BURLISON	GUINN	HOYT

VERTICAL DOUBLE DEAD END CONSTRUCTION – THREE–PHASE

Progress Energy

FLA DWG. 03.12–11





FRONT VIEW

NOTES:

1. THE INTENT OF THIS DRAWING IS TO SHOW PHASE SPACING AND CIRCUIT ARRANGEMENT. PRIMARY SUPPORT CONFIGURATION MAY VARY.

2. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE A SLAB GAIN FOR ALL CONDUCTOR SIZES. WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER, USE POLE GAIN EVEN IF SLAB GAIN EXISTS. POLE GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS OR SLACK SPANS.

3. SEE DWG. 03.12-04 FOR BILL OF MATERIALS.

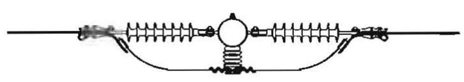
4	11/30/09	GUINN	GUINN	ELKINS
3	12/31/07	GECCONI	GUINN	HOYT
2	6/4/04	NUNNERY	NUNNERY	WOOLSEY
0	7/7/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

VERTICAL TANGENT CROSSING

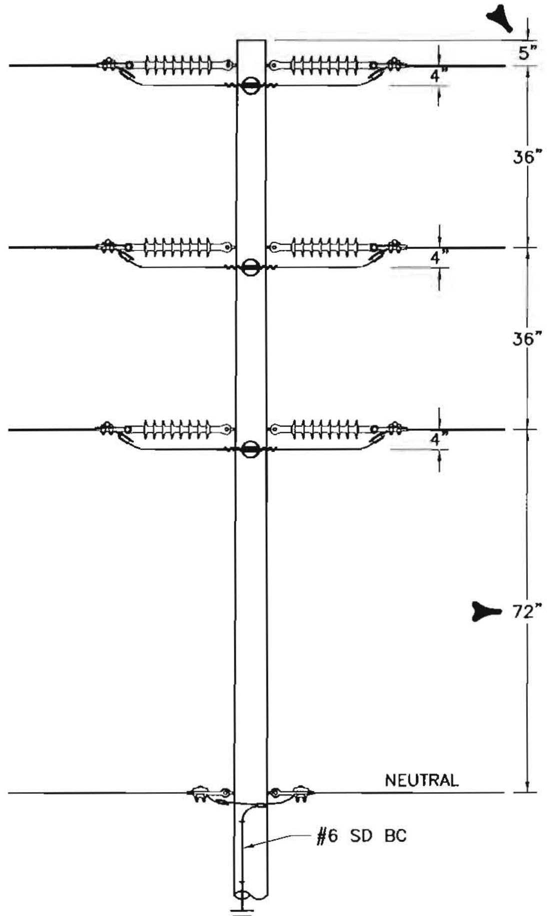
Progress Energy

FLA DWG. 03.12-12

VERTICAL DEADEND WITH VERTICAL DEADEND

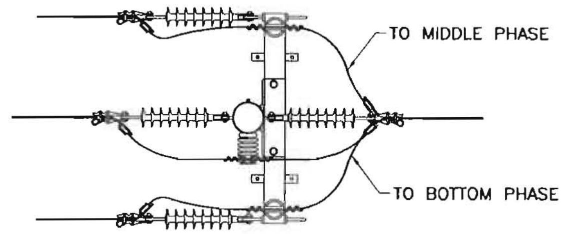


PLAN VIEW

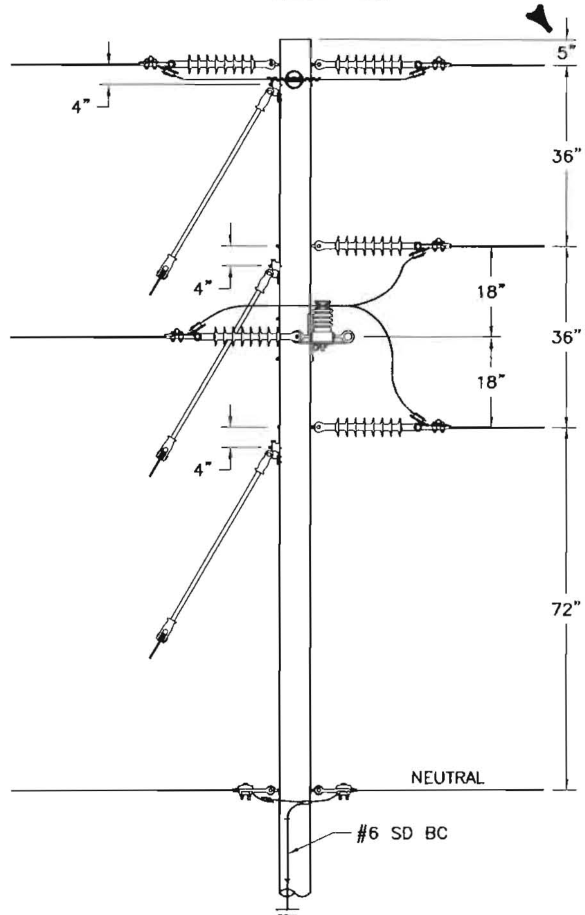


FRONT VIEW

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.
5. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

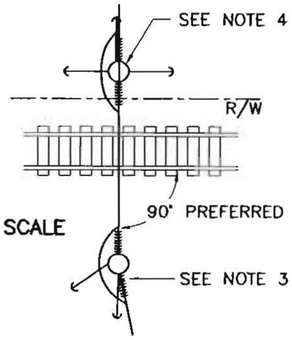
4	11/30/09	GUINN	GUINN	ELKINS
3	11/19/07	CECCONI	SIMPSON	HOYT
2	9/20/06	GUINN	GUINN	HOYT
0	7/4/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

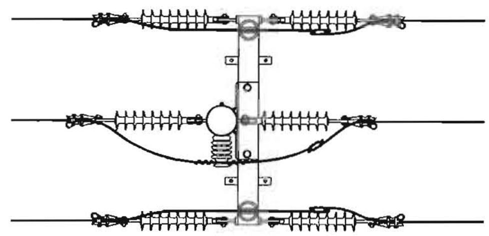
VERTICAL DEADEND WITH VERTICAL DEADEND

Progress Energy

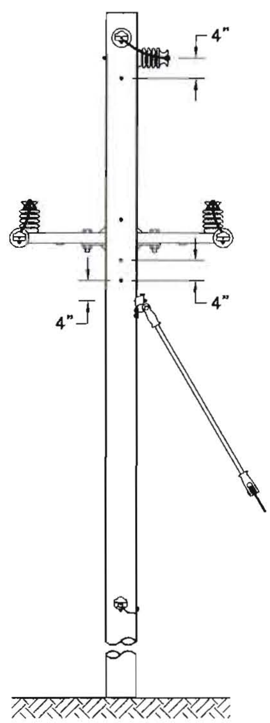
FLA DWG. 03.12-14

NOT TO SCALE

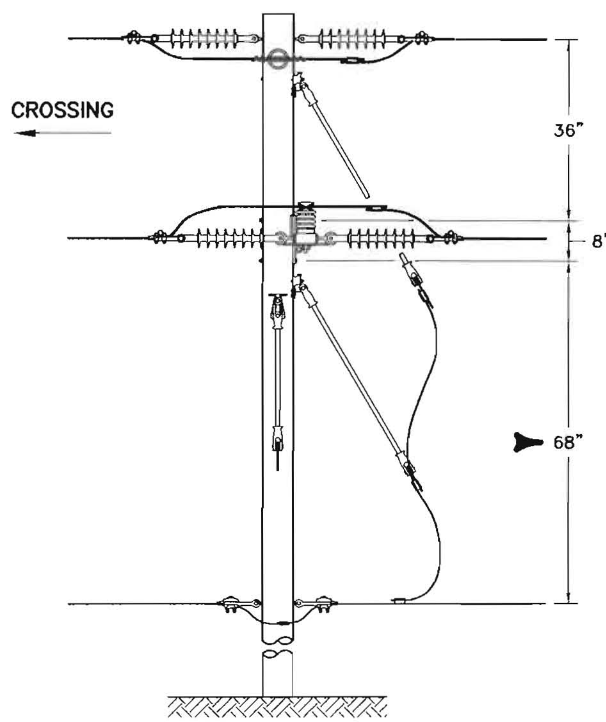




PLAN VIEW



FRONT VIEW



SIDE VIEW

NOTES:

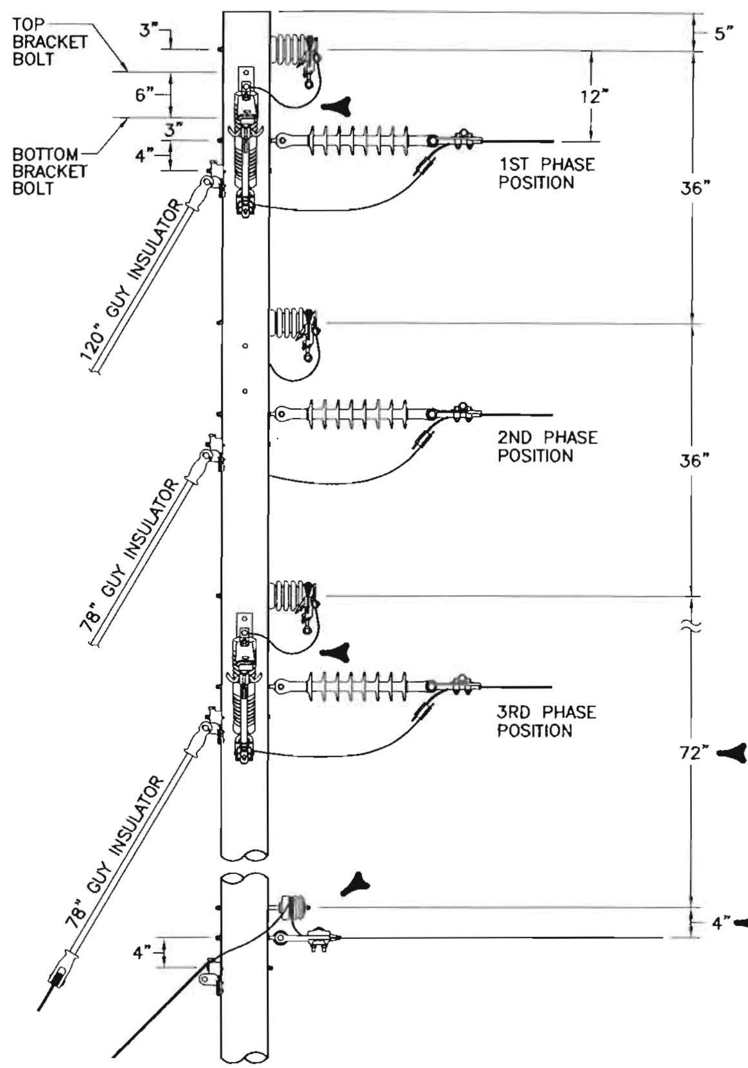
1. POLES SHOULD BE PLACED 1' OFF R/W AND CROSSING SHOULD BE AT 90° TO RAILS.
2. REFER TO NESC 231.C.1, EXCEPTION 1 FOR MINIMUM POLE DISTANCE TO RR RAILS.
3. WHEN CHANGING FROM GRADE C TO GRADE B FOR CROSSING, USE DEADEND AND ONE SIDE GUY FOR ANGLES GREATER THAN 5°.
4. WHEN CHANGING FROM GRADE C TO GRADE B FOR CROSSING, USE DEADEND GUY AND SIDE GUY BOTH WAYS FOR TANGENT POLES LESS THAN 5°.
5. DO NOT INSTALL SPLICES IN CROSSING SPAN OR ADJACENT SPANS.

3				
2	11/30/09	GUINN	GUINN	ELKINS
1	1/7/08	CECCONI	GUINN	HOYT
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



BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
CODE V (# OF PHASE) O (WIRE SIZE)	1	ID	3	011708	1	BOLT, EYE, 5/8"
				013346	1	CLAMP, DE
				080577	1	INSUL, POLYMER, 15/25KV, DE
	2	CP	3	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

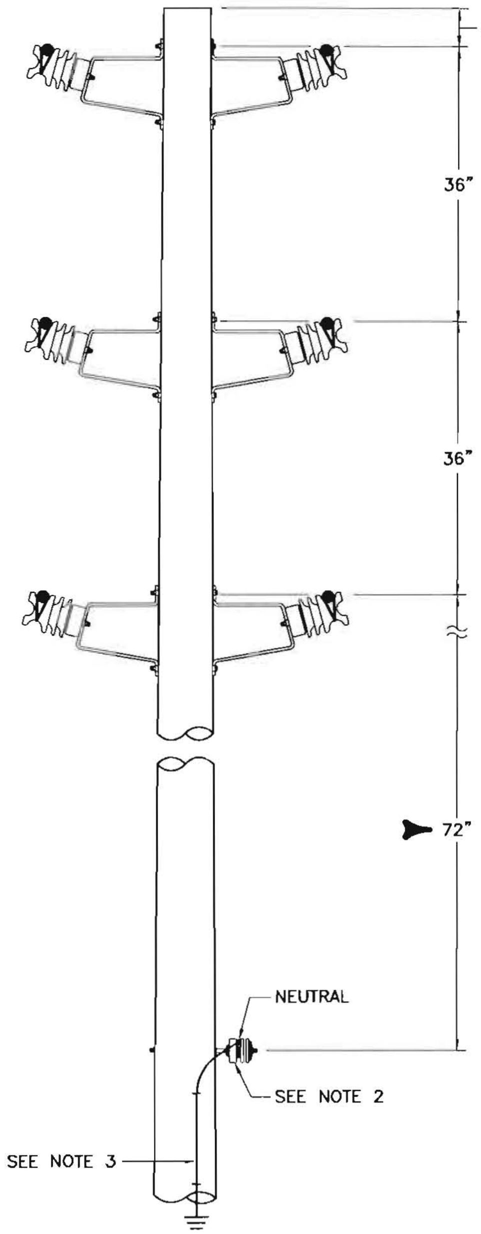
NOTES:
1. MIDDLE CUTOUT CAN BE PLACED ON SAME SIDE OF POLE AS OTHER CUTOUTS.
2. FOR FEEDER TAPS, THE CUTOUTS ARE OMITTED, BUT THE SPACING FOR THE TAP IS THE SAME.
3. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

REVISED		BY	CK'D	APPR.
3				
2				
1	10/30/09	GUINN	GUINN	ELKINS
0	10/9/08	BURLISON	GUINN	HOYT

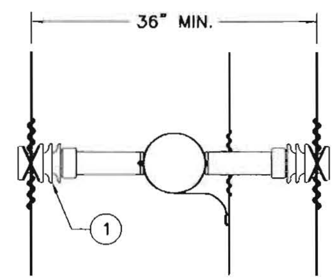
VERTICAL CONSTRUCTION – TANGENT
FUSED TAP CONSTRUCTION

Progress Energy

FLA DWG. 03.12–20



FRONT VIEW



PLAN VIEW

BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
D30(WIRECODE)M	1	IPS(WIRECODE)	6	080212	1	INSULATOR, POST, TIE, TOP, 15KV, W/O STUD
				072361	1	STUD, LINE, POST, 5/8" X 1-3/4"
				070424	1	BRACKET, POST, INSULATOR, MOUNTING
				152107	2	BOLT, MACHINE, SQ, 5/8" X 12"
				013264	2	WASHER, SPRING, COIL, STEEL, 5/8", GALV.
				–	1	TIE, E-Z, F-NECK OR TIE WIRE (VARIES W/COND. SIZE)

NOTES:

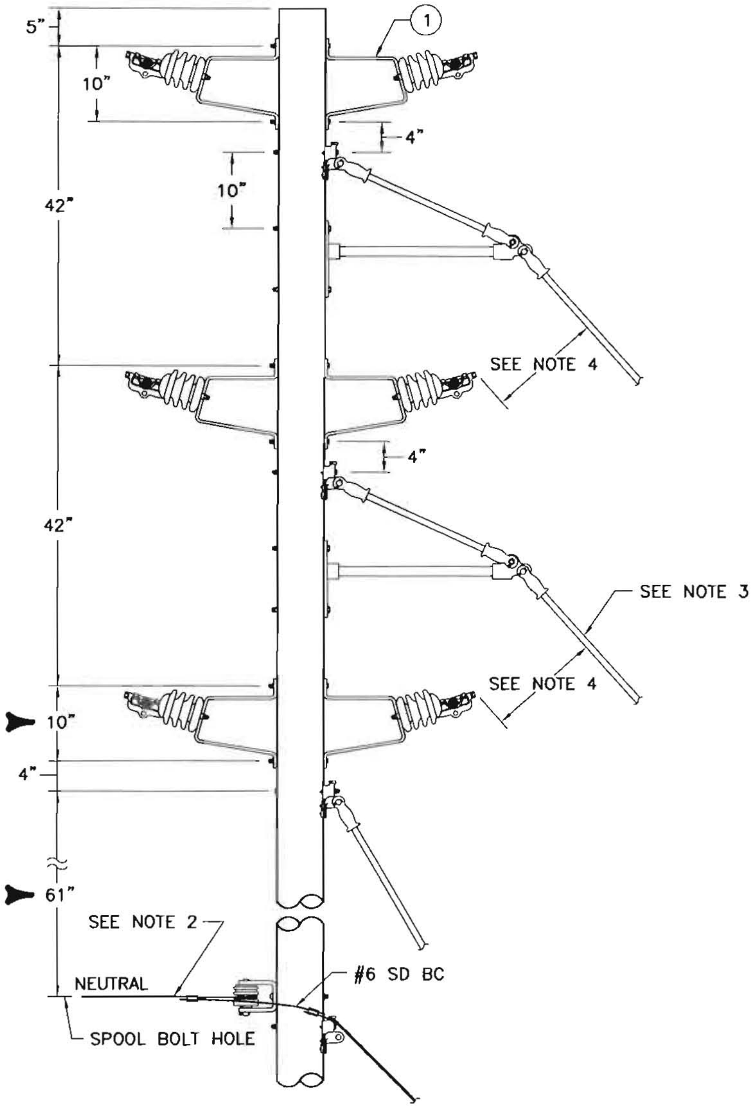
1. SEE DWG. 03.14-04 WHEN INSTALLING 795 KCMIL AAC AT 4° TO 5°.
2. TYPICAL INSTALLATION – REFER TO SECTION 04 FOR NEUTRAL/SECONDARY DETAILS.
3. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

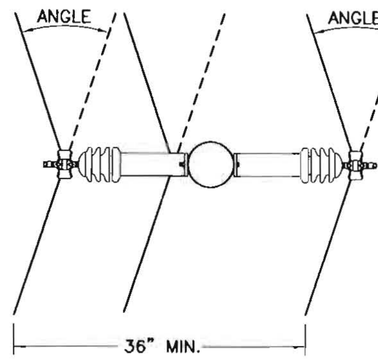
REVISED		BY	CK'D	APPR.
3	11/30/09	CUINN	CUINN	ELKINS
2	10/4/07	BURLISON	CUINN	HOYT
1	6/30/06	CECCONI	CUINN	HOYT
0	6/11/03	YOUNTS	SIMPSON	WOOLSEY

VERTICAL CONSTRUCTION DOUBLE CIRCUIT, THREE-PHASE, 0 DEGREES TO 5 DEGREES

Progress Energy

FLA DWG. 03.14-02





PLAN VIEW

BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
D31(WIRECODE) M	1	IPCS(WIRECODE)	6	080232	1	INSULATOR, POST, CLAMP, HORIZ
				072361	1	STUD, LINE, POST, 5/8" X 1-3/4"
				070424	1	BRACKET, POST, INSULATOR, MTG
				152107	2	BOLT, MACHINE, SQ, 5/8" X 12"
				013308	2	WASHER, 2-1/4" SQ., 13/16" HOLE
				013264	2	WASHER, SPRING COIL, STEEL, 5/8"
				–	1	CLAMP, LINE, POST, ANGLE (VARIES W/ CONDUCTOR SIZE)
				–	1	ROD, ARMOR (VARIES WITH CONDUCTOR SIZE), SEE NOTE 1

NOTES:

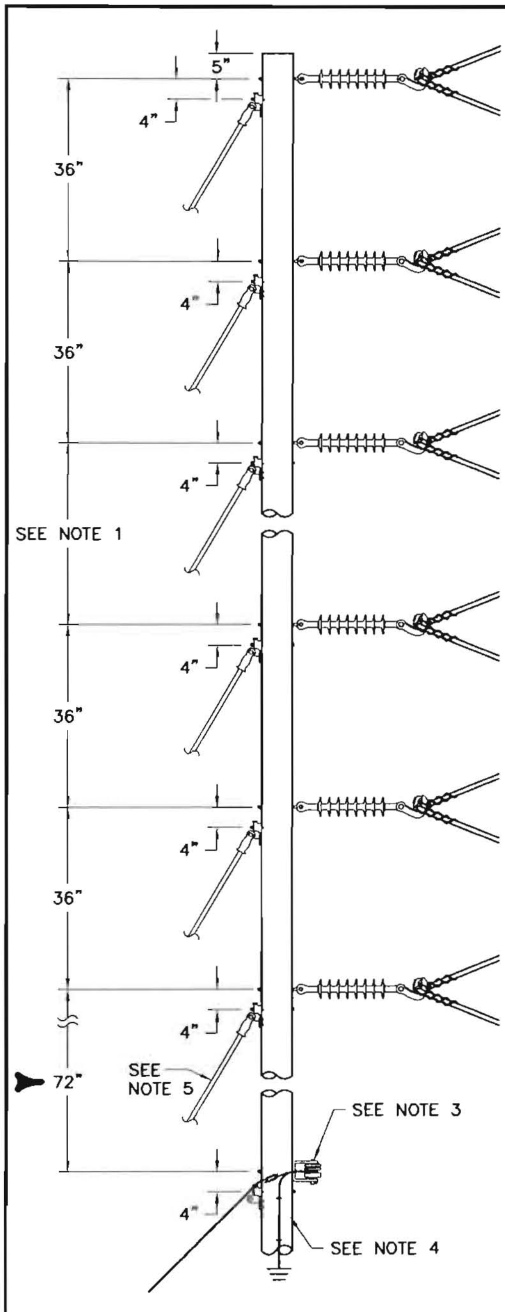
1. ARMOR ROD NOT REQUIRED WHEN USING CUSHION GRIP (795 AAC ONLY).
2. TYPICAL INSTALLATION – REFER TO SECTION 04 FOR NEUTRAL/SECONDARY DETAILS.
3. TYPICAL INSTALLATION – REFER TO SECTION 02 FOR GUYING DETAILS.
4. MINIMUM SPACING:
   12KV = 8"
   25KV = 12"

REVISED		BY	CK'D	APPR.
4	11/30/09	GUINN	GUINN	ELKINS
3	1/29/08	BURLISON	GUINN	HOYT
2	10/6/06	GUINN	GUINN	HOYT
0	6/11/03	YOUNTS	SIMPSON	WOOLSEY

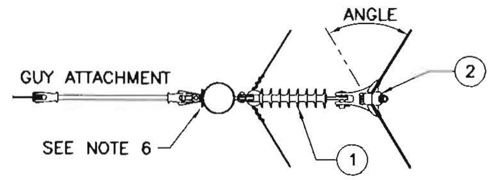
VERTICAL CONSTRUCTION DOUBLE CIRCUIT, THREE-PHASE, 6 DEGREES TO 15 DEGREES

Progress Energy

FLA DWG. 03.14-04



FRONT VIEW



PLAN VIEW

NOTES:

1. USE 6'-0" MINIMUM CIRCUIT SPACING IF SPANS 200 FT. OR LESS WITHIN A 150 FT. RULING SPAN OR 230 FT. OR LESS WITHIN A 200 FT. RULING SPAN. CONTACT DISTRIBUTION STANDARDS FOR OTHER SPANS.
2. 16-30 DEGREES FOR 795 AAC. 16-59 DEGREES FOR ALL OTHER CONDUCTORS. DOUBLE DEADEND 795 AAC FOR ANGLES GREATER THAN 30 DEGREES.
3. TYPICAL INSTALLATION- SEE SECTION 04 FOR NEUTRAL/SECONDARY DETAILS.
4. SEE SECTION 01 FOR ADDTIONAL GROUNDING DETAILS.
5. TYPICAL INSTALLATION - SEE SECTION 02 FOR GUYING DETAILS.
6. USE 2-1/4" SQUARE WASHER ON 1/0 AAAC AND SMALLER CONDUCTOR AND 3" CURVE WASHER FOR CONDUCTORS LARGER THAN 1/0 AAAC.

BILL OF MATERIALS

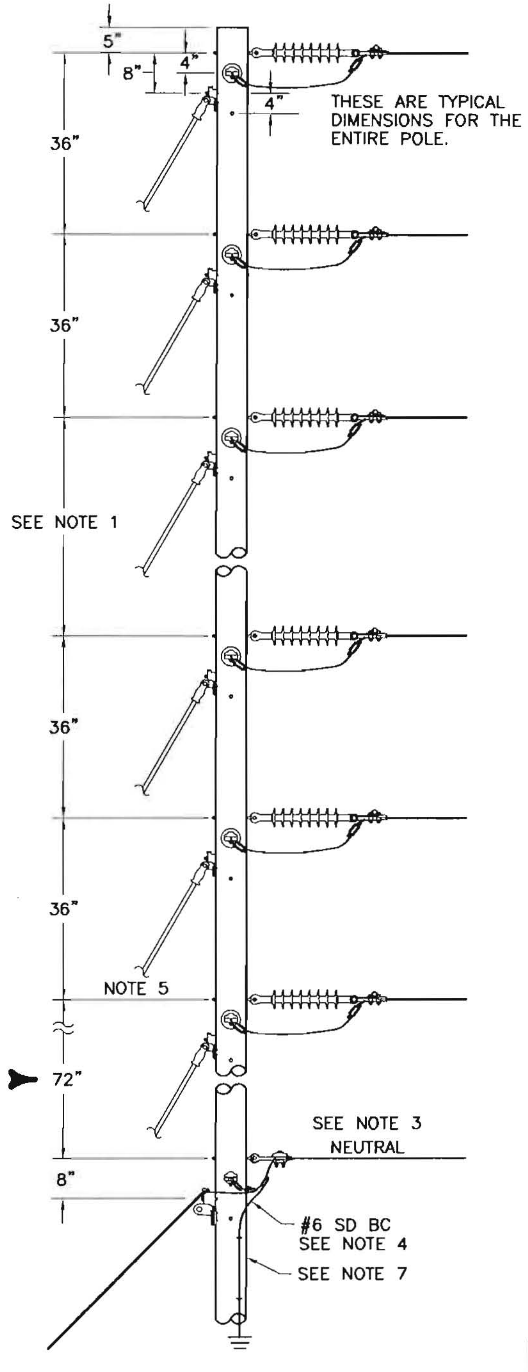
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
D32(WIRECODE)M	1	I_	6	080577	1	INSULATOR, POLYMER, 25KV, DE, SILICONE, RATED 15KV
				011708	1	BOLT, OVAL EYE, 5/8" X 10"
				–	1	WASHER (SEE NOTE 6)
	2	KW2_	6	–	1	CLAMP, SUSPENSION (VARIES WITH CONDUCTOR SIZE)
				–	1	ROD, ARMOR (VARIES WITH CONDUCTOR SIZE)
	2	KW27 (795 AAC ONLY)	6	113506	1	CLEVIS, EYE, 90 DEGREE, 3-3/16X 1-1/16"
				9220067202	1	CLAMP, SUSPENSION-CUSHION GRIP, RANGE 0.981" TO 1.0

3	11/30/09	GUINN	GUINN	ELKINS
2	11/19/07	CECCONI	SIMPSON	HOYT
1	11/29/06	GUINN	GUINN	HOYT
0	6/11/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

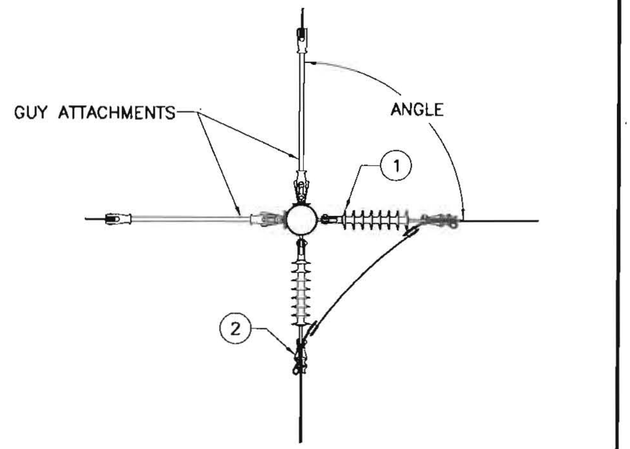
VERTICAL CONSTRUCTION DOUBLE CIRCUIT, THREE-PHASE, 16 DEGREES TO 59 DEGREES

Progress Energy

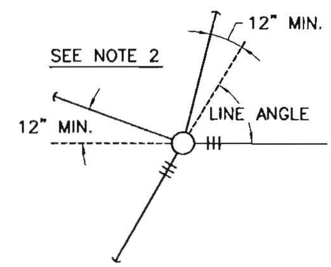
FLA DWG. 03.14-06



FRONT VIEW



PLAN VIEW



NOTES:

1. USE 6'–0" MINIMUM CIRCUIT SPACING IF SPANS 200 FT. OR LESS WITHIN A 150 FT. RULING SPAN OR 230 FT. OR LESS WITHIN A 200 FT. RULING SPAN. CONTACT DISTRIBUTION STANDARDS FOR OTHER SPANS.
2. IF USED FOR LINE ANGLES LESS THAN 60°, OFFSET EACH ANCHOR 12". (SEE ABOVE) OR ADD A BISECTIONAL GUY. CONSIDER BISECTIONAL GUYS WHERE ANGLE PERMITS.
3. TYPICAL INSTALLATION – SEE SECTION 04 FOR NEUTRAL/ SECONDARY DETAILS.
4. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.
5. TYPICAL INSTALLATION – SEE SECTION 02 FOR GUYING DETAILS.
6. USE 2–1/4" SQUARE WASHER ON 1/0 AAAC AND SMALLER CONDUCTOR AND 3" CURVE WASHER FOR CONDUCTORS LARGER THAN 1/0 AAAC.
7. THE CHARTS BELOW SHOW THE MINIMUM CLASS POLES REQUIRED FOR GRADES B AND C CONSTRUCTION WITH LEAD TO HEIGHT RATIOS 1/1 AND 2/3 BASED ON A 200 FOOT RULING SPAN.

L/H	GRADE B		
1/1	50C2	55C1	60H1
2/3	50C1	55H1	60H2

L/H	GRADE C		
1/1	50C3	55C2	60C1
2/3	50C2	55C1	60H1

BILL OF MATERIALS

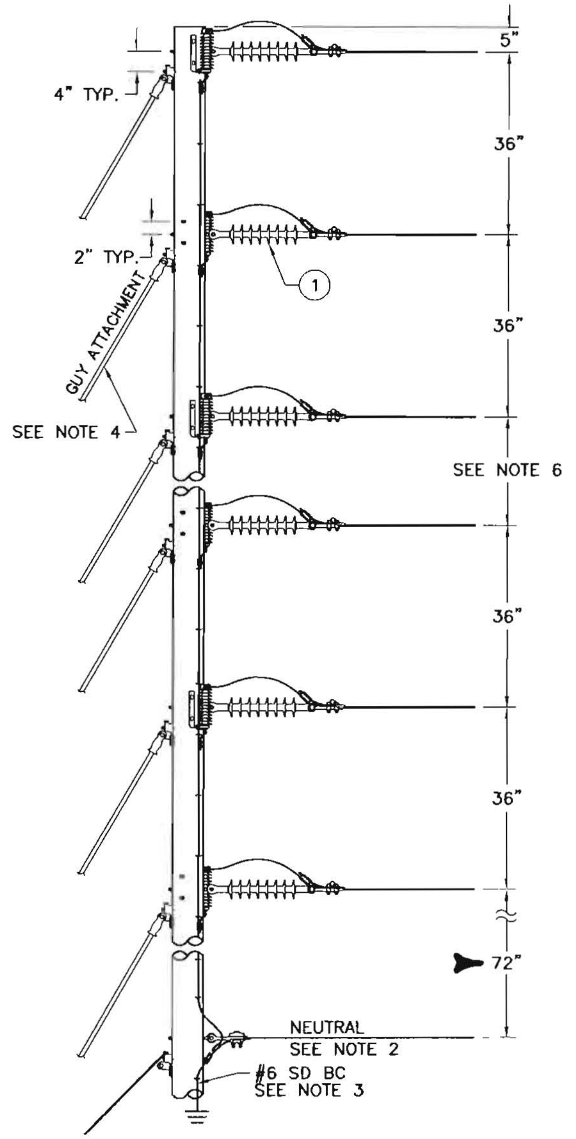
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
D33(WIRECODE) M	1	I_	12	080577	1	INSULATOR, POLYMER, 25KV, DEADEND, SILICONE
				011708	1	BOLT, OVAL EYE, 5/8" X 10"
				–	1	WASHER (SEE NOTE 6)
	2	KW4_	12	–	1	CLAMP (VARIES WITH CONDUCTOR SIZE) (SEE NOTE 7)

REVISED		BY	CK'D	APPR.
4	11/30/09	GUINN	GUINN	ELKINS
3	2/12/09	CECCONI	GUINN	HOYT
2	11/19/07	CECCONI	SIMPSON	HOYT
0	6/11/03	YOUNTS	SIMPSON	WOOLSEY

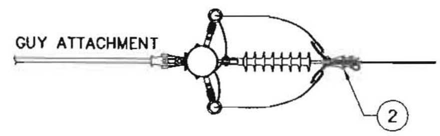
VERTICAL CONSTRUCTION DOUBLE CIRCUIT, THREE–PHASE, 60 DEGREES TO 90 DEGREES

Progress Energy

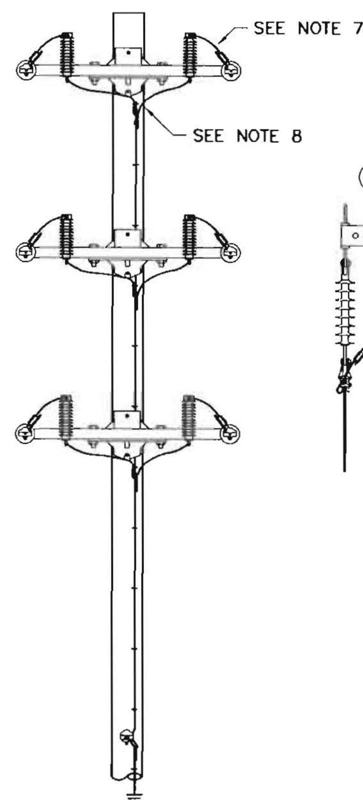
FLA DWG. 03.14–08



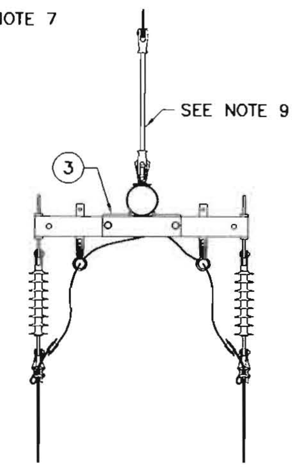
FRONT VIEW



PLAN VIEW



FRONT VIEW



PLAN VIEW

ALTERNATE THREE-PHASE DEADEND CONSTRUCTION

BILL OF MATERIALS

MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	CU PER MACRO	CATALOG NUMBER	QTY PER CU	DESCRIPTION
D33(WIRECODE) M	1	I_	12	080577	1	INSULATOR, POLYMER, 25KV, DEADEND, SILICONE
				011708	1	BOLT, OVAL EYE, 5/8" X 10"
				–	1	WASHER (SEE NOTE 5)
	2	KW4_	12	–	1	CLAMP, DEADEND (VARIES WITH WIRE SIZE)
	3	XS	1	070164	1	BRACKET, GALV., STEEL XARM 40"
				013308	2	BOLT, MACHINE, SQUARE, NUT, 3/4" X 12"
				152122	2	WASHER, 2-1/4", SQ., FLAT, 13/16" HOLE, GALV.

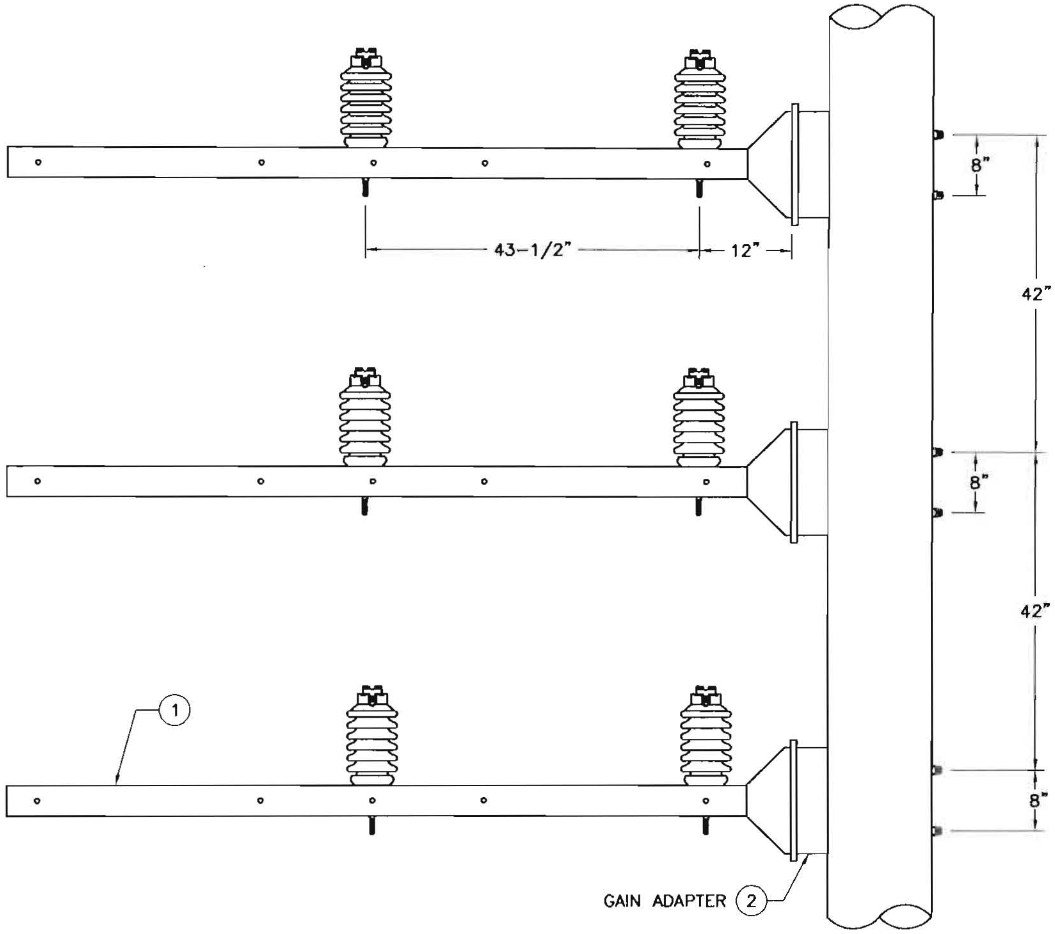
NOTES:
1. ARRESTERS ISSUED SEPARATELY. SEE SECTION 08 FOR DETAILS.
2. TYPICAL INSTALLATION: SEE SECTION 04 FOR NEUTRAL/SECONDARY DETAILS.
3. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.
4. TYPICAL INSTALLATION: SEE SECTION 02 FOR GUYING DETAILS.
5. USE 2-1/4" SQUARE WASHER ON 1/0 AAAC AND SMALLER CONDUCTOR AND 3" CURVE WASHER FOR CONDUCTORS LARGER THAN 1/0 AAAC.
6. USE 6'-0" MINIMUM CIRCUIT SPACING IF SPANS 200 FT. OR LESS WITHIN A 150 FT. RULING SPAN OR 230 FT. OR LESS WITHIN A 200 FT. RULING SPAN. CONTACT DISTRIBUTION STANDARDS OR OTHER SPANS.
7. ALL CONDUCTORS MUST BE THE SAME SIZE.
8. ATTACH ARE TO POLE WITH TWO 3/4" MACHINE BOLTS.
9 WHEN TWO GUYS PER PHASE ARE REQUIRED, ATTACH THE FIRST GUY TO THE ARM AND THE SECOND GUY TO THE POLE. A) MAXIMUM LOAD PER PHASE = 5,100 LBS. B) TOTAL MAXIMUM LOAD PER ARM = 10,200 LBS.

3	11/30/09	GUINN	GUINN	ELKINS
2	12/7/07	CECCONI	GUINN	HOYT
1	11/29/06	GUINN	GUINN	HOYT
0	7/4/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

VERTICAL CONSTRUCTION DOUBLE CIRCUIT, DEADEND

Progress Energy

FLA DWG. 03.14-10



BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
–	1	–	–	9220179761	–	CROSSARM, STEEL, ALLEY, 4" X 4" X 8'-6 3/4" W/11/16"
	2	–	–	9220179760	–	CROSSARM, STEEL, GAIN, MNT DIXIE ALLEY ARM TO RD POLE

NOTES:

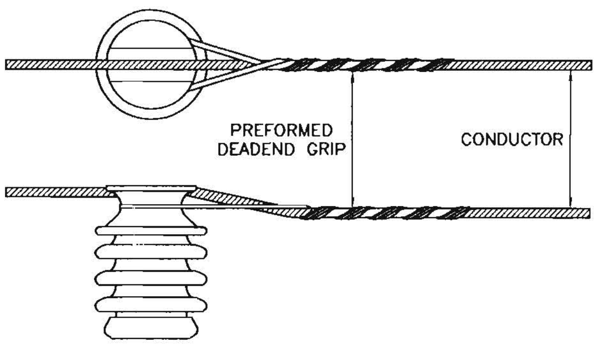
1. USE 35KV CLAMP TOP INSULATORS WITH CUSHION GRIPS ONLY.
2. CUT STUD BOLTS TO PROPER LENGTH IF NECESSARY.
3. INSULATORS MAY BE MOVED ALONG THE ARM AS NEEDED AS LONG AS A MINIMUM OF 43" SEPARATION IS MAINTAINED.
4. USE 3/4" BOLTS TO FASTEN ARM TO POLE.
5. USE GAIN ADAPTER ON ROUND POLES.
6. THIS IS A NON-STOCK ITEM. REQUIRES SPECIAL ORDER. CHECK WITH PURCHASING FOR LEAD TIME.

REVISED		BY	CK'D	APPR.
3				
2				
1				
0	1/22/10	BURLISON	CUINN	ELKINS

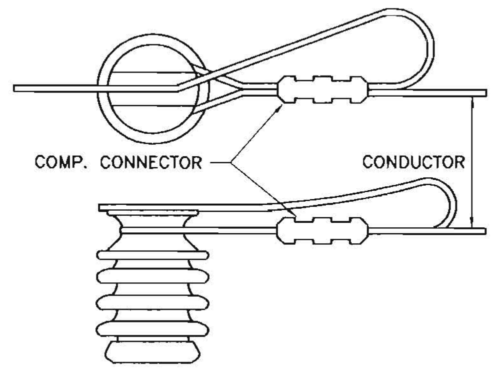
DOUBLE CIRCUIT STEEL ARM

Progress Energy

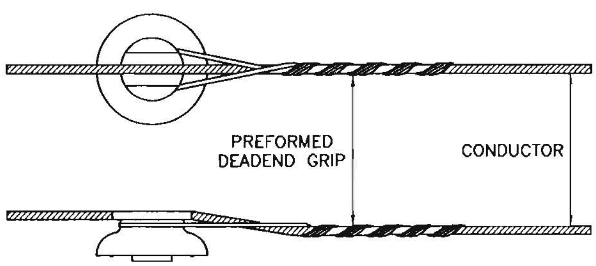
FLA DWG. 03.14-22



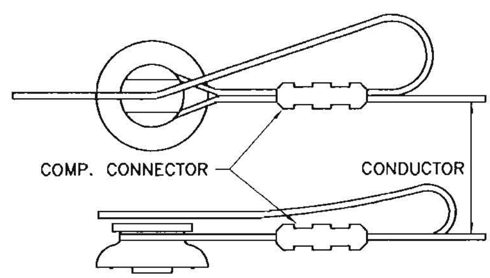
4–1/0 AL. DEADEND ON
POST INSULATOR



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

NOTES:

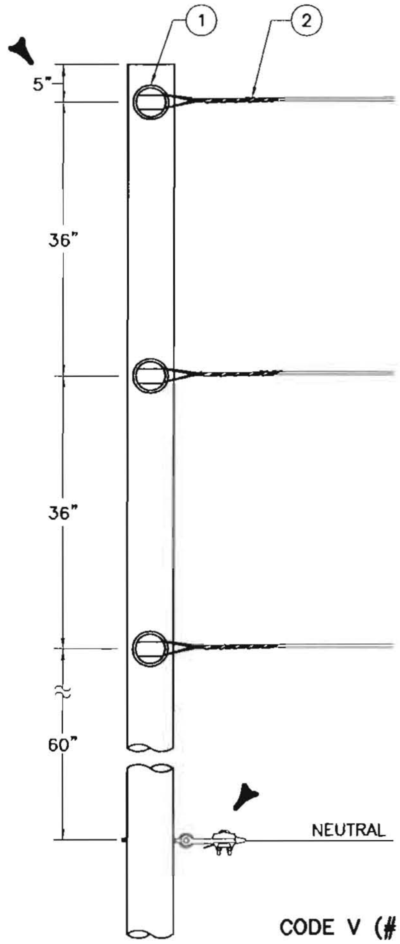
1. A SLACK SPAN MAY BE ATTACHED TO THE POLE UTILIZING A DEAD–END POLYMER INSULATOR PROVIDED THE CONSTRUCTION IS CONFIGURED AS IF IT WERE GUYED AND MEETS ALL REQUIRED CLEARANCES AND SPACING.

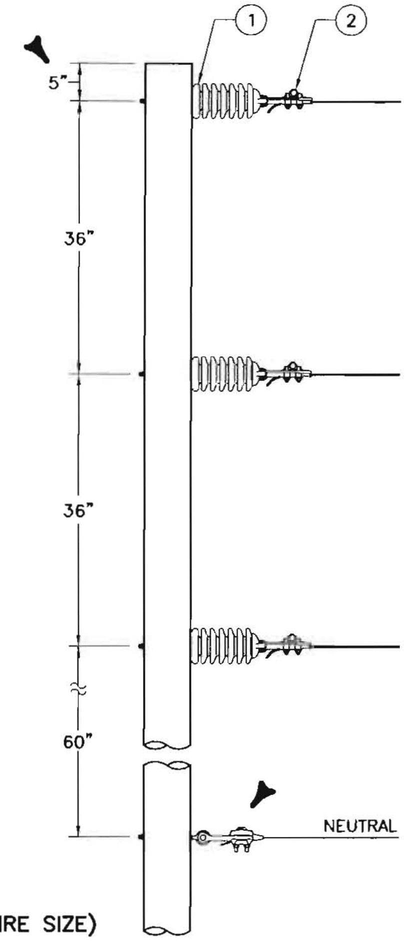
REVISED		BY	CK'D	APPR.
3				
2	6/17/08	BURLISON	GUINN	HOYT
1	4/8/04	NUNNERY	NUNNERY	WOOLSEY
0	1/28/04	NUNNERY	NUNNERY	WOOLSEY

SLACK SPAN,
DETAILS FOR ATTACHMENT TO INSULATOR

Progress Energy

PGN DWG. 03.16–00





MACROS

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

FOR #2 AND #1/0 CONDUCTORS

FOR #4/0 THROUGH 795

FLORIDA BILL OF MATERIALS – #2 AND #1/0						
ITEM NO.	COMP. UNIT	CATALOG NUMBER	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.	COMP. UNIT	CATALOG NUMBER	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:

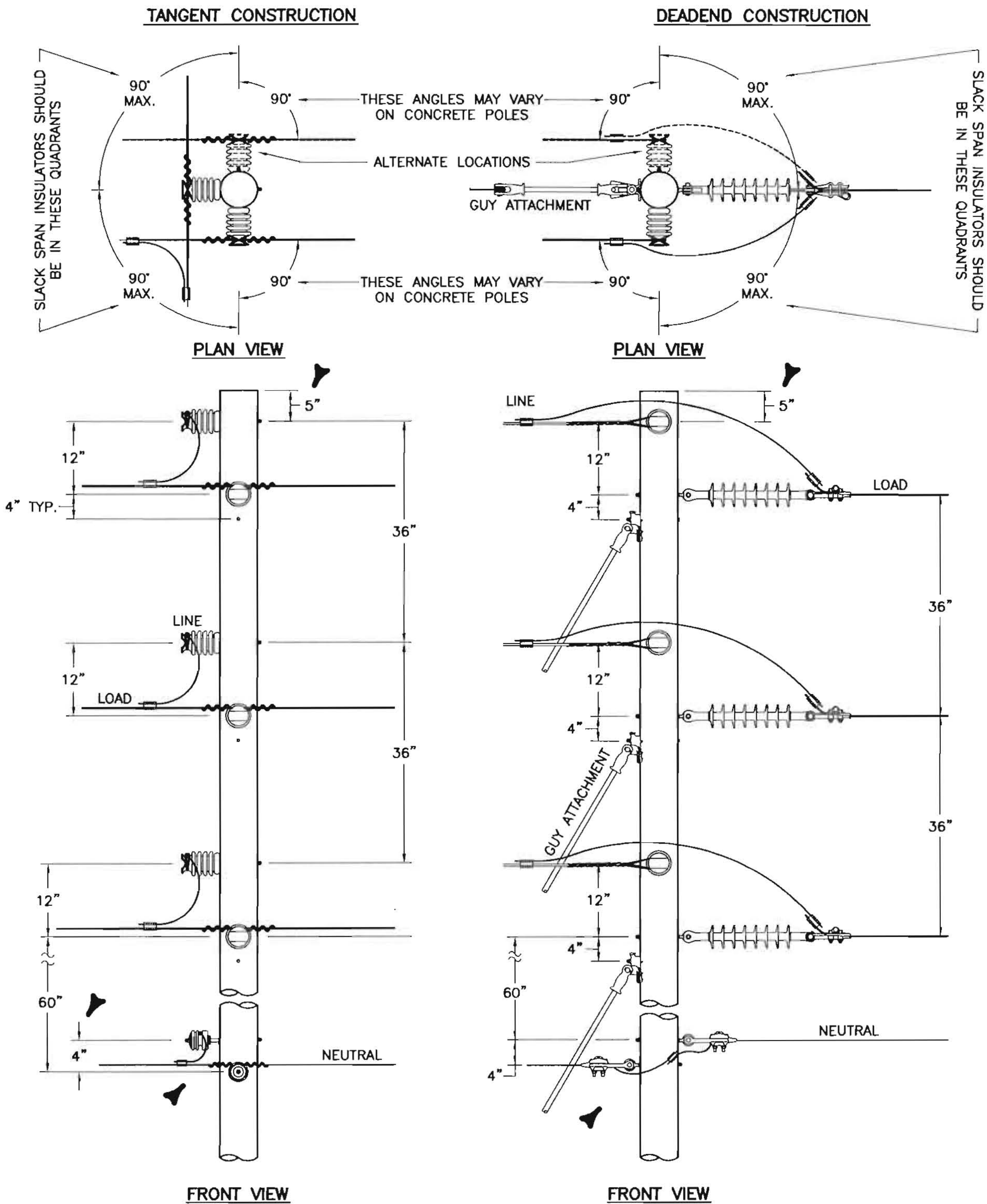
1. SEE DWG 03.06–04 FOR POST TYPE INSULATORS.
2. SEE DWG. 03.06–08 FOR PIN TYPE INSULATORS.

REVISED		BY	CK'D	APPR.
4	12/31/07	CECCONI	GUINN	HOYT
3	7/31/06	GUINN	GUINN	HOYT
2	8/26/05	ROBESON	GUINN	HOYT
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).

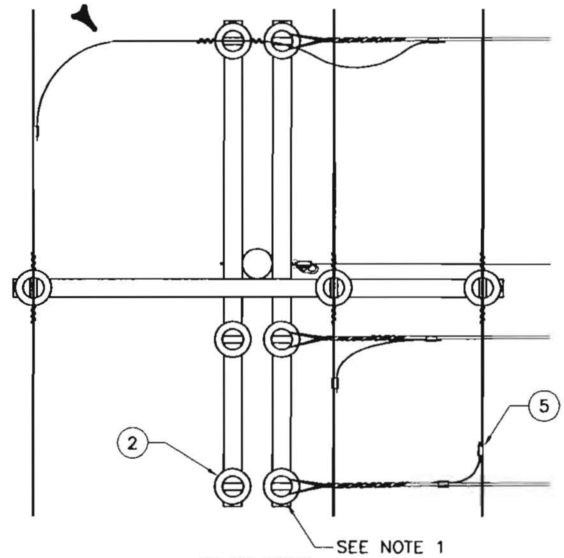
REVISED		BY	CK'D	APPR.
4	12/31/07	CECCONI	GUINN	HOYT
3	9/20/06	GUINN	GUINN	HOYT
2	6/30/04	NUNNERY	NUNNERY	WOOLSEY
0	7/7/03	YOUNTS	SIMPSON	WOOLSEY

VERTICAL SLACK SPAN
WITH VERTICAL CONSTRUCTION

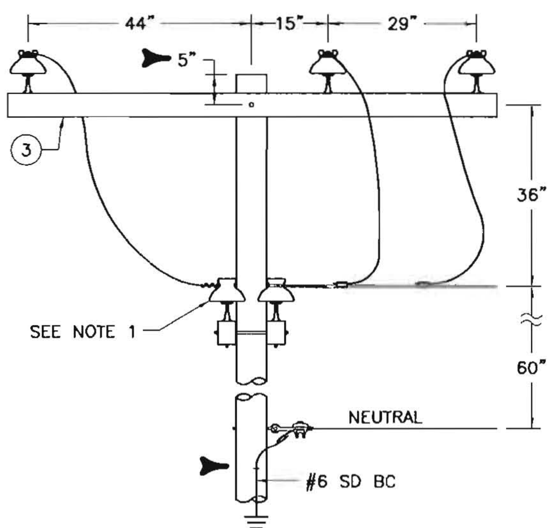
Progress Energy

FLA DWG. 03.16–04

DEADEND CONSTRUCTION

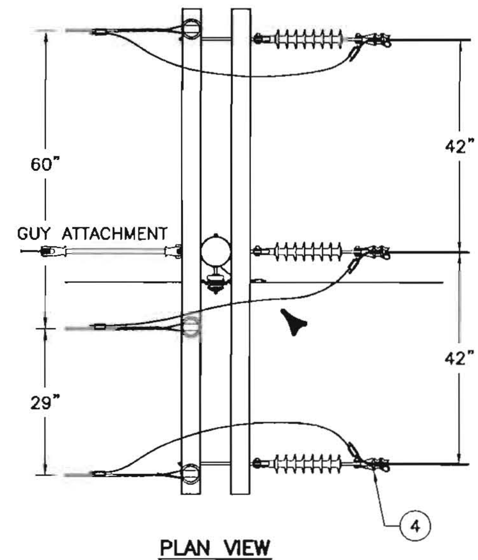


PLAN VIEW

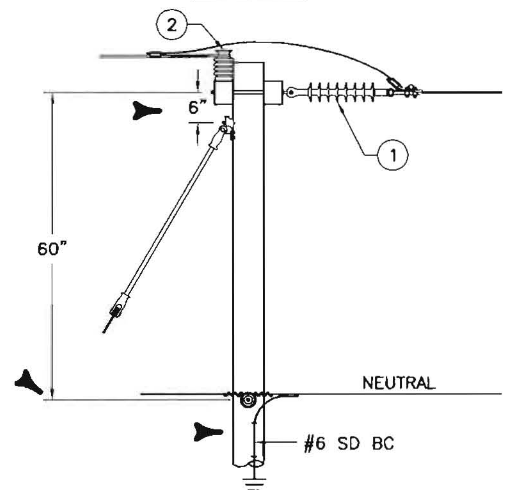


FRONT VIEW

TANGENT CONSTRUCTION



PLAN VIEW



FRONT VIEW

*PIN INSULATORS USED ON 1/0 AL. CONDUCTORS

HORIZONTAL SLACK SPAN WITH HORIZONTAL CONSTRUCTION

FLORIDA BILL OF MATERIALS				
ITEM NO.	COMP. UNIT	CATALOG NUMBER	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:

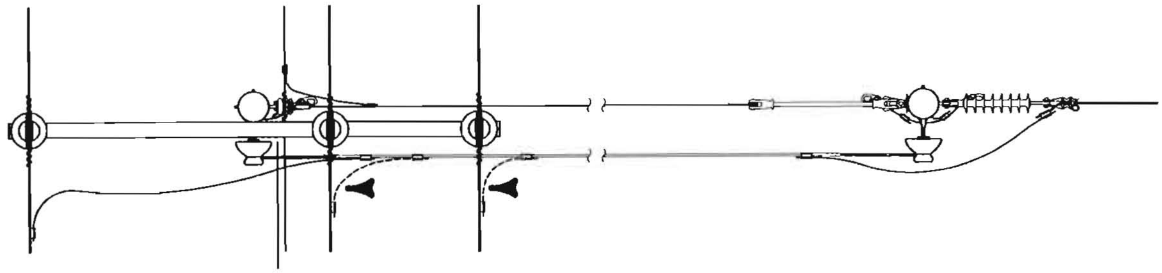
1. IF CONDUCTOR IS 1/0 AL OR SMALLER, THE PIN INSULATOR SHOULD BE IN THIS LOCATION AND ONLY ONE CROSSARM IS NECESSARY.
2. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

3				
2	12/21/07	GUINN	GUINN	HOYT
1	9/20/06	GUINN	GUINN	HOYT
0	7/7/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

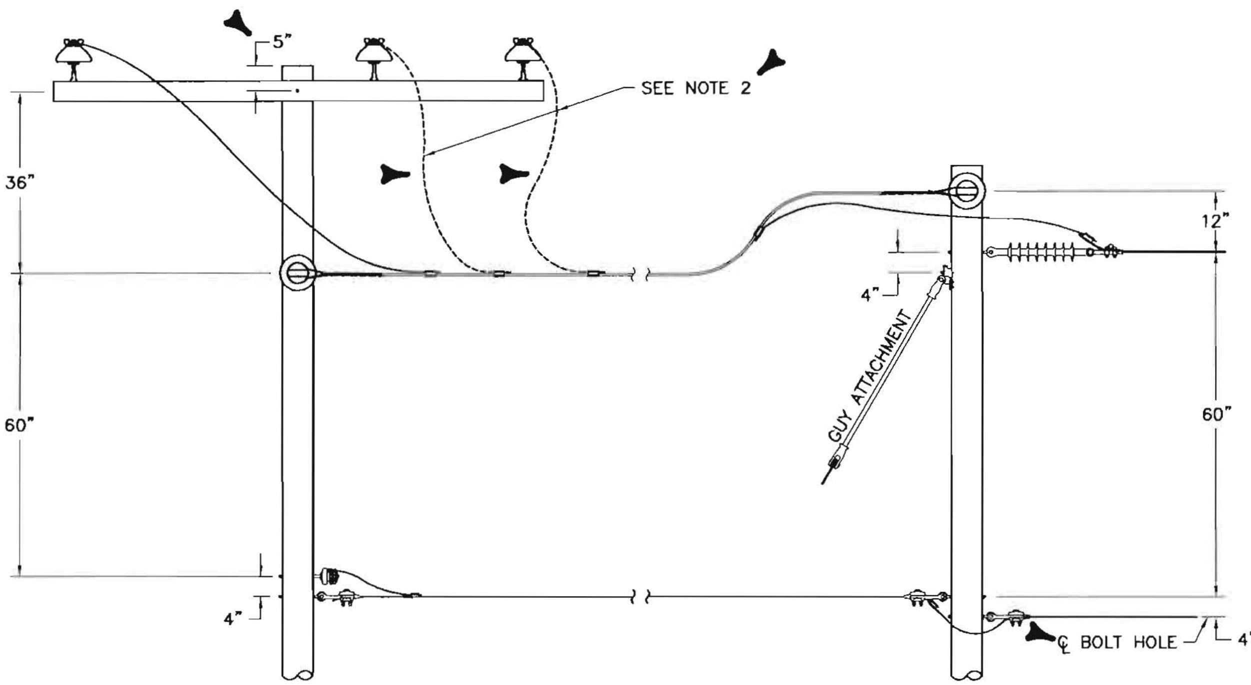
SLACK SPAN

Progress Energy

FLA DWG. 03.16–30A



PLAN VIEW



FRONT VIEW

1Ø SLACK SPAN TAP FROM 3Ø HORIZONTAL LINE

NOTES:

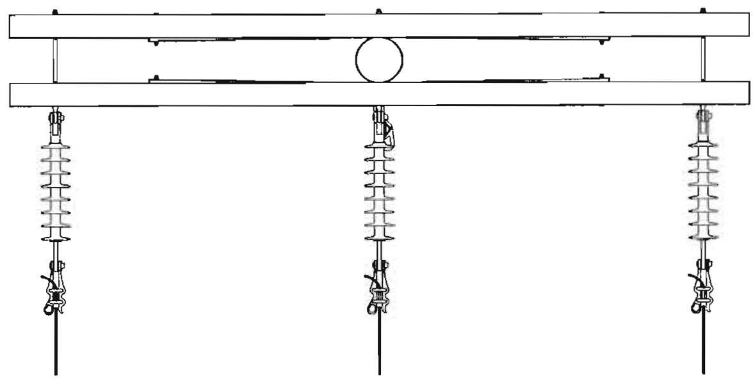
1. IF CONDUCTOR IS 1/0 AL OR SMALLER, THE PIN INSULATOR SHOULD BE IN THIS LOCATION AND ONLY ONE CROSSARM IS NECESSARY.
2. SLACK SPAN TAP CAN BE CONNECTED TO ANY PHASE AS DESIGNATED BY THE ENGINEER.

3	5/5/09	DANNA	GUINN	ELKINS
2	12/31/07	CECCONI	GUINN	HOYT
1	9/20/06	GUINN	GUINN	HOYT
0	7/28/03	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

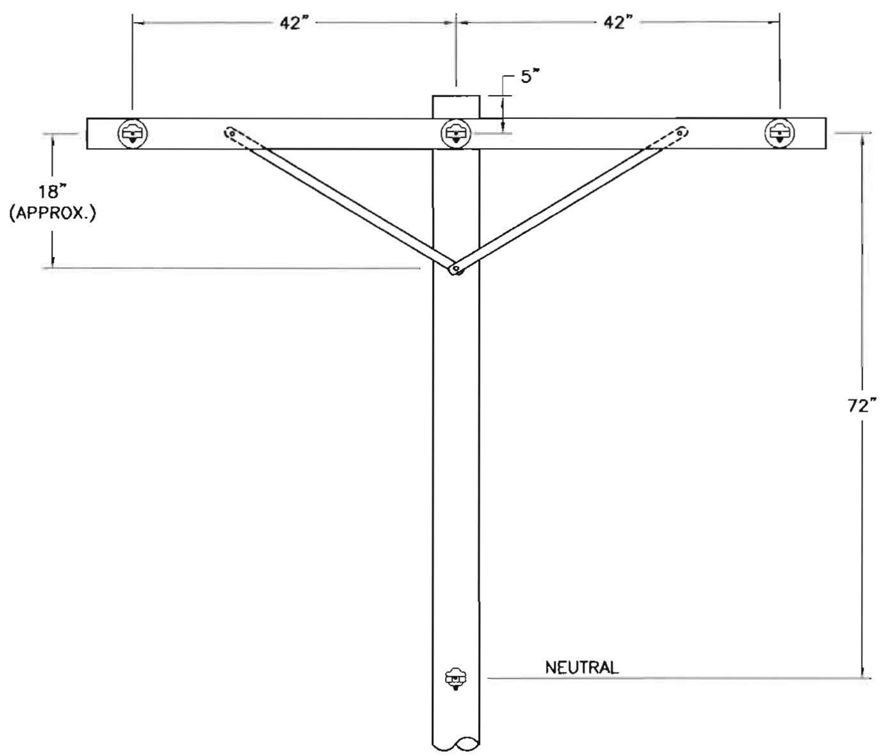
SLACK SPAN

Progress Energy

FLA DWG. 03.16-30B



PLAN VIEW



FRONT VIEW

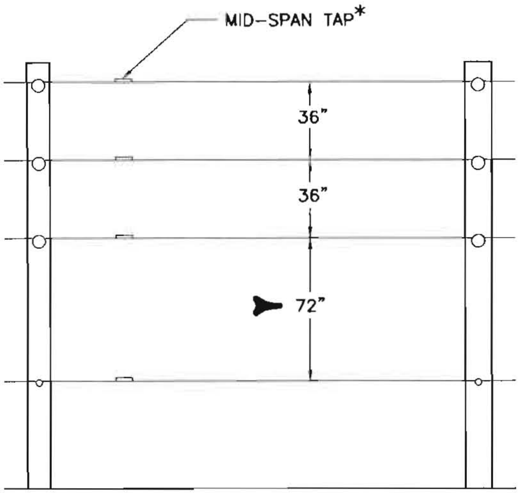
3				
2				
1				
0	12/8/09	CROWDER	GUINN	ELKINS
REVISED		BY	CK'D	APPR.

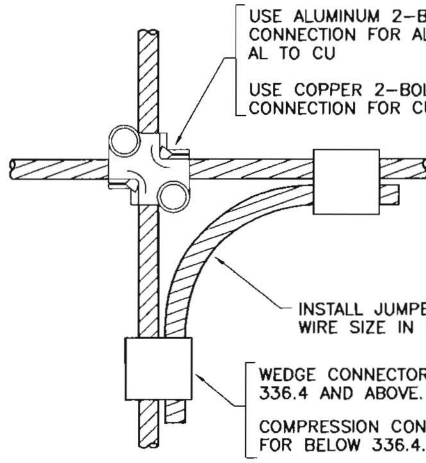
HORIZONTAL CONSTRUCTION –
SLACK SPAN
CODE H (# OF PHASES) 5 (WIRE SIZE)

Progress Energy

FLA DWG. 03.16–32

MIDSPAN TAP CONNECTION





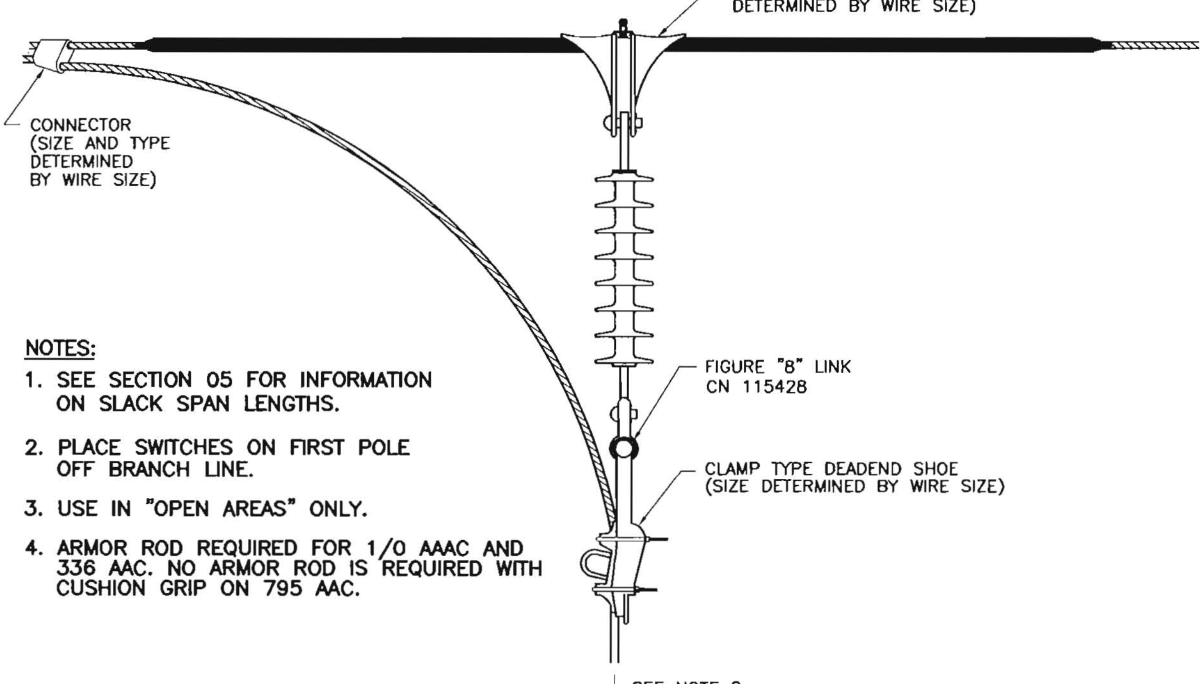
NOTES:

*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	11/30/09	GUINN	GUINN	ELKINS
1	10/6/06	BURLISON	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

AVIAN PROTECTION

PROGRESS ENERGY CONSTRUCTS AND OPERATES DISTRIBUTION FACILITIES TO SERVE CUSTOMERS. SOME OF THESE FACILITIES ARE CONSTRUCTED ALONG RIVERS, LAKES, AND COASTLINES THAT ARE NATURAL HABITATS FOR EAGLES, OSPREYS, AND OTHER RAPTORS. AQUACULTURE FARMS ARE BEING DEVELOPED IN MANY RURAL AREAS, WHICH MAY ATTRACT LARGE BIRDS OF PREY. IN ADDITION, RAPTORS SOMETIMES UTILIZE DISTRIBUTION POLES AND EQUIPMENT FOR NESTING AND AS A PERCH WHEN HUNTING. THE WING SPAN OF THESE LARGE RAPTORS CAN CONTACT ENERGIZED CONDUCTORS AND EQUIPMENT WHEN LANDING OR LEAVING THE PERCH, RESULTING IN POTENTIAL OUTAGES AND ELECTROCUTION OF THE BIRD. ALSO, RAPTOR NESTS CONSTRUCTED ON DISTRIBUTION FACILITIES CAN HAVE SIMILAR RESULTS.

SPECIFICATIONS CONTAINED IN THIS SECTION HAVE BEEN DEVELOPED FOR CONSTRUCTING AND MAINTAINING DISTRIBUTION FACILITIES IN AREAS OF KNOWN POPULATIONS OF LARGE RAPTORS WITH THE OBJECTIVE OF MINIMIZING OUTAGES AND RAPTOR ELECTROCUTIONS. SOME OF THE MORE COMMON CONSTRUCTION TYPES HAVE BEEN ADDRESSED. CONTACT THE DISTRIBUTION STANDARDS UNIT FOR UNIQUE SITUATIONS. AVIAN CONSTRUCTION IS TO BE USED ONLY IN AREAS DESIGNATED BY ENVIRONMENTAL UNIT AS RAPTOR HAVENS, ON LINES BUILT IN CLOSE VICINITY TO FISH FARMS, OR ON LINES WHERE RAPTOR FATALITIES HAVE OCCURRED UNDER THE DIRECTION OF LOCAL ENVIRONMENTAL UNIT REPRESENTATIVE.

TOTAL CONSTRUCTION COSTS WOULD BE APPLIED AGAINST REVENUE CREDIT TO SERVE A NEW CUSTOMER TO DETERMINE ANY CUSTOMER COST.

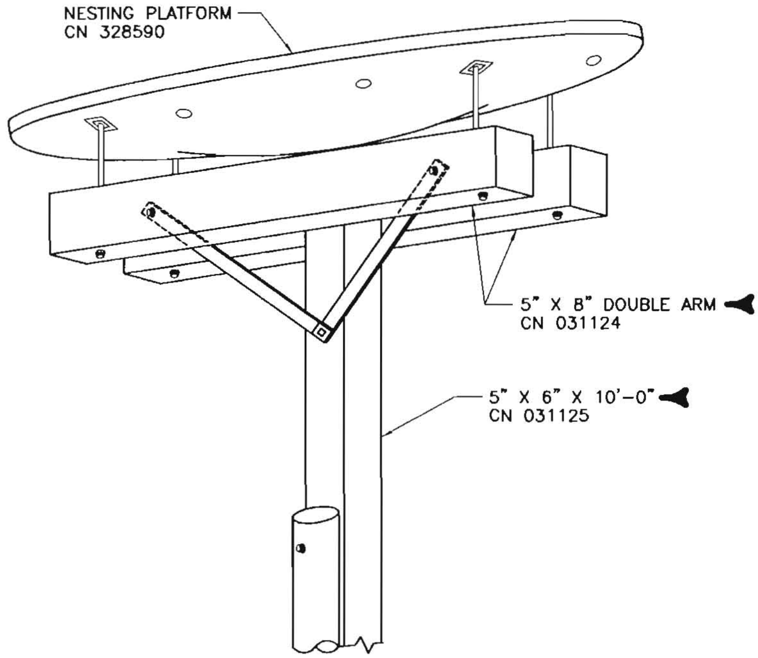
3				
2				
1				
0	11/30/09	SIMPSON	GUINN	ELKINS
REVISED		BY	CK'D	APPR.

AVIAN PROTECTION – OVERVIEW

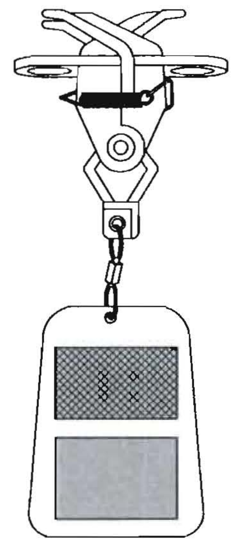
Progress Energy

PGN DWG. 03.26–01

NESTING PLATFORM



FIREFLY CONDUCTOR FLAPPER



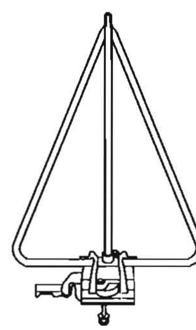
1/0 – 795
CN 9220128460

100' SPACING – TOP CONDUCTOR ONLY

POLE TOP CAP BIRD PERCH DETERRENT

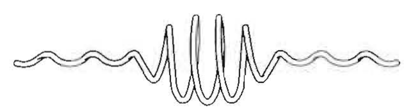
LARGE CAP:
CN 9220119162
SMALL CAP:
CN 9220197645

TRIANGLE BIRD PERCH DETERRENT



LIGHT CROSSARMS:
CN 9220197392
HEAVY CROSSARMS:
CN 9220197398

CONDUCTOR PRE-FORM DIVERTERS

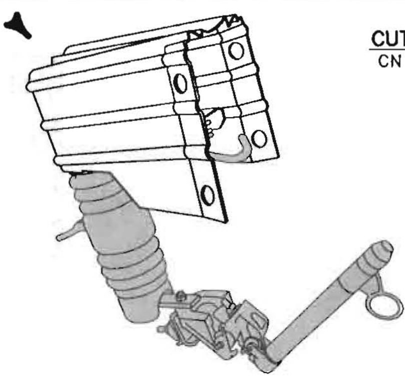


CONDUCTOR SIZE	CATALOG NUMBER
1/0	442011
4/0	442012
336	9220110988
795	9220197883

100' SPACING – TOP CONDUCTOR ONLY

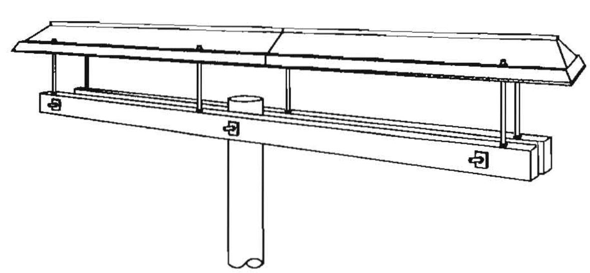
CUTOUT COVER

CN 9220197382



CROSSARM COVER

CN 9220203074



NOTES:

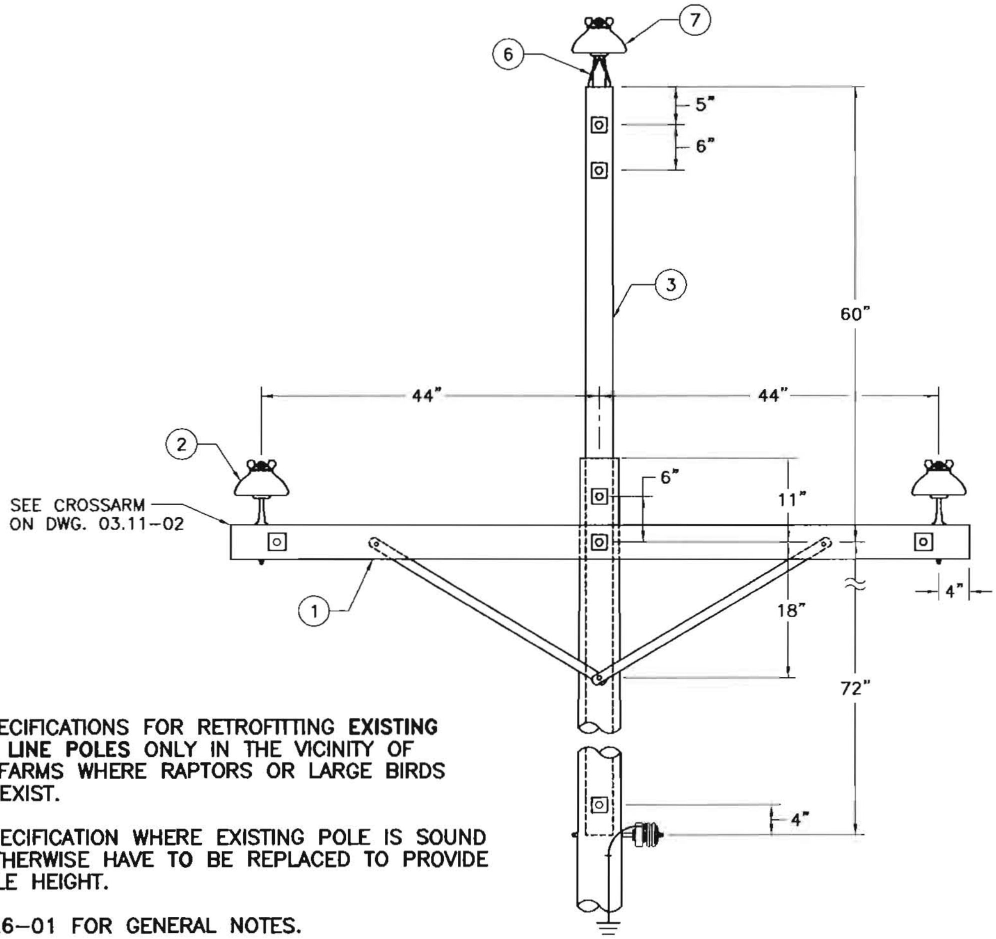
1. COORDINATE RAPTOR NEST RELOCATIONS WITH LOCAL ENVIRONMENTAL SPECIALIST.
2. SEE DWG. 03.26–01 FOR GENERAL NOTES.

REVISED		BY	CK'D	APPR.
3				
2				
1	2/15/10	SIMPSON	SIMPSON	ELKINS
0	9/15/09	GUINN	GUINN	ELKINS

AVIAN PROTECTION
DETERRENT ITEMS FOR DISTRIBUTION

Progress Energy

FLA DWG. 03.26–02



FRONT VIEW

NOTES:

1. USE THESE SPECIFICATIONS FOR RETROFITTING **EXISTING 12KV TANGENT LINE POLES** ONLY IN THE VICINITY OF AQUACULTURE FARMS WHERE RAPTORS OR LARGE BIRDS OF PREY MAY EXIST.

2. APPLY THIS SPECIFICATION WHERE EXISTING POLE IS SOUND AND WOULD OTHERWISE HAVE TO BE REPLACED TO PROVIDE ADDITIONAL POLE HEIGHT.

3. SEE DWG. 03.26-01 FOR GENERAL NOTES.

BILL OF MATERIALS

MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
H20(WIRE SIZE) M	1	X1L8	1	031113	1	CROSSARM, WOOD, 8'-0"
				071306	2	BRACE, FLAT, GALV. STEEL, 36"
				152107	1	BOLT, MACHINE, 5/8" X 12"
				011209	2	BOLT, CRG, 3/8" X 4-1/2"
				013308	2	WASHER, 5/8" SQUARE, FLAT, 13/16"ø HOLE
				014114	1	SCREW, LAG, 1/2" X 4"
	2	IX(WIRE SIZE)	2	072306	1	PIN, SHDR, 6" X 5/8" X 6-1/2"
				080304	1	INSULATOR, PIN, 23KV, 55-5 PIN TYPE
				–	1	TIE, TOP, F-NECK, 1/0 AL
				152108	1	BOLT, MACHINE, SQ, NUT, 5/8" X 16"
	3	X1H1B1	1	031125	1	CROSSARM, WOOD, 4-3/4" X 5-3/4" X 10'
				013229	2	WASHER, ROUND, FLAT, 1/2" BOLT
				011311	1	BOLT, DOUBLE ARMING W/4 NUTS, 5/8" X 16"
				010439	1	BOLT, MACHINE, WITH SQUARE NUT, 5/8" X 14"
				071206	1	BRACE, BOW, ANGLE STEEL, 60"
				013308	3	WASHER, 2-1/4" SQ., FLAT, 13/16" HOLE
				152098	2	BOLT, MACHINE, SQ, NUT, 1/2" X 7"
				152107	1	BOLT, MACHINE, SQ, NUT, 5/8" X 12"
				152110	1	BOLT, MACHINE, SQ, NUT, 5/8" X 20"
	4	–	–	152107	4	BOLT, MACHINE, SQ, NUT, 5/8" X 12"
	5	–	–	013308	8	WASHER, 2-1/4" SQ, FLAT, 13/16" HOLE
	6	–	–	072152	1	PIN, POLE TOP, 20"
	7	–	–	080304	1	INSULATOR, PIN, 23KV, 55-5 PIN TYPE

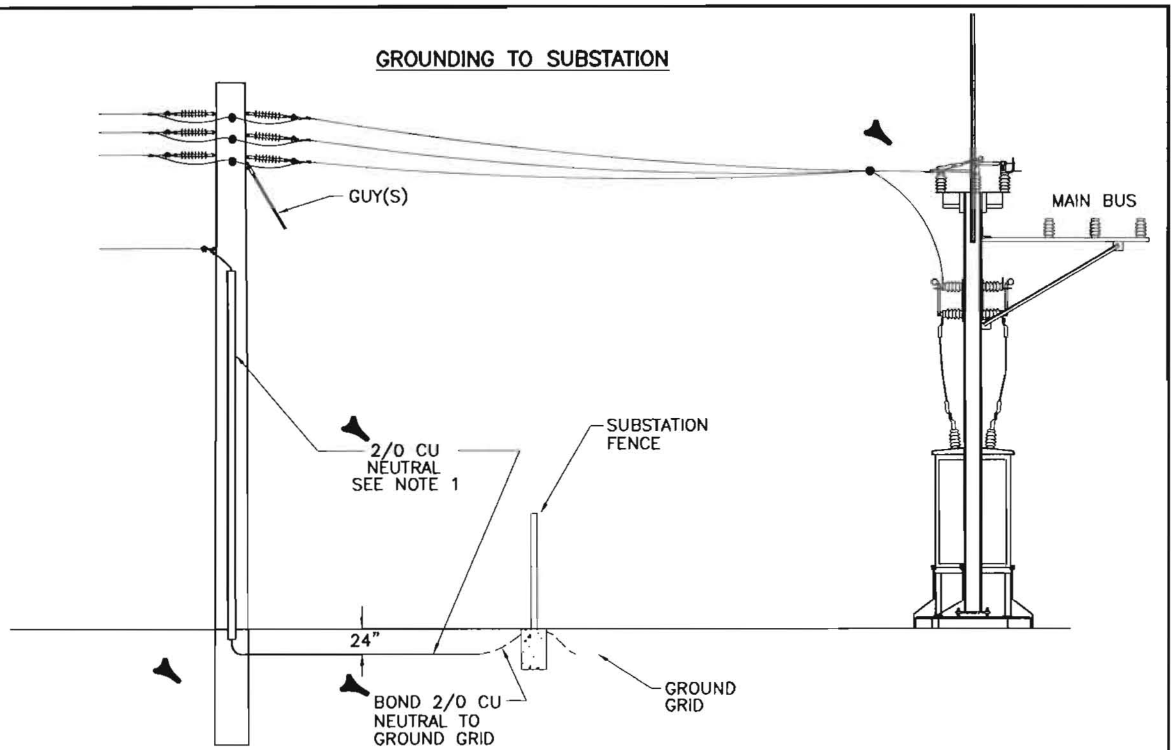
REVISED		BY	CK'D	APPR.
3				
2				
1				
0	9/8/09	GUINN	GUINN	ELKINS

AVIAN PROTECTION
TANGENT LINE
(EXISTING POLE WITH CROSSARMS)

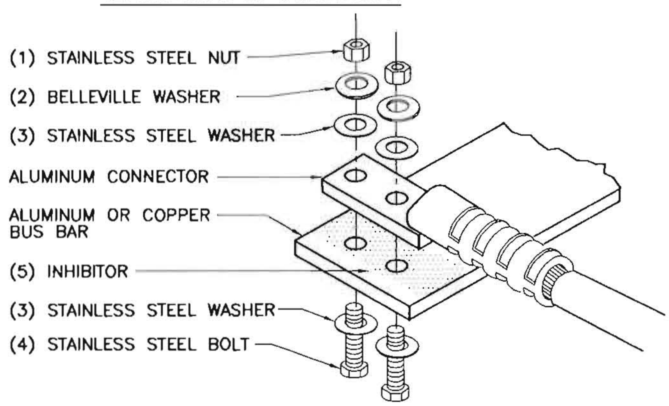
Progress Energy

FLA DWG. 03.26-03

GROUNDING TO SUBSTATION



TERMINATION IN SUBSTATION



SWITCH CONNECTION DETAIL TORQUE TO 40 FT. LBS.

ITEM	DESCRIPTION	
	FOR AL TO AL OR AL TO CU PADS	FOR CU TO CU PADS
1	STAINLESS STEEL NUT	SILICONE BRONZE NUT
2	BELLEVILLE WASHER	SILICONE BRONZE LOCK WASHER
3	STAINLESS STEEL WASHER	SILICONE BRONZE WASHER
4	STAINLESS STEEL BOLT	SILICONE BRONZE BOLT
5	INHIBITOR	INHIBITOR

NOTES:

1. BURY 2/0 CU NEUTRAL FROM STATION GROUND GRID TO BASE OF FIRST FEEDER POLE ON EACH OVERHEAD FEEDER. CONTINUE 2/0 CU UP POLE TO OVERHEAD NEUTRAL CONNECTION. THEN INSTALL 1" U-GUARD OVER 2/0 CU NEUTRAL.
2. DISTRIBUTION PERSONNEL WILL INSTALL CONDUCTORS AND MAKE CONNECTIONS TO L.D. & B.P. SWITCHES.

REVISED		BY	CK'D	APPR.
3				
2	1/23/08	GUINN	GUINN	HOYT
1	12/28/07	GUINN	GUINN	HOYT
0	7/7/03	YOUNTS	SIMPSON	WOOLSEY

OVERHEAD FEEDER TERMINATION IN SUBSTATION WITH METAL BUS STRUCTURE

Progress Energy

FLA DWG. 03.28-02

3				
2				
1				
0	11/10/08	CECCONI	GUINN	HOYT
REVISED		BY	CK'D	APPR.

SECTION 12 – COASTAL AND CONTAMINATED AREAS
TABLE OF CONTENTS

Progress Energy

FLA DWG. 12.00–00A

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-VELOCITY 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.

4	6/4/07	SIMPSON	SIMPSON	HOYT
3	10/13/06	BURLISON	GUINN	HOYT
2	8/18/05	SIMPSON	SIMPSON	HOYT
0	7/29/02	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

COASTAL AND CONTAMINATED AREAS
CONSTRUCTION

Progress Energy

PGN DWG. 12.00-02

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

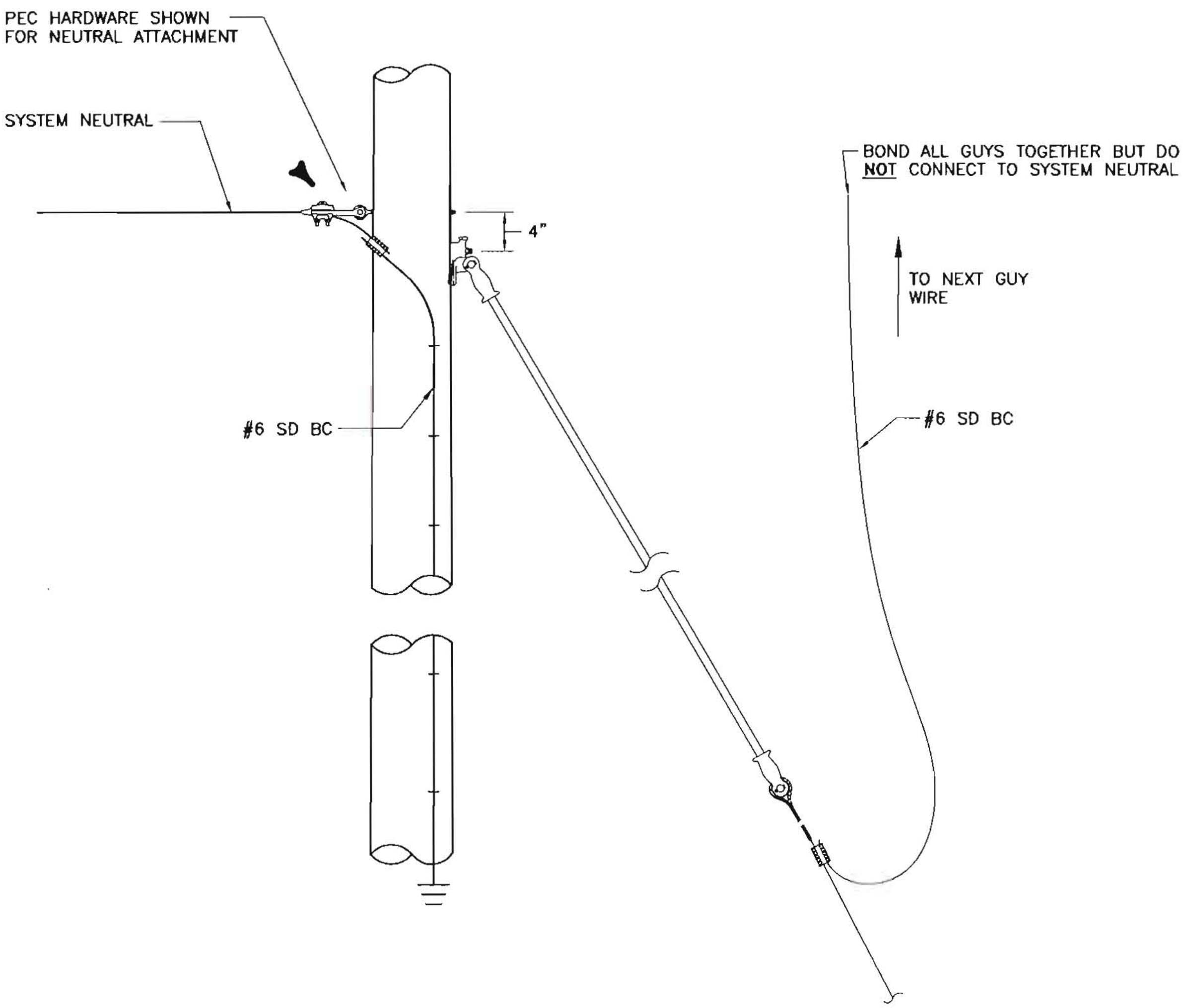
- CONTACT DISTRIBUTION STANDARDS FOR ANY COASTAL SPECIAL APPLICATIONS NOT LISTED HERE.

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 ALL DOWN GUYS AND THE GUY MUST NOT 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.

4	12/21/07	CECCONI	GUINN	HOYT
3	6/5/07	SIMPSON	SIMPSON	HOYT
2	10/13/06	BURLISON	GUINN	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).

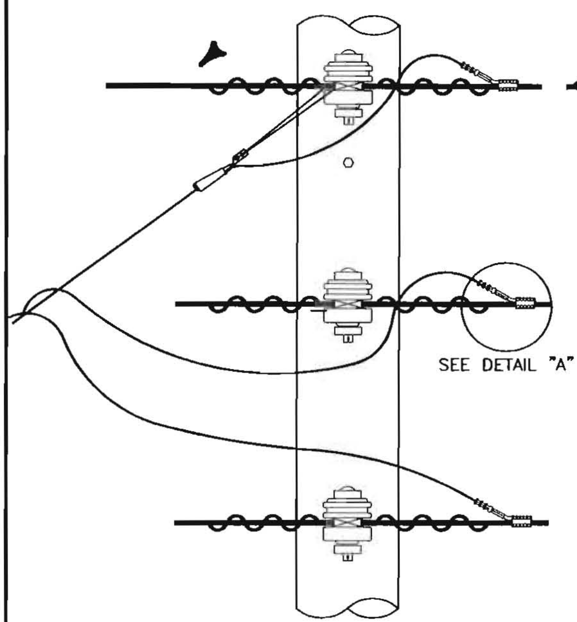
FOR ALUMINUM TO ALUMINUM CONNECTIONS, USE ALUMINUM SQUEEZONS WITH A LIBERAL AMOUNT OF INHIBITOR APPLIED.

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

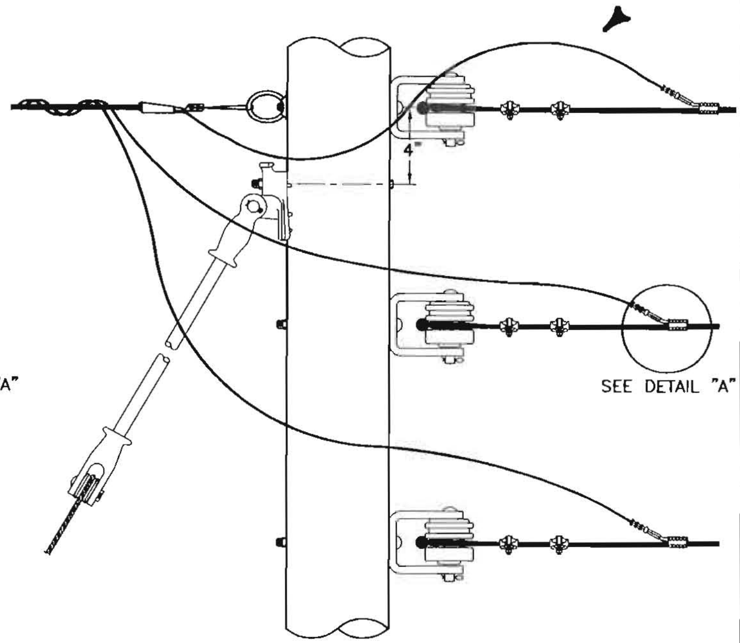
CONDUCTOR SPLICES AND CONNECTIONS
COASTAL AND CONTAMINATED AREAS

Progress Energy

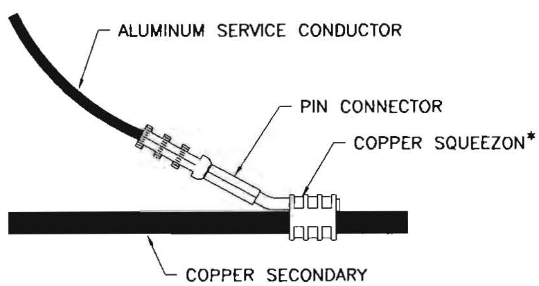
PGN DWG. 12.06-04



FRONT VIEW



SIDE VIEW



*CAROLINAS METHOD SHOWN. FOR FLORIDA, USE STANDARD CLAMP

DETAIL "A"

NOTES:

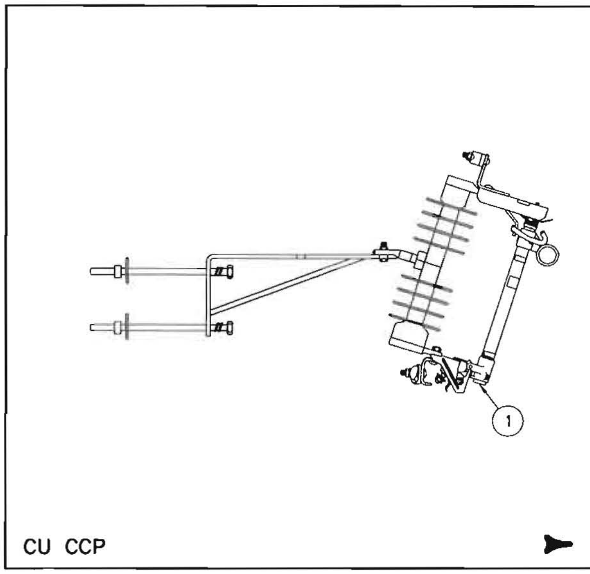
1. USE PIN CONNECTOR TO CONNECT ALUMINUM TRIPLEX DIRECTLY TO COPPER SECONDARY.
2. BEFORE MAKING CONNECTIONS, CLEAN ALL CONDUCTORS THOROUGHLY BY WIRE BRUSHING.
3. ALWAYS POSITION ALUMINUM CONDUCTOR ABOVE COPPER CONDUCTOR TO PREVENT COPPER SALT ACCUMULATION ON THE ALUMINUM CONNECTION.
4. TOOL AND DIE DATA FOR PIN CONNECTOR IS SHOWN ON DWG. 06.03-04.
5. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

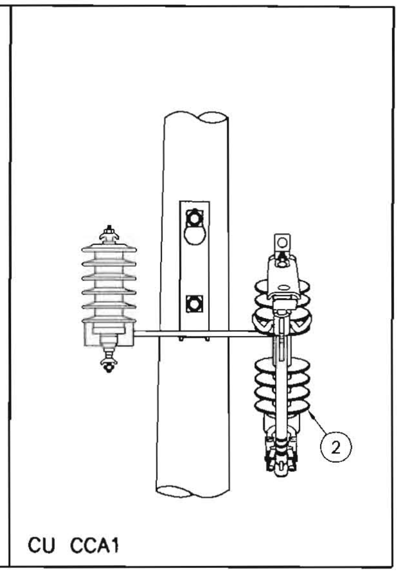
5	11/27/07	CECCONI	GUINN	HOYT
4	10/13/06	BURLISON	GUINN	HOYT
3	8/24/05	SIMPSON	SIMPSON	HOYT
0	7/30/02	YOUNTS	SIMPSON	WOOLSEY
REVISED		BY	CK'D	APPR.

AL TO CU SECONDARY CONNECTIONS
COASTAL AND CONTAMINATED AREAS

Progress Energy

PGN DWG. 12.06-06





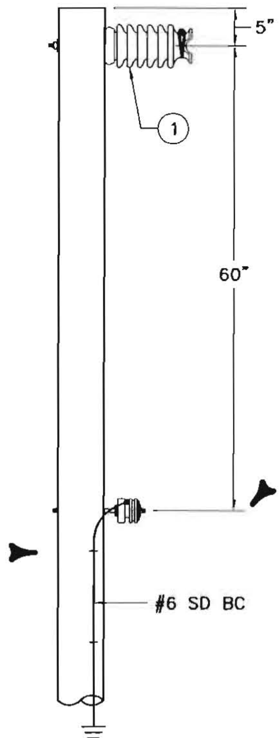
FLORIDA BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	CATALOG NUMBER	QUANTITY	DESCRIPTION
1	CCP	221139	1	CUTOUT, 25KV
		9220094529	1	BRACKET, CUTOUT, COLA
		152106	2	BOLT, 5/8" X 10"
		013308	2	WASHER, 2-1/4" SQUARE, FLAT
		013264	2	WASHER SPRING, COIL
2	CCA1	221139	1	CUTOUT, 25KV
		220202	1	ARRESTER, 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	BURLISON	GUINN	HOYT
1	12/20/02	YOUNTS	SIMPSON	WOOLSEY
0	9/27/02	YOUNTS	SIMPSON	WOOLSEY

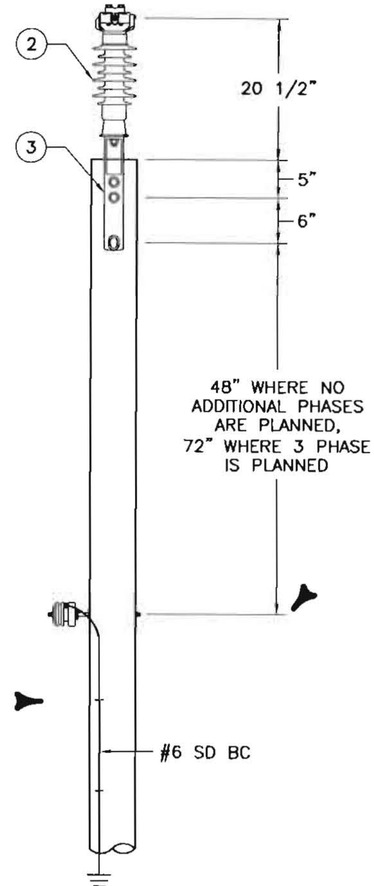
CUTOUT AND ARRESTER ASSEMBLY – COASTAL AND CONTAMINATED AREAS

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
		10332013	1	STUD
3	PT-BKT	10043008	1	BKT, INS, POST-TOP, GALV.
		10033512	2	5/8" MACHINE BOLT

NOTES:

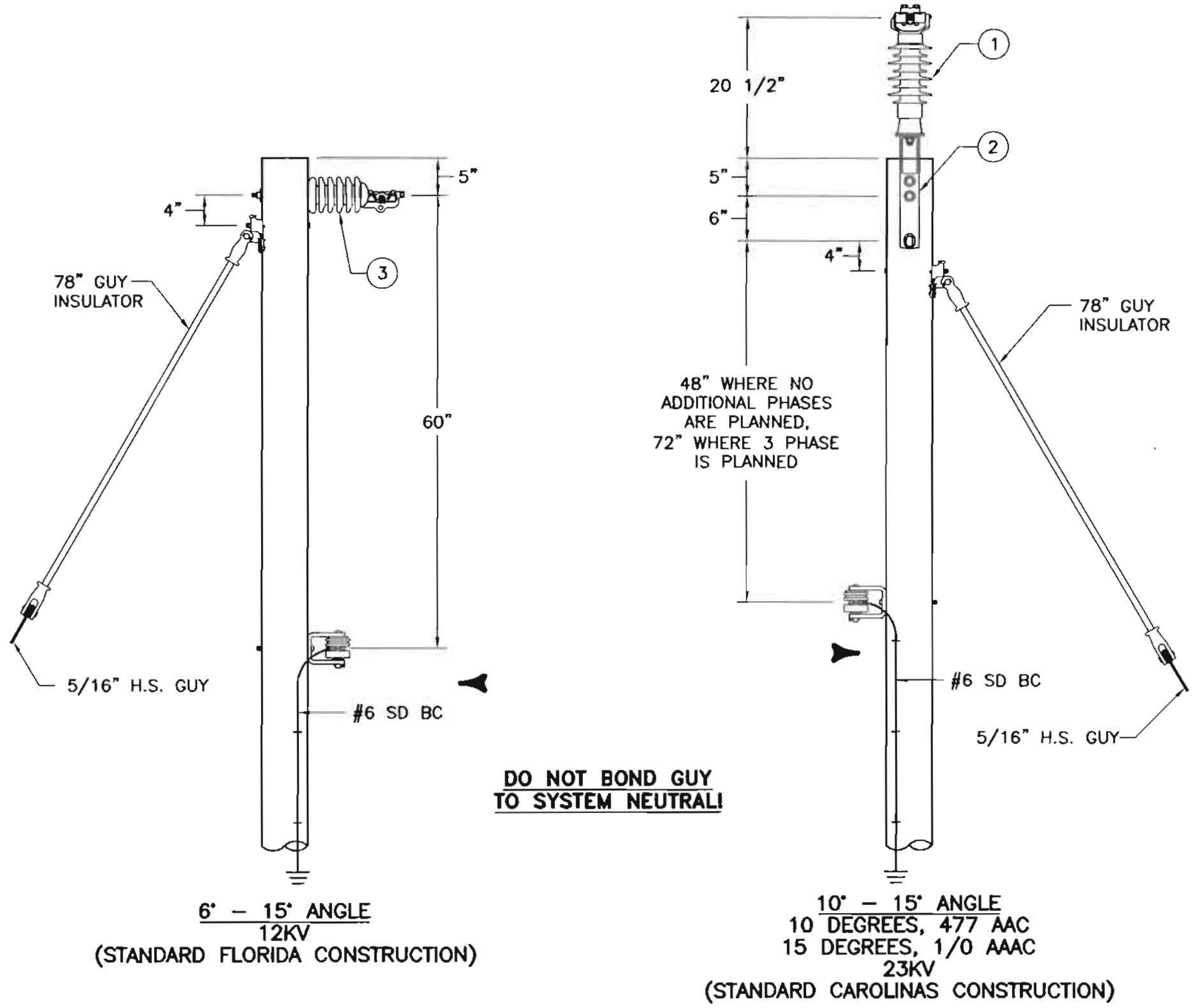
1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE SLAB GAINS (NEW POLES DO NOT HAVE SLAB GAINS) OR WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER. GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS (THIS INCLUDES SLACK SPANS).
2. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

REVISED		BY	CK'D	APPR.
6	11/19/07	CECCONI	SIMPSON	HOYT
5	10/13/06	BURLISON	GUINN	HOYT
4	8/18/05	ROBESON	SIMPSON	HOYT
0	7/30/02	YOUNTS	SIMPSON	WOOLSEY

SINGLE-PHASE PRIMARY – TANGENT
COASTAL AND CONTAMINATED AREAS

Progress Energy

PGN DWG. 12.08-01



CAROLINAS BILL OF MATERIALS

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

FLORIDA OF MATERIALS

MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
–	3	CIC_	1	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:

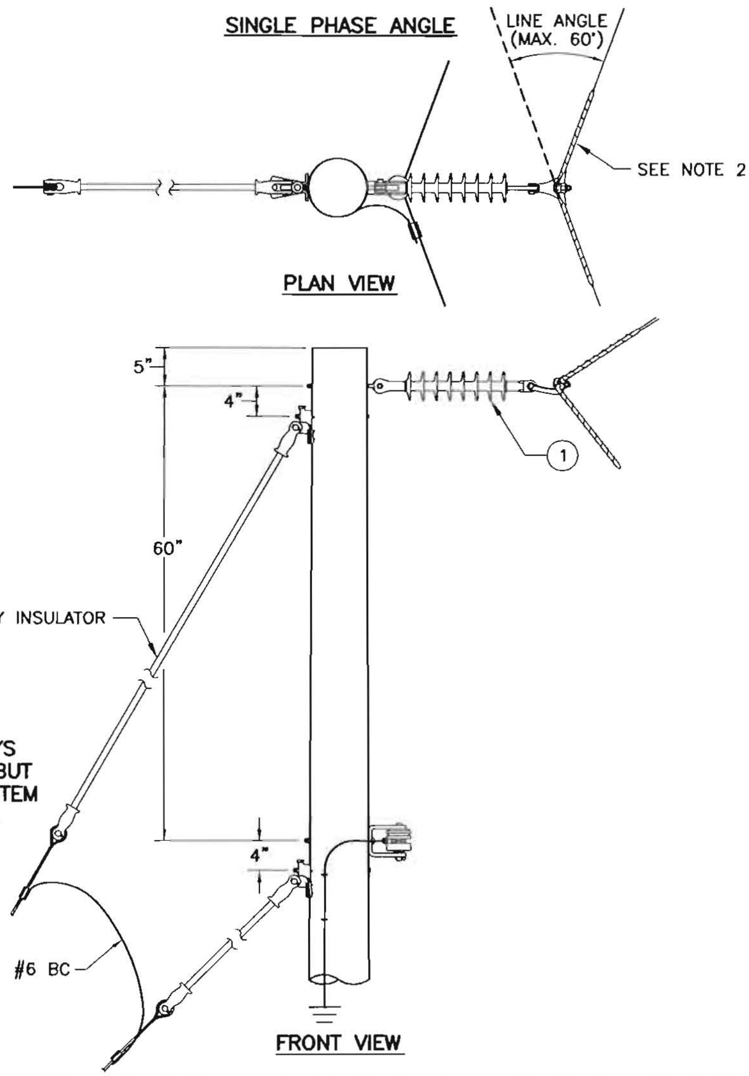
1. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

REVISED		BY	CK'D	APPR.
6	11/19/07	CECCONI	SIMPSON	HOYT
5	6/8/07	SIMPSON	SIMPSON	HOYT
4	10/13/06	BURLISON	GUINN	HOYT
0	7/30/02	YOUNTS	SIMPSON	WOOLSEY

SINGLE-PHASE PRIMARY – SMALL ANGLES – COASTAL AND CONTAMINATED AREAS

Progress Energy

PGN DWG. 12.08-02



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

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

NOTES:

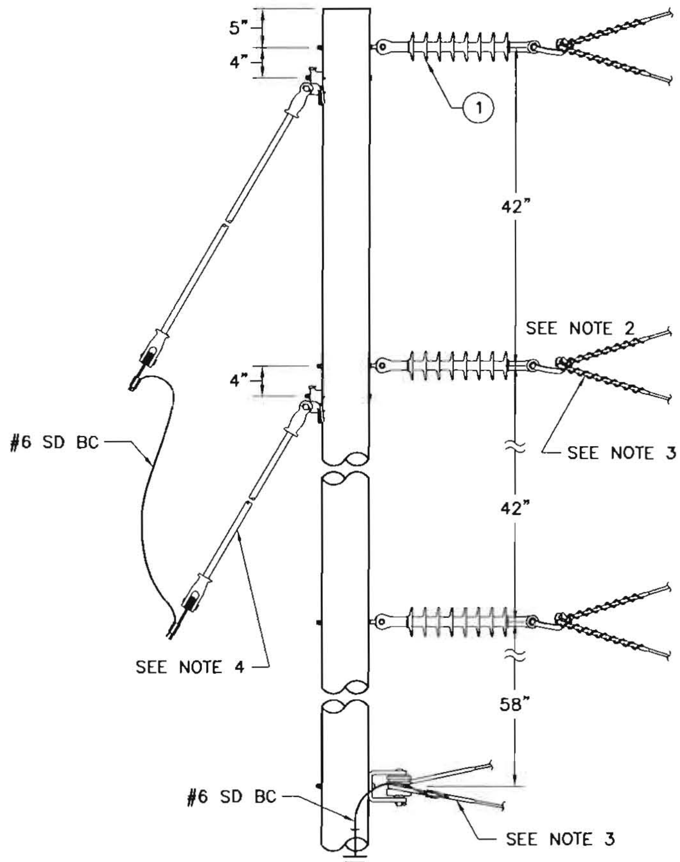
1. ALL GUYS MUST BE BONDED TO EACH OTHER. DO **NOT** BOND TO THE POLE GROUND.
2. ARMOR RODS REQUIRED FOR ANGLE ASSEMBLIES.

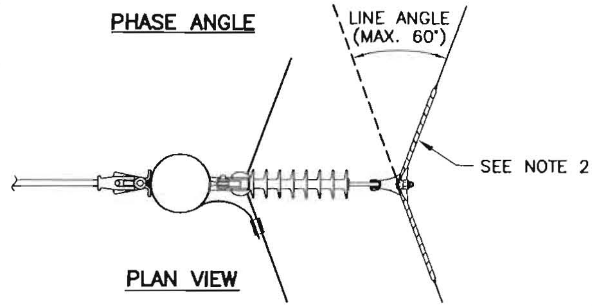
REVISED		BY	CK'D	APPR.
3				
2	6/5/07	SIMPSON	SIMPSON	HOYT
1	10/13/06	BURLISON	GUINN	HOYT
0	8/18/05	SIMPSON	SIMPSON	HOYT

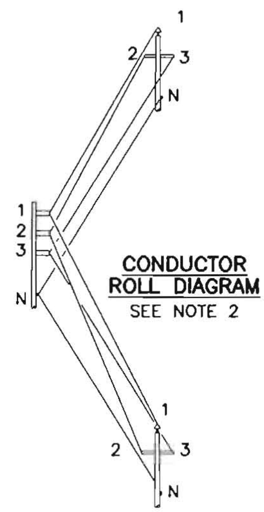
SINGLE-PHASE PRIMARY–
ANGLES 20 TO 60 DEGREES MAXIMUM
COASTAL AND CONTAMINATED AREAS

Progress Energy

PGN DWG. 12.08-03







CAROLINAS BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
–	1	AA-SI45?	3	10033512	1	BOLT, EYE, 5/8, ALL
			3	11111028	1	CLAMP, SUSP, ALL
			3	11223914	1	INSULATOR, SUSP, 45KV, SIL
			4	–	1	ARMOR ROD (VARIES WITH WIRE SIZE)

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

NOTES:

1. USE 2 OR 3 PRIMARY GUYS AS SPECIFIED ON WORK ORDER.
2. FROM ARMLESS OR CROSSARM CONSTRUCTION WITH POLE TOP PIN, ROLL PHASES AS SHOWN IN THE DIAGRAM.
3. ARMOR ROD REQUIRED ON 1/0 AAAC AND 336 AAC. FOR 795 AAC, AN ARMOR ROD OR CUSHION GRIP IS REQUIRED.
4. SEE DWG. 02.04-18 FOR THE APPROPRIATE APPLICATION OF GUY INSULATORS.
5. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

3				
2				
1				
0	12/6/07	ROBESON	GUINN	HOYT
REVISED		BY	CK'D	APPR.

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

Progress Energy

PGN DWG. 12.08-04

OVERHEAD 12 KV SYSTEMS			
TYPE TRANSFORMER	SIZE (KVA)	CN	COMP. UNIT
CONVENTIONAL: 7200/12470Y, 120/240, 304L STAINLESS STEEL 2-BUSHING	25	1301180025	T1D25C
CONVENTIONAL: 7200/12470Y, 120/240, 304L STAINLESS STEEL 2-BUSHING, ±2 @ 2.5% TAPS	50	1301180050	T1D50C
	100	1301180100	T1D100C

NOTES:

1. 304L STAINLESS STEEL TRANSFORMERS ARE TO BE USED ONLY IN DESIGNATED COASTAL AREAS.
2. INSTALL GROUNDED SPRING AT BASE OF ALL RG BUSHINGS TO CONDUCT ANY LEAKAGE CURRENT TO GROUND. SOME NEWER UNITS WILL ALSO HAVE A SPRING AT THE TOP OF THE BUSHING THAT IS NOT GROUNDED.

3				
2				
1				
0	11/10/08	SIMMONS	QUINN	HOYT
REVISED		BY	CK'D	APPR.

304L STAINLESS STEEL
POLE-TYPE TRANSFORMERS
FOR COASTAL AREAS

Progress Energy

FLA DWG. 12.08-10

UNDERGROUND 12 KV SYSTEMS			
TYPE TRANSFORMER	SIZE (KVA)	CN	COMP. UNIT
SINGLE-PHASE: PAD-MOUNTED 12470GRDY/7200 TO 240/120 VOLT WITH 304L STAINLESS STEEL CONSTRUCTION	25	9220128345	T1L25C
	50	9220128346	T1L50C
	75	9220128347	T1L75C
	100	9220128348	T1L100C
	167	9220128349	T1L167C
SINGLE-PHASE: PAD-MOUNTED 12470GRDY/7200 TO 480/240 VOLT WITH 304L STAINLESS STEEL CONSTRUCTION	50	9220128350	T9L50C
	167	9220128351	T9L167C
THREE-PHASE: PAD-MOUNTED 12470GRDY/7200 TO 208Y/120 VOLT WITH 304L STAINLESS STEEL CONSTRUCTION	75	9220128303	T5L75C
	150	9220128308	T5L150C
	300	9220128310	T5L300C
	500	9220128312	T5L500C
	750	9220128314	T5L750C
	1000	9220182167	T5L1000C
	1500	9220182169	T5L1500C
THREE-PHASE: PAD-MOUNTED 12470GRDY/7200 TO 480Y/277 VOLT WITH 304L STAINLESS STEEL CONSTRUCTION	75	9220128316	T6L75C
	150	9220128318	T6L150C
	300	9220128320	T6L300C
	500	9220128323	T6L500C
	750	9220128325	T6L750C
	1000	9220128328	T6L1000C
	1500	9220182171	T61500C
	2500	9220182165	T62500C

NOTES:

1. 304L STAINLESS STEEL TRANSFORMERS ARE TO BE USED ONLY IN DESIGNATED COASTAL AREAS.

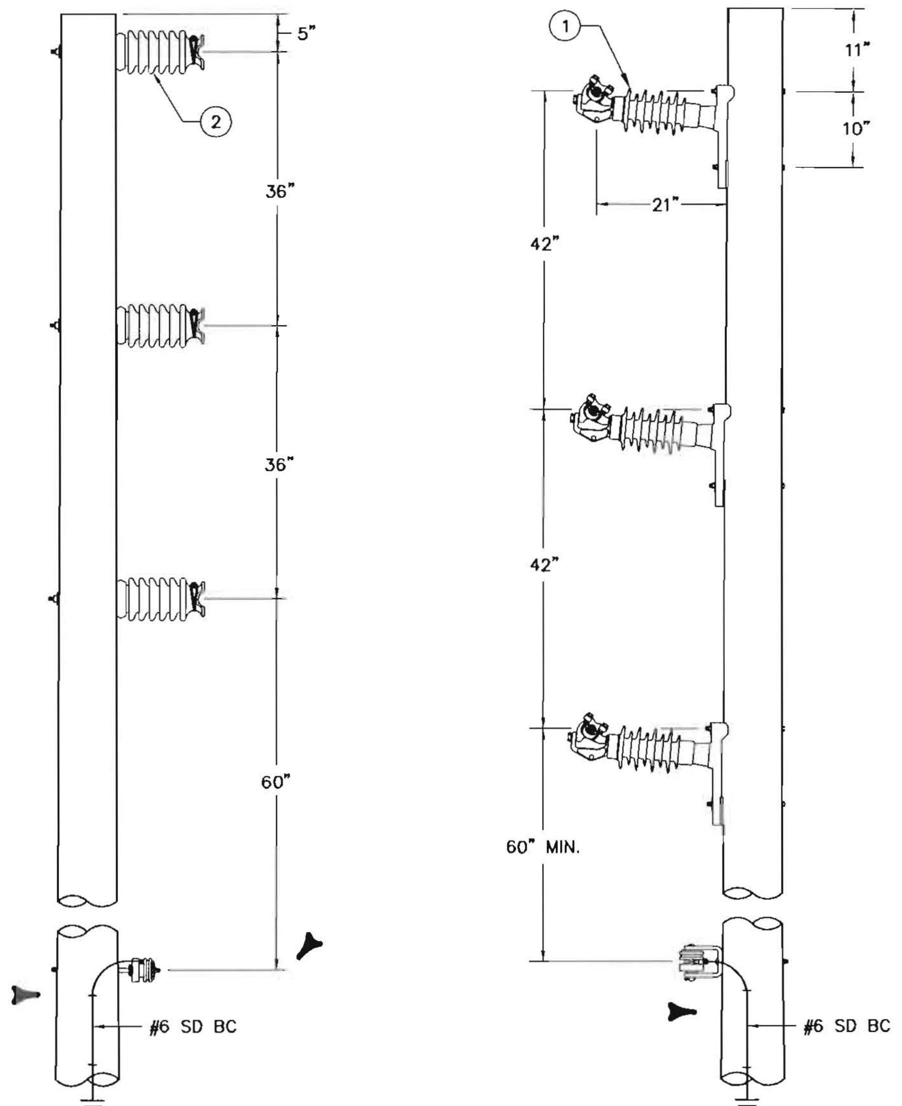
REVISED		BY	CK'D	APPR.
3				
2				
1				
0	11/20/08	SIMMONS	QUINN	HOYT

304L STAINLESS STEEL
PAD-MOUNTED TRANSFORMERS
FOR COASTAL AREAS

Progress Energy

FLA

DWG. 12.08-12



12KV
(STANDARD FLORIDA CONSTRUCTION)

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	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:

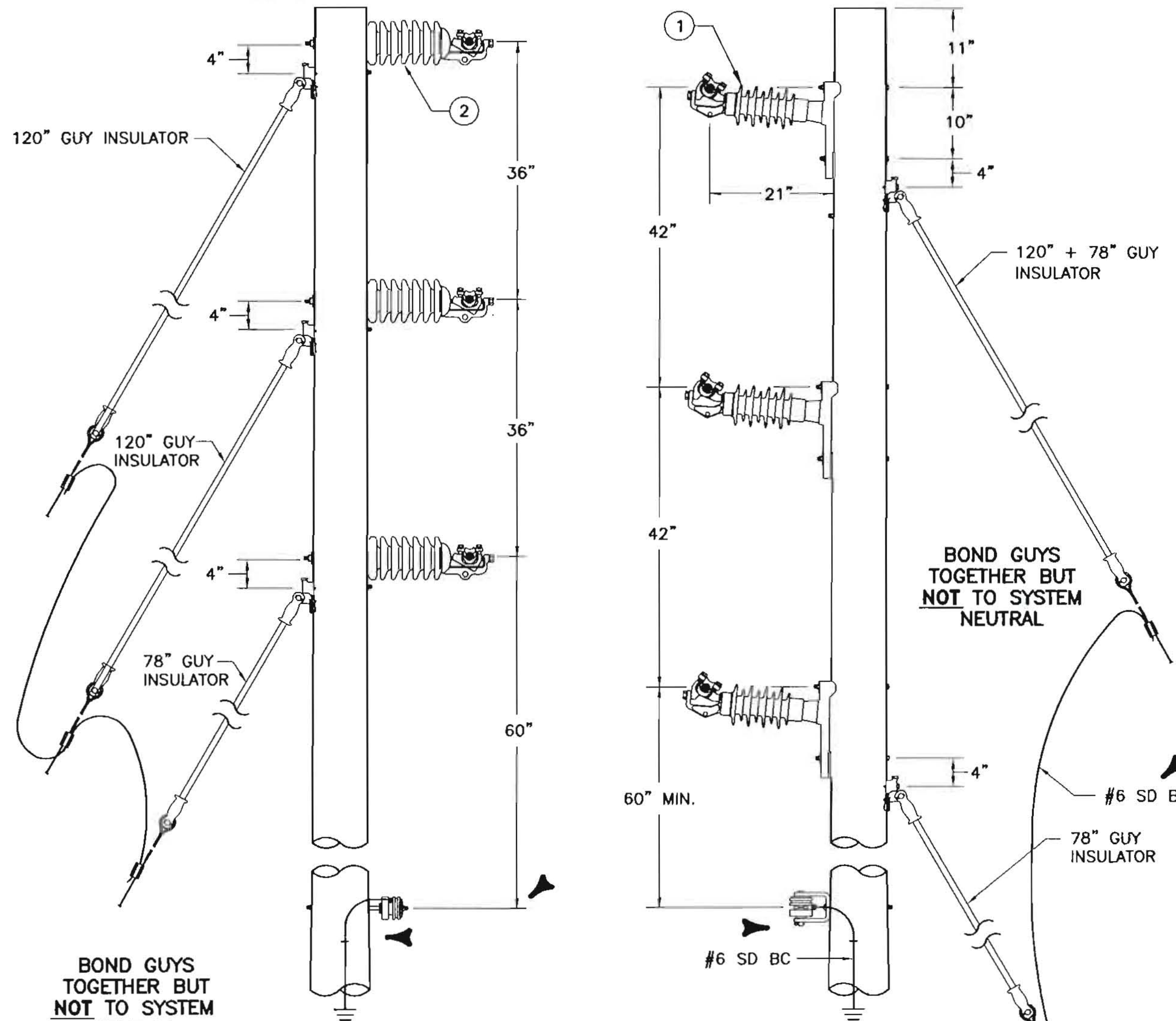
1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE SLAB GAINS (NEW POLES DO NOT HAVE SLAB GAINS) OR WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER. GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS (THIS INCLUDES SLACK SPANS).
2. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

REVISED	DATE	BY	CK'D	APPR.
3				
2				
1	11/19/07	CECCONI	SIMPSON	HOYT
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						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
–	1	INS–HLP45SI?	3	11222510	1	INSUL., HLP, 45KV, SILICONE
				11110319	1	LP CLAMP, ALL
				10033512	2	BOLT, MACH., 5/8", ALL

FLORIDA BILL OF MATERIALS						
MACRO UNIT	CU ITEM NO.	COMPATIBLE UNIT	QTY REQ'D	CATALOG NUMBER	QTY PER CU	DESCRIPTION
–	2	CIC_	3	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:

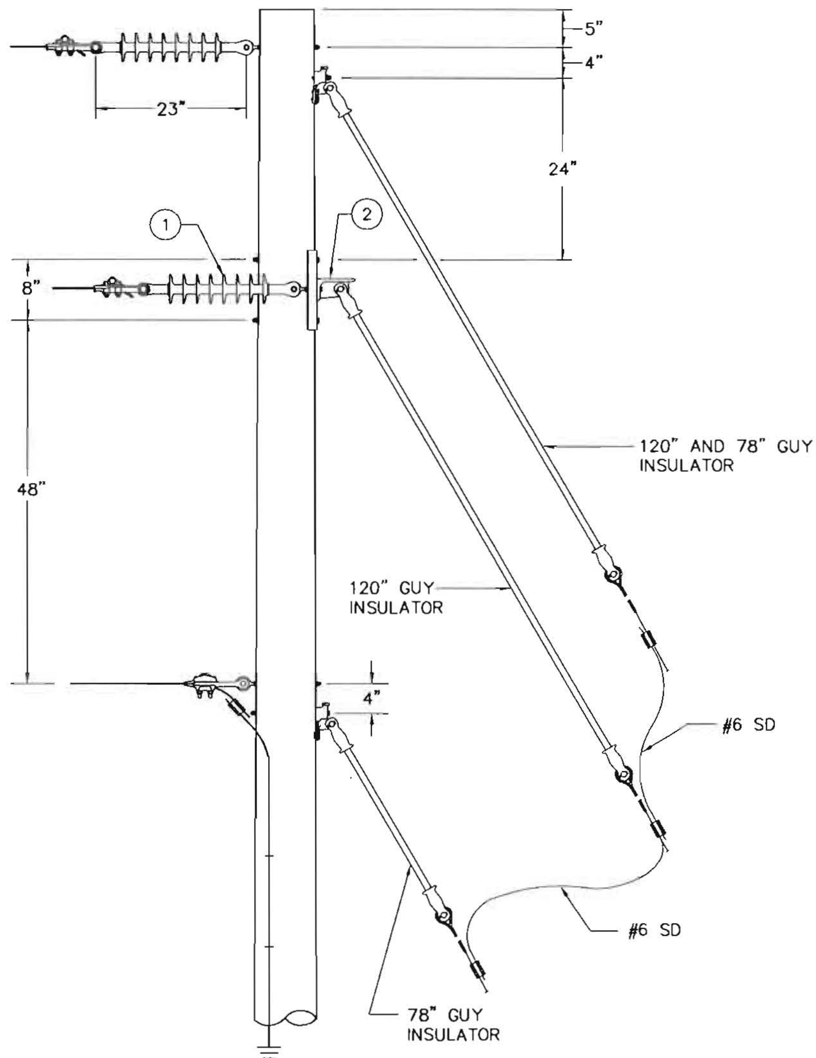
1. POLE GAINS ARE REQUIRED FOR POST INSULATOR INSTALLATIONS ON WOOD POLES WHEN THE POLE DOES NOT HAVE SLAB GAINS (NEW POLES DO NOT HAVE SLAB GAINS) OR WHEN THE CONDUCTOR IS 336.4 KCMIL OR LARGER. GAINS ARE NOT REQUIRED FOR INSULATORS USED FOR JUMPERS (THIS INCLUDES SLACK SPANS).
2. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

REVISED		BY	CK'D	APPR.
3				
2	11/19/07	CECCONI	SIMPSON	HOYT
1	6/8/07	SIMPSON	SIMPSON	HOYT
0	10/13/06	BURLISON	GUINN	HOYT

VERTICAL PRIMARY – ANGLES TO 20 DEGREES
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	10/26/05	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

20.00 UNDERGROUND GENERAL AND SYMBOLS

20.03 STORMS

20.04 MISCELLANEOUS DRAWINGS

3				
2				
1				
0	2/20/09	CECCONI	GUINN	HOYT
REVISED		BY	CK'D	APPR.

SECTION 20 – UNDERGROUND GENERAL
TABLE OF CONTENTS

Progress Energy

FLA DWG. 20.00–00A

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.

PAD-MOUNTED 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.

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

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

PRIOR TO ENERGIZING NEW OR REPAIRED UNDERGROUND PRIMARY CABLE

APPROPRIATE TEST EQUIPMENT AND CORRESPONDING OPERATING INSTRUCTIONS SHALL BE USED TO TEST THE INTEGRITY AND CONDITION OF CABLE PRIOR TO ENERGIZING.

APPROVED AND APPROPRIATE TEST EQUIPMENT THAT ARE AVAILABLE ARE AS FOLLOWS:

1. VON RADAR TEST SET
2. PHASING VOLT METER/HI-POT SET (AB CHANCE, HASTINGS, SALISBURY)
3. FFR UNIT (HDW, VON)

REFER TO OPERATIONS MANUAL FOR SPECIFIC OPERATING INSTRUCTIONS FOR EACH TYPE OF EQUIPMENT.

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UNDERGROUND DISTRIBUTION SPECIFICATIONS

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AN OPEN POINT SHALL BE PROVIDED IN A PAD-MOUNTED TRANSFORMER NEAR THE MIDPOINT OF EACH LOOP.

LOOPED PRIMARY CABLE SYSTEMS SHALL NORMALLY BE INSTALLED BY DIRECT BURIAL WITHOUT A SPARE CONDUIT. PRIMARY CABLE SHALL BE SPLICED WHEN A CABLE REEL ENDS. IF A PARTIAL REEL OF CABLE IS LEFT OVER AT THE END OF AN INSTALLATION, THE PARTIAL REEL SHOULD BE USED TO START THE NEXT JOB.

UG CABLE SCRAP GUIDELINES:

ALL UNDERGROUND (UG) CABLE SHOULD BE SCRAPPED ACCORDING TO THE GUIDELINES NOTED BELOW. THIS APPLIES TO COMPANY AND CONTRACTOR CREWS.

FIELD APPLICATIONS:

WHEN INSTALLING UG CABLE, STANDARD CONSTRUCTION PRACTICES SHOULD BE APPLIED AND PRUDENT DECISIONS SHOULD BE MADE TO SCRAP MINIMAL AMOUNTS AT EACH TERMINATION POINT. AT ALL TERMINATION POINTS, THE ACTUAL AMOUNT OF SCRAP SHOULD BE DOCUMENTED ON THE WORK ORDER.

MATERIALS AND SERVICES:

SCRAP AMOUNTS BY CATALOG NUMBER AND AMOUNT ARE TO BE REPORTED ON A REGULAR BASIS BY THE CONTRACTOR TO THE LOCAL MATERIAL AND SERVICES REPRESENTATIVE VIA THE SUPPLIED MATERIAL AND SERVICES SPREADSHEET.

A PARTIAL REEL OF CABLE SHOULD BE SCRAPPED ACCORDING TO THE FOLLOWING GUIDELINES:

- 1/0 AL PRIMARY CABLE-SCRAP LESS THAN 100'
- 500 AL PRIMARY CABLE-SCRAP LESS THAN 175'
- 750 AL PRIMARY CABLE- SCRAP LESS THAN 175'
- 1000 AL PRIMARY CABLE- SCRAP LESS THAN 175'

500 AL AND 1000 AL PRIMARY CABLE ARE PRE-MEASURED FROM MASTER REELS. SCRAP SHOULD BE AT A MINUMUM. HOWEVER IF CABLE IS LEFT ON REEL, CONTACT MATERIAL AND SERVICES DEPARTMENT FOR PICK-UP.

THESE GUIDELINES ARE RECOMMENDED; HOWEVER, WHEN THESE AMOUNTS CAN BE USED FOR SHORT SPANS, DIP POLE CHANGE-OUTS, PMH/PME RELOCATIONS, OR SPLICING, EFFORTS SHOULD BE MADE TO USE THESE AMOUNTS RATHER THAN SCRAP.

THERE SHOULD BE A MAXIMUM OF ONLY TWO SPLICES USED IN EACH DIRECT-BURIED SPAN DURING A NEW INSTALLATION.

IF PRIMARY CABLE IS BEING INSTALLED IN A CONDUIT OR A DUCT BANK SYSTEM, THE PRIMARY CABLES SHOULD BE SPLICED IN SPLICE PITS, PULLBOXES, OR MANHOLES ACCORDING TO THE INSTRUCTIONS OF THE DESIGNER.

IN RESIDENTIAL SUBDIVISIONS, THE PRIMARY CABLE LOOPS FROM THE MAIN TRENCH TO THE TRANSFORMER LOCATIONS SHOULD BE PLACED IN THE TRENCH SO THAT THE TWO CABLES DO NOT CROSS.

THE PRIMARY NEUTRAL OF THE UNDERGROUND SYSTEM IS FORMED BY CONNECTING THE PRIMARY CONCENTRIC NEUTRALS AT EACH TRANSFORMER LOCATION. THIS PRIMARY CONCENTRIC NEUTRAL SHALL BE CONNECTED TO THE OVERHEAD SYSTEM NEUTRAL AT EACH DIP POLE AND SHALL BE TREATED IN THE SAME MANNER AS THE OVERHEAD SYSTEM NEUTRAL.

SECONDARY CIRCUITS AND SERVICE LATERALS

ALL SECONDARY CABLES SHALL BE TAGGED AT EACH END AS TO WHICH TRANSFORMER OR PEDESTAL IT IS COMING FROM OR TO WHICH PEDESTAL OR CABLE MARKER IT IS GOING TO.

IN RESIDENTIAL SUBDIVISIONS, EACH CUSTOMER SHALL BE SERVED BY A SEPARATE SERVICE LATERAL EXTENDING FROM A TRANSFORMER, SECONDARY PEDESTAL OR CABLE MARKER. SERVICE SHALL BE LOCATED IN ACCORDANCE WITH DESIGNER'S LAYOUT. THIS IS NECESSARY BECAUSE OF VOLTAGE DROP AND CABLE CAPACITIES. SERVICE LATERALS SHALL BE RUN IN A STRAIGHT LINE WHERE PRACTICAL. IF NOT, THE EXACT RUN SHOULD BE NOTED ON THE MAP OF THE SYSTEM.

SERVICE LATERALS SHALL BE TAGGED AND MARKED AT THE PEDESTAL AND PAD WITH COLOR TIES CORRESPONDING TO THE HOUSE OR LOT TO BE SERVED.

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.

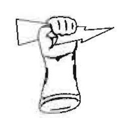
WORK OVERVIEW:

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.

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DISTRIBUTION UNDERGROUND CONSTRUCTION SPECIFICATIONS

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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.

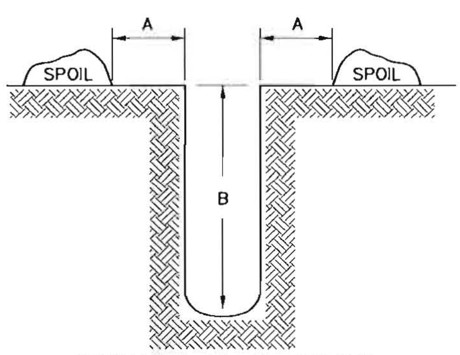
WHERE HAZARDOUS ATMOSPHERIC CONDITIONS EXISTS, EMERGENCY RESCUE EQUIPMENT, SUCH AS BREATHING APPARATUS, A SAFETY HARNESS AND LINE, OR A BASKET STRETCHER SHALL BE READILY AVAILABLE. THIS EQUIPMENT SHALL BE ATTENDED WHEN IN USE.

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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TRENCHING AND EXCAVATION

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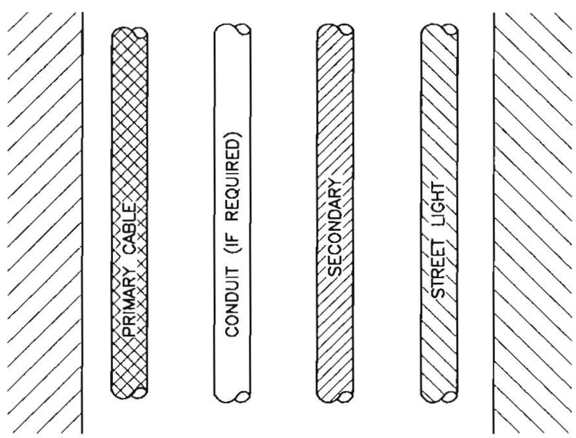
FLA FLORIDA DWG. 22.01-00A

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. ALL CABLE ENDS MUST BE CAPPED WITH PROPER SIZE CAP. WRAPPING WITH TAPE DOES NOT PROVIDE ADEQUATE PROTECTION.
9. PVC ENDS MUST BE CAPPED.
10. 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 LAID.
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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TRENCHING AND EXCAVATION

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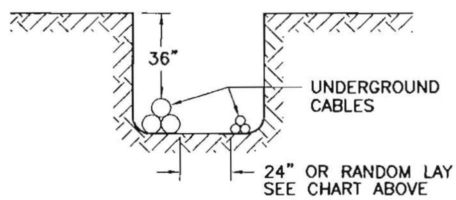
FLA DWG. 22.01-00B

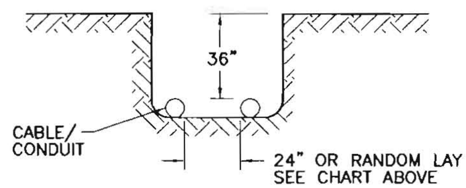
*CLEARANCE FOR PARALLEL CABLE RUNS MINIMUM HORIZONTAL CLEARANCE BETWEEN CABLE(S) OF DIFFERENT LOOPS APPLIES TO DIRECT BURIED CABLE, CONDUIT WITH CABLE INSTALLED AND CABLE INSTALLED VIA DIRECTIONAL BORE METHOD			
DIRECT BURIED CABLES	FEEDER CABLE	PRIMARY CABLE	SECONDARY OR SL CABLE
FEEDER CABLE	24"	24"	24"
PRIMARY CABLE	24"	RANDOM LAY	RANDOM LAY
SECONDARY OR SL CABLE	24"	RANDOM LAY	RANDOM LAY

*FOR FEEDER CABLES ON SAME LOOP OR PRIMARY CABLES ON SAME LOOP, CLEARANCE BETWEEN CABLES SHALL BE 36"

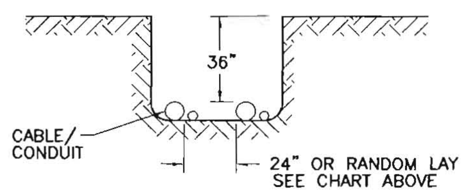
DIRECT BURIED CABLE



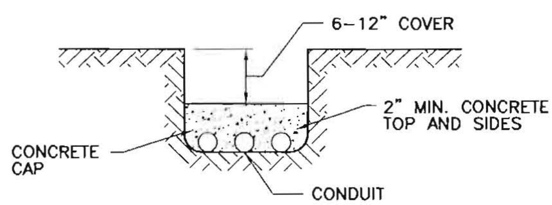
CONDUIT



CABLE WITH SPARE CONDUIT



CONDUIT CONCRETE ENCASED



NOTES:

1. SEPARATION REQUIREMENTS DO NOT APPLY TO CONDUIT SYSTEMS WITH CONCRETE ENCASEMENT AS CONSTRUCTED IN ABOVE ILLUSTRATION.

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CABLE AND CONDUIT DEPTH AND SPACING – NO JOINT USERS

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FLA 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.

TRENCH

- PRIMARY CABLE (ALL SIZES) THAT IS INSTALLED VIA THE TRENCHING METHOD WILL BE DIRECT BURIED IN TRENCH
- SERVICE AND SECONDARY CABLE THAT IS INSTALLED VIA THE TRENCHING METHOD WILL BE DIRECT BURIED IN TRENCH

DIRECTIONAL BORE

- PRIMARY CABLE (ALL SIZES) THAT IS INSTALLED VIA THE DIRECTIONAL BORE METHOD SHOULD BE DIRECT BURIED WITHIN BORE.
- SERVICE AND SECONDARY CABLE THAT IS INSTALLED VIA THE DIRECTIONAL BORE METHOD SHOULD BE DIRECT BURIED WITHIN BORE.

CONDUIT USAGE

FUTURE MAINTENANCE CONSIDERATIONS MAY MAKE IT NECESSARY TO INSTALL A SPARE CONDUIT. IF FUTURE REPLACEMENT OF CABLE WOULD NOT BE POSSIBLE USING TRENCHING OR DIRECTIONAL BORE METHODS, THEN A SPARE CONDUIT MUST BE INSTALLED. THE FOLLOWING IS A LIST OF FUTURE MAINTENANCE CONSIDERATIONS THAT MUST BE REVIEWED BEFORE THE DECISION IS MADE TO INSTALL A SPARE CONDUIT.

- FUTURE REPLACEMENT WOULD REQUIRE DIRECTIONAL BORING BUT THE DISTANCE OF THE BORE IS LONGER THAN THE MAXIMUM DIRECTIONAL BORE LENGTH. SOME FACTORS THAT DETERMINE MAXIMUM BORE LENGTH ARE 1) MAXIMUM FOOTAGE ON THE CABLE REEL, 2) AS A RULE OF THUMB THE BORE LIMITS ON CURRENT DIRECTIONAL BORE MACHINES USED BY PGN CONTRACTORS IS APPROXIMATELY 500 FT. FOR FUTURE BORES OVER 500 FT CONSULTATION WITH THE CONTRACTOR SHOULD TAKE PLACE. 3) EXCESSIVE CABLE PULLING TENSIONS. CABLE PULLING PROGRAM SHOULD BE USED TO DETERMINE IF MAXIMUM CABLE TENSIONS WILL BE EXCEEDED DURING CABLE PULLBACK.
- FUTURE REPLACEMENT WOULD REQUIRE DIRECTIONAL BORE BUT GREEN SPACE NEAR THE TRANSFORMERS AND OR TERMINATIONS IS LIMITED. THE DIRECTIONAL BORE METHOD REQUIRES BORE PITS TO INSTALL AND RECEIVE THE CABLE OR CONDUIT. THESE AREAS MUST BE AVAILABLE AS GREEN SPACE (NO PAVEMENT) FOR FUTURE INSTALLATION AND RECEIVING PITS (TYPICALLY A 6' X 6' AREA FOR EACH PIT). IN ADDITION, THE BORE PIT AREAS MUST BE ABLE TO ACCOMMODATE THE NECESSARY EQUIPMENT REQUIRED TO COMPLETE THE BORE (I.E.– BORING RIG, TRUCK, AND REEL TRAILER). IF UNCLEAR ABOUT FUTURE ABILITY TO BORE, PLEASE CONSULT WITH THE BORING CONTRACTOR.

SPECIAL CONDITIONS FOR CONDUIT USAGE

CERTAIN CONDITIONS MAKE IT NECESSARY TO INSTALL CABLE IN CONDUIT. THE FOLLOWING ARE EXAMPLES OF APPROVED CONDITIONS.

- PROJECT TIMING
  - CROSSINGS UNDER PAVEMENT WHERE CONDUIT MUST BE INSTALLED PRIOR TO CABLE INSTALLATION DUE TO PROJECT TIMING (EVERY EFFORT SHOULD BE MADE TO INSTALL CABLE IF TIMING AND FIELD CONDITIONS ALLOW).
- CUSTOMER REQUEST
  - PGN IS A "DIRECT BURIED" UTILITY. CUSTOMER REQUESTS FOR CONDUIT INSTALLATION SHOULD BE EVALUATED ON A CASE–BY–CASE BASIS AND WILL REQUIRE MANAGEMENT APPROVAL. THE CUSTOMER IS RESPONSIBLE FOR PAYING ALL ADDITIONAL COSTS ASSOCIATED WITH THE REQUEST (I.E.– CONDUIT, BOXES, SPLICES, PULLING LABOR, ETC.).

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USE OF CONDUIT

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PGN DWG. 22.01–02A

- SPECIFIC REGULATIONS*
  - RAILROAD AND GAS TRANSMISSION CROSSINGS.
  - CROSSING OTHER UTILITIES WHEN CODE CLEARANCES CANNOT BE MET (SEE DWG 22.01-05).
  - REQUIRED BY DOT OR OTHER GOVERNMENTAL AGENCIES.
  - SUBSTATION EXITS TO JUST OUTSIDE OF FENCE.
- FUTURE GROWTH
  - CONDUIT FOR FUTURE PROJECT EXPANSION AND LOAD GROWTH. FOR LONGER TERM PROJECTS, AN ECONOMIC ANALYSIS SHOULD BE PERFORMED TO DETERMINE BEST OPTION (I.E. INSTALL CONDUIT NOW VS. BORE IN THE FUTURE).
- SHALLOW INSTALLATIONS*
  - PRIMARY (ALL SIZES)
    - LESS THAN 30" TO 12" – SCH 40 PVC
    - LESS THAN 12" TO 6" – STEEL OR CONCRETE ENCASED PVC
  - SECONDARY (SERVICE AND LIGHTING)
    - LESS THAN 24" TO 12" – SCH 40 PVC
    - LESS THEN 12" TO 6" – STEEL OR CONCRETE ENCASED PVC

CERTAIN CONDITIONS MAKE IT NECESSARY TO INSTALL A SPARE CONDUIT. THE FOLLOWING ARE EXAMPLES OF APPROVED CONDITIONS.

- RADIAL PRIMARY FEEDS
  - WHEN CABLE SUPPLYING A SINGLE RADIAL FED TRANSFORMER IS UNDER PAVEMENT OR CONCRETE. CONDUIT CAN BE INSTALLED THE ENTIRE ROUTE FROM THE TERMINATION POINT TO THE TRANSFORMER IF A MAJORITY OF THE ROUTE IS UNDER PAVEMENT OR CONCRETE.
  - TRANSFORMERS ON "SHORT-TERM" RADIAL FEEDS (FUTURE LOOP) SHOULD FOLLOW THE GUIDELINES PREVIOUSLY STATED ABOVE UNDER "**CONDUIT USAGE**".

*USE THE MOST COST EFFECTIVE DESIGN WHEN TRANSITIONING FROM "CABLE IN CONDUIT" TO "DIRECT BURIED". FOR EXAMPLE, EVALUATE THE COST OF A PULL BOX AND SPLICES VS. THE COST OF INSTALLING THE REMAINDER OF THE SPAN IN 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 HOUSE CABLE SPLICES IN CABLE IN CONDUIT INSTALLATIONS. PULL BOXES SHOULD BE INSTALLED WHEN:

- IT HAS BEEN DETERMINED THAT THE MAXIMUM CABLE PULLING LENGTHS FOR CABLES IN CONDUIT HAVE BEEN EXCEEDED.
- A JUNCTION IS REQUIRED PER SPECIFIC DESIGN CONSIDERATIONS.

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	12/2/08	DANNA	QUINN	HOYT
REVISED		BY	CK'D	APPR.

USE OF CONDUIT

Progress Energy

FLA DWG. 22.01-02B

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."

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0	12/2/08	DANNA	GUINN	HOYT
REVISED		BY	CK'D	APPR.

USE OF CONDUIT

Progress Energy

PGN DWG. 22.01-02C

CONDUIT USE BY TYPE

PROGRESS ENERGY CURRENTLY USES TWO TYPES OF PVC CONDUIT FOR ELECTRIC POWER CONDUCTORS AND CABLES: SCHEDULE 40 AND CELLULAR CORE.

PROGRESS ENERGY REQUIRES CONDUIT TO MEET CERTAIN INDUSTRY STANDARDS FOR STRENGTH, DIMENSIONAL COMPATIBILITY, UV RESISTANCE, AND TEMPERATURE.

SCHEDULE 40
- NEMA TC-2
- UL 651

CELLULAR CORE
- ASTM F891
- ASTM F512-89a

CELLULAR CORE CONDUIT HAS A SEPARATE SET OF STANDARDS UNDER WHICH IT IS MANUFACTURED BUT WE REQUIRE THE CONDUIT TO MEET SCHEDULE 40 STRENGTH AND TEMPERATURE REQUIREMENTS. IT IS THEREFORE EQUIVALENT IN APPLICATION TO SCHEDULE 40 AND WILL BE STOCKED IN CERTAIN SIZES UNDER THE SCHEDULE 40 CATALOG NUMBERS.

MINIMUM WALL THICKNESS (INCHS)	
NOMINAL PIPE SIZE	CONDUIT TYPE: SCH 40
1-1/2	0.145
2	0.154
2-1/2	0.203
4	0.237
6	0.280

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0	12/2/08	DANNA	GUINN	HOYT
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USE OF CONDUIT

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FLA DWG. 22.01-02D

I. RECOMMENDED MAXIMUM FILL OF CONDUIT AS % OF CROSS-SECTIONAL AREA			
	NUMBER OF CABLES		
	1	2	3
NEW CONSTRUCTION	53%	31%	40%

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	SDR 13.5
1"	1.05	0.86	1.004	0.792	–	–	–
1-1/2"	–	–	1.564	1.921	1.618	2.056	SDR 13.5
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	SDR 13.5
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"
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	2"	4"	4"	2"	4"	4"

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)
2 #10 CU LIGHTING CABLE	1-1/2"	–	2"	–
3 #10 CU LIGHTING CABLE	–	–	2"	–
2 #6 AL LIGHTING CABLE	1-1/2"	–	2"	–
3 #6 AL LIGHTING CABLE	–	–	2"	–
#2 TPX	1-1/2"	–	2"	–
#2/0 TPX	2"	–	2"	–
#4/0 TPX	2"	4"	2"	4"
350 TPX	2-1/2"	4"	4"	4"
500 TPX	4"	–	4"	–
750 TPX	4"	–	4"	–
#4/0 QPX	4"	4"	4"	4"
350 QPX	4"	–	4"	–
500 QPX	4"	–	4"	–
750 QPX	4"	–	7"	–

NOTES:

1. WHEN THREE NON-TRIPLEXED (PARALLEL) CABLES ARE PULLED INTO CONDUIT, THE CONDUIT MUST BE LESS THAN OR GREATER THAN THREE TIMES THE DIAMETER OF ONE CABLE BECAUSE THE CENTER CABLE MAY WEDGE BETWEEN THE OTHER TWO AND JAM, ESPECIALLY AROUND BENDS IN THE CONDUIT. CABLE PULLING PROGRAMS WILL PROVIDE INFORMATION ON THE POSSIBILITY OF JAMMING BASED ON THE CONDUIT DIAMETER SELECTED.

3				
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1				
0	12/23/08	GUINN	GUINN	HOYT
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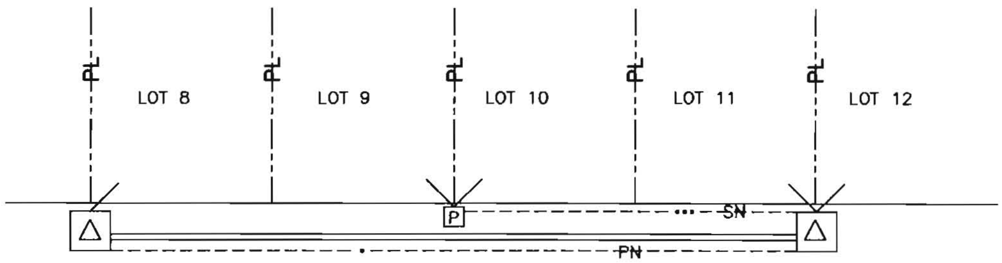
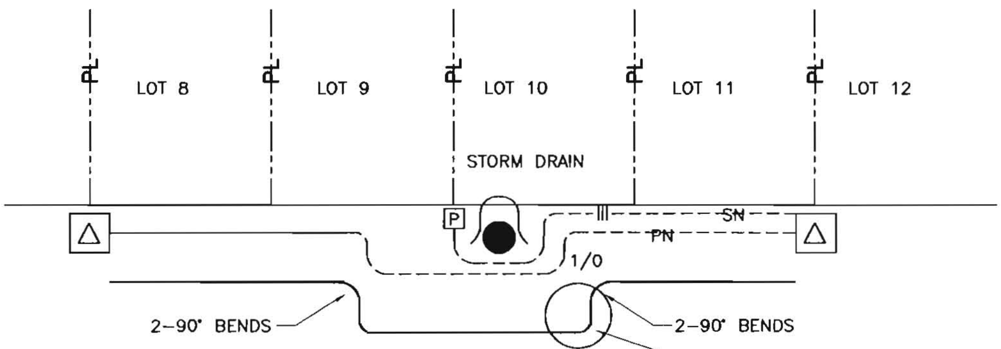
RECOMMENDED CONDUIT FILL

Progress Energy

FLA 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.

3			
2			
1			
0 11/19/02	CECCONI	SIMPSON	WOOLSEY
REVISED	BY	CK'D	APPR.

ROUTING CONDUITS AROUND OBSTACLES

Progress Energy

FLA FLORIDA DWG. 22.01-04

3				
2				
1				
0	11/12/09	CECCONI	GUINN	ELKINS
REVISED		BY	CK'D	APPR.

SECTION 33 - FLOODING AND
STORM SURGE REQUIREMENTS
TABLE OF CONTENTS

Progress Energy

FLA DWG. 33.00-00A

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.

PAD-MOUNTED TRANSFORMERS INSTALLED WITHIN 1000' OF ANY SALTWATER, SALTWATER MARSH OR AREAS SUBJECT TO SEVERE SALT FOG, SEVERE CORROSION, EROSION FROM WIND-BLOWN SANDY SOILS OR HIGH VELOCITY WINDS SHOULD BE CONSTRUCTED FROM 304L STAINLESS STEEL EXTERNALLY (NON-STANDARD). SEE DWG. 12.08-12 FOR A LISTING OF THESE TRANSFORMERS.

REVISED		BY	CK'D	APPR.
3				
2	2/9/09	SIMMONS	GUINN	HOYT
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

FLOODING AND STORM SURGE HARDWARE REQUIREMENTS

- SINGLE–PHASE TRANSFORMER BOX PAD, SEE DWG. 33.03–01.
- SUBMERSIBLE SECONDARY SET SCREW CONNECTORS. FOR SINGLE–PHASE PAD–MOUNTED TRANSFORMERS, SEE DWGS. 33.06–01 AND 33.06–02.
- STAINLESS STEEL PAD–MOUNTED TRANSFORMERS, SEE DWG. 12.08–12. (ONLY IF WITHIN 1000 FT. OF SALTWATER OR SALTWATER MARSH).
- ABOVE GROUND PEDESTALS WITH SINGLE SET SCREW, SUBMERSIBLE CONNECTORS, SEE DWGS. 25.02–02B AND 25.04–06.
- SUBMERSIBLE SWITCHGEAR:

  TRAYER OIL FILLED 600 AMP LOADBREAK, 200 AMP CURRENT LIMITING FUSE. SEE DWGS. 28.06–01 AND 28.06–03.

  NOTE: TRAYER FOOTPRINT MATCHES S&C PMH GEAR FOR RETROFIT APPLICATIONS.

  OR

  VISTA NEXT GENERATION SWITCHGEAR, 600 AMP LOAD BREAK, 200 AMP ARC SPINNER INTERRUPTER SEE DWG. 28.03–07.
- COLD SHRINK FOR 200 AMP LOAD BREAK ELBOW, SEE DWGS. 33.05–05 THROUGH 33.05–11.

3				
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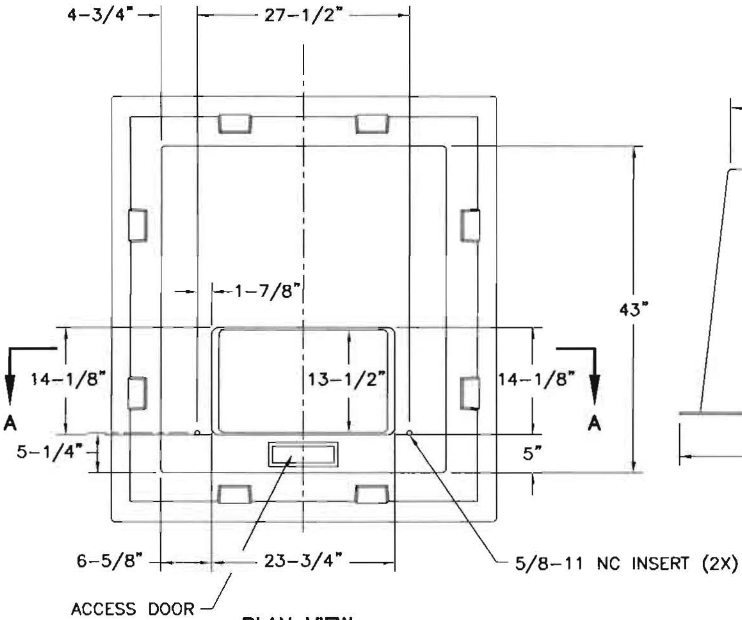
1				
0	11/12/09	CECCONI	GUINN	ELKINS
REVISED		BY	CK'D	APPR.

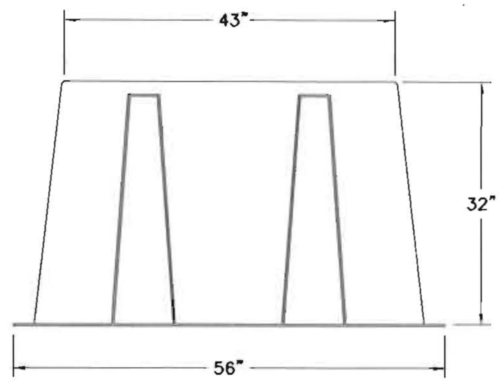
FLOODING AND STORM SURGE
HARDWARE REQUIREMENTS

Progress Energy

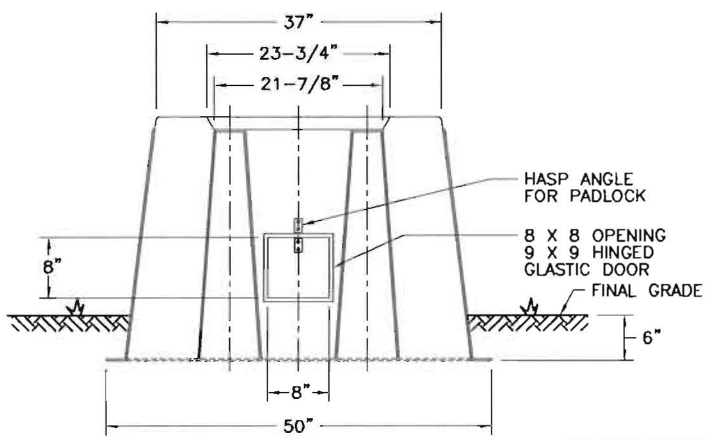
FLA DWG. 33.01–02



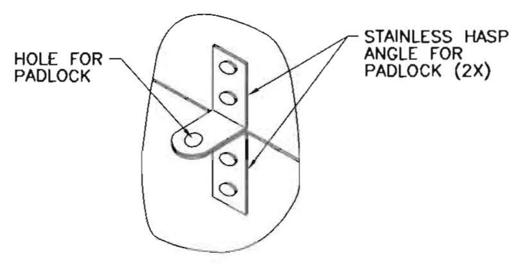
PLAN VIEW



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 FIRE ANT CONTROL UNDER ENTIRE PAD INCLUDING PAD OPENINGS.
4. MAINTAIN CLEARANCES PER DWG. 27.06-05.
5. SOD MAY BE REQUIRED AROUND BOX PAD TO PREVENT SOIL EROSION.

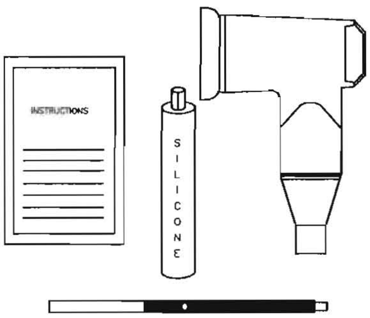
REVISED		BY	CK'D	APPR.
3				
2				
1	8/26/09	GUINN	GUINN	ELKINS
0	11/29/06	DANNA	GUINN	HOYT

SINGLE-PHASE TRANSFORMER
BOX PAD

Progress Energy

FLA DWG. 33.03-01

COMPATIBLE UNIT: TE (WIRE SIZE)



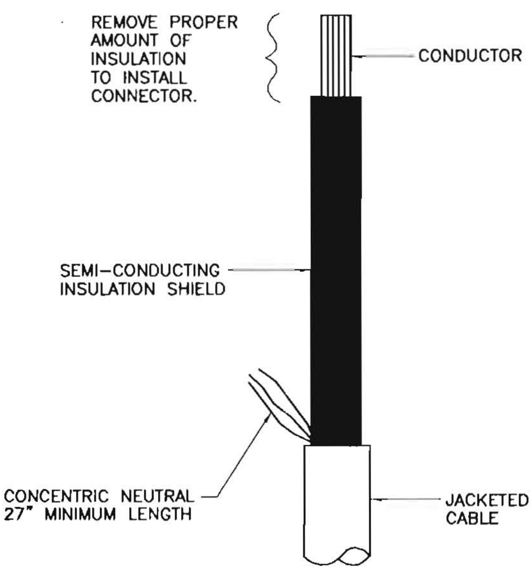
COMPATIBLE UNIT	APPLICATION	QTY.	CN	DESCRIPTION
TE0	1 PHASE	1	326422	ELBOW KIT 4/0
TE1	1 PHASE	1	326410	ELBOW KIT 1/0
TE2	1 PHASE	1	326410	ELBOW KIT #2 AL
#2 STR	–	1	326238	COPPERTOP CONNECTORS
1/0 SOL	–	1	326241	COPPERTOP CONNECTORS
1/0 STR	–	1	326240	COPPERTOP CONNECTORS
4/0 STR	–	1	326237	COPPERTOP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



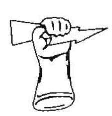
INSTALLATION GUIDELINES

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 MANUFACTURER. CONSULT KIT INSTRUCTIONS FOR PROPER LENGTH.

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0	11/29/06	DANNA	GUINN	HOYT
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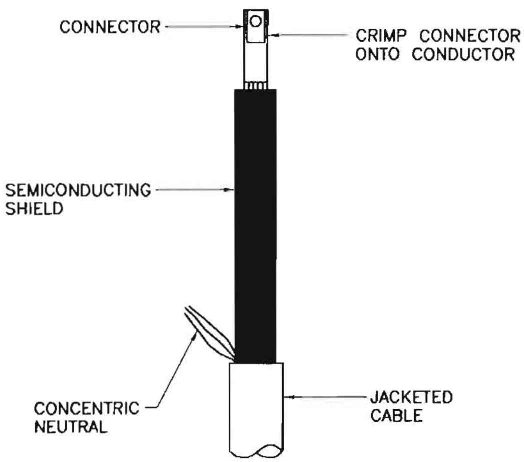
200 AMP LOADBREAK ELBOW

Progress Energy

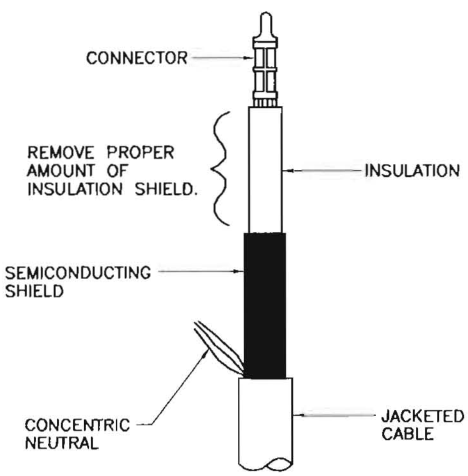
FLA DWG. 33.05-05

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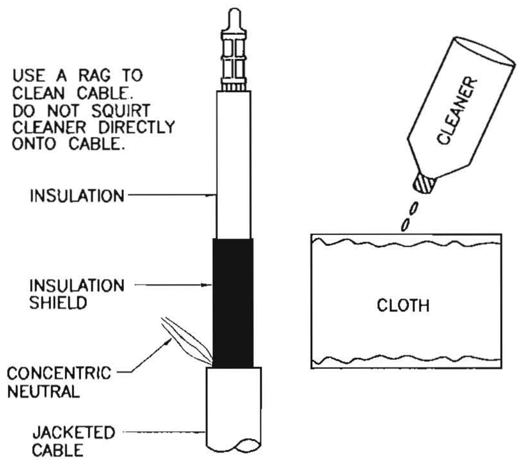
0	11/29/06	DANNA	GUINN	HOYT
REVISED	BY	CK'D	APPR.	

200 AMP LOADBREAK ELBOW

Progress Energy

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. <u>IMPORTANT</u> – 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.

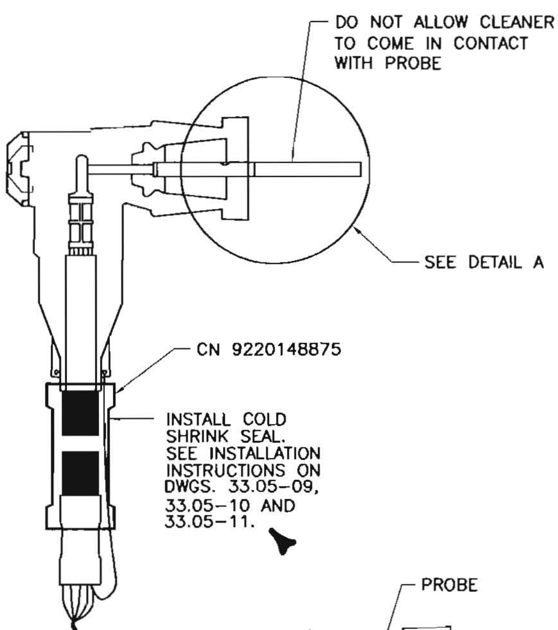
APPLY SILICONE LUBRICANT TO THE CLEAN INSULATION. KEEP THE ELBOW AND CABLE CLEAN. USING A DOWNWARD TWISTING MOTION, SLIDE THE ELBOW ONTO THE CABLE.

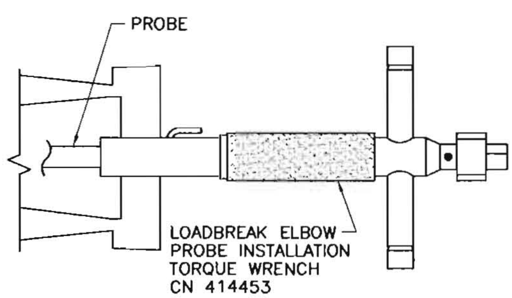
ALIGN THE HOLE IN THE CONNECTOR WITH THE HOLE IN THE ELBOW. INSERT THE CONTACT PROBE INTO THE THREADED HOLE AND TURN BY HAND SEVERAL TURNS. CHECK THAT THE PROBE HAS NOT CROSS–THREADED. TIGHTEN THE PROBE TO PROPER TORQUE USING THE PROBE INSTALLATION TORQUE WRENCH (CN 414453).

<u>NOTE:</u> MANY ELBOW FAILURES HAVE BEEN TRACED TO IMPROPER INSTALLATION OF THE PROBE. PROPER TORQUE IS CRITICAL TO ELBOW LIFE.

<u>DO NOT</u> 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.





<u>DETAIL A</u>

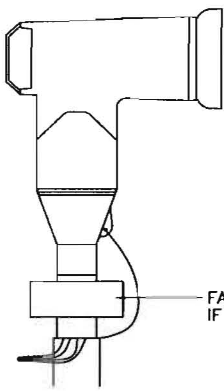
3					200 AMP LOADBREAK ELBOW	Progress Energy
2						
1	12/1/06	CECCONI	GUINN	HOYT		FLA
0	11/29/06	DANNA	GUINN	HOYT		DWG. 33.05–07
REVISED		BY	CK'D	APPR.		

COMPATIBLE UNIT: TE (WIRE SIZE)

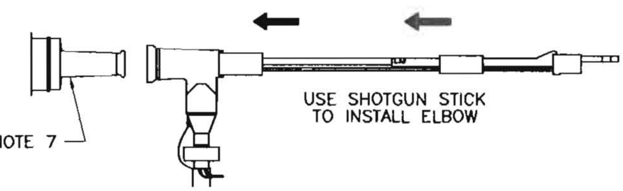
APPLICATION GUIDE

PROPER PERSONAL PROTECTIVE EQUIPMENT MUST BE USED WHEN INSTALLING FAULT INDICATOR ON ENERGIZED CABLES.

FAULT INDICATOR



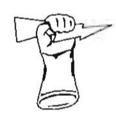
INSTALL FAULT INDICATOR AS REQUIRED. INDICATOR MUST BE BELOW ELBOW AND ABOVE NEUTRAL BREAKOUT.



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 <u>ONLY</u> 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.

REVISED		BY	CK'D	APPR.
3				
2				
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0	11/29/06	DANNA	GUINN	HOYT

200 AMP LOADBREAK ELBOW

Progress Energy

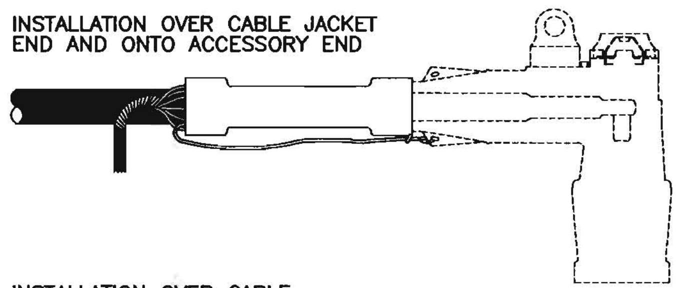
FLA DWG. 33.05–08

3M
COLD SHRINK
CABLE ACCESSORY SEALING KITS

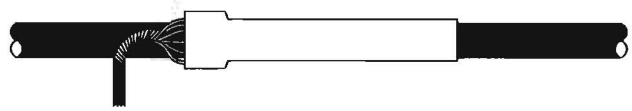
INSTRUCTION SHEET
ANSI C119.1
KIT CONTENTS:

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

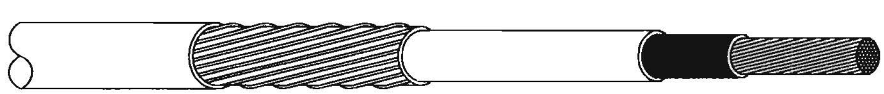


INSTALLATION OVER CABLE JACKET END ONLY



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)

REVISED	BY	CK'D	APPR.
3			
2			
1			
0 11/29/06	DANNA	GUINN	HOYT

200 AMP LOADBREAK ELBOW –
COLD SHRINK

Progress Energy

FLA DWG. 33.05-09

CABLE PREPARATION

STEP 1:

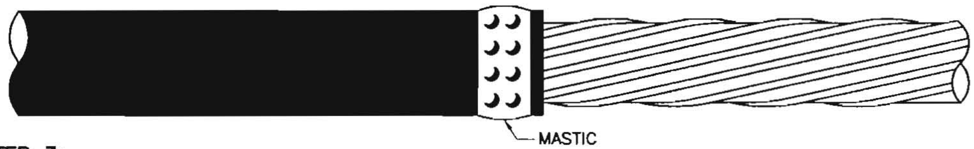
REMOVE CABLE JACKET.

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.

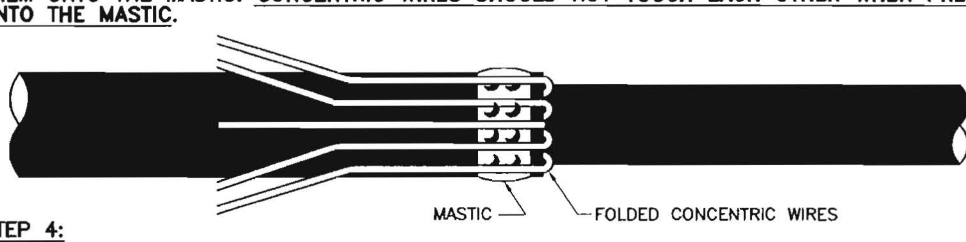
STEP 2:

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**.



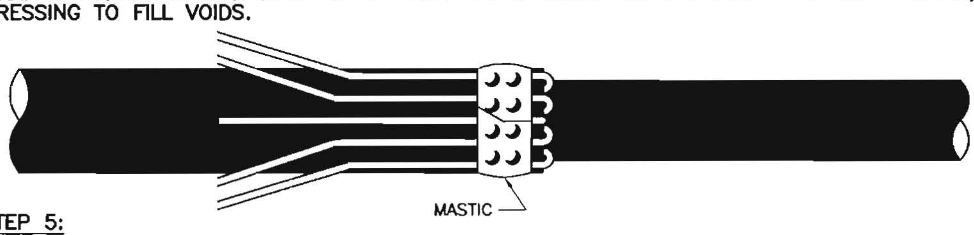
STEP 3:

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.

3				
2				
1				
0	11/29/06	DANNA	GUINN	HOYT
REVISED	BY	CK'D	APPR.	

200 AMP LOADBREAK ELBOW – COLD SHRINK

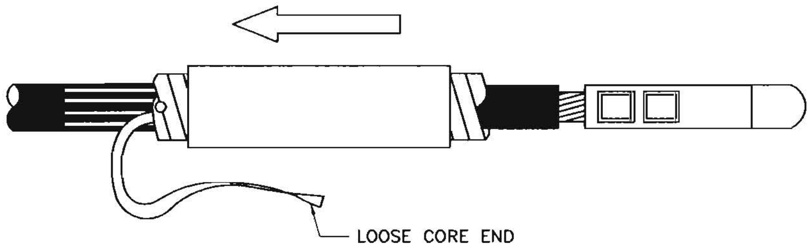
Progress Energy

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.

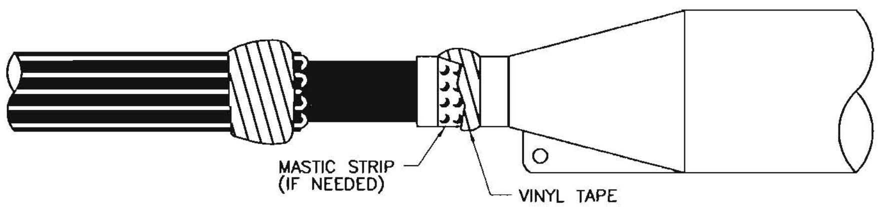


STEP 2:

INSTALL CABLE ACCESSORY PER MANUFACTURER'S INSTRUCTIONS.

STEP 3:

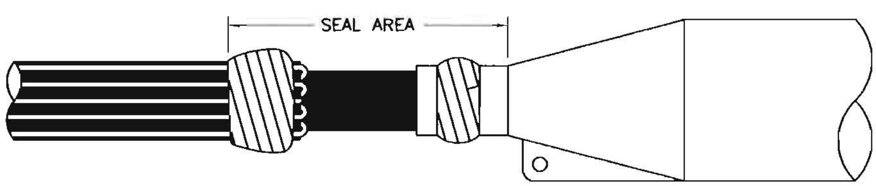
IF SURFACE IRREGULARITES EXIST IN THE SEAL AREA OF THE INSTALLED ACCESSORY, WRAP A MASTIC STRIP AROUND THE END OF THE INSTALLED ACCESSORY. OVER WRAP MASTIC WITH TWO LAPPED LAYERS OF VINYL TAPE.



STEP 4:

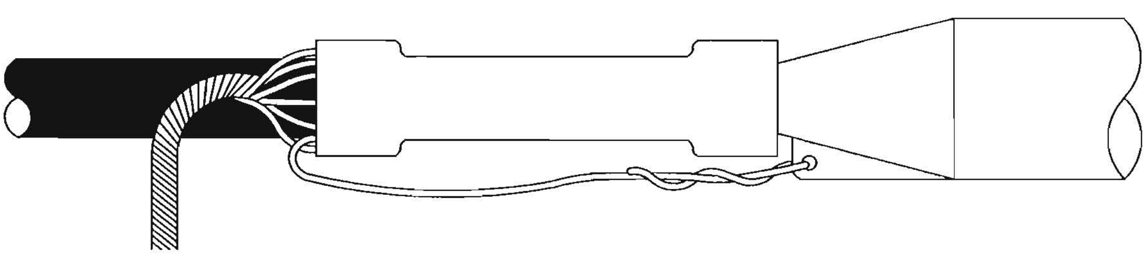
POSITION THE COLD SHRINK TUBE OVER THE SEAL AREA AND REMOVE THE CORE BY UNWINDING THE LOOSE CORE END COUNTER-CLOCKWISE.

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.



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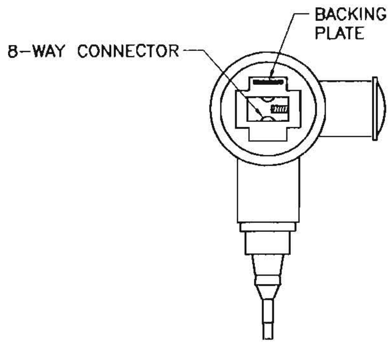
0	11/29/06	DANNA	GUINN	HOYT
REVISED		BY	CK'D	APPR.

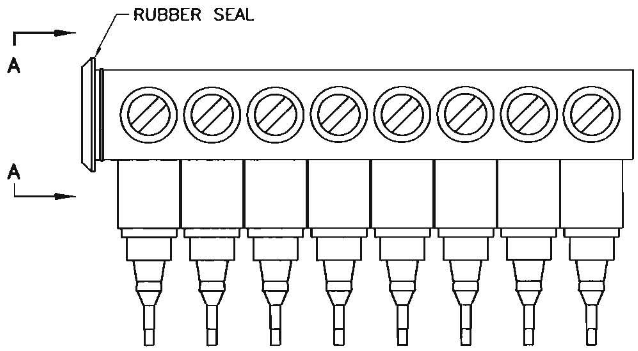
200 AMP LOADBREAK ELBOW –
COLD SHRINK

Progress Energy

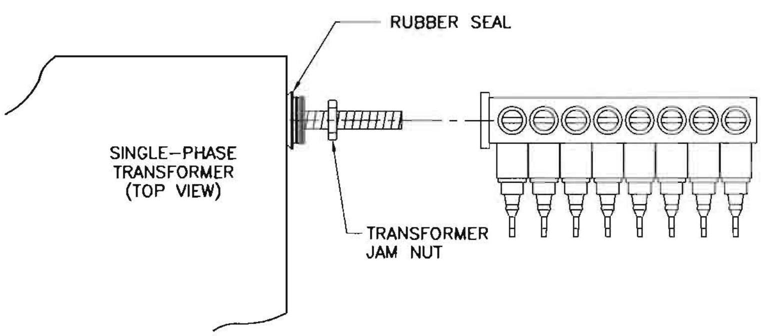
FLA DWG. 33.05–11



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.

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

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.

3				
2				
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0	11/29/06	DANNA	GUINN	HOYT
REVISED		BY	CK'D	APPR.

SINGLE SET SCREW
SUBMERSIBLE CONNECTORS – NOTES
SINGLE-PHASE TRANSFORMERS

Progress Energy

FLA DWG. 33.06-02

Progress Energy

Distribution Engineering Manual

Document title

Distribution Engineering Manual: Overhead Design Guide

Document number

DST-EDGX-00027

Applies to: Energy Delivery Group – Carolinas and Florida

Keywords: distribution; distribution engineering manual

Table of Contents

1. 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.

2. Line Location

Routing of an overhead distribution line requires careful consideration in order to meet a number of different needs. Often there are a limited number of corridors available. It is important to evaluate each route with respect to their impact on the safe operation and maintenance of the line as well as the economic impact (i.e. cost to build, operate and maintain). When evaluating an available corridor for an overhead distribution line the following points should be considered:

- Economic Impact: A selected corridor should generally aim toward the shortest route to the customer's facility to minimize the cost. When the customer requires that the route be located elsewhere solely for the customer's convenience, the additional cost for the customer-preferred route should be borne by the customer.

- Operation and Maintenance: Access to the poles by line trucks reduces the time for restoration and the cost of future maintenance. For new residential lines, front lot line construction shall be used. Lines shall not be located on rear or side lot lines even if the customer wants to pay the additional cost. Lines outside of a residential development should also be located along road access whenever possible. Road access not only allows for truck access but also reduces tree exposure and trimming on one side of the line.

- Clearances: Both horizontal clearances to fixed objects from line wind swing and the ground clearances required by the NESC are a requirement. In the mountainous areas the terrain will often affect the line route.

- Easements: Written easements for primary lines are a requirement. A corridor 15-feet wide on each side of the line is preferred. Consideration for large conductor lines should also be given to guy lead lengths, which are usually more than 15 feet. A blanket easement should be obtained for the development, if possible.

- Roadway Considerations: The state DOTs have issued guidelines concerning the location of facilities along state-maintained highways. If poles are to be located on these highway rights-of-way, the planner must be familiar with these requirements. The State of Florida has issued a document titled the Utility Accommodation Guide that should be followed.
  Click on Manuals and then the 1999 PDF file.

  The State of North Carolina has a similar guide to be followed.

- Future Improvements: Distribution systems grow and often tap lines are upgraded to become feeders. When selecting a route, consideration should also be given to the use of the route for a feeder in the future.

- Environmental Impacts: Environmental impacts should always be given consideration. Wetlands are sensitive areas. River management zones are also controlled areas. Your Environmental Coordinator can assist with any regulations that must be met in these zones.

- Street Lighting: For lines located along a street, consideration should be given to the possibility of street lighting. This can often affect the pole spacing of the line.

- Railroad Crossings: Railroad crossings require that a special crossing permit be obtained. These permits are coordinated through the Joint Use Section.

- Water Crossings: Permits for lines crossing all navigable waterways are controlled by the Army Corp of Engineers. These permits are also coordinated through the Joint Use Section. For a detailed discussion on the line clearance requirements over navigable waterways, see the Clearances section of this Engineering Manual.

- Federal Lands: Federal forest lands and Native American-owned lands are other special permitting zones. These permits are also coordinated through the Joint Use Section.
- Mines: Active mining areas are subject to control by the Mine Safety & Health Administration. Progress Energy lines should remain outside of any active mining area. See Specification Dwg 01.04-04 for more detail on this.

3. Primary Framing

3.1 Voltages and Insulation Levels

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.

In the Carolinas, there are two predominant service voltages. The most common voltage (occurring over 80% of the system) is 22860GrdY/13200 volts, commonly referred to as 23 kV. The other system voltage is 12470GrdY/7200. The 12kV areas are scattered about. Some of the larger 12kV areas are in Raleigh inside the inner Beltline, Asheville and Atlantic Beach. There is one substation with a voltage of 34500GrdY/19920. These 34kV feeders are located in the Morehead City area along the road to Cedar Island.

Except for the 34kV feeders, all new Carolinas wood pole lines are insulated for 25kV levels. As in Florida, insulators on concrete poles and steel crossarms should use 35 kV insulators. The 34 kV feeders are insulated for 35 kV levels.

For both service areas the coastal construction is similar. 45 kV silicone insulation is used. This is shown in Section 12 of the Distribution Construction Specifications.

3.2 Construction Standards and Limitations

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.

In the Carolinas, the standard construction for three-phase circuits is delta using fiberglass brackets. Double circuits and vertical construction are spaced at 42 inches. Due to hardware strength limitations, 477 AAC feeder spans are limited to 280 feet maximum. Horizontal construction using wood eight-foot crossarms is an optional means of construction. Designers should avoid rolling back and forth between delta and vertical construction to the extent possible, as these rolls have less conductor clearance in mid-span.

3.3 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 that a General Distribution Feeder.

Express Feeder: A feeder that is routed past existing customers (i.e.,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 (i.e., 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.

High Reliability Line Design (Carolinas only): A feeder or feeder section that is constructed to heavy-duty design specifications as shown on Specification Dwgs 3.26-02 thru 12. These construction specifications were designed to build a feeder that would have the reliability levels of a sub-transmission system. The Region Engineering Supervisor should be consulted before this type of construction is utilized. Industrial, Express, or Dedicated feeders may be constructed to the high reliability design standards.

4.0 NESC (National Electrical Safety Code)

4.1 General

For both service areas 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 2002. The code is now on a five-year revision cycle, with the next book due out in 2007. 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.

4.2 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. The Carolinas are in the Medium Loading district, which has a wind loading of 4 lbs/ft (about 40 mph). This wind loading is acting on a conductor covered with ¼ inch of ice. The equipment or structure the wind acts on need not be covered in ice. 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 in height 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

4.3 Grade C Construction

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.

4.4 Grade B Construction

Grade B construction is encountered frequently on our system. Grade B construction is required for railroad crossings and limited access highways. 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.

5. 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 or wrapped butt pole grounds are not counted towards 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.

The grounding specifications in the Carolinas are presently different from the grounding specifications in Florida. These differences are legacy issues, and each method meets the NESC requirements and provides a solidly-grounded system. The differences have evolved due to the higher lightning levels in Florida and the different soil conditions in the service areas.

In Florida, each equipment ground is tested and rods driven to achieve a desired value of ohms. This is 15 ohms for terminal poles and 25 ohms for all other equipment poles. Due to the lightning levels in Florida, this guarantees each individual ground will perform well. See Specification Dwg 1.01-06.

In the Carolinas, the clay-type soils, rocky soils and varying water table make it much more difficult to achieve a low impedance ground. The grounding specifications are of a prescriptive nature. The number of ground rods for each type of equipment is specified. See Specification Dwg 1.01-03. This type of specification matches the value of the grounding system with the cost of the equipment it is protecting.

6. Services

6.1 General

Services and secondary conductors should be sized to meet the following three criteria:

- Load current. They should be sized to meet the anticipated peak demand load current plus any allowance for anticipated load growth. The summer and winter ampacities of each service conductor is shown in Section 5 of the Distribution Construction Specifications Manual.

- Voltage drop. They should be sized to meet the maximum voltage drop allowed for residential and commercial services.

- Flicker. They should be sized to meet the flicker allowed for the largest motor, air conditioner compressor or other devices located at the premises. Also there are regulatory flicker requirements that the flicker caused by a customer will not cause objectionable flicker to other customer's service.

  Once the wire size has been selected, the service conductors have a maximum unguyed span limit. This is shown on Specification Dwg 4.00-01. These limits are based on the deflection of a standard two-inch overhead steel mast being limited to 350 lbs. of tension.

6.2 Voltage Drop Requirements

The voltage drop requirement will usually be the governing factor for residential services due to the standard residential service length. The amount of allowed voltage drop is defined by the utility commissions in our service areas. The defined limits are as follows:

Residential or lighting customers: +/- 5% from nominal voltage of 120 volts (126 volts max, 114 volts min)

Industrial/commercial customers – Florida: +/- 7 1/2% from nominal voltage of 120 volts (129 volts max, 111 volts min)

Industrial/commercial customers – Carolinas: +/- 10% from nominal voltage of 120 volts (132 volts max, 108 volts min)

The voltage drop limits include the drop in the transformer and the drop in the secondary and service. The voltage drop in the transformers depends upon the transformer impedance. The transformer impedance limits are:

10 to 75 kva units	3.0% max, 1.5% min
100 to 167 kva units	3.0% max, 2.0% min

Since the actual transformer impedance is not known at the time of design, the practice has been to assume the residential transformers have a 2.0% impedance....i.e......2.0% of the voltage drop will occur in the transformer and the remaining 3.0% (3.6 volts) will occur in the service.

6.3 Voltage Drop Examples

Example – Residential Dwelling Voltage Drop

Residential dwelling has an estimated 20 KW demand at 120/240 volts single phase. Distance of planned sec/service is 150 ft. You are planning on running a #1/0 TPX service. What is the anticipated voltage drop?

Answer:

Assume .95 pf. KVA = KWD/pf = 20 kW/.95 = 23.5 KVA
For #1/0 TPX, from either Florida Dwg 5.00-06 or Carolinas Dwg 5.00-04, the voltage drop factor per hundred ft is .087.
.087 [vd per 100 ft] times 23.5 KVA times 1.5 [hundred ft] = 3.06 volts drop
3.06 volts < 3.6 volt design limit

Example – Office Building Service

A small office building has an estimated demand of 70 KWD at 208Y/120 volts three phase. Distance from transformer bank to POD is 80 ft. What is the minimum size OH service required? Do we need a lift pole?

Answer:

Assume .85 pf. KVA = KWD/pf = 70 kW/.85 = 82.4 KVA

First, find minimum size service cables needed due to ampacity.
3 Ph KVA = [Square root 3] times Volts (ph to ph) times Amps
Amps = 3 Ph KVA/ [Square root 3] times Volts = 82.4 KVA/[1.732 X .208] = 229 amps
From either Florida Dwg 5.00-11 or Carolinas Dwg 5.00-03, need #4/0 QPX.

Second, check voltage drop.
For #4/0 QPX, from either Florida Dwg 5.00-06 or Carolinas Dwg 5.00-04, the voltage drop factor per hundred ft is .0432.
.0432 [vd per 100 ft] times 82.4 KVA times 0.8 [hundred ft] times 2/3 (to get on 120 volt base) = 1.90 volts drop
1.90 volts < 3.6 volt design limit

Do we need a lift pole?
Distance is 80 feet.
See Dwg 4.00-01.
Limit of #4.0 QPX unguyed is 60 feet. Therefore, a lift pole is needed.

6.4 Flicker

The requirements for voltage flicker limits vary between our service areas.

CAROLINAS: While there is no regulatory limit for the amount of flicker a customer's device may cause in their own service, from a practical standpoint there should be a design limit for residential services. Without a design limit for residential services the standard air conditioner or heat pump's normal operation would cause objectionable flicker for the average customer. The design practice has been to limit residential flicker to no more than 6% (7.2 volts) in the service.

FLORIDA: In Florida sudden changes in voltage (flicker) that occur more frequently than two times per hour are limited to 5%. Voltage changes that occur more frequently than once per minute are limited to 2 ½%.

A more detailed discussion of voltage flicker requirements is located in DST-EDGX-00033 Voltage Flicker of this Engineering Manual.

6.5 Large Overhead Services

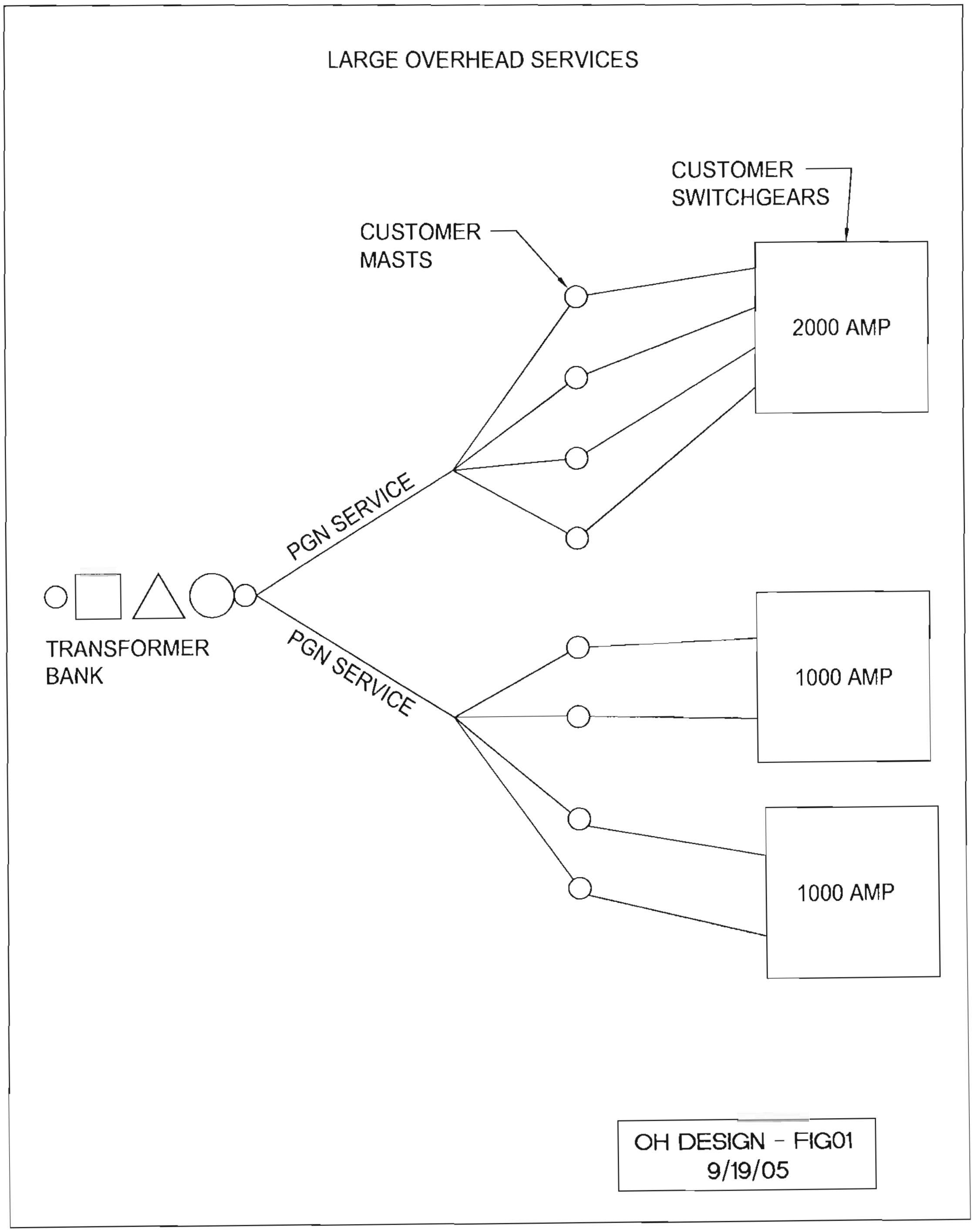
One situation encountered in overhead systems is an overhead service to a high amperage point of delivery. When the customer starts wiring out more than four or six conductors per phase and our service drops need to be several conductors per phase to handle the amperage, connecting up this many wires can be a challenge. It is difficult to parallel this many conductors per phase. The key is to divide and conquer.

For load requirements where multiple-service disconnects are to be installed, the National Electric Code permits a maximum of six disconnects to be installed. Most electricians will take advantage of this code rule. It is more economical to use the individual disconnects than to use a main breaker and the same number of individual disconnects. A point of delivery like this could have up to six mastheads and six or more conductors per phase. Cable trays with large amounts of conductors could also be used.

In Florida where more than one service riser is involved, our service policies require that it is the responsibility of the customer to connect the conductors from each riser together. In the Carolinas it is the responsibility of the utilities to connect the service drop conductors to the service riser conductors. Large overhead service connections are more of a problem in the Carolinas than they are in Florida.

The key is to connect up all of the conductors without needlessly paralleling all of the conductors. The designer should work with the electrical contractor to have each set of conductors indentified for each disconnect. The load for each disconnect should also be identified. The designer could then group sets of disconnects to be served by a set of conductors in our service drop. See Fig 01 below.

There are other NEC rules that allow customers to have more than one disconnect. When the customer's load requirements are in excess of 2000 amps, the NEC permits the customer to have a second point of delivery. This second point of delivery could be adjacent to the first point of delivery or located at another location.



7.0 Poles

7.1 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:

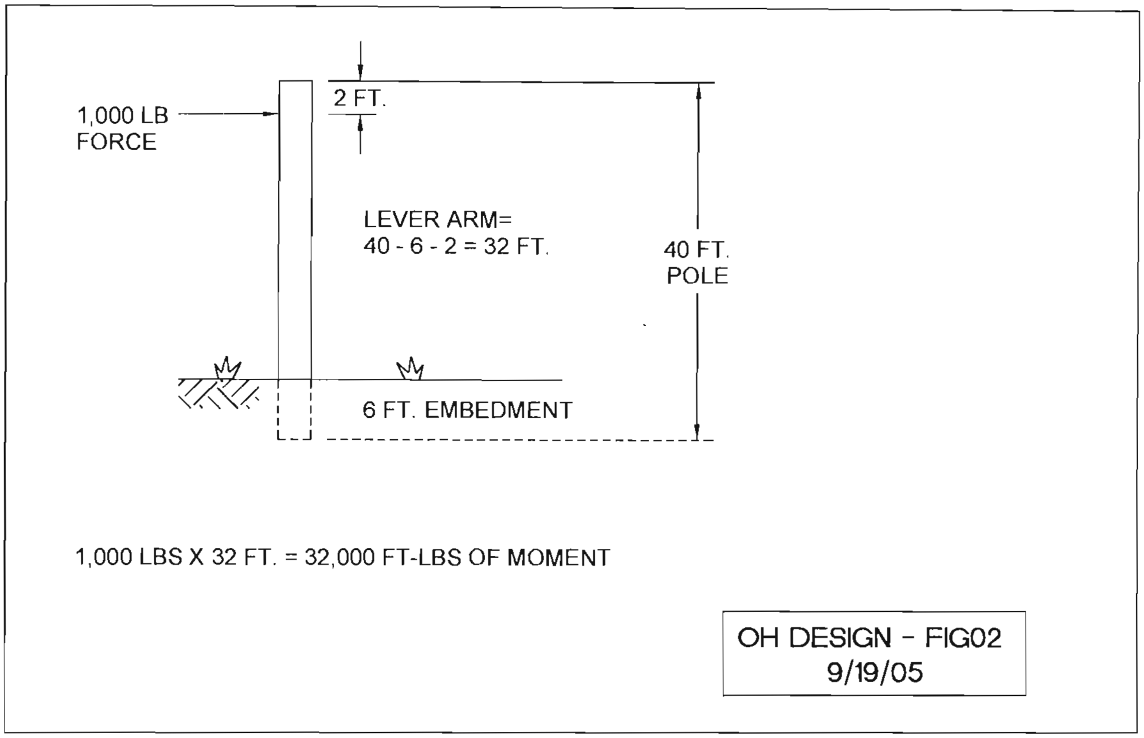
- The vertical, downward axial loading in the pole caused by the guy lead. (See Fig 05). This is usually the major force. The horizontal force of wind and tension on the conductors is offset by the horizontal force component of the guy wire. So only the vertical component would contribute to the pole, 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 to include the joint use facilities and the ice weight (for Carolinas only) 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)
Carolinas 4 lbs/sq ft force (40 mph), with conductor areas increased by ¼ inch radial ice

Ice Loading:
Florida No ice
Carolinas ¼ inch radial ice on conductors

Overload Factors	
Class C – Normal construction	2
Class C – Crossing over other circuits	2.75
Class B – Railroad crossings and controlled access highways	4

Shape Factors for Wind Loading	
Cylindrical components – poles, transformers	1.0
Flat surfaces – cap banks, reclosers	1.6

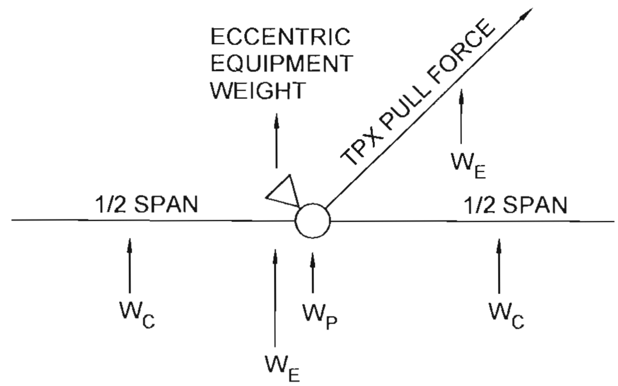
POLE BENDING MOMENTS - SOUTHERN YELLOW PINE						
POLE SIZE	CLASS	POLE DEPTH (FT)	CIR AT GROUND LINE (IN)	ANSI MAXIMUM MOMENT (FT-LBS)	WIND ON POLES	
					CAROLINAS	FLORIDA
30	4	5.0	29.85	56,173	739	1,787
30	6	5.0	25.33	34,234	656	1,475
35	3	5.5	34.19	84,410	1,234	2,777
35	4	5.5	31.68	67,151	1,134	2,551
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



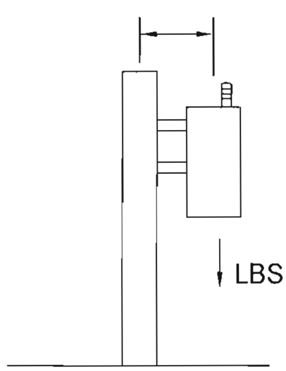
W_C = WIND FORCE ON CONDUCTORS = SPAN LENGTH X FORCE PER FOOT (W_F)

W_F = WIND FORCE / COND. FT = WIND FORCE (LB/FT) X $\frac{\text{CONDUCTOR DIAMETER (IN)}}{12}$

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. As another example, consider a 477 Sac conductor in Carolina with a 300 foot span. The diameter of this conductor is .793 inches and the ¼ inch of radial ice added yield an overall diameter of 1.293 inches. Wc = (4 lbs/sq ft)[1.293/12] = .431 lb/ft. The 300 ft span times .431 lb/ft is a force of 129 lbs per conductor on the pole. 129 lbs at a height of 32 feet is 4,128 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 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).

7.2 <u>Pole-Sizing-Height – Non-Joint Use Poles</u>

The recommended approach to selecting the proper pole is to determine the height needed first, and then determine the class pole needed.

The height of the pole needed is determined from a combination of the ground clearance required by the NESC for the lowest conductor/cable on the pole plus the NESC clearances between the various conductors/cables on the pole.

Step 1- Determine the sag of the lowest conductor/cable on the pole. If there are no joint use conductors/cables on the pole, the sag of lowest supply conductor must meet minimum NESC ground clearances for the conditions under the line. See Specification Drawing 09.02-01 for appropriate ground clearances. These ground clearances are determined under the following conductor temperature and loading conditions, whichever gives the greatest final sag (NESC Rule 232)

- 120 degree F, no wind displacement
- The maximum temperature for which the line is designed to operate (185 degree F for Florida, 120 degrees F for the Carolinas.)
- 32 degrees F, no wind displacement, radial thickness of ice (1/4 inch for the Carolinas, none for Florida)

For our example, we will use a #4/0 AAAC neutral in a 300-foot span that crosses a Carolina DOT-maintained road. Carolina 25 kV construction will be used.

Before we check out the span for the above conditions, we need to first understand the basics of ruling spans. (See the Conductor Sag and Tension section of this Engineering Manual for a complete in-depth discussion of this topic.) Ruling span is an equivalent span length based on the total spans and the average tension of the conductor in a series of spans being pulled up and sagged in one operation. It is a theoretical span whose sag and tension characteristics, when applied to the whole section, will result in the minimum tension difference between the individual spans once they are tied off. The formula to calculate the ruling span is:

$$RULING\ SPAN = \sqrt{\frac{S_1^3 + S_2^3 + S_3^3 + \cdots S_n^3}{S_1 + S_2 + S_3 + \cdots S_n}}$$

Here is an Excel spread sheet that can perform the ruling span calculation.

Ruling Span Calculation Sheet

When looking up the sags for a particular conductor in the sag tables, we need to be in the section called Conductor Loading Conditions for Design. We then go to the section of the sag table that contains the closest ruling span. Within that ruling span section, find the sag for the span length of concern. If you find that the actual ruling span you have is between the ruling spans listed in the charts, you can interpolate between the two span values. Since you are doing safety calculations and the actual amount of initial sag done by the installing crews could be in doubt, another method is to use the larger sag value for your design calculations.

Now let's go back to our example. Assume we have ruling spans such that the 280-foot ruling span chart section is close. For the first condition listed above, checking the final sag tables in Specification Dwg 05.01-18, the 120 degree, no wind displacement final sag for a 300-foot span is 66 inches.

For the second condition, since the neutral will not be operated above 120 degrees F, there is no need to check this sag.

For the third condition, the 32 degrees F, no wind displacement, ¼ inch ice sag is 40 inches.

The condition resulting in the greatest sag is the 120 degrees F, no wind displacement which gives the 66 inches of sag.

Step 2: Determine the required ground clearance distance. Assume, for instance, that it is a DOT-maintained highway. From Specification Dwg 09.02-01, 15.5 foot of clearance over roads subject to truck traffic is required by the NESC for the neutral. However, in North Carolina, 18 feet of clearance is required over DOT-maintained roads. In Florida, 24 feet is required over limited access roads and 18 foot over all others. Therefore, we add 66 inches (5.5 feet) to the 18-foot minimum clearance to determine the mounting height of our neutral on the pole which would be 23.5 feet.

If there were any grade differences between the base of the poles and the ground area being spanned, it should be taken into account in this step. For instance, if the bases of the poles were three feet below a raised roadway, then three additional feet should be added to the required neutral height.

Step 3- Determine what the primary conductor configuration is for the top of the pole. In our example we will be constructing a three-phase 25 kV line (Carolina construction). See Specification Drawing 03.12-02. The total supply space requirement shown on this drawing for 25 kV construction is 145 inches, or 12.08 feet. Adding this to the Step 2 height will require an above-ground height of 35.6 feet (23.5 feet plus 12.08 feet).

Step 4- The normal requirement of pole depth setting is 10 % of pole length plus 2 feet. The actual pole setting depths depend on soil conditions and are shown on Specification Dwg 02.02-14. In the above example, if we selected a 45-foot pole, the setting depth would be 0.10 X 45 foot plus 2 feet = 6.5 feet. If we subtract this from 45 feet (45-6.5) it will leave us with 38.5 foot height above ground level, 2.9 feet more than our calculated need.

7.3 <u>Pole Sizing-Height –Joint Use Poles</u>

There are several considerations to be taken into account for joint use poles. First, let's look at some of the basic NESC rules involving vertical separation of joint use cables from our supply space conductors.

The NESC requires a "Communications Worker Safety Zone" of 40 inches on the pole between the highest communications cable and the lowest supply conductor/cable on the pole.

If additional joint-use companies will be attaching to the pole, we would need to add 12 inches for each additional one.

There are also some additional sag-related clearance rules to be considered involving the mid-span separations between the different conductors. The sag of the joint use cables will rarely be exactly equal to the sag of the supply conductors, so sag differences must be considered. NESC Rule 235-C2 requires the conductors and cables to have their vertical clearance adjusted at the supporting structure so that the clearance at any point in the span for voltages less that 50 kV between conductors is not less than 75% of that required at the supports. There are some exceptions. A neutral conductor bonded to the communication as required by the code may have a span clearance of 12 inches provided the clearance at the supporting poles of 30 inches is maintained. Since it is not the standard practice in either Florida or the Carolinas to enforce and monitor the NESC bonding requirements, this exception is rarely able to be used.

Let's now look at some joint use examples and determine how much additional pole height must be added to the pole to accommodate the joint use.

Example – Joint Use

You have obtained the sag requirements for the joint use cables from the joint use company. Their design final sag requirements are 6 inches more than the design final sag requirements of our supply neutral. The bonding exception requirements for NESC Rule 235-C2 will not be met.

Answer:

In this case we need to allow for the Communications Worker Safety Zone on the pole and also take into account the increased sag requirements. The following should be added to the height calculations for a non-joint use pole:

- 40 inches (3.33 feet) for the Communications Worker Safety Zone
- 12 inches (1 foot) for each additional joint use company
- 6 inches (0.5 feet) for the difference between the joint-use cable sag and our supply-conductor neutral sag.

In the prior non-joint use pole example, what would be the neutral attachment height for one joint use cable? We would need to add the additional joint use space to the 23.5 foot distance we determined in Step 2 above. This would be the 23.5 feet plus 3.33 feet plus .5 feet for a total of 27.33 feet.

Example – Joint Use

You have obtained the sag requirements for the joint use cables from the joint use company. Their design final sag requirements are two feet total, which is less than the design final sag requirements of our supply neutral. Our neutral sag requirements are 66 inches (5.5 feet). The bonding exception requirements for NESC Rule 235-C2 will not be met. How high would the neutral need to be for maintaining an 18-foot road clearance?

Answer:

First, determine the clearance at mid-span between the lowest supply conductor and the highest joint use cable. The NESC will allow the clearance between conductors/cables in mid-span to be 75 percent of the clearance required at the pole. If the sag of the supply conductor/cable is greater than 75 percent of the clearance requirement at the pole, the mounting height of the supply conductor/cable will have to be raised to meet the minimum clearance in mid span. Start with our neutral sag, 66 inches, and subtract the joint use cable sag of 24 inches to get 42 inches of sag difference. We need 75% of 40 inches, or 30 inches as a minimum as a mid span clearance. The total mid span clearance mounting requirement is therefore 42 inches plus 30 inches, for a total of 72 inches. We will need to raise our neutral attachment height from 40 inches to 72 inches, which is an additional 32 inches. So the pole spacing between our neutral and the joint use cable attachment should be 72 inches to meet the mid span requirement.

The following should be added to the height calculations for a non-joint use pole:

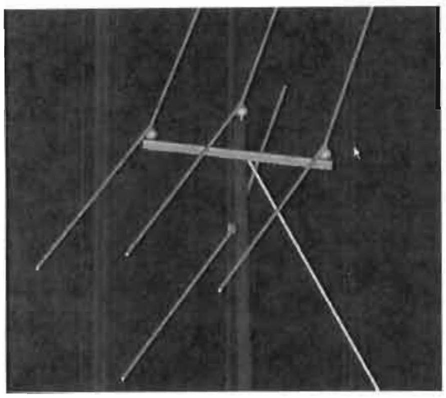
- 40 inches (3.33 feet) for the Communications Worker Safety Zone
- 32 inches (2.66 feet) for the additional sag-related clearances
- 12 inches (1 foot) for each additional joint use company

Let's do the math for this from the mid-span viewpoint again first. From a mid-span viewpoint, the distance totals would be the 18 feet ground clearance to the joint use cable plus the 30 inch (2.5 feet) mid-span clearance plus the 66 inches (5.5 feet) of neutral sag for a total of 26 feet.

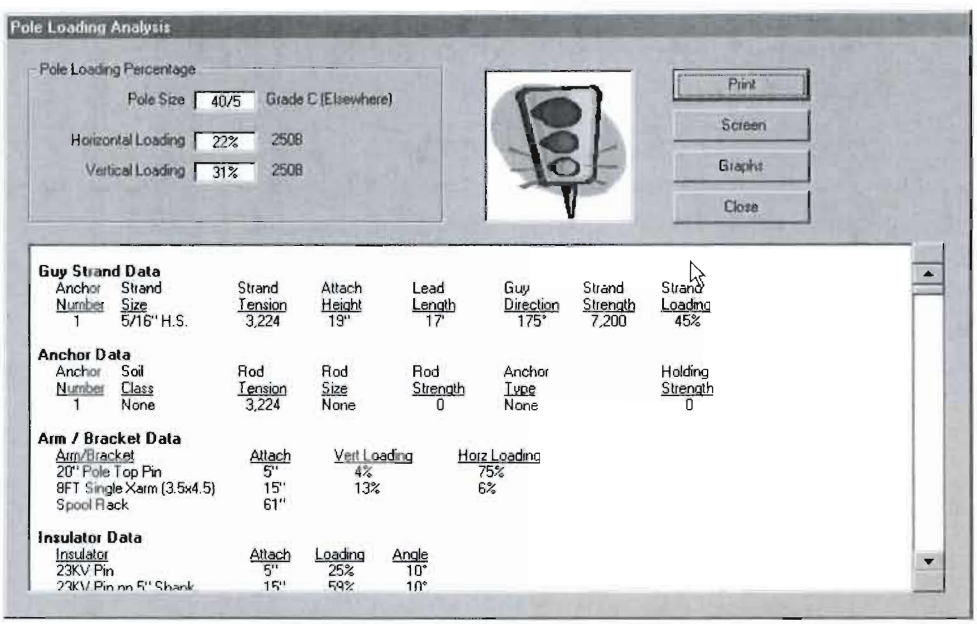
We can also check the math from the pole viewpoint if we desire. From the pole viewpoint, the required mounting height for the joint use cable attachment is 18-feet of ground clearance for the joint use cable plus two feet of joint use sag for a mounting height of 20 feet. To this we add the 72 inches (6 feet) spacing between the supply and joint use cable for a total of 26 feet to the neutral attachment mounting height.

7.4 Pole Foreman

The recommended computer program used 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.

This program is sold by individual software licenses. This method is currently more economical than a corporate site license. An individual site license is about $1500 purchase price with an annual maintenance fee of 14%. The maintenance fee covers changes in Progress Energy templates, NESC rule changes and program feature upgrades. Contact Distribution Standards if you are interested in purchasing a copy.

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

8. 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.

8.1 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.

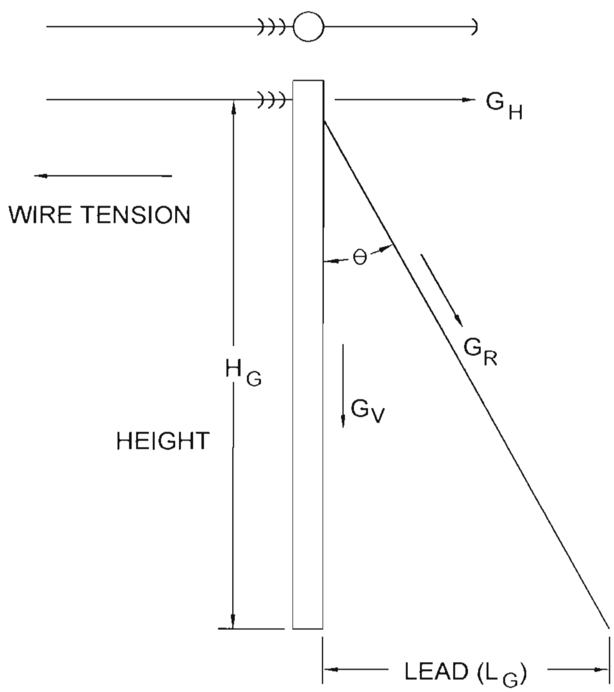
The maximum loading tensions with appropriate NESC overload factors must be used for the conductor tensions.

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

$$\sin\theta = \frac{L_G}{\sqrt{H_G^2 + L_G^2}} \qquad \cos\theta = \frac{H_G}{\sqrt{H_G^2 + L_G^2}}$$

G_R = GUY RESISTIVE FORCE

$$G_R = \frac{G_H}{\sin\theta} \quad \underline{\text{OR}} \quad G_H\left[\frac{\sqrt{H_G^2 + L_G^2}}{L_G}\right]$$

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

8.2 Angle or Bisector Guys

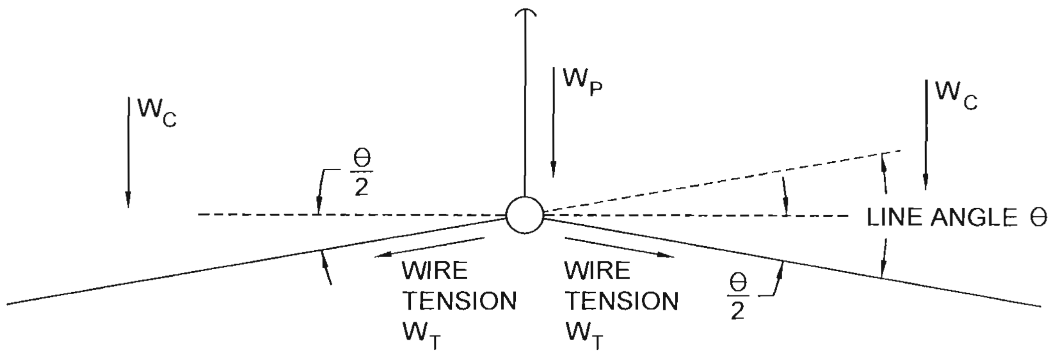
An angle or bisector guyed structure is treated differently by the NESC. A tangent pole has the transverse wind loading on the conductors and pole resisted by the bending moment of the pole. A guyed structure is required to use the pole acting as a column or strut only, and all the forces must be resisted 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. The Carolinas are in the Medium Loading district, which has a wind loading of 4 lbs/ft (about 40 mph). This wind loading is acting on a conductor covered with ¼ inch of ice. The equipment or structure the wind acts on need not be covered in ice. 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
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8.3 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. For the Carolinas, use Specification Dwgs 02.04-32, 34 and 36. For the Florida, use Specification Dwgs 02.04-33, 35 and 37. The reason there are two sets of charts for the same wire size is due to the Carolinas area being in the medium-loading zone and the Florida area being in the light-loading zone. 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.)

8.4 Example – Guy Sizing

Case One: Grade C construction, 3#1/0 AAAC primary conductors with #1/0 AAAC neutral, 250 foot span, 45 ft pole, conductor configuration vertical turning a 45-degree line angle utilizing angle assemblies, guy lead available is 20 feet.

Allowing for embedment depth, the guy lead to height ratio is 1: 1.95. The 1:2 ratio sections will therefore be used. The 50-degree angle will be used.
Carolinas area: From Specification Dwg 02.04-34, the guy wire tension for a #1/0 single conductor is 3543 lbs.
Florida area: From Specification Dwg 02.05-35, the guy wire tension for a #1/0 single conductor is 3,920 lbs.
Conductor/guy configuration that will be utilized is two guys backing up three primary conductors and one guy backing up the neutral conductor.

Primary guy tensions – Carolinas: 3,543 lbs times 1.5 equals 5,314 lbs.
Neutral guy tension – Carolinas: 3,543 lbs
Primary guy tensions – Florida: 3,920 lbs times 1.5 equals 5,880 lbs.
Neutral guy tension – Florida: 3,920 lbs

From Specification Dwg 02.04-10, a 5/16 HS guy wire for Grade C construction is rated 6,545 lbs. This easily meets the required primary and neutral guy tensions.

8.5 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 of eastern NC. 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. After hurricanes, many beach lines have been found to be leaning or the poles lying on the ground un-broken. Adding storm guys will avoid this.

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.

8.6 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 pull out 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.

8.7 Guy Insulator Clearances

NESC Rule 279 (2) b 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.

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.

9.0 Overhead Conductor Data

9.1 Electrical Properties

Let's look at some of the basic electrical properties of conductors. This will give us a basis for understanding how the voltage drop factors are determined.

DC Resistance: The DC resistance of a conductor is a function of its cross sectional area, length and volume resistivity. This can be expressed as

$$R = Pv\ [L/A]$$

where R = conductor resistance (ohms per unit length)
Pv = volume resistivity of conductor material
L = conductor unit length
A = conductor cross sectional area

The resistance of a material is a function of temperature. The resistance will go up as the temperature rises. The common temperature used for measuring this is 20 deg C. To determine the DC resistance at other temperatures, the known resistance must be corrected using the temperature coefficient of resistance for the conductor metal. Over a moderate temperature range such as 0 deg C to 120 deg C the change in resistance is linear.

AC Resistance: A conductor offers a greater resistance to the flow of alternating current than it does to direct current. Factors that are responsible for this are skin effect, proximity effect and hysteresis and eddy current losses. Let's look at these factors.

Skin effect is always present in a conductor carrying AC current. AC current tends to flow near the outside of a conductor, yielding a higher current density on the outer layers and increasing the effective resistance. For a concentric-lay stranded aluminum conductor such as we use, studies indicate that the skin effect is identical to that of a solid cylindrical conductor having the same DC resistance. The magnitude of this increase is usually expressed as an AC/DC ratio. These ratios would be determined from conductor tables.

Proximity effect is present when two conductors carrying AC current are spaced relatively close to one another. Their mutual inductance affects the current distribution in each wire. This results in greater current density on the near sides of the conductors when the current in the conductors is flowing in opposite directions and at the far sides of the conductors when the current is flowing in the same direction. Similar to skin effect, this leads to an increase in resistance. Bare overhead conductors are usually installed with sufficient spacing such that proximity effects may be neglected. However, it is a factor in tri-plexed cables.

Hysteresis and eddy current effects in conductors add to the effective AC resistance. These losses are a function of current and increase with the level of current. These losses are important in conductors utilizing steel cores at high current levels, such as our ACSR conductors. In concentric-lay stranded conductors the practice is to alternate the direction of lay in the different layers. This allows for one strand layer to cancel out the axial magnetic effects of the next layer.

Inductance and Inductive Properties: The inductance (L) of an electrical circuit is defined as the ratio of the voltage drop along the conductor (V) to the rate of change of the current (i). It is expressed as

$$V = L\,[di/dt]$$

The general method of calculating inductance expresses the distance between conductors in terms of geometric mean distance (GMD) and the conductor radius in terms of geometric mean radius (GMR). Inductive reactance for cables is generally given in terms of ohms per 1000 ft.

9.2 Voltage Drop Constants

Using the electrical properties of AC resistance and inductive reactance from the manufacturer's tables, a voltage drop constant can be calculated for our Progress Energy overhead service cables. These voltage drop constants are expressed in terms of per kva per 100 feet of circuit on a 120 volt base in our construction specifications. The formula for calculating the voltage drop constant is

$$\text{Voltage Drop Constant} = I[R\ \cos(\varnothing) + X\ \sin(\varnothing)]$$

where I = current for one kva of load in amps
R = AC resistance in ohms
X = inductive reactance in ohms per
Ø = power factor phase angle

Let's see how we can calculate the voltage drop constant for a typical overhead conductor. As an example, let's use 1/0 aluminum triplex, which is a common conductor in the Carolinas. What we want to calculate is the voltage drop per kva per 100 ft on a 120 volt base. Let's use a .95 power factor.

From the manufacturer's data we can get the resistance and reactance.
AC resistance @ 90 Deg C is .210 ohms per 1000 ft
Reactance is .029 ohms per 1000 ft

Find the current I for one kva
I = [1000 VA]/240 V = 4.17 amps

Find the AC resistance R for 100 ft of TPX
R = [.210/10] 2 = .042 ohms   Note: Times 2 for two wire loop in circuit

Find inductive reactance X for 100 ft
X = [.0289/10] 2 = .00578 ohms

Find the phase angle Ø
Inverse COS (.95) = 18.2 degrees
COS (18.2) = .95
SIN (18.2) = .312

Find Voltage Drop Constant
Voltage Drop constant = 4.17 [.042 (.95) + .00578 (.3122)] = .1739 volts per kva per 100 ft
This is on a 240 volt base. Divide by 2 to get 120 volt base.
.1739/2 = .0869 volts per kva per 100 ft

The .087 figure is listed on Specification Dwg 05.00-04.

9.3 Progress Energy Tables

Overhead conductor data is found in both the Distribution Overhead Construction Specifications Manual and the Engineering Manual. Data which is used in the day-to-day job by both engineers and service coordinators is found in the construction specifications. Other more engineering oriented data is in the Engineering Manual. The main overhead conductor data tables are located as follows:

- Voltage Drop Factors: These are found in the construction specifications. These tables contain the voltage drop factors for overhead multiplexed cables. The Carolinas table is Specification Dwg 05.00-04 and the Florida table is Specification Dwg 05.00-06.

- Multiplex Cable Ampacities: These are found in the construction specifications. These tables contain ampacity, weights, and some physical data. The Carolinas table is Specification Dwg 05.00-03 and the Florida table is Specification Dwg 5.00-11.

- Bare Conductor Ampacities: These are found in the construction specifications. These tables contain ampacity, weights, and some physical data. The Carolinas tables are Specification Dwgs 05.00-01 & 02 and the Florida table is Specification Dwg 5.00-10.

- AC Resistance & Reactance: This data is found in the Engineering Manual below in Figures 7 thru 10.

BARE PRIMARY CONDUCTORS - PHYSICAL AND MECHANICAL PROPERTIES

SIZE - NAME	STRAND.	COPPER EQUIV.	DIA. (INCHES)	CROSS SECTION AREA (SQ. IN.)	MCM (ALUM.)	WT. PER MILE (LBS.)	VERTICAL LOADS WEIGHT LOAD (LBS./LIN. FT.)				HORIZONTAL LOADS WIND LOAD (LBS./LIN. FT.)					RATED BREAKING STRENGTH
							BARE	1/4" ICE	1/2" ICE	1" ICE	40 MPH (4 PSF)	80 MPH (16 PSF)	90 MPH (21 PSF)	100 MPH (26 PSF)	110 MPH (31 PSF)	
#4 - SWANATE	7/1	6	.257	.0411	62.50	354	.0670	.22	.54	1.63	.25	.34	.45	.56	.66	2,360
#2 - SPARROW	6/1	4	.316	.0608	66.37	482	.0913	.27	.60	1.73	.27	.42	.55	.68	.82	2,850
1/0 - RAVEN	6/1	2	.398	.0968	105.53	767	.1453	.35	.69	1.88	.30	.53	.70	.86	1.03	4,380
4/0 - PENGUIN	6/1	2/0	.563	.1939	211.61	1537	.2911	.54	.95	2.23	.35	.75	.99	1.22	1.45	8,350
336.4 - MERLIN	18/1	4/0	.684	.2789	336.40	1929	.3652	.66	1.10	2.46	.41	.91	1.20	1.48	1.77	8,680
556.5 - PARAKEET	24/7		.914	.4938	556.50	3786	.7169	1.08	1.60	3.10	.47	1.22	1.60	1.98	2.36	19,800
795 - TERN	45/7		1.063	.6674	795.00	4731	.8958	1.30	1.87	3.46	.52	1.42	1.86	2.30	2.75	22,100
477 SAC - COSMOS	45/7	300	.792	.493	477.00	2364	.4475	.77	1.25	2.68	.43	1.06	1.39	1.72	2.05	8360

BARE PRIMARY CONDUCTORS - ELECTRICAL PROPERTIES

SIZE - NAME	RESISTANCE (OHMS)				REACTANCE (OHMS) @ 50°C										RATED AMPACITY
	25°C		50°C		10"		15"		30"		54"		60"		
	PER MILE	PER 1000 FT.	PER MILE	PER 1000 FT.	PER MILE	PER 1000 FT.	PER MILE	PER 1000 FT.	PER MILE	PER 1000 FT.	PER MILE	PER 1000 FT.	PER MILE	PER 1000 FT.	(AMPERES)
#4 - SWANATE	2.226	.422	2.48	.470	.689	.131	.738	.140	.823	.156	.894	.169	.907	.172	140
#2 - SPARROW	1.390	.263	1.610	.305	.623	.118	.672	.127	.757	.143	.828	.157	.841	.159	185
1/0 - RAVEN	.924	.175	1.030	.195	.588	.111	.637	.121	.721	.137	.793	.150	.805	.153	240
4/0 - PENGUIN	.493	.093	.545	.103	.553	.105	.602	.114	.686	.130	.758	.144	.770	.146	365
336.4 - MERLIN	.273	.052	.300	.057	.440	.083	.489	.093	.573	.109	.645	.122	.657	.125	515
556.5 - PARAKEET	.163	.031	.179	.034	.401	.075	.450	.085	.534	.101	.606	.114	.618	.117	720
795 - TERN	.116	.022	.128	.024	.384	.073	.433	.078	.517	.098	.589	.112	.601	.114	890
477 SAC - COSMOS	.194	.037	.213	.040	.426	.081	.475	.090	.559	.106	.630	.119	.643	.122	640

CAROLINAS BARE CONDUCTORS

OH DESIGN - FIG07
9/20/05

OVERHEAD MULTIPLEX CONDUCTORS - PHYSICAL AND MECHANICAL PROPERTIES

SIZE - NAME	PHASE		NEUTRAL		DIA. OF CIRCUM-SCRIBED CIRCLE (INCHES)	AREA OF CIRCUM-SCRIBED CIRCLE (SQ. INCHES)	VERTICAL LOADS WEIGHT LOAD (LBS./LIN. FT.)				HORIZONTAL LOADS WIND LOAD (LBS./LIN. FT.)				
	SIZE, AWG AND STRANDING	INSULATION THICKNESS MILS	SIZE, AWG AND STRANDING	RATED BREAKING STRENGTH			NO ICE	1/4" ICE	1/2" ICE	1" ICE	40 MPH (4 PSF)	80 MPH (16 PSF)	90 MPH (21 PSF)	100 MPH (26 PSF)	110 MPH (31 PSF)
#4 ALUM. TRIPLEX CRAB	4-7	45	30580 - 7	1110	.63	.3117	.153	.427	.856	2.181	.377	1.507	1.978	2.448	2.919
#2 ALUM. TRIPLEX SOLASTER	2-7	45	48690 - 7	1760	.75	.4418	.232	.543	1.010	2.409	.417	1.667	2.188	2.708	3.229
1/0 ALUM. TRIPLEX SANDCRAB	1/0-7	60	77470 - 7	2800	.95	.7088	.373	.746	1.275	2.799	.483	1.933	2.538	3.142	3.746
1/0 ALUM. QUADRUPLEX VIATKA	1/0-7	60	77470 - 7	2800	1.11	.9677	.542	.965	1.543	3.167	.537	2.147	2.818	3.488	4.159
4/0 ALUM. TRIPLEX LEPAS	4/0-19	60	246900-7	8560	1.32	1.368	.754	1.242	1.886	3.640	.607	2.427	3.185	3.943	4.702
4/0 ALUM. QUADRUPLEX WALKING	4/0-19	60	246900-7	8560	1.49	1.744	1.015	1.556	2.253	4.113	.663	2.653	3.483	4.312	5.141
350 ALUM. TRIPLEX	350000-37	95	246900-7	8560	1.76	2.44	1.187	1.812	2.593	4.620	.753	3.013	3.955	4.897	5.838
350 ALUM. QUADRUPLEX	350000-37	95	246900-7	8560	2.15	3.63	1.635	2.381	3.283	5.554	.883	3.533	4.638	5.742	6.846

OVERHEAD MULTIPLEX CONDUCTORS - ELECTRICAL PROPERTIES

SIZE - NAME	RESISTANCE (OHMS)								REACTANCE		RATED AMPACITY
	25°C		50°C		75°C		90°C		(OHMS) @ 50°C		
	PER MILE	PER 1000 FT.	PER MILE	PER 1000 FT.	PER MILE	PER 1000 FT.	PER MILE	PER 1000 FT.	PER MILE	PER 1000 FT.	(AMPERES)
#4 ALUM. TRIPLEX CRAB	2.23	.423	2.46	.465	2.67	.506	2.81	.532	.158	.030	118
#2 ALUM. TRIPLEX SOLASTER	1.40	.266	1.54	.292	1.68	.318	1.76	.334	.153	.029	159
1/0 ALUM. TRIPLEX SANDCRAB	.88	.167	.97	.184	1.06	.200	1.11	.210	.153	.029	211
1/0 ALUM. QUADRUPLEX VIATKA	.88	.167	.97	.184	1.06	.200	1.11	.210	.153	.029	187
4/0 ALUM. TRIPLEX LEPAS	.44	.083	.49	.092	.53	.100	.55	.105	.143	.027	329
4/0 ALUM. QUADRUPLEX WALKING	.44	.083	.49	.092	.53	.100	.55	.105	.143	.027	290
350 ALUM. TRIPLEX	.28	.053	.31	.059	.33	.063	.35	.066	.143	.027	420
350 ALUM. QUADRUPLEX	.28	.053	.31	.059	.33	.063	.35	.066	.143	.027	400

OH DESIGN – FIG08
9/20/05

CAROLINAS OVERHEAD CABLES

FLORIDA OVERHEAD SERVICE & SECONDARY CABLES
PHYSICAL & ELECTRICAL PROPERTIES

SIZE - NAME	NO. OF STRANDS	INSULATION THICKNESS (MILS)	BARE OD (INCHES)	INSUL OD (INCHES)	AC RESISTANCE - OHMS PER 1000 FT			INDUCTIVE REACTANCE OHMS/1000 FT
					25°C	75°C	90°C	
SERVICE CABLES								
#6 DUPLEX VISLA	7	45	0.178	0.277	0.6726	0.8057	0.8457	0.032
#2 TRIPLEX SOLASTER	7	45	0.283	0.382	0.2656	0.3182	0.334	0.029
#1/0 TRIPLEX SANDCRAB	7	60	0.357	0.489	0.1671	0.2002	0.2101	0.029
AERIAL CONDUCTORS - SECONDARY								
#4 DUPLEX WHIPPET	7	45	0.225	0.324	0.4227	0.5064	0.5315	0.030
#1/0 DUPLEX NO CODE WORD	7	60	0.357	0.489	0.1671	0.2002	0.2101	0.029
#1/0 TRIPLEX AUBURN	7	60	0.357	0.489	0.1671	0.2002	0.2101	0.029
#4/0 TRIPLEX NO CODE WORD	19	60	0.512	0.644	0.0835	0.1001	0.1051	0.027
#1/0 QUADRUPLEX GALLEY	7	60	0.357	0.489	0.1671	0.2002	0.2101	0.029
#4/0 QUADRUPLEX NO CODE WORD	19	60	0.512	0.644	0.0835	0.1001	0.1051	0.027

DATA IS FROM GENERAL CABLE (BICC) DATED MAY 2005

OH DESIGN - FIG09
9/20/05

	CATALOG NUMBER	TYPE OF INSULATION	*AMPACITY PER CONDUCTOR	WEIGHT IN POUNDS PER FOOT	OUTSIDE DIAMETER INCHES	BREAKING STRENGTH IN POUNDS
600 VOLT COPPER CABLE						
6 DUPLEX		HDP	65	.210	0 32	1,105
6 TRIPLEX		HDP	100	.310	0.63	1,105
2 TRIPLEX		HDP	135	630	0.84	2,705
6 QUADRUPLEX		HDP	85	.440	0.80	1,105
2 QUADRUPLEX		HDP	120	1.000	1 09	2,705
6 SOLID 1/C		TBWP	100	.112	0.287	763
4 SOLID 1/C		TBWP	130	164	0.329	1,213
2 STRANDED 1/C	193501	XLP	192	.342	0.870	2,622
1/0 STRANDED 1/C		TBWP	235	.424	0.524	3,066
2/0 STRANDED 1/C		TBWP	275	.522	0.570	3,866
4/0 STRANDED 1/C	193504	XLP	400	587	1.110	6,149
250 KCM STRANDED 1/C		TBWP	410	.985	0 762	7,265
350 KCM STRANDED 1/C		XLP	510	1.345	0.866	10,170
500 KCM STRANDED 1/C	193507	XLP	700	2 071	1.390	14,530
600 VOLT ALUMINUM SERVICE CABLE (SC)						
6 DUPLEX	180404	XLP	55	0.063	0.43	528
4 TRIPLEX		XLP	100	1.156	0.71	826
2 TRIPLEX	181408	XLP	135	0 228	0.73	1,266
2 QUADRUPLEX	182408	XLP	160	0.310	1.02	1,267
1/0 TRIPLEX	181410	XLP	250	0.366	1.00	1,864
1/0 QUADRUPLEX	182411	XLP	225	0.533	1 19	1,990
4/0 TRIPLEX	181412	XLP	400	0.697	1 30	4,020
336.4 QUADRUPLEX	182422	XLP	465	1.630	1 80	5,940
600 VOLT ALUMINUM AERIAL SECONDARY CABLE (ASC)						
4 2 CONDUCTOR	201103	XLP	90	0.099	0.54	1,745
1/0 2 CONDUCTOR	201101	XLP	271	0.265	0.85	4,380
1/0 3 CONDUCTOR	201106	XLP	250	0.408	1.00	4,415
1/0 4 CONDUCTOR	201109	XLP	225	0.533	1.19	4,415
4/0, 4/0, 1/0	201107	XLP	400	0.626	1 39	4,415
4/0, 4/0, 4/0, 1/0	201111	XLP	355	0.968	1.74	4,415

*AMPACITY BASED ON AMBIENT TEMPERATURE OF 40°C AND CONDUCTOR TEMPERATURE RISE OF 35°C OVERALL CONDUCTOR TEMPERATURE OF 75°C EXCEPT FOR CABLES WITH XLP INSULATION WHICH HAS A TEMPERATURE RISE OF 50°C AND OVERALL CONDUCTOR TEMPERATURE OF 90°C.

INSULATION:
HDP = HI-DENSITY POLYETHYLENE
PVC = POLY-VINYL CHLORIDE
RINJ & HTS ARE THERMALLY EQUIVALENT TO CROSS LINK POLYETHYLENE
XLP = CROSS LINK POLYETHYLENE
TBWP = TRIPLE BRAID WEATHERPROOF

NOTE: MAXIMUM CONDUCTOR CURRENT WILL ALSO BE LIMITED BY THE UP STREAM PROTECTIVE DEVICE
PRIMARY LOAD PICKUP JUMPER - SEE "PRIMARY LOAD PICKUP JUMPER", GENERAL, SECTION OH-1

FLORIDA OH CABLE DATA
PRE-YEAR 2000

OH DESIGN - FIG10
9/20/05

10.0 Joint Use

General

Any communications company (attacher) wishing 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. 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. All new attachments requests must come through the System Joint Use Administrator.

Permitting

Pole utilization requires a permit for installation of new attachments, removal of existing attachments, upgrade to larger cables, 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 "after the fact".

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.

Each pole in the application shall be checked to meet NESC clearance and pole class requirements. If NESC 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 shall be paid in advance by the proposed attacher. It is the responsibility of the attacher to obtain all necessary easements for their facilities.

Once the NESC analysis is completed, the attacher will receive an approved permit if no make-ready is required for the attachment. If the attacher's application requires make-ready, the attacher will receive an invoice for make-ready costs which includes engineering and construction costs along with an administrative fee.

Tagging

Each attacher shall install identifying tags on its cables and equipment at a minimum interval of every five (5) poles for the purpose of identification. Attachers shall install tags at the time attacher's facilities are installed. Existing attachers should also install identifying tags on their equipment.

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 cannot 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 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. 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 & 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 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 attacher-owned facilities.

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-degree 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. PE utilizes NJUNS (National Joint Utilities Notification System) to notify all attachers of pole replacements and requires all third-party attachers to utilize the system.

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. PE will only consider requests for attachment to transmission poles that were specifically designed to accommodate underbuilt distribution and communication facilities.

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.

Only one wireless device (receiver, transmitter, or combination unit) will be allowed per pole. Multiple wireless attachers are not permitted on a single pole. Amplifiers and equipment other than wireless devices will not be allowed on poles. All other locations will be reviewed based on field conditions and approved by PE. Wireless devices will not be permitted on poles designed for the exclusive use of street lighting.

All wireless attachers must obtain all necessary easements for their facilities.

NOTE: PEF does not allow wireless attachments on streetlight brackets.

Procedures

Additional procedures for joint use in the Carolinas can be found at the following location on ProgressNet.

http://progressnet/work2000/JointUseInfo2.htm

- JU Telephone Make Ready Field Procedures Document
- Stub Pole Removal Document
- Banner Agreement Flowchart
- Banner Agreement Document
- Joint Use Attachment Request for New Agreement
- Permitting for New Attachments
- Priority Pole Replacements – Field Procedure

Joint Use Contacts

Pole attachment requests are to be submitted to the following addresses:

In the Carolinas:
Progress Energy Carolinas, Inc.
Joint Use
100 E. Davie St., TPP 16
Raleigh, NC 27601
(919) 546-6239

In Florida:
Progress Energy Florida, Inc.
Joint Use
3300 Exchange Place, NP4D
Lake Mary, FL 32746
(352) 748-8758

PE's Joint Use Supervisor, at (407) 942-9415, should be contacted for questions and clarification of the joint use policy.

11.0 Environmental Issues

There are many state and federal environmental regulations that affect our distribution system activities. Environmental responsibility is a core value of Progress Energy. As a distribution system designer, we need to be aware of the environmental areas of concern. Anytime we encounter one of these areas, we can turn to our regional Environmental Coordinator to assist us with compliance.

There are Carolinas and Florida environmental websites we can use for information.

The first site is maintained by the Progress Energy Florida Environmental Section. The link on the left sidebar titled, "Environmental Programs" contains information on each program.

Similarly the Carolinas environmental information is on a site maintained by the Energy Delivery Business Unit.

Below is a listing of the environmental areas that our distribution activities could involve.

Oil Spills

Both state and federal regulations require the reporting of oil spills. All oil spills, regardless of volume, should be reported to your Environmental Coordinator to ensure proper reporting and cleanup.

SPCC (Spill Prevention Control and Countermeasures) Plans

Federal regulations require that an SPCC plan be prepared for any site that stores more than 1320 gallons of oil, in aggregate or in a single container. Our large transformer installations would qualify for these plans if certain other requirements are also met. See the Transformers section of the Engineering Manual for more information on this subject.

Endangered and Threatened Species

We need to be aware of species that would fall under the Endangered Species Act. Two species that are found in our service areas are the red cockaded woodpecker and the bald eagle. Conducting any activity that disturbs their areas, habitats or nests is prohibited. In addition, bald eagles have wingspans large enough to be affected by our overhead power lines. Any overhead power line located near a bald eagle nesting area or feeding ground could possibly need some special construction and/or increased phase spacing in order not to interfere with their activities.

Also, there are rare plant areas that would fall under the Endangered Species Act. Line designers should be aware of the rare plant sites in their area. The Carolinas Environmental Coordinators and Region Foresters have a county-by-county listing of identified rare plant sites.

Migratory Bird Nests

There are laws against the disturbance of migratory bird nests. Federal and state permits are required to relocate any active nest. Osprey nests are often found in our PEC and PEF service areas. These nests involve special consideration.

Sedimentation/Erosion

There are state and federal regulations involving any land-disturbing activities that would cause sediment runoff. Runoff from any land disturbing activities cannot be allowed to leave the site (Right-of-Way) or enter a stream or wetland area. In general, land disturbing activities of one acre or more may require permits and a State approved sedimentation control plan.

Wetland, Rivers and Coastal Areas

Wetlands and coastal areas are special habitats. As such, any disturbing of the soil and vegetation in these areas is generally prohibited unless certain conditions are met or a permit is obtained. In North Carolina, the Neuse and Tar-Pamlico River basins are also areas where our work activities may be subject to special regulations. The Neuse River rules are documented in the Overhead and Underground Construction Specifications Manuals.

PCBs

Transformers on the distribution system may contain PCBS if they are not marked as Non-PCB transformers. Rebuilding, replacement or relocation projects may result in the identification of transformers that require proper handling and/or disposal in accordance with Federal Regulations.

12.0 Special Construction

12.1 General

There are many situations encountered where the Distribution Construction Specifications do not provide guidance. Some of these situations are long spans, tall waterway crossings, joint-use lines with many attachers, transmission underbuilds, large conductors, etc. Designers should contact Distribution Standards for assistance in these cases. Distribution Standards will provide guidance on designs for these unusual cases.

12.2 Substation Overhead Feeder Exits

Substation bay structures are not guyed structures and cannot stand the tensions of the normal span lengths of our distribution conductors. It is a necessary practice in both service areas to limit the conductor tension coming into the substation bay for overhead feeder exits. In most cases this means the ruling span length for the bay attachment must be kept to a short length. For Florida, the substation tensions and sags are shown on Specification Dwg 05.01-10. For the Carolinas, the span and tension information is shown on Specification Dwgs 03.28-04 & 06.

12.3 Overhead Neutral Construction

Feeders with overhead neutral construction are rare, but more prevalent in the Carolinas than in Florida. There are specification drawings for this type of construction shown in the Carolinas Distribution Construction Specifications Manual in subsection 03.24. This type of construction is generally confined to express feeders. The engineering reason for this type of construction is to guard against damage done by direct lightning strikes to the conductors and poles. Since the ground wire down lead takes up one side of the pole, it is difficult to use this type of construction for normal feeders and install items such as underground dips, transformer banks, capacitor banks, etc. It is also difficult to install lightning arresters, which are still needed to prevent against lightning induced over voltages.

For this type of construction, it is important that the ground down lead be fully insulated through the primary space. It is also critical to line performance that each pole ground be a low resistance ground. Failure to follow these precautions will usually result in a line design that is less reliable than the standard feeder construction.

12.4 Avian Protection

Progress Energy constructs and operates distribution facilities to serve customers in North Carolina, South Carolina and Florida. These facilities are constructed along rivers, lakes, and coastlines that are natural habitats for eagles, ospreys, and other raptors. Aquaculture farms are being developed in many rural areas, which may attract large birds of prey. In addition, raptors sometimes utilize distribution poles and equipment for nesting and as a perch when hunting. The wing span of these large raptors can contact energized conductors and equipment when landing or leaving the perch, resulting in potential outages and electrocution of the bird. Also, raptor nests constructed on distribution facilities can have similar results.

Specifications contained in this section have been developed for constructing and maintaining distribution facilities in areas of known populations of large raptors with the objective of minimizing outages and raptor electrocutions. Some of the more common construction types have been addressed. Contact the Distribution Standards Unit for unique situations.

Progress Energy

Joint Use – Pole Attachment Standards and Clearances

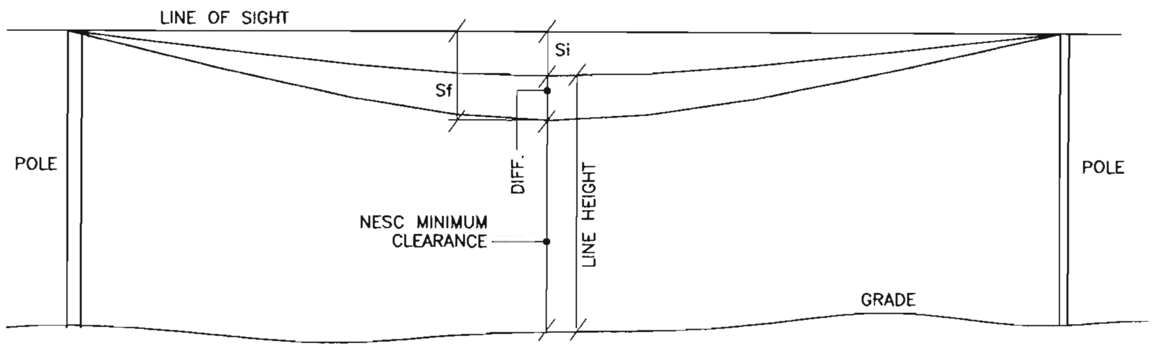
3				
2	3/31/10	CECCONI	GUINN	ELKINS
1	6/30/09	CECCONI	GUINN	ELKINS
0	2/27/09	CECCONI	GUINN	HOYT
REVISED		BY	CK'D	APPR.

SECTION 9 – CLEARANCES AND JOINT USE

TABLE OF CONTENTS

Progress Energy

FLA DWG. 09.00–00A



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

NO POTENTIAL SOURCE OF CONTAMINATION CAN BE LOCATED WITHIN 100 FEET OF A COMMUNITY WELL. TRANSFORMERS (POLE MOUNTED, PAD-MOUNTED 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 SERVE 25 OR MORE PERSONS. A SINGLE FAMILY RESIDENTIAL WELL IS NOT CLASSIFIED AS A COMMUNITY WELL. THIS REGULATION IS FOR NEW NEW INSTALLATIONS ONLY. EXISTING COMMUNITY WELLS WHICH HAVE OIL FILLED EQUIPMENT LOCATED WITHIN 100 FEET ARE GRANDFATHERED.

REVISED		BY	CK'D	APPR.
3				
2				
1	6/30/09	GUINN	GUINN	ELKINS
0	7/24/02	HOYT	ROBESON	WOOLSEY

EQUIPMENT AND CIRCUITS NEAR NATURAL GAS OR GASOLINE FACILITIES AND COMMUNITY WELL CLEARANCES

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 1. TO PORTIONS THAT ARE READILY ACCESSIBLE TO PEDESTRIANS	4.5'	5.0'	5.5' (3.5')	7.5' (4.5')
2. TO PORTIONS THAT ARE NOT READILY ACCESSIBLE TO PEDESTRIANS	3.0'	3.5'	5.5' (3.5')	7.5' (4.5')
B. VERTICAL 1. OVER OR UNDER CATWALKS AND OTHER SURFACES UPON WHICH PERSONNEL WALK	10.5'	11.0'	11.5'	13.5'
2. OVER OR UNDER OTHER PORTIONS OF SUCH INSTALLATIONS	3.0'	3.5'	6.0'	8.0'
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 WITH SUPPORTING STRUCTURES ABOVE THE ROADWAY MAY SERVE AS SUPPORTING STRUCTURES FOR ELECTRICAL LINES. THE CLEARANCES SHOWN FOR ATTACHED AND NOT ATTACHED IS THE CLEARANCE ABOVE THE BRIDGE SUPPORTING STRUCTURES. SEE DWG. 09.01–04 FOR CLEARANCE TO BRIDGES WITHOUT SUPPORTING STRUCTURES ABOVE THE ROADWAY.

**CLEARANCES SHOWN ARE FOR CONDUCTORS AT REST. THE CLEARANCE IN PARENTHESES IS THE CLEARANCE REQUIRED WITH WIND DISPLACEMENT. THE WIND DISPLACEMENT FOR VARIOUS CONDUCTORS AND SPAN LENGTHS CAN BE FOUND IN THE SAG TABLES IN SECTION 05. SUBTRACT THE WIND DISPLACEMENT FROM THE REQUIRED CLEARANCE AT REST. THE REMAINING CLEARANCE MUST BE EQUAL TO OR MORE THAN THE CLEARANCES SHOWN IN PARENTHESES.

REVISED		BY	CK'D	APPR.
3	8/6/09	ROBESON	CUINN	ELKINS
2	12/14/07	CUINN	CUINN	HOYT
1	8/5/05	CECCONI	NUNNERY	HOYT
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:

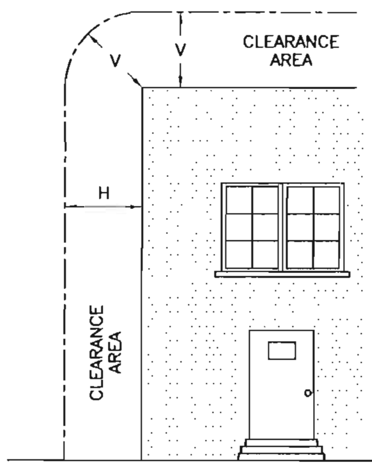
1. THESE CLEARANCES APPLY UNDER WHICHEVER OF THE FOLLOWING CONDUCTOR TEMPERATURE AND LOADING CONDITIONS PRODUCES THE CLOSEST APPROACH:
   A. 180°F, NO WIND DISPLACEMENT, FINAL SAG.
   B. 32°F, NO WIND DISPLACEMENT, FINAL SAG.
2. WIND DISPLACEMENT CONSIDERATIONS (HORIZONTAL):
   A. FIGURES SHOWN IN PARENTHESIS 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 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.

3				
2				
1				
0	6/30/09	GUINN	GUINN	ELKINS
REVISED		BY	CK'D	APPR.

MINIMUM FINAL SAG CLEARANCES TO BUILDINGS, ETC.

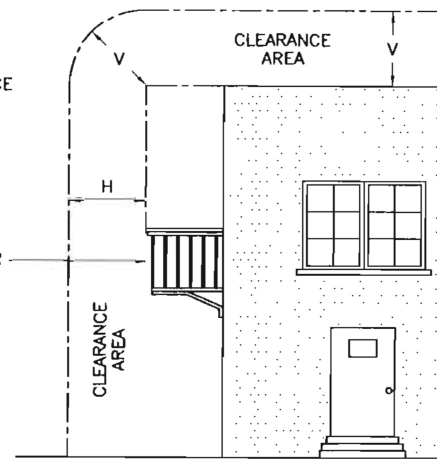
Progress Energy

FLA DWG. 09.01–01B

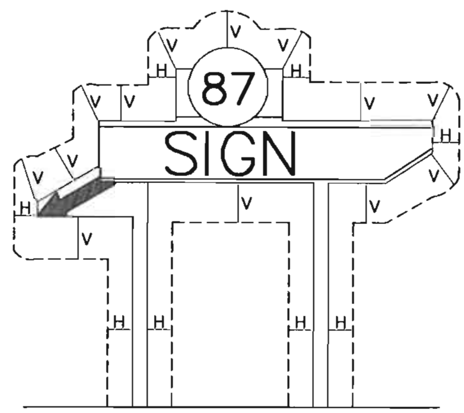


BUILDING ELEVATION

H = HORIZONTAL CLEARANCE
V = VERTICAL CLEARANCE



BUILDING ELEVATION



*VERTICAL
10.5' (0 TO 750V ø–N)
12.5' (750 TO 22,000V ø–N)

HORIZONTAL
5.5' (0 TO 750V 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.

3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

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}

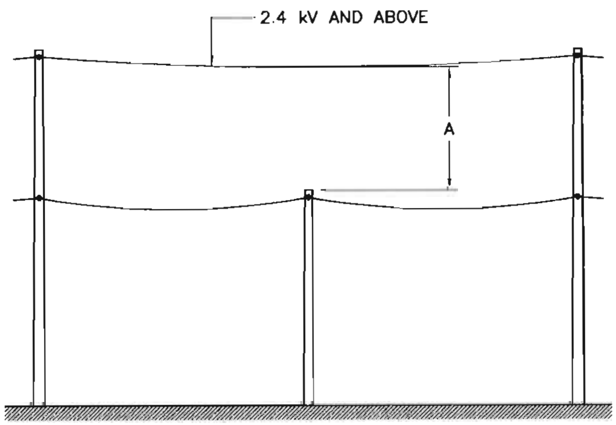
{2} FOR VOLTAGES TO GROUND OVER 50kV – 10 FEET (305 CM) PLUS 4 INCHES (10 CM) FOR EVERY 10kV OVER 50kV.

1910.333(c)(3)(i)(B)

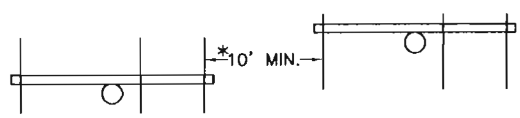
(B) WHEN AN UNQUALIFIED PERSON IS WORKING ON THE GROUND IN THE VICINITY OF OVERHEAD LINES, THE PERSON MAY NOT BRING ANY CONDUCTIVE OBJECT CLOSER TO UNGUARDED, ENERGIZED OVERHEAD LINES THAN THE DISTANCES GIVEN IN PARAGRAPH (c)(3)(i)(A) OF THIS SECTION.

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



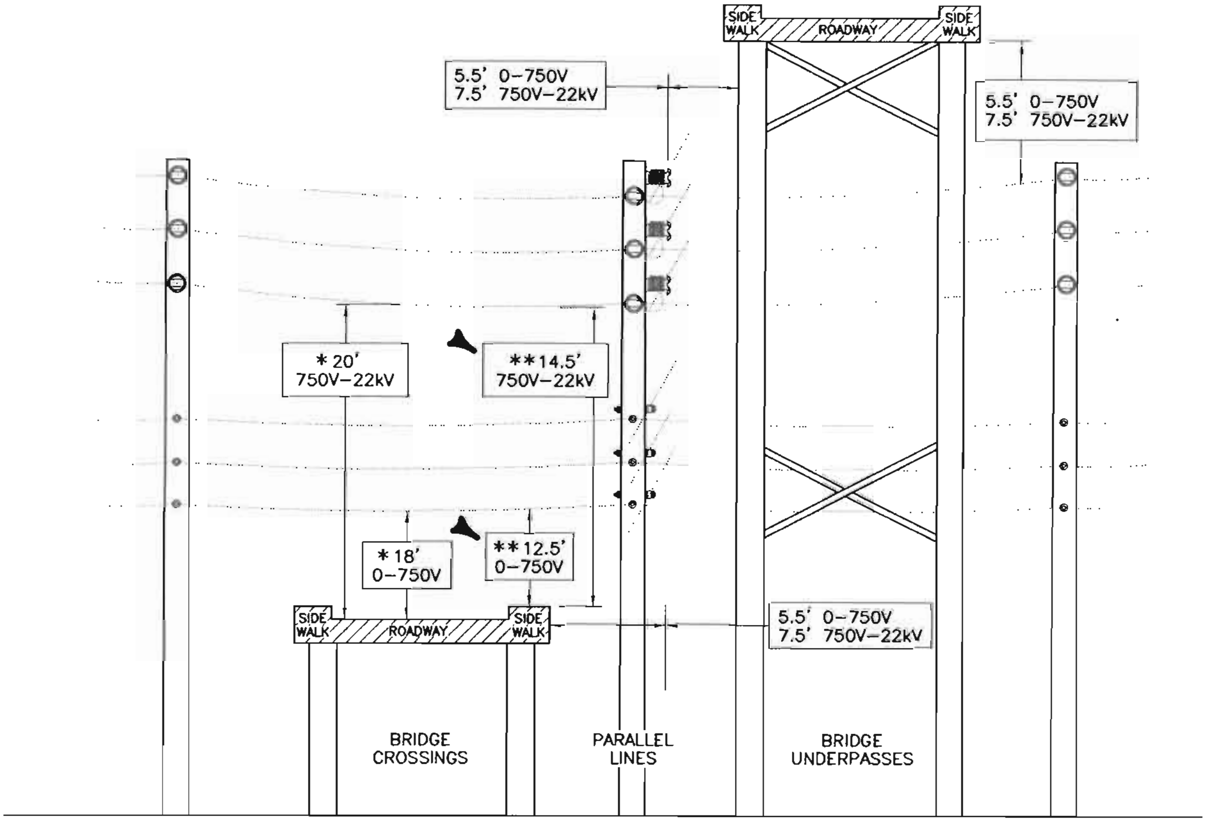
"A" = 4.5 FEET FOR VOLTAGES 0 TO 22 kV ø–G
= 5.5 FEET FOR VOLTAGES 22 TO 50 kV ø–G (69 kV)
= 7 FEET FOR VOLTAGES 70 kV ø–G (115 kV)
= 9 FEET FOR 140 kV ø–G (230 kV)

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.

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 ϕ-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.

SEE DWG. 09.01-01A FOR LINE CLEARANCES ABOVE BRIDGES WITH A SUPER STRUCTURE ABOVE THE ROADWAY.

* THESE CLEARANCES ARE TO THE ROADWAY SURFACE OF THE BRIDGE.

** THESE CLEARANCES ARE TO THE SIDEWALK WHERE ONLY RESTRICTED TRAFFIC IS NORMALLY EXPECTED. NO HORSEBACK RIDERS OR VEHICLES GREATER THAN 8 FOOT IN HEIGHT.

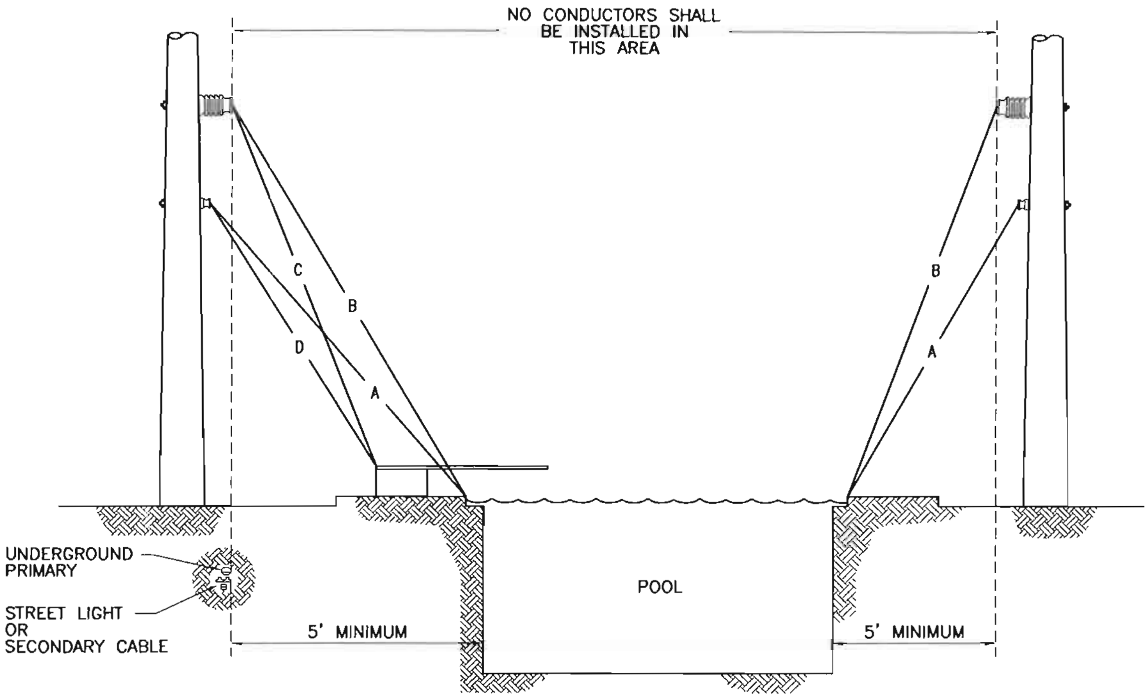
3				
2				
1	8/6/09	ROBESON	GUINN	ELKINS
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

MINIMUM FINAL SAG CLEARANCES FROM BRIDGES

Progress Energy

PGN

DWG. 09.01-04



A N G L E	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	NUNNERY	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 5)	16 (SEE NOTE 5)	16.5 (SEE NOTE 5)	18.5 (SEE NOTE 5)
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:

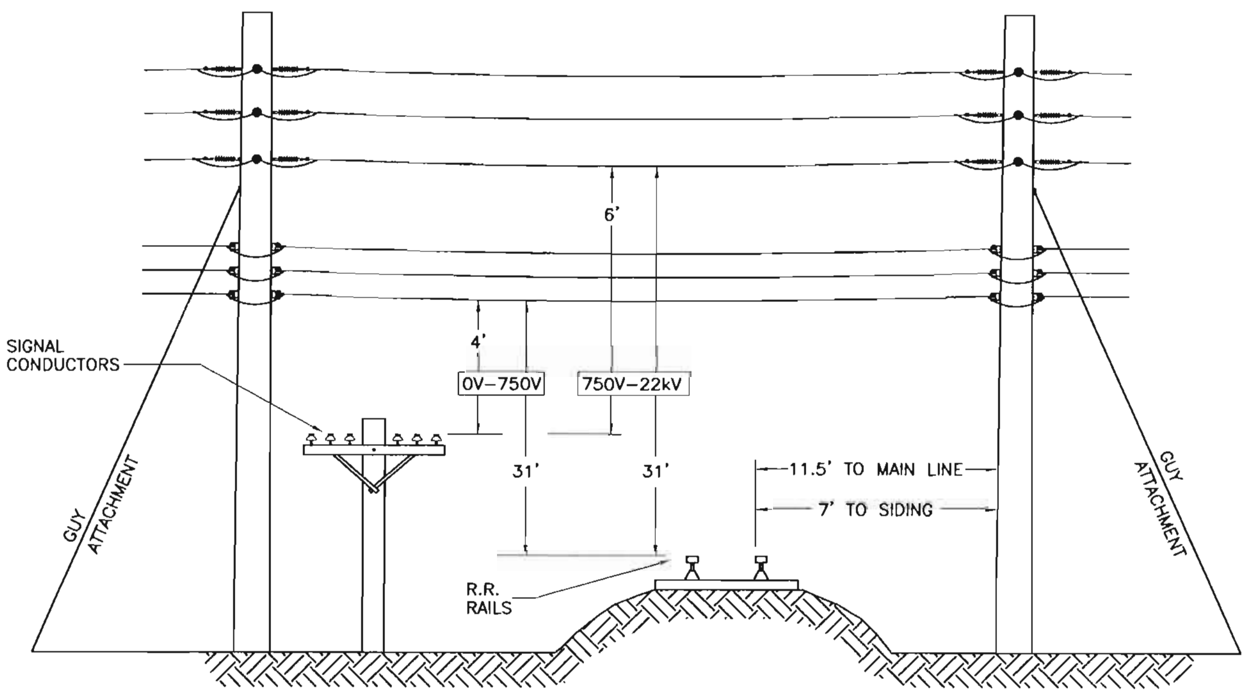
1. THE ABOVE MINIMUM CLEARANCES IN THE TABLE MUST BE MET USING THE CONDUCTOR SAG AT 185°F. THE SAG VALUES ARE LISTED IN THE SAG AND TENSION CHARTS IN SECTION 05.01.
2. SEE NESC RULE 234.I WHERE CONDUCTORS RUN ALONG OR ARE CLOSER THAN 20 FT. HORIZONTALLY TO TRACK RAILS. CONSIDER SWING DUE TO WIND (NESC RULE 234.A.2). ALSO, RAILROADS REQUIRE 50 FT. MINIMUM VERTICAL CLEARANCE WHEN LINE CROSSES RAILS WITHIN 1000 FT. OF RAILROAD, BRIDGE OR TRESTLE.
3. REFER TO NATIONAL ELECTRICAL SAFETY CODE (NESC) RULE 232 FOR MINOR EXCEPTIONS AND REFINEMENTS. ALSO REFER TO SERVICE CLEARANCE DWGS. 09.02-04 AND 09.02-05 FOR MORE DETAILS ON SERVICE CLEARANCES.
4. WHERE HEIGHT OF ATTACHMENT TO BUILDING DOES NOT PERMIT TRIPLEX SERVICE DROPS TO MEET THIS VALUE, THE CLEARANCE MAY BE REDUCED TO 12 FT.
5. THE MINIMUM VERTICAL CLEARANCE OF ALL CONDUCTORS, CABLES, GUYS, ETC. MUST BE MAINTAINED AT 18 FEET FOR DOT MAINTAINED HIGHWAYS. A 24 FOOT CLEARANCE IS REQUIRED ON ALL LIMITED ACCESS HIGHWAYS.
6. 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				
2				
1				
0	7/20/09	GUINN	GUINN	ELKINS

STANDARD FINAL SAG CLEARANCES

Progress Energy

FLA 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. SEE PGN DWG. 09.02–02B FOR RIGHTS-OF-WAY CONSTRUCTION.

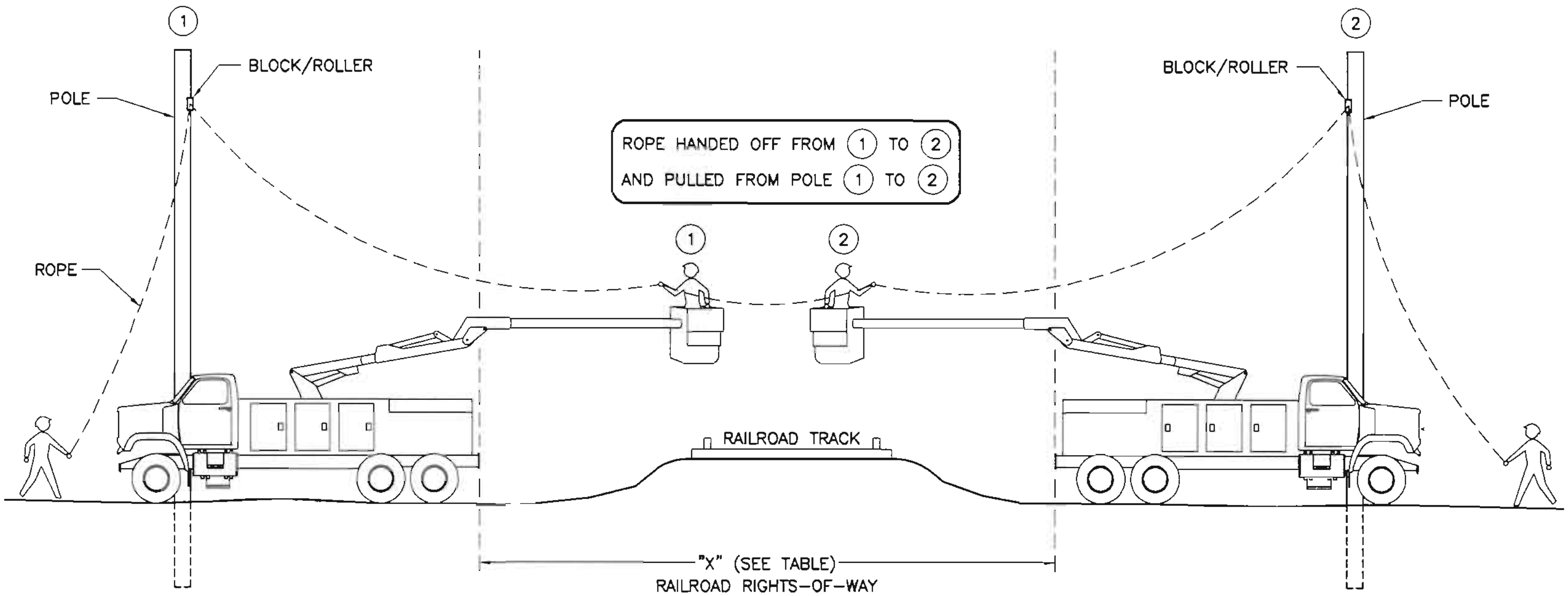
3. CLEARANCE TO RAILROAD IS FOR NESC REFERENCE ONLY. BEFORE DESIGNING A RAILROAD CROSSING OR FACILITY NEXT TO A RAILROAD, CHECK WITH COMPANY PERMIT COORDINATOR FOR SPECIFIC RAILROAD COMPANY CLEARANCE REQUIREMENTS. THEY MAY REQUIRE MORE CLEARANCE THAN THE NESC.

REVISED		BY	CK'D	APPR.
3				
2				
1	9/30/09	ROBESON	GUINN	ELKINS
0	7/24/08	SIMPSON	SIMPSON	HOYT

MINIMUM FINAL SAG CLEARANCES
RAILROAD AND SIGNAL CROSSINGS

Progress Energy

PGN DWG. 09.02–02A



<u>WORKING "OVER" RAILROAD RIGHT-OF-WAY WITHOUT BEING "IN" RAILROAD ROW</u>

PLACE ONE MAN WITH RADIO APPROXIMATELY 7 MILES UP-TRACK AND DOWN-TRACK (TWO MEN TOTAL) TO WATCH FOR TRAIN COMING – SIGNALS WORKERS TO CLEAR TRACK AREA (15 MINUTES TO CLEAR)

TWO TRUCKS (BUCKET) SET UP ON OPPOSITE SIDE OF ROW

ROLLERS/BLOCK INSTALLED ON EACH SIDE POLE

WORKER (1) HANDS ROPE OFF TO WORKER (2)

ROPE PULLED IN AIR TO CLEAR TRACKS

WIRE PULLED OVER TRACKS VIA ROPE

TRUCK	APPROX. BUCKET REACH	"X"
55' MH	40'	80'
85' MH*	48'	~100'
100' MH*	50'	~100'

*TRANSMISSION

<u>NOTES:</u>

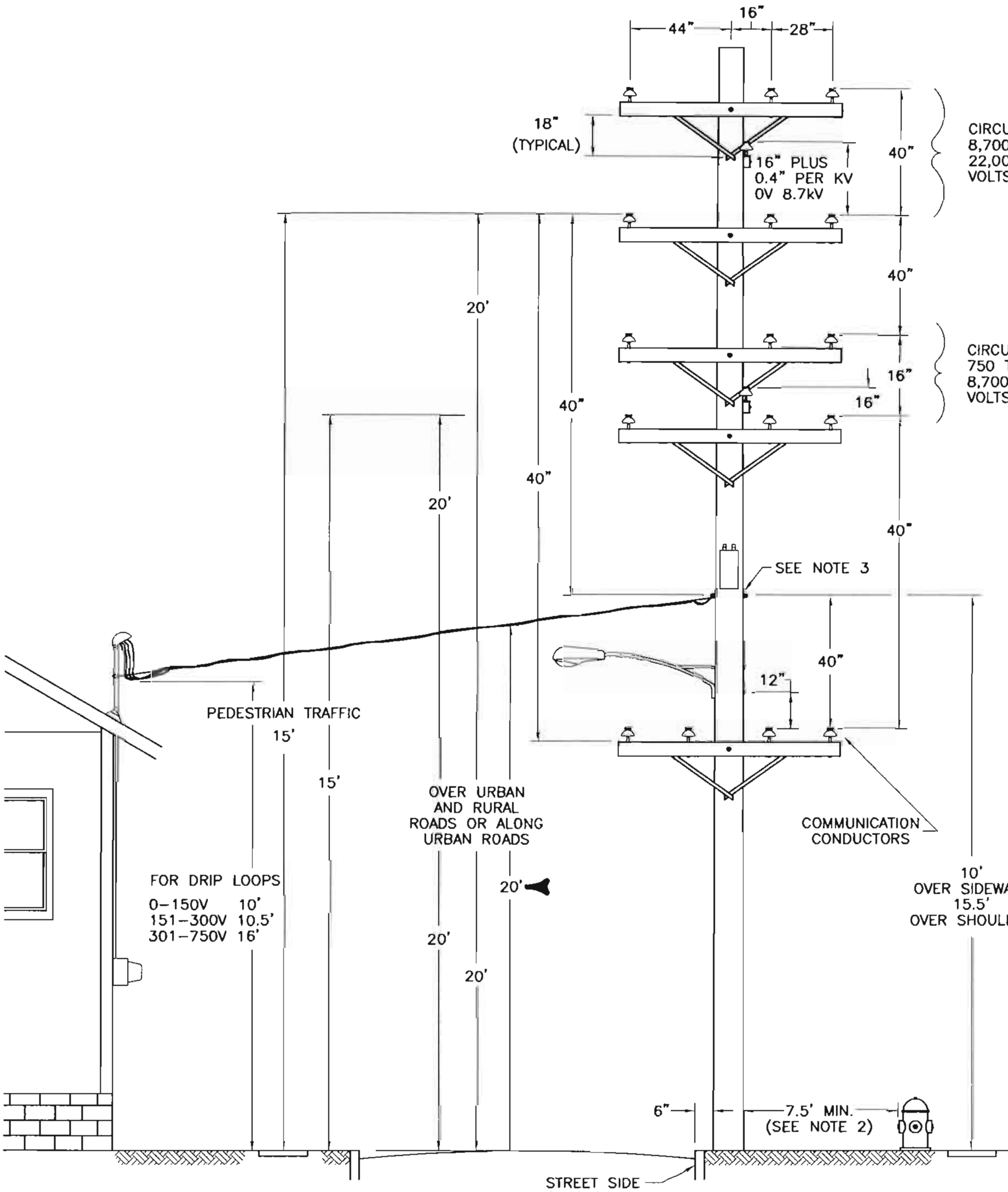
1. SEE DWG. 09.02-02A FOR CLEARANCES.
2. PLAN WORK TO MINIMIZE TIME OVER RIGHTS-OF-WAY.
3. <u>DO NOT</u> PERFORM WORK OVER A MOVING TRAIN.

REVISED	BY	CK'D	APPR.
3			
2			
1			
0 7/24/08	SIMPSON	SIMPSON	HOYT

RAILROAD RIGHTS-OF-WAY CONSTRUCTION

Progress Energy

PGN DWG. 09.02-02B



NOTES:

1. ALL VOLTAGES ARE MAXIMUM TO GROUND ON GROUNDED SYSTEMS, AND PHASE TO PHASE ON DELTA SYSTEMS.

2. THIS CLEARANCE CAN ONLY BE REDUCED BELOW 7.5' WITH APPROVAL OF LOCAL FIRE AUTHORITY.

3. THE NEUTRAL POSITION SHOWN INDICATES THERE IS ONLY ONE NEUTRAL ON THE POLE SHARED BY ALL CIRCUITS. IF MULTIPLE NEUTRALS ARE USED, ADDITIONAL CLEARANCES ARE REQUIRED TO ACCOMMODATE ADDITIONAL NEUTRALS. SEE DWG. 09.03-01.

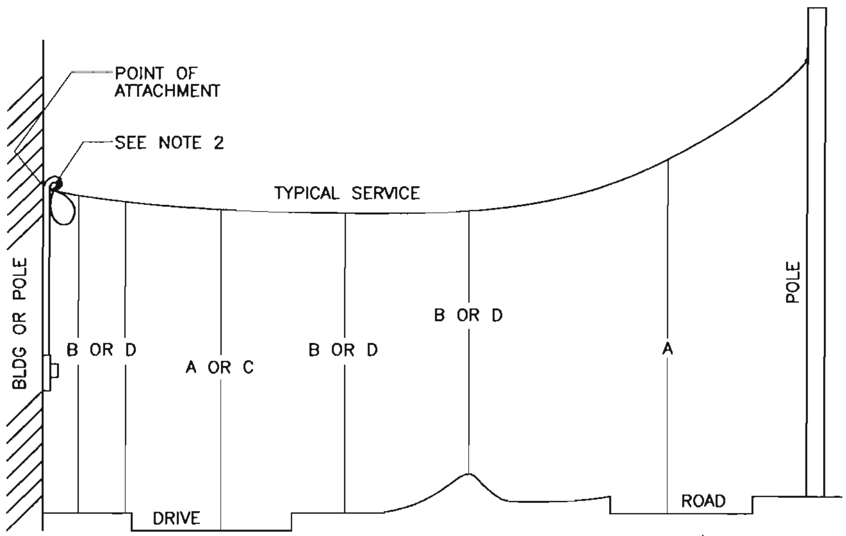
3				
2				
1				
0	6/23/09	CUINN	CUINN	ELKINS
REVISED		BY	CK'D	APPR.

MINIMUM FINAL SAG CLEARANCES FOR CONDUCTOR

Progress Energy

FLA 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:

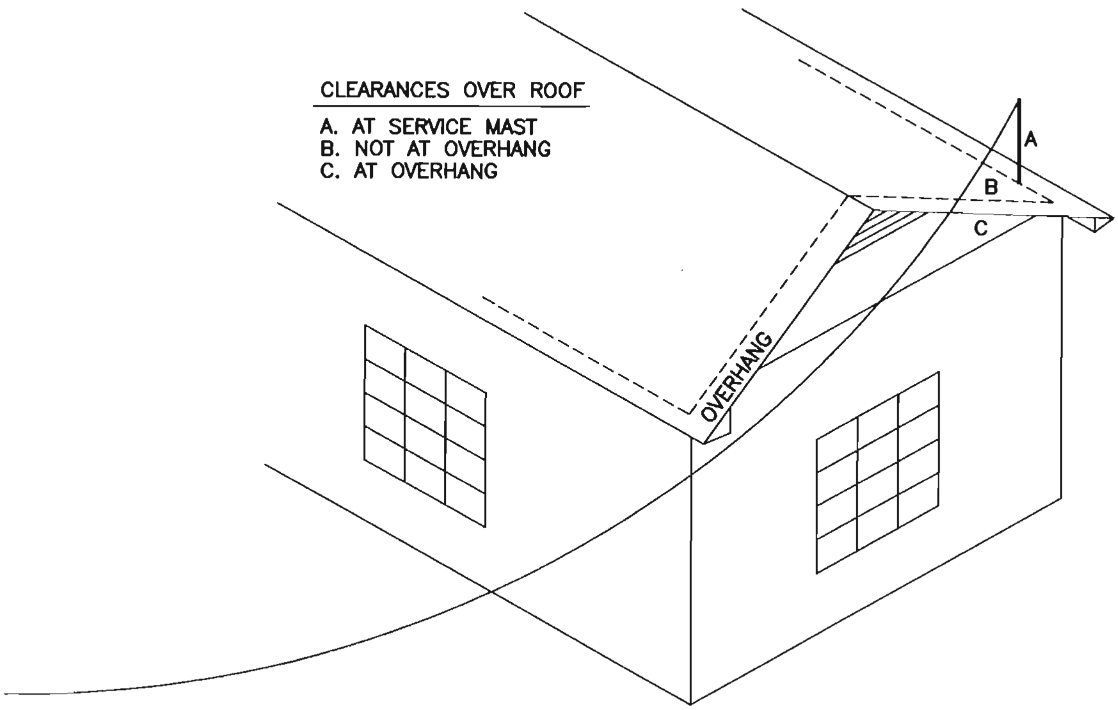
1. THE ABOVE TABLE GIVES REQUIRED MINIMUM INSTALLATION HEIGHTS. THESE INSTALLATION HEIGHTS ARE APPLICABLE TO SERVICE DROP MULTIPLEX CABLES INSTALLED USING THE STANDARD SAGS FOR NORMAL STRINGING TEMPERATURES.
2. POINT OF ATTACHMENT OF SERVICE DROP AT BOTH BUILDING AND POLE MUST BE AT A HEIGHT SUFFICIENT 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.

3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

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)

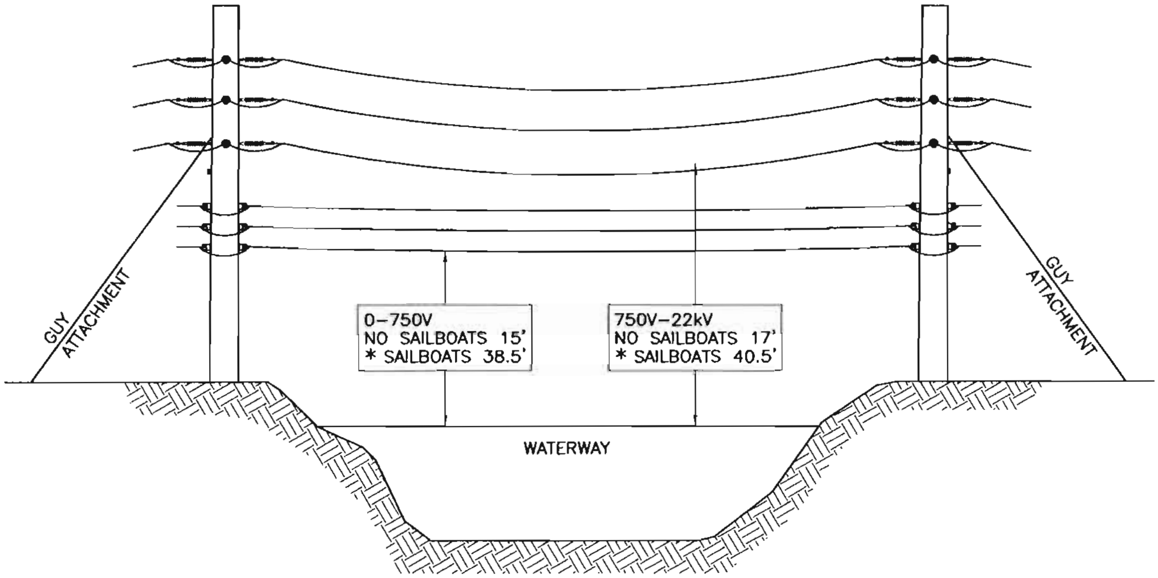
5. POINT OF ATTACHMENT OF SERVICE TO BUILDING SHALL BE HIGH ENOUGH TO PROVIDE THE GROUND CLEARANCES OF DWG. 09.02–04, BUT SHALL NOT EXCEED 25' ABOVE GRADE AT TIME OF INSTALLATION AND SHALL NOT REQUIRE THE USE OF A LADDER ON CARPORT OR OTHER ROOF.

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.

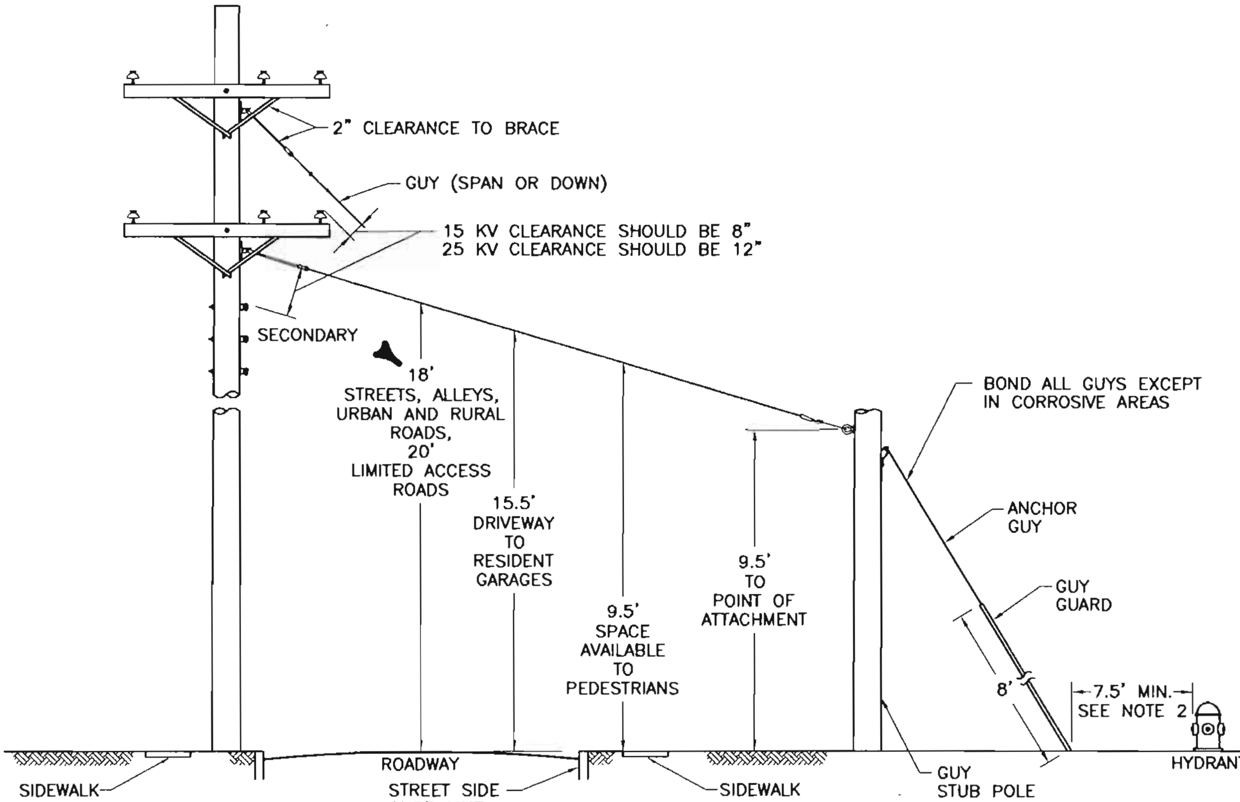
NOTE: CONSULT ENGINEERING FOR MANUAL GUYING REQUIREMENTS.

REVISED		BY	CK'D	APPR.
3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY

MINIMUM FINAL SAG CLEARANCES OVER WATERWAYS

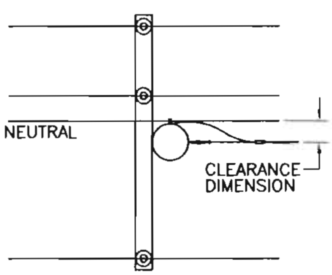
Progress Energy

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 SECTION 02.

3. FOR MINOR EXCEPTIONS, SEE TABLES 232-1, 235-6, AND 239-2 OF THE NESC.

NOTES:

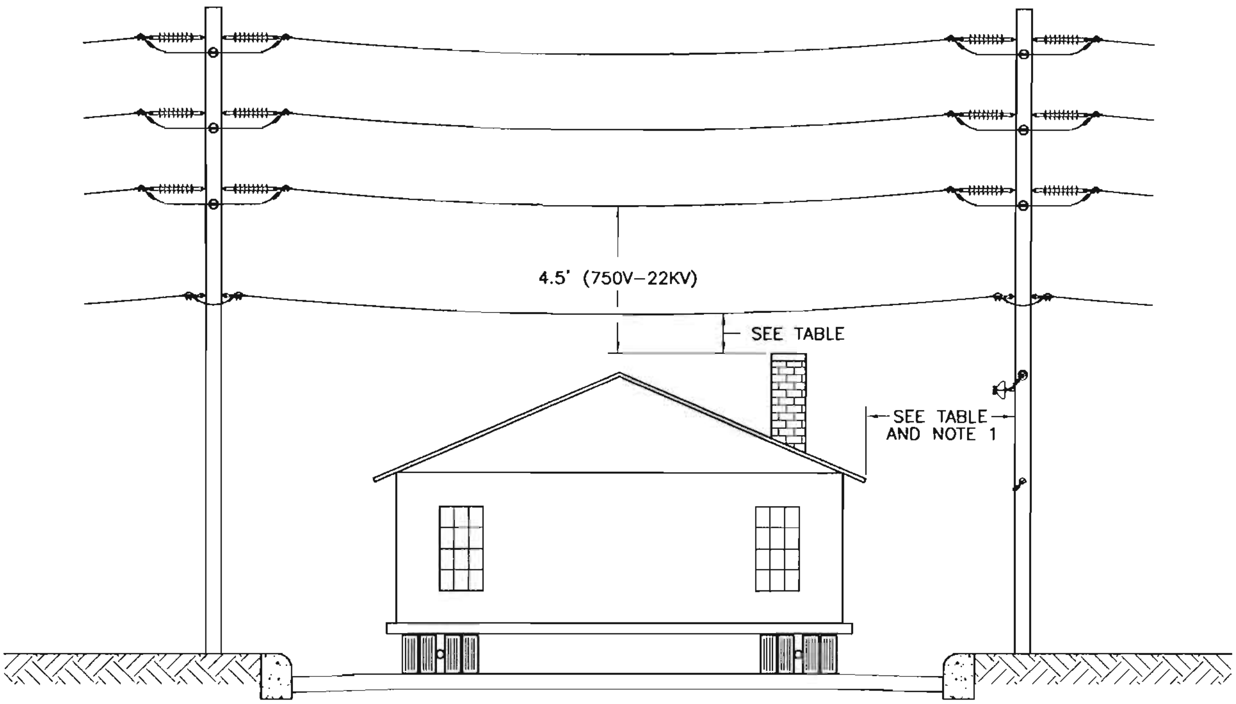
1. THE USE OF GUY INSULATORS DOES NOT NEGATE OR REDUCE ANY OF THE DIMENSIONS ON THIS PAGE.
2. THIS CLEARANCE CAN ONLY BE REDUCED BELOW 7.5' WITH APPROVAL OF LOCAL FIRE AUTHORITY.

REVISED		BY	CK'D	APPR.
3				
2				
1	7/21/09	ROBESON	GUINN	ELKINS
0	6/25/09	GUINN	GUINN	ELKINS

MINIMUM GUY CLEARANCE

Progress Energy

FLA DWG. 09.02-07



THE CLEARANCE OF A BUILDING BEING TRANSPORTED UNDER DISTRIBUTION LINES IS TREATED THE SAME AS A MOVING VEHICLE PER THE NESC UNIFORM SYSTEM OF CLEARANCES. THE VERTICAL CLEARANCE ABOVE GROUND CONSISTS OF A REFERENCE COMPONENT WHICH IN THIS CASE WOULD BE THE HEIGHT OF THE BUILDING ON THE TRANSPORT VEHICLE, PLUS A MECHANICAL AND ELECTRICAL COMPONENT AS FOLLOWS:

CLEARANCE REQUIREMENTS		
CATEGORY	VERTICAL CLEARANCE REQUIRED (FT)	HORIZONTAL CLEARANCE REQUIRED (FT)
INSULATED COMMUNICATIONS: GROUNDED NEUTRALS GROUNDED GUYS AND SPAN GUY	1.5	3
TRIPLEX OR QUADRUPLEX	2	3.5
OPEN SECONDARY	2.5	5.5*
PRIMARY (750–22 KV PHASE TO GROUND)	4.5	7**

* MUST MAINTAIN 3.5 FT WHEN DISPLACED BY WIND
** MUST MAINTAIN 4.5 FT WHEN DISPLACED BY WIND

NOTES:

1. IF NO LINES EXIST ON THE POLE AT THIS LEVEL, THE HORIZONTAL CLEARANCE CAN BE REDUCED TO 3 INCHES TO GROUNDED EQUIPMENT ON POLE OR POLE SURFACE.

2. DISCONNECTING LINES:
NO CONDUCTOR IS PERMITTED TO BE TAKEN DOWN (INCLUDING THE NEUTRAL) UNLESS A PROPER CLEARANCE IS OBTAINED FOR THE LINE, THE CIRCUIT CLEARED AND PROPERLY GROUNDED.

3. PUSHING CONDUCTORS/CABLES UP WITH INSULATED STICKS OR TEMPORARILY RAISING CONDUCTORS/CABLES:
IN MOST CASES, PUSHING A CONDUCTOR/CABLE UP TOWARD A PRIMARY WILL RESULT IN A VIOLATION OF THE 4.5 FOOT PRIMARY CONDUCTOR CLEARANCE REQUIRED FROM THE TOP OF THE STRUCTURE/HOUSE BEING MOVED. IT IS ALSO CONSIDERED A HAZARD TO DO SO SINCE IT IS DIFFICULT TO JUDGE HOW CLOSE THE PUSHED UP CONDUCTOR MAY BE TO THE ENERGIZED CONDUCTOR. THEREFORE THE PRACTICE IS NOT PERMITTED.

   CONDUCTORS/CABLES MAY BE TEMPORARILY RAISED/RELOCATED BY RAISING SUPPORTS AT THE POLES. HOWEVER, THE NESC REQUIRES THAT CLEARANCE MUST BE MAINTAINED AS IF IT WERE A PERMANENT INSTALLATION.

4. DURING TRANSPORT OF THE BUILDING:
A. NO ONE IS PERMITTED ON TOP OF THE BUILDING.
B. ROAD AND OTHER CONDITIONS CAN CHANGE FROM THE TIME LINE CLEARANCES ARE CHECKED TO THE DAY OF THE MOVE. IT IS RECOMMENDED THAT A PROGRESS ENERGY EMPLOYEE ACCOMPANY THE MOVING BUILDING AND RE-CHECK CLEARANCES AS THE BUILDING APPROACHES EACH LINE.

3				
2				
1				
0	1/22/08	ROBESON	GUINN	HOYT
REVISED	BY	CK'D	APPR.	

LINE CLEARANCES FOR MOVING STRUCTURE/HOUSE

Progress Energy

PGN DWG. 09.02–08

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:

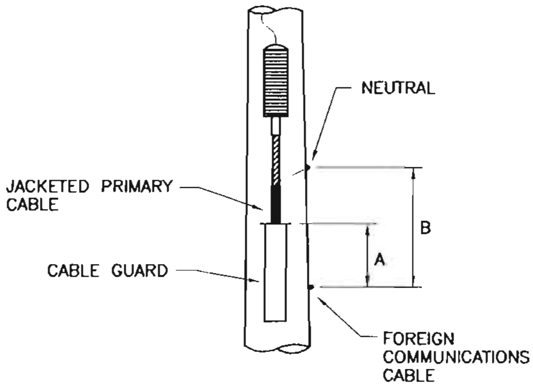
1. NO VERTICAL CLEARANCE IS REQUIRED BETWEEN WIRES ELECTRICALLY INTERCONNECTED AT THE CROSSING.
2. THE ABOVE CLEARANCES ARE FOR ANY LOCATION WHERE THE SUBJECT WIRES CROSS OR COULD BE CLOSEST TOGETHER, REGARDLESS OF SPAN LENGTHS. REFER TO NESC RULE 233.A.1 FOR APPLICABLE WIRE LOADING CONDITIONS TO USE 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.
10. CROSSINGS SHOULD BE MADE ON A COMMON SUPPORTING STRUCTURE, WHERE PRACTICAL.

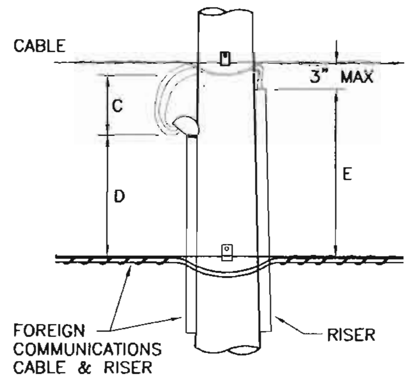
3				
2	12/20/07	SIMPSON	GUINN	HOYT
1	12/1/03	NUNNERY	NUNNERY	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

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 NO 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.

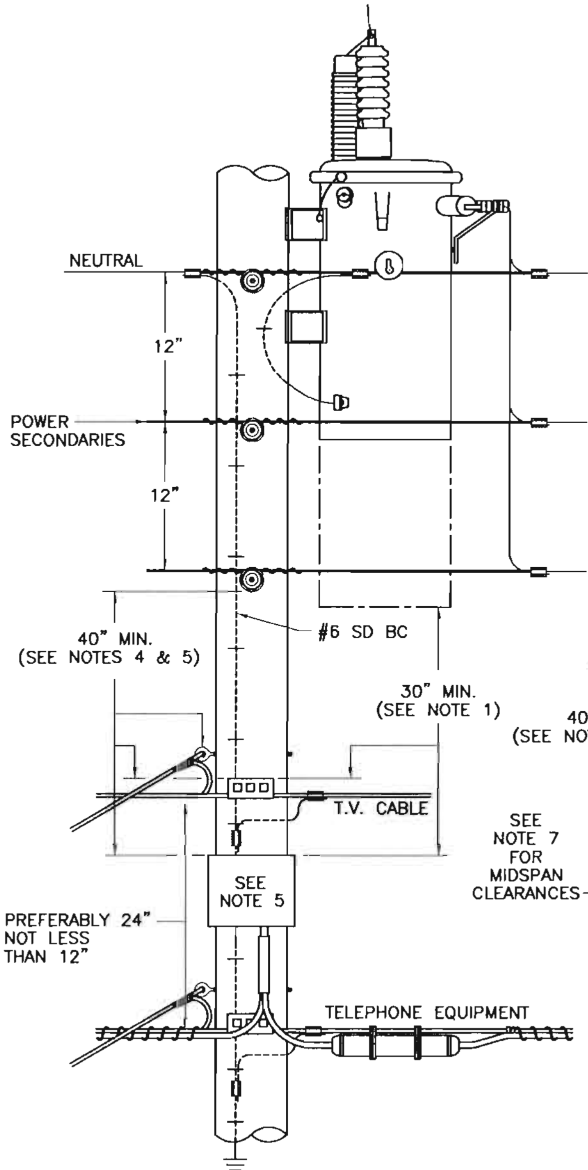
11. REQUESTS FOR EXCEPTIONS TO THIS DESIGN GUIDE SHALL BE REFERRED TO THE JOINT USE UNIT. ANY EXCEPTIONS APPROVED WILL BE DISTRIBUTED TO THE REGIONS FOR UNIFORM APPLICATION ON A SYSTEM-WIDE BASIS.

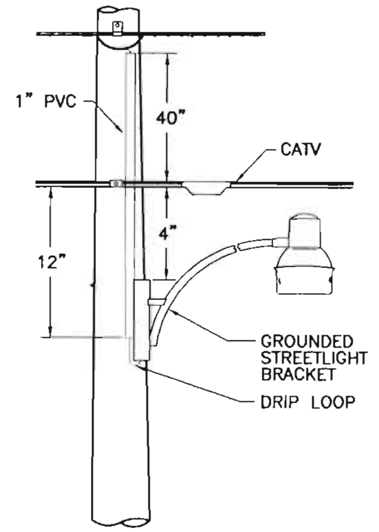
3				
2				
1	8/12/04	ROBESON	NUNNERY	SPRINGER
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

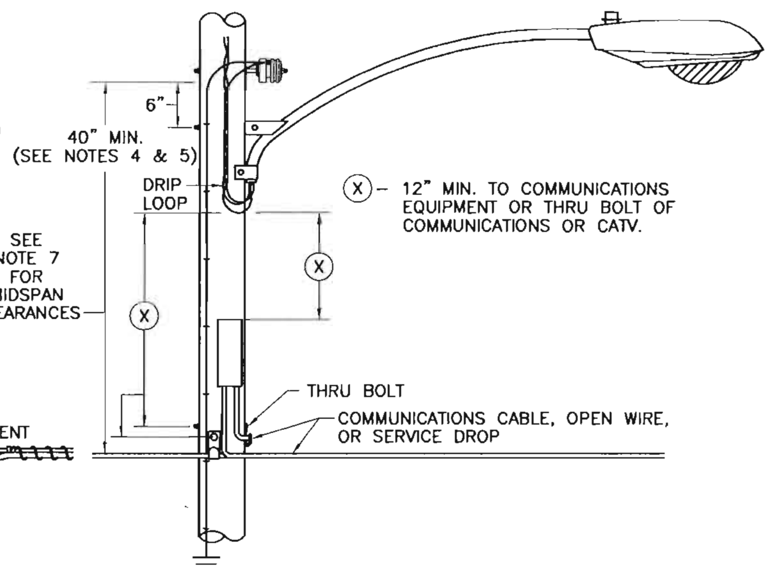
FOREIGN ATTACHMENTS & CLEARANCES

Progress Energy

PGN DWG. 09.04-01







NOTES:

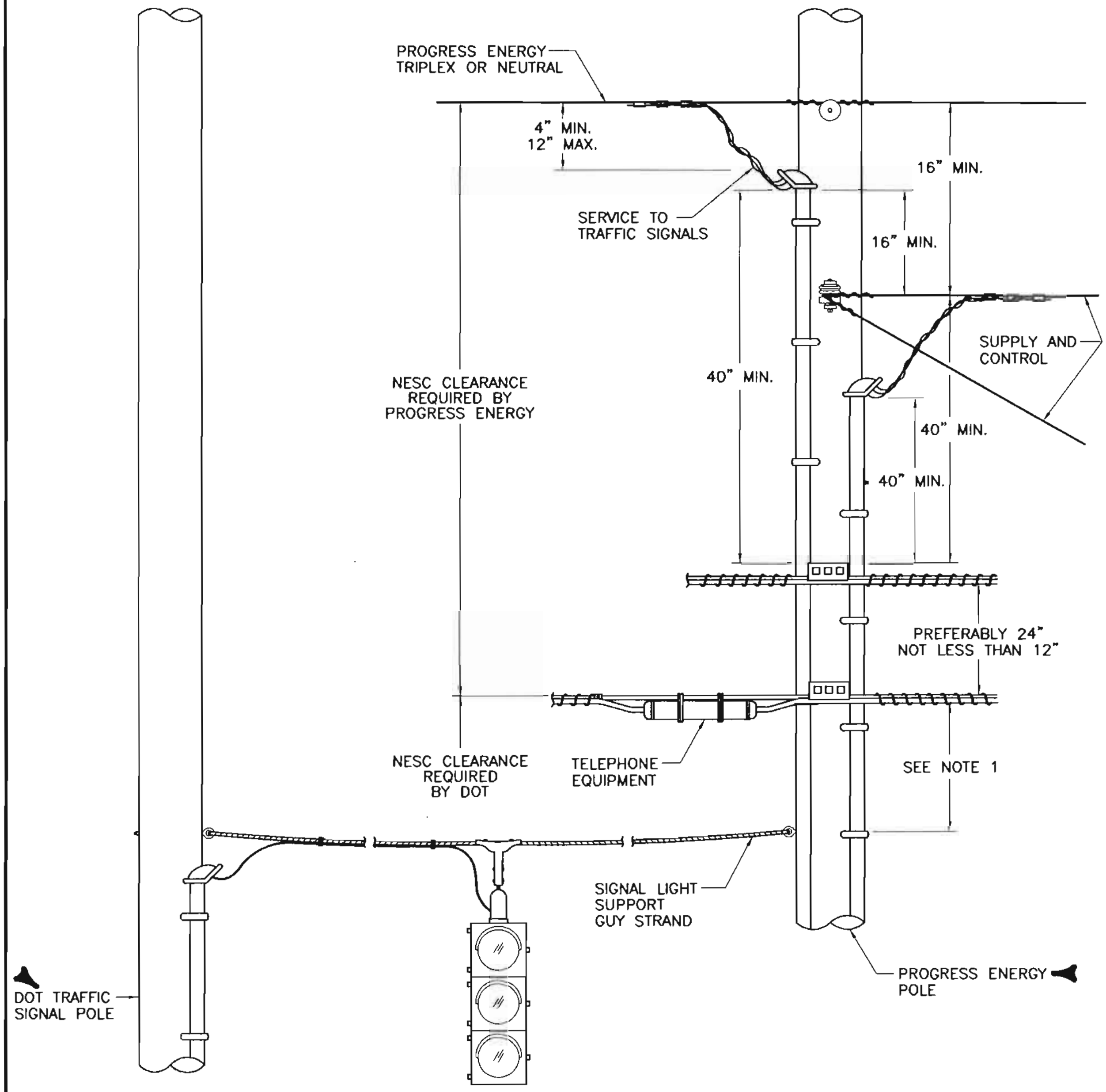
1. THIS DIMENSION OF NOT LESS THAN 30" APPLIES BETWEEN CONDUCTORS AND NON–CURRENT CARRYING PARTS OF EQUIPMENT THAT ARE EFFECTIVELY GROUNDED.
2. WHERE T.V. CABLE DOES NOT EXIST, MINIMUM DIMENSIONS APPLY TO TELEPHONE EQUIPMENT.
3. WHERE POWER AND COMMUNICATION LINES ARE BETWEEN THE SAME POLES, THESE CLEARANCES 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.
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.
9. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

8	9/23/08	GUINN	GUINN	HOYT
7	11/19/07	CECCONI	SIMPSON	HOYT
6	10/6/05	MCINTIRE	GUINN	HOYT
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. DOT REQUIREMENTS:
   FOR EFFECTIVELY BONDED SPAN WIRES, THIS CLEARANCE MAY BE 4" (12" PREFERRED). FOR UNBONDED SPAN WIRES, THE CLEARANCE MUST BE 20".

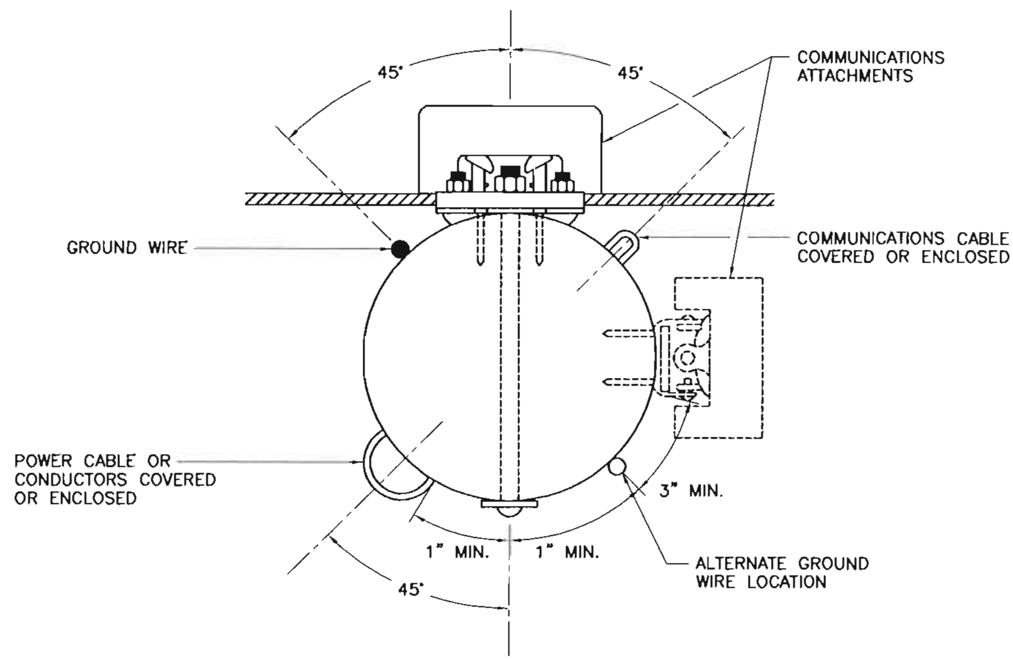
REVISED		BY	CK'D	APPR.
3	12/21/09	ROBESON	GUINN	ELKINS
2	12/6/07	ROBESON	GUINN	HOYT
1	4/1/04	ROBESON	NUNNERY	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY

JOINT USE CONSTRUCTION
TRAFFIC SIGNAL SUPPORT AND
POWER OPERATING CIRCUIT CLEARANCES

Progress Energy

PGN DWG. 09.04–03

LOCATION OF VERTICAL RUNS

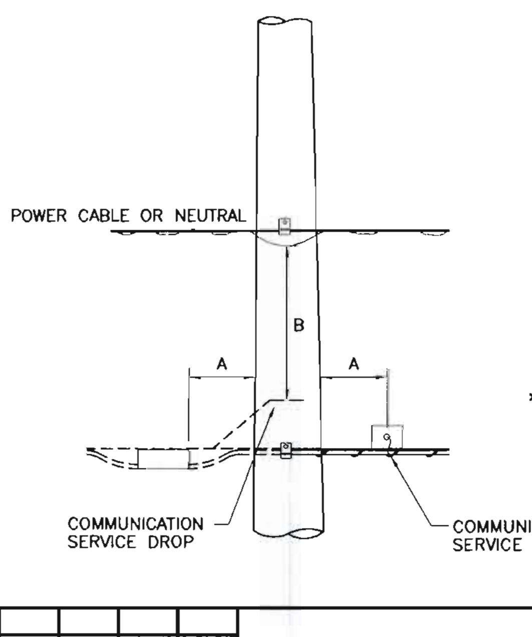


STREET SIDE

NOTES:

1. DO NOT LOCATE GROUNDED EQUIPMENT LESS THAN 1" FROM A BOLT OR STAPLE.
2. LOCATE U-GUARD ON SIDE OF POLE AWAY FROM TRAFFIC.

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

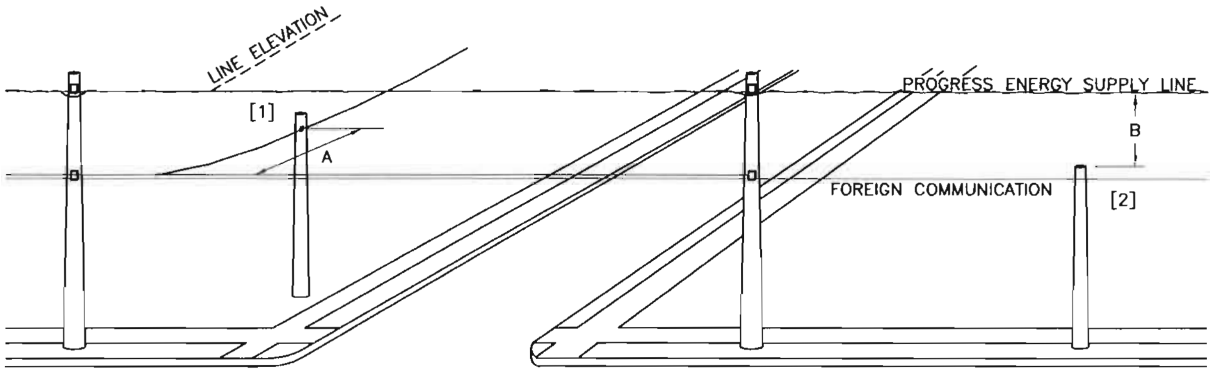
*PROGRESS ENERGY REQUIREMENT – NOT OPTIONAL ON NEW CONSTRUCTION – THIS CLEARANCE TO FACILITATE FUTURE POLE CHANGE OUT AND CLIMBING SPACE.

REVISED		BY	CK'D	APPR.
3				
2				
1	4/3/09	GUINN	GUINN	HOYT
0	7/24/02	HOYT	ROBESON	WOOLSEY

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.

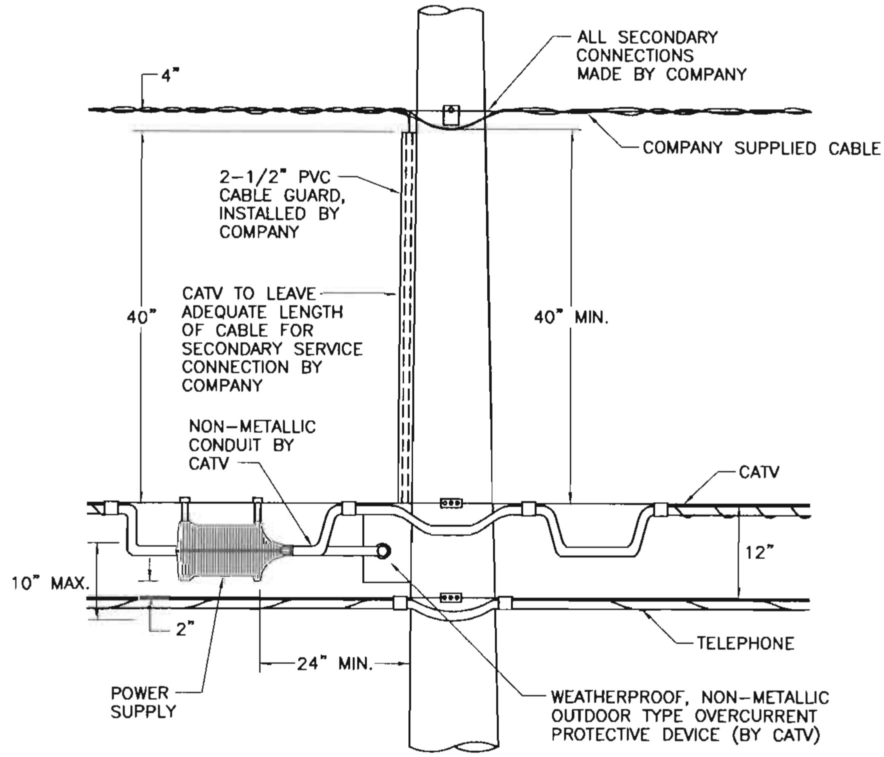
3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

FOREIGN POLE CLEARANCE AT FINAL SAG

Progress Energy

PGN DWG. 09.04–05

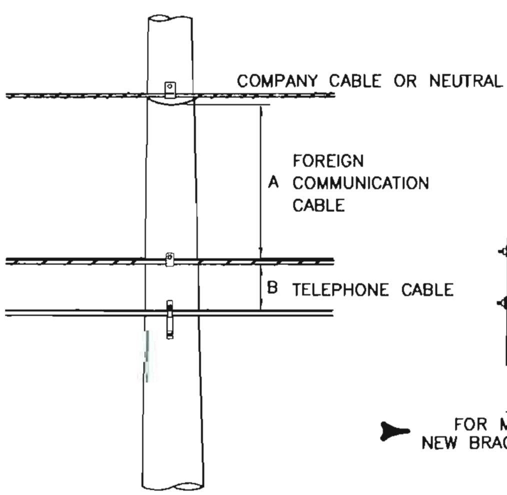
STRAND MOUNTED POWER SUPPLY

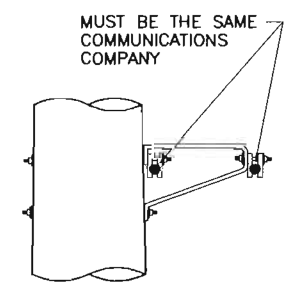


MTNC ONLY

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

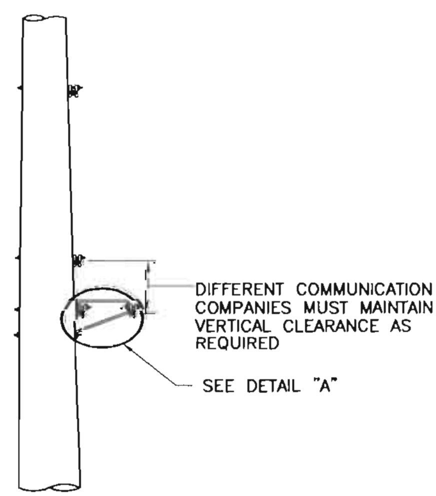
* COMPANY REQUIREMENT – NOT OPTIONAL





DETAIL "A"

FOR MAINTENANCE ONLY
NEW BRACKETS NOT PERMITTED



NOTES:

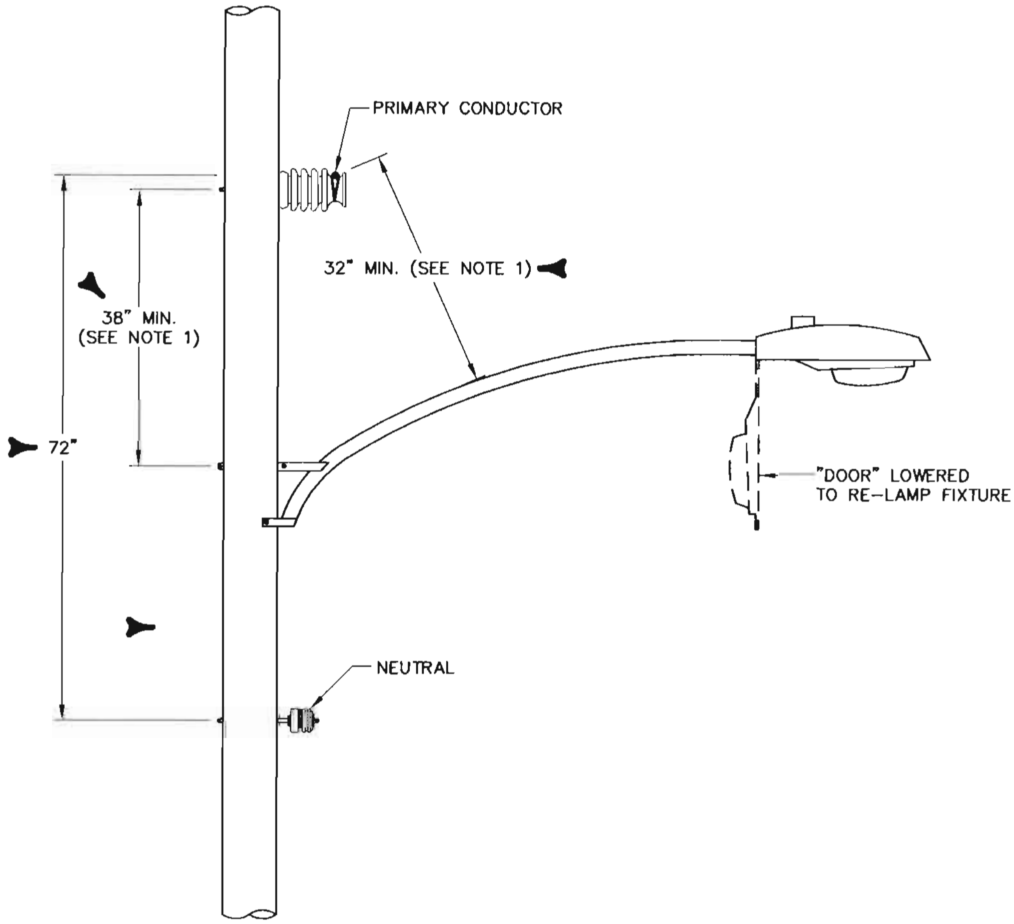
1. EXTENSION BRACKET MUST BE MOUNTED ON EXISTING CABLE SIDE ONLY.
2. EXTENSION BRACKET MAY BE UTILIZED IN TANGENT SITUATIONS ONLY, NOT APPROVED FOR DEAD-END POLES.
3. EXTENSION BRACKET MANUFACTURER'S SPECIFICATIONS MUST RECEIVE COMPANY APPROVAL PRIOR TO UTILIZATION.

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



LIGHTING UNIT ABOVE NEUTRAL

NOTES:

1. THIS DRAWING SHOWS MINIMUM CLEARANCE, PRIMARY CONDUCTOR TO BRACKET, FOR ONE TYPE OF BRACKET. THIS CLEARANCE SHALL BE MAINTAINED FOR ALL STYLES OF BRACKETS, OR ANY PART OF THE BRACKET. SEE OTHER DRAWINGS AND/OR ENGINEER'S INSTRUCTIONS FOR ACTUAL MOUNTING HEIGHTS.

2. FOR CLEARANCES – LIGHTING UNITS BELOW SECONDARY AND ABOVE COMMUNICATION CIRCUITS OR EQUIPMENT, SEE DWG. 09.04–02.

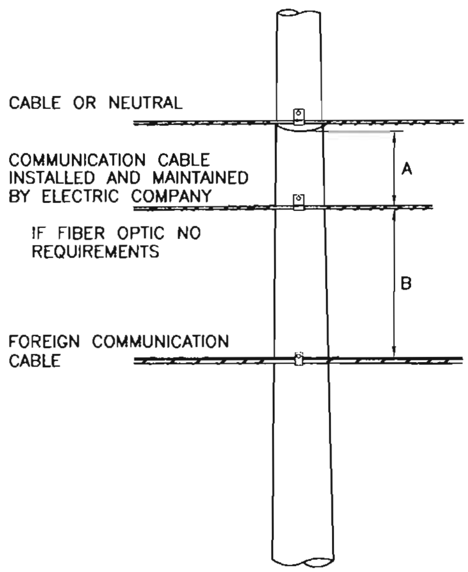
3. SEE DWG. 09.04–02 IF TELECOM IS ATTACHED.

3				
2				
1				
0	1/13/09	GUINN	GUINN	ELKINS
REVISED		BY	CK'D	APPR.

CLEARANCES – LIGHTING UNITS
TO POWER CIRCUITS OR EQUIPMENT

Progress Energy

FLA DWG. 09.04–07



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.

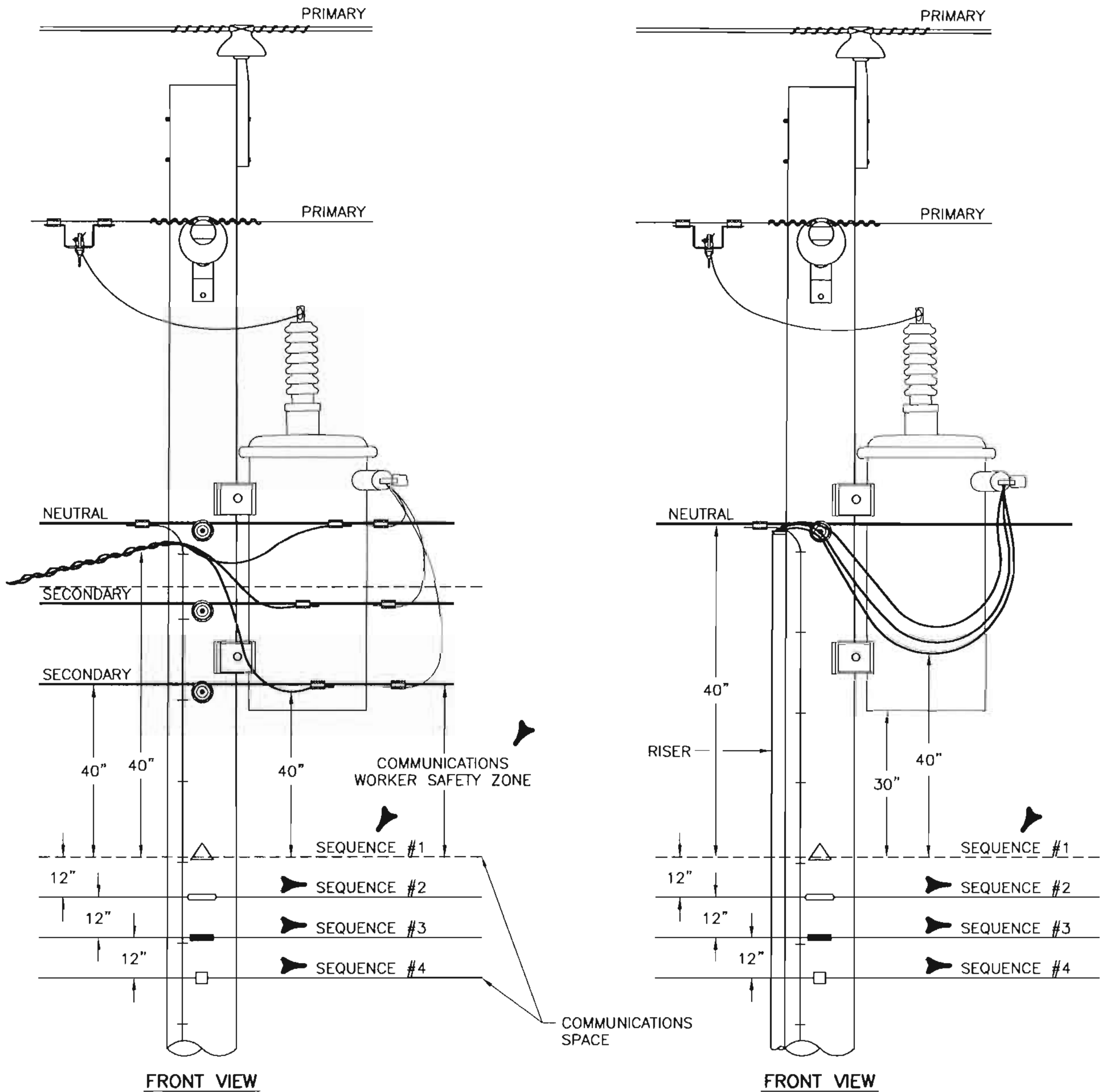
NO CLEARANCE IS SPECIFIED BETWEEN SUPPLY CONDUCTORS AND FIBER-OPTIC SUPPLY CABLES THAT ARE COMPLETELY DIELECTRIC (INCLUDING THE MESSENGER).

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:

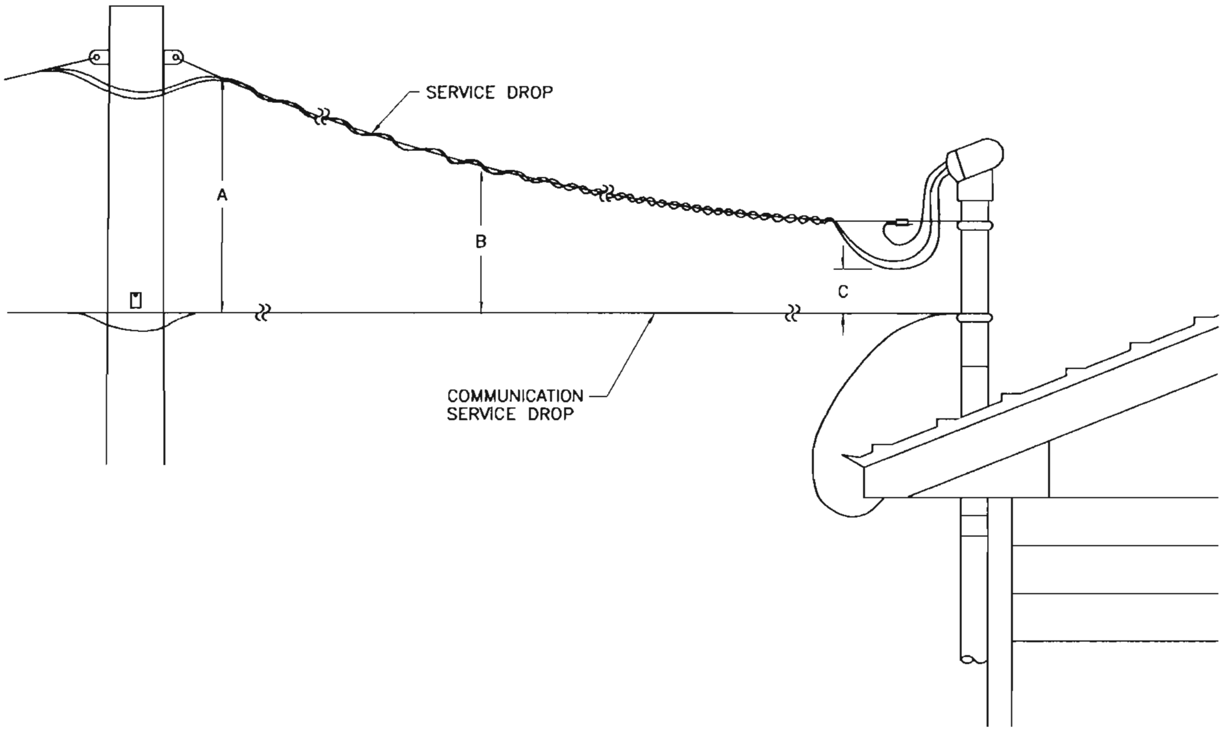
1. PROGRESS ENERGY FIBER OPTIC CABLE LOCATED AT THE BOTTOM OF THE SUPPLY SPACE (i.e. LESS THAN 40" FROM POWER) MUST HAVE A MINIMUM CLEARANCE OF 40" BETWEEN THE FIBER OPTIC CABLE AND THE TOP COMMUNICATIONS CABLE TO ENSURE THE 40" COMMUNICATION WORKER SAFETY ZONE IS NOT VIOLATED.
2. THE PEC JU-TRANSFER 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	8/26/04	ROBESON	NUNNERY	SPRINGER
1	4/27/04	BUNCH	NUNNERY	WOOLSEY
0	2/26/03	ROBESON	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

JOINT USE CLEARANCE REQUIREMENTS

Progress Energy

PGN DWG. 09.04-14



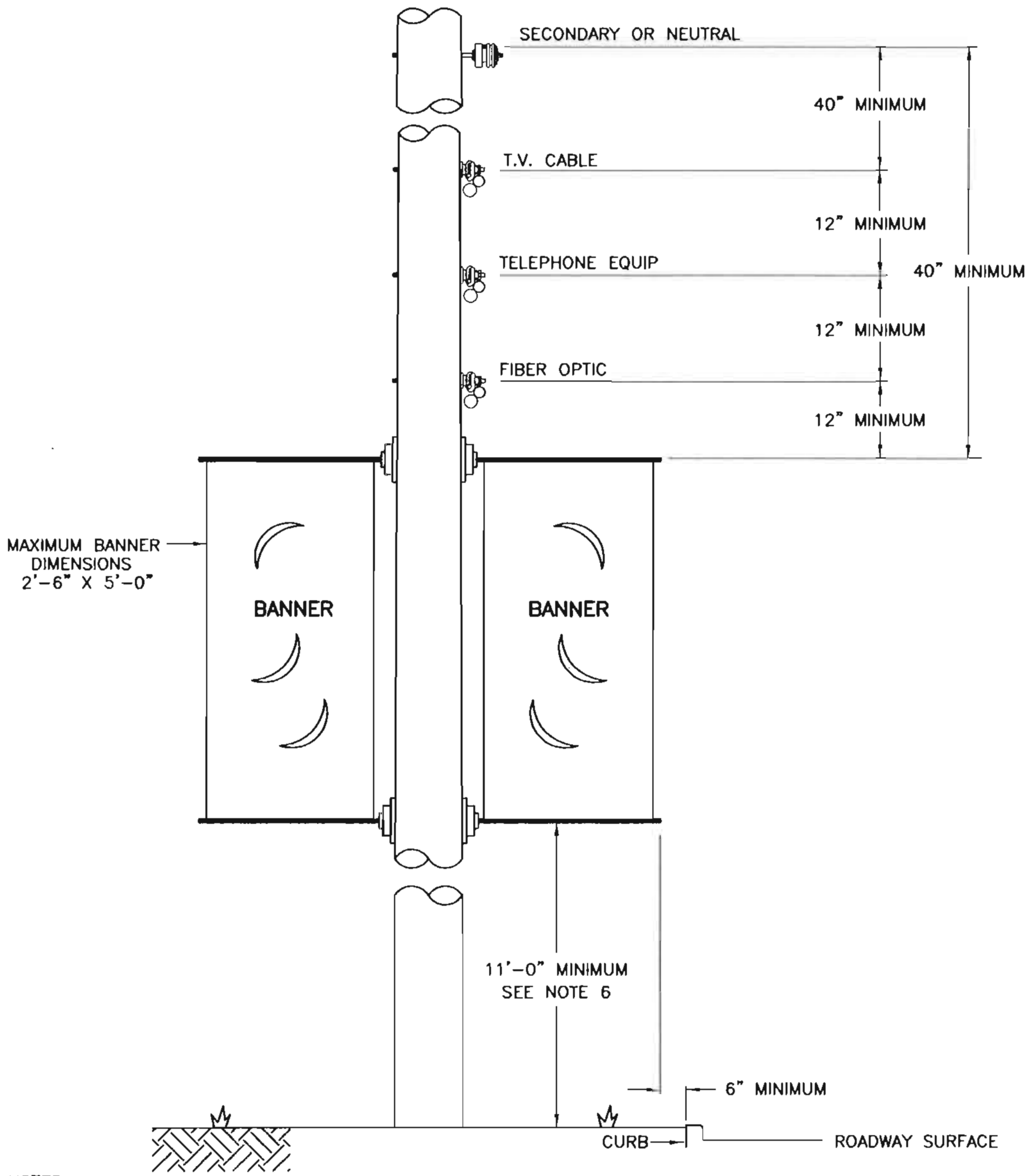
DIMENSION (LETTER)	*NESC MINIMUM REQUIREMENT	PROGRESS ENERGY PREFERRED MINIMUM REQUIREMENT	NESC APPLICABLE REFERENCE SECTION
A	40"	40"	235-5
B	12"	12"	235 C1 EXCEPTION 3
C	12"	12"	235 C1 EXCEPTION 3

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



NOTES:

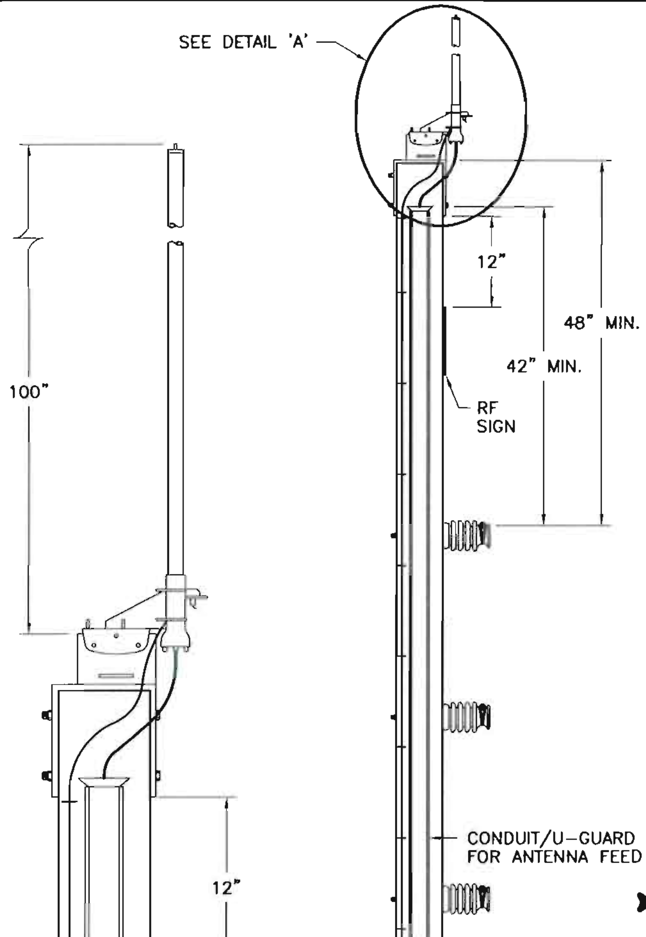
1. POLE MUST BE INSPECTED FOR STRUCTURAL INTEGRITY PRIOR TO BANNER ATTACHMENT.
2. BANNERS SHOULD NOT BE ATTACHED TO POLES WITH YELLOW OR WHITE INSPECTION TAGS.
3. BANNER AGREEMENT MUST BE COMPLETED PRIOR TO BANNER ATTACHMENT TO COMPANY DISTRIBUTION POLES.
4. BANNERS ATTACHED TO POLES SHOULD BE PERPENDICULAR 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.

3				
2				
1				
0	3/23/09	CECCONI	GUINN	HOYT
REVISED		BY	CK'D	APPR.

BANNER INSTALLATION ON DISTRIBUTION POLES

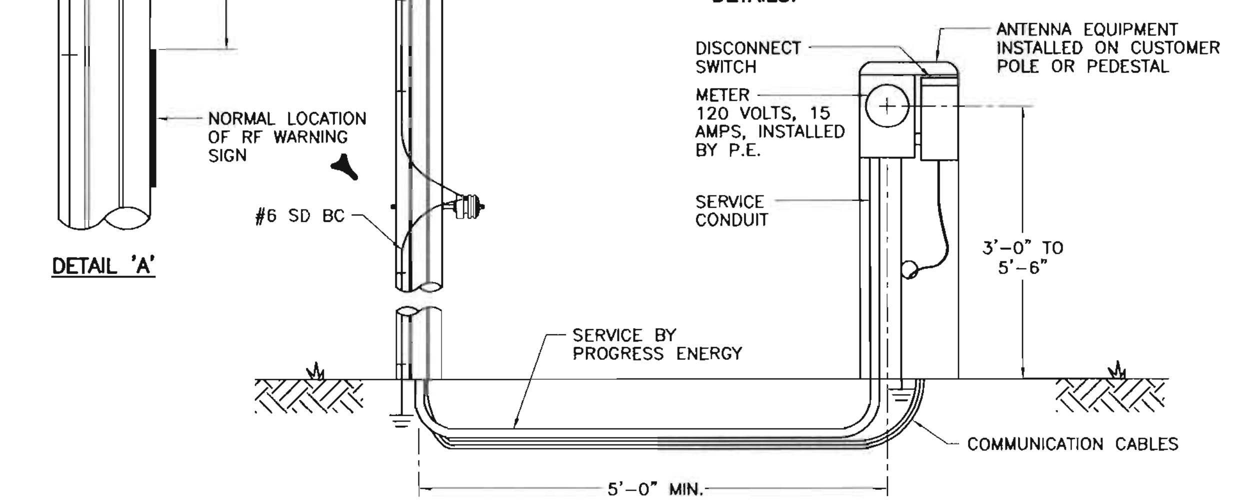
Progress Energy

FLA DWG. 09.04–25



NOTES:

1. ANTENNA MUST BE INSTALLED BY AN APPROVED CONTRACTOR QUALIFIED TO WORK IN THE SUPPLY SPACE.
2. POLE LOCATIONS APPROVED BY PROGRESS ENERGY. <u>DO NOT</u> INSTALL ANTENNA ON EQUIPMENT POLES SUCH AS CAPACITOR BANKS, RECLOSERS, SWITCHES, U.G. DIP, ETC.
3. ONLY ONE ANTENNA PER POLE ALLOWED.
4. <u>CAUTION:</u> 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, <u>EXCEPT IN CASE OF EMERGENCY</u>.
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 <u>X</u> 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.
9. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.



<u>LINE INSULATION:</u>
BECAUSE POLE GROUND GOES TO TOP OF POLE, EXISTING LINE INSULATORS MUST BE HIGHER VOLTAGE THAN NORMAL.

<u>12KV SYSTEM:</u>
USE 35KV INSULATOR

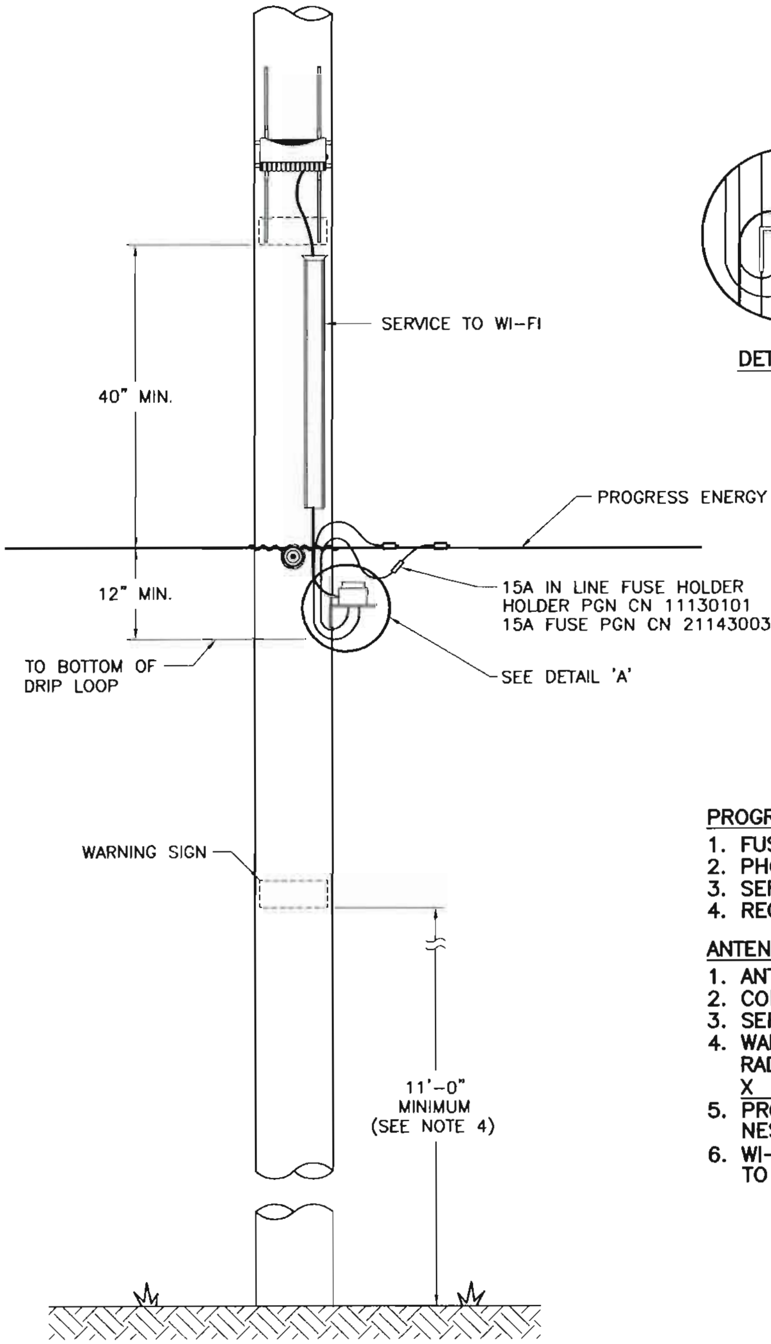
<u>23KV SYSTEM:</u>
USE 45KV INSULATOR

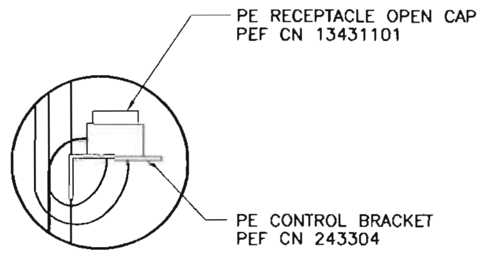
REVISED		BY	CK'D	APPR.
3				
2	11/19/07	CECCONI	SIMPSON	HOYT
1	8/26/05	ROBESON	QUINN	HOYT
0	6/15/05	NUNNERY	NUNNERY	HOYT

JOINT USE CONSTRUCTION
(DAS) DISTRIBUTED ANTENNA SYSTEMS

Progress Energy

PGN DWG. 09.04–30





DETAIL 'A'

FRONT VIEW

PROGRESS ENERGY PROVIDE AND INSTALL:

1. FUSE HOLDER AND FUSE
2. PHOTOCONTROL BRACKET
3. SERVICE CONNECTION
4. RECEPTACLE OPEN CAP

ANTENNA COMPANY PROVIDE AND INSTALL:

1. ANTENNA
2. CONDUIT/ U-GUARD
3. SERVICE CABLE
4. WARNING SIGN – "WARNING – ANTENNA RADIATION. MINIMUM APPROACH DISTANCE IS X__FT".
5. PROPER GROUNDING IN ACCORDANCE WITH NESC REQUIREMENTS.
6. WI-FI ANTENNA INSTALLER MUST BE QUALIFIED TO WORK IN SUPPLY SPACE.

NOTES:

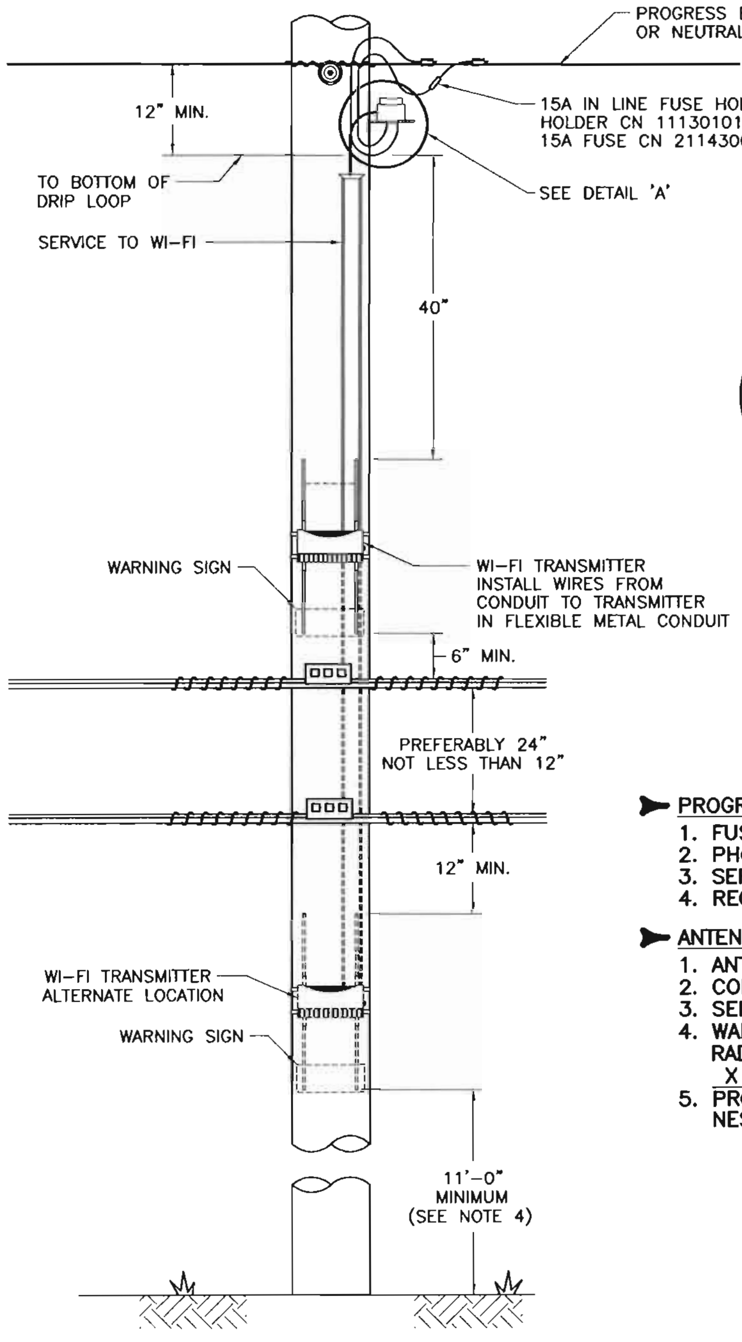
1. DO NOT INSTALL ANTENNAS ON EQUIPMENT POLES SUCH AS CAPACITOR BANKS, RECLOSERS, REGULATOR, SWITCHES, U.G. DIP, ETC.
2. ALL ANTENNA LOCATIONS MUST BE APPROVED BE BY A PROGRESS ENERGY DISTRIBUTION ENGINEER.
3. ONLY ONE ANTENNA PER POLE ALLOWED.
4. MINIMUM CLEARANCE IS BASED ON NESC TABLE 232-2(1)d.

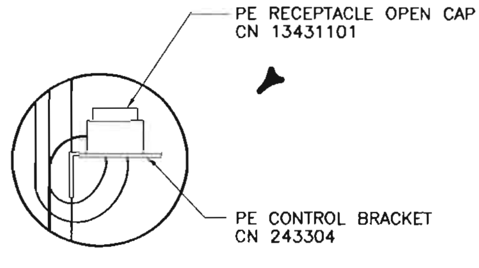
3				
2				
1				
0	10/17/08	ROBESON	GUINN	HOYT
REVISED		BY	CK'D	APPR.

JOINT USE CONSTRUCTION
WI-FI ANTENNA INSTALLATION
ON SERVICE POLE

Progress Energy

PGN DWG. 09.04-32





DETAIL 'A'

PROGRESS ENERGY PROVIDE AND INSTALL:

1. FUSE HOLDER AND FUSE
2. PHOTOCONTROL BRACKET
3. SERVICE CONNECTION
4. RECEPTACLE OPEN CAP

ANTENNA COMPANY PROVIDE AND INSTALL:

1. ANTENNA
2. CONDUIT/ U-GUARD
3. SERVICE CABLE
4. WARNING SIGN – "WARNING – ANTENNA RADIATION. MINIMUM APPROACH DISTANCE IS X FT".
5. PROPER GROUNDING IN ACCORDANCE WITH NESC REQUIREMENTS.

FRONT VIEW

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.

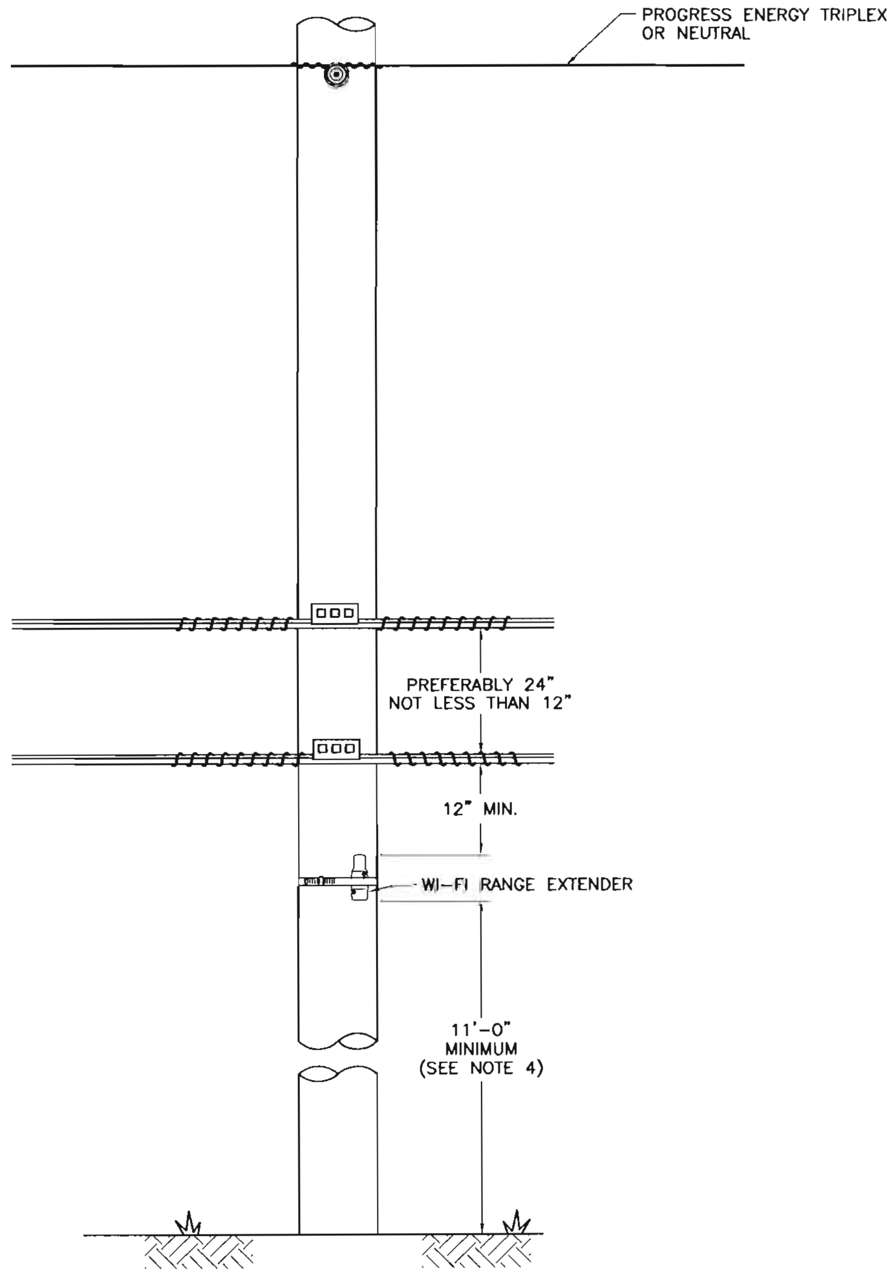
3	10/9/08	ROBESON	QUINN	HOYT
2	1/18/06	MCINTIRE	QUINN	HOYT
1	8/26/05	ROBESON	QUINN	HOYT
0	7/6/05	ROBESON	NUNNERY	HOYT
REVISED		BY	CK'D	APPR.

JOINT USE CONSTRUCTION

WI-FI ANTENNA INSTALLATION

Progress Energy

PGN DWG. 09.04-35



FRONT VIEW

NOTES:

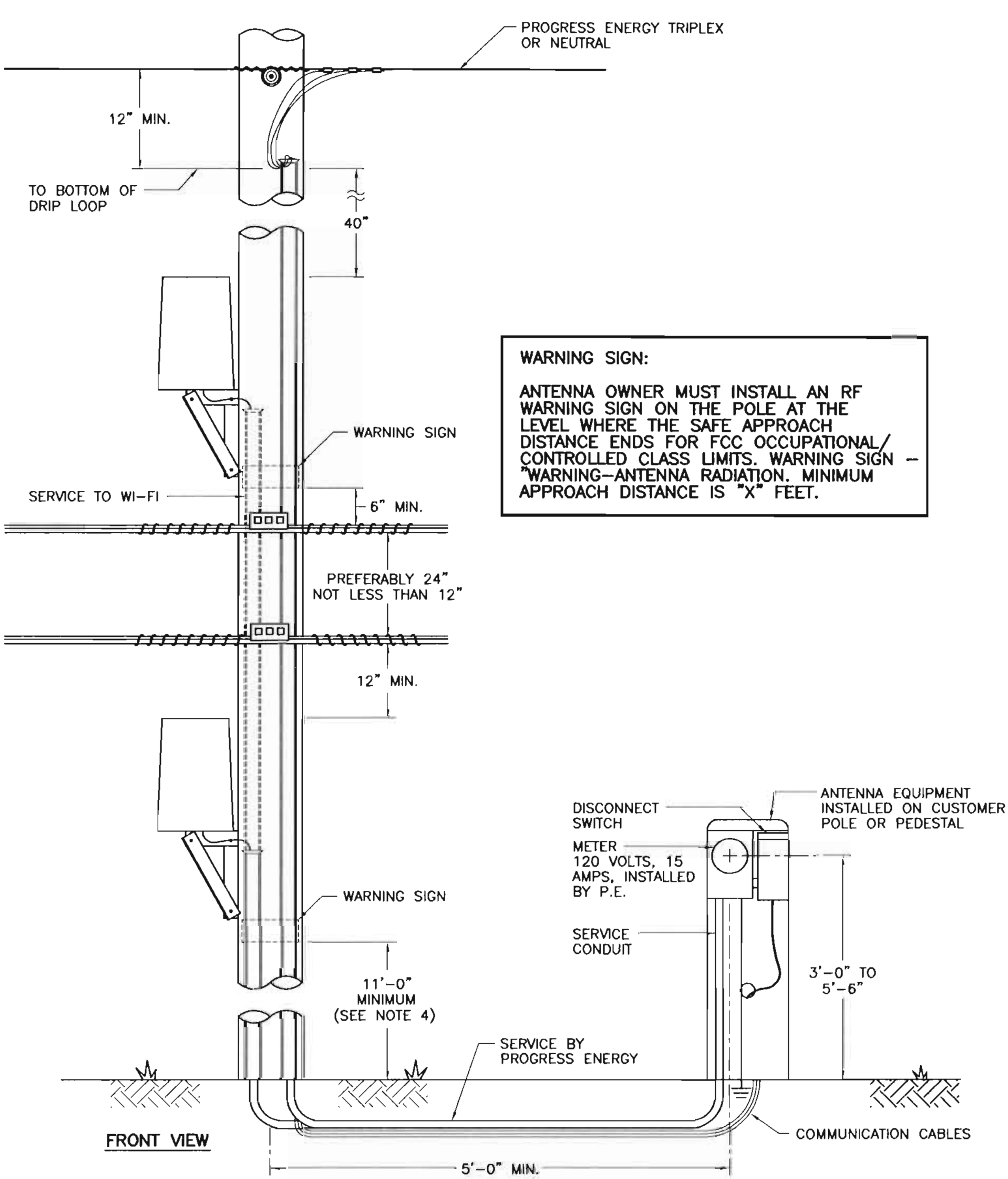
1. **DO NOT** INSTALL ANTENNAS ON EQUIPMENT POLES SUCH AS CAPACITOR BANKS, RECLOSERS, REGULATOR, SWITCHES, U.G. DIP, ETC.
2. ALL ANTENNA LOCATIONS MUST BE APPROVED BE BY A PROGRESS ENERGY DISTRIBUTION ENGINEER.
3. ONLY ONE ANTENNA PER POLE ALLOWED.
4. MINIMUM CLEARANCE IS BASED ON NESC TABLE 232-2(1)d.

3				
2				
1				
0	2/27/09	BURLISON	QUINN	HOYT
REVISED		BY	CK'D	APPR.

JOINT USE CONSTRUCTION
WI-FI ANTENNA INSTALLATION

Progress Energy

PGN DWG. 09.04-36



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 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.

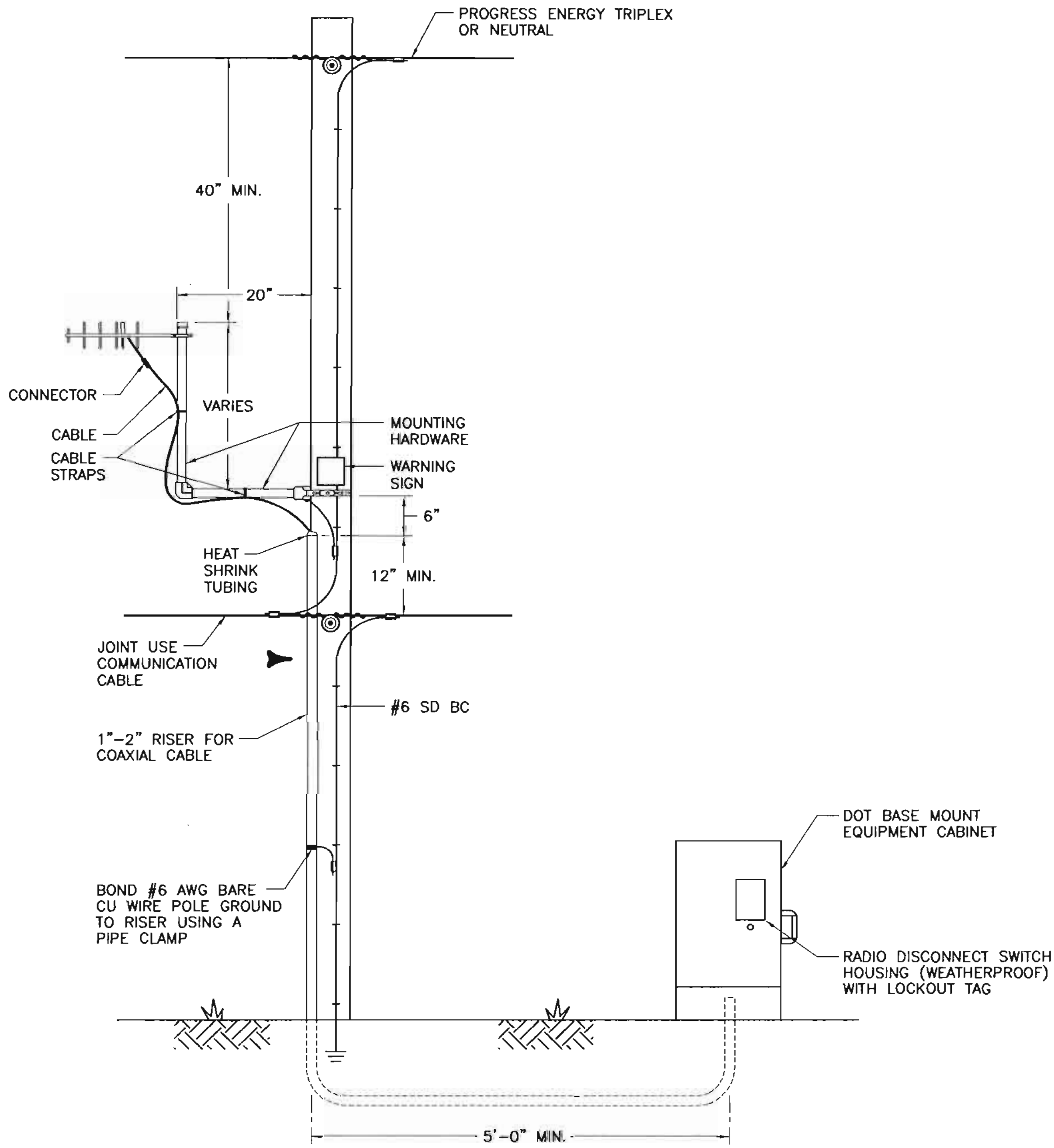
3				
2				
1				
0	3/31/10	ROBESON	QUINN	ELKINS
REVISED		BY	CK'D	APPR.

JOINT USE CONSTRUCTION

DAS ANTENNA INSTALLATION

Progress Energy

PGN DWG. 09.04-37



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".
6. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

3				
2				
1	11/19/07	CECCOON	SIMPSON	HOYT
0	7/27/05	ROBESON	NUNNERY	HOYT
REVISED		BY	CK'D	APPR.

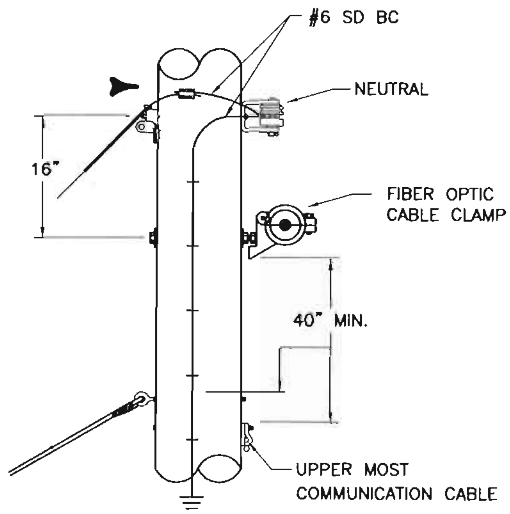
JOINT USE CONSTRUCTION

TRAFFIC SIGNAL ANTENNA

Progress Energy

PGN DWG. 09.04-40

TANGENT AND ANGLES TO 20°



CAROLINAS BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	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.	COMPATIBLE UNIT	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.
4. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

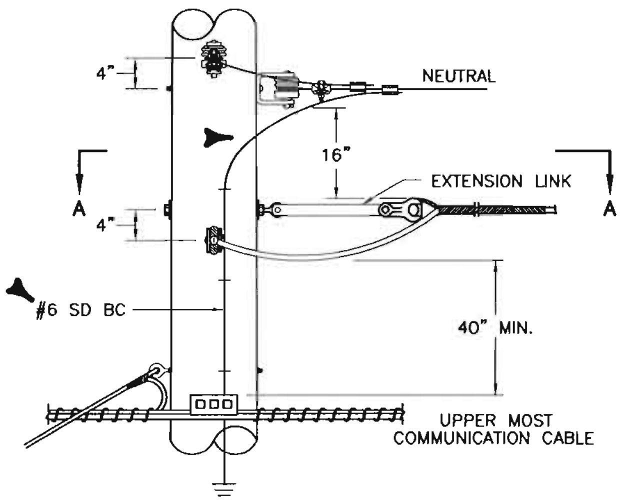
3				
2				
1	11/19/07	CECCONI	SIMPSON	HOYT
0	11/15/06	BURLISON	GUINN	HOYT
REVISED		BY	CK'D	APPR.

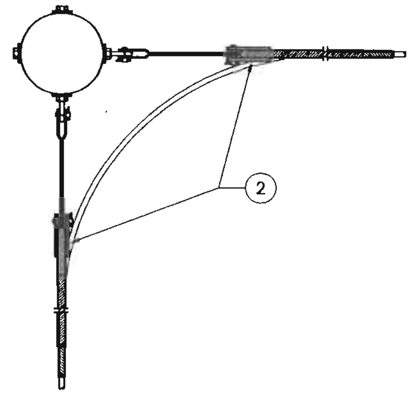
PROGRESS ENERGY FIBER OPTIC CABLE INSTALLED IN SUPPLY SPACE – INSTALLATION DETAILS

Progress Energy

PGN DWG. 09.04–42

ANGLES GREATER THAN 20°





SECTION "A-A"

CAROLINAS BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	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.	COMPATIBLE UNIT	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:

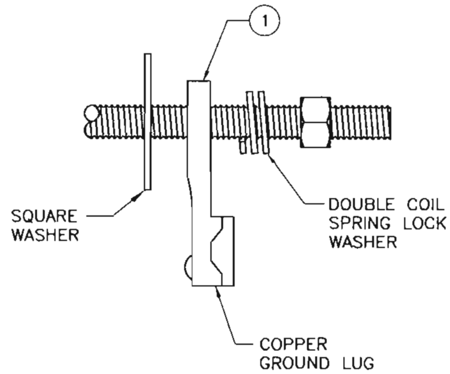
1. NEUTRAL GUYS NOT SHOWN FOR CLARITY.
2. CLEARANCES SHOWN TO NEUTRAL ALSO APPLY TO LOWEST OPEN-WIRE SECONDARY AND TRIPLEX.
3. USE 5/8" BOLTS FOR FIBER OPTIC CABLE SUPPORTS.
4. 30" IF BASE OF FIBERGLASS STANDOFF BRACKET IS BONDED TO POLE GROUND AND THE COMMUNICATION CABLE IS BONDED TO POLE GROUND, 40" IF NOT.
5. SEE DWG. 09.04-49 FOR FIBERGLASS BONDING DETAIL.
6. NEW FOPT REINFORCING RODS MUST BE USED WHEN TRANSFERRING DEADENDS.
7. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

REVISED		BY	CK'D	APPR.
3				
2				
1	11/19/07	CECCONI	SIMPSON	HOYT
0	11/15/06	BURLISON	GUINN	HOYT

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

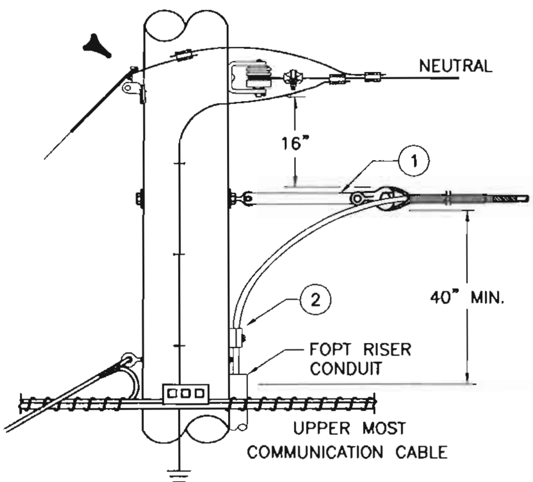
3				
2				
1				
0	11/15/06	BURLISON	QUINN	HOYT
REVISED		BY	CK'D	APPR.

PROGRESS ENERGY FIBER OPTIC CABLE
INSTALLED IN SUPPLY SPACE –
INSTALLATION DETAILS

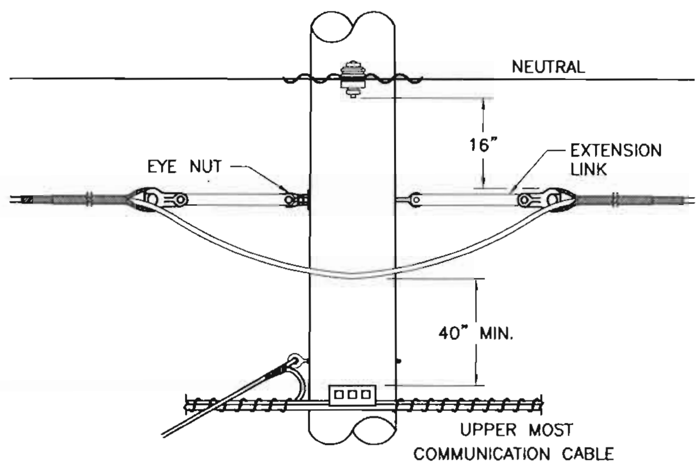
Progress Energy

PGN DWG. 09.04–49

DEAD-END AND FOPT DOWNLEAD



DOUBLE DEAD-END



CAROLINAS BILL OF MATERIALS				
ITEM NO.	COMPATIBLE UNIT	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.	COMPATIBLE UNIT	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".
4. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

REVISED		BY	CK'D	APPR.
3				
2				
1	12/21/07	CECCONI	GUINN	HOYT
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

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

Document title

Extreme Wind Loading Design Guideline for Overhead Transmission Line Structures

Document number

STD-TRMX-00005

Applies to: Transmission Operations & Planning Department – Carolinas and Florida

Keywords: engineering; transmission - engineering standards

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.

<u>Air Density Factor</u>

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.

<u>Wind Climate</u>

- 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 winds 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.

Wind-Structure Interaction

- 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.

Gust Response Factor, G_{rf} (NESC Rule 250C2)

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.

Shape Factor, C_d, (NESC Rule 252B2a)

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).

Examples:

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, and
2. The specific Wind Region of interest

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. 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, 115kV 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 an 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.

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

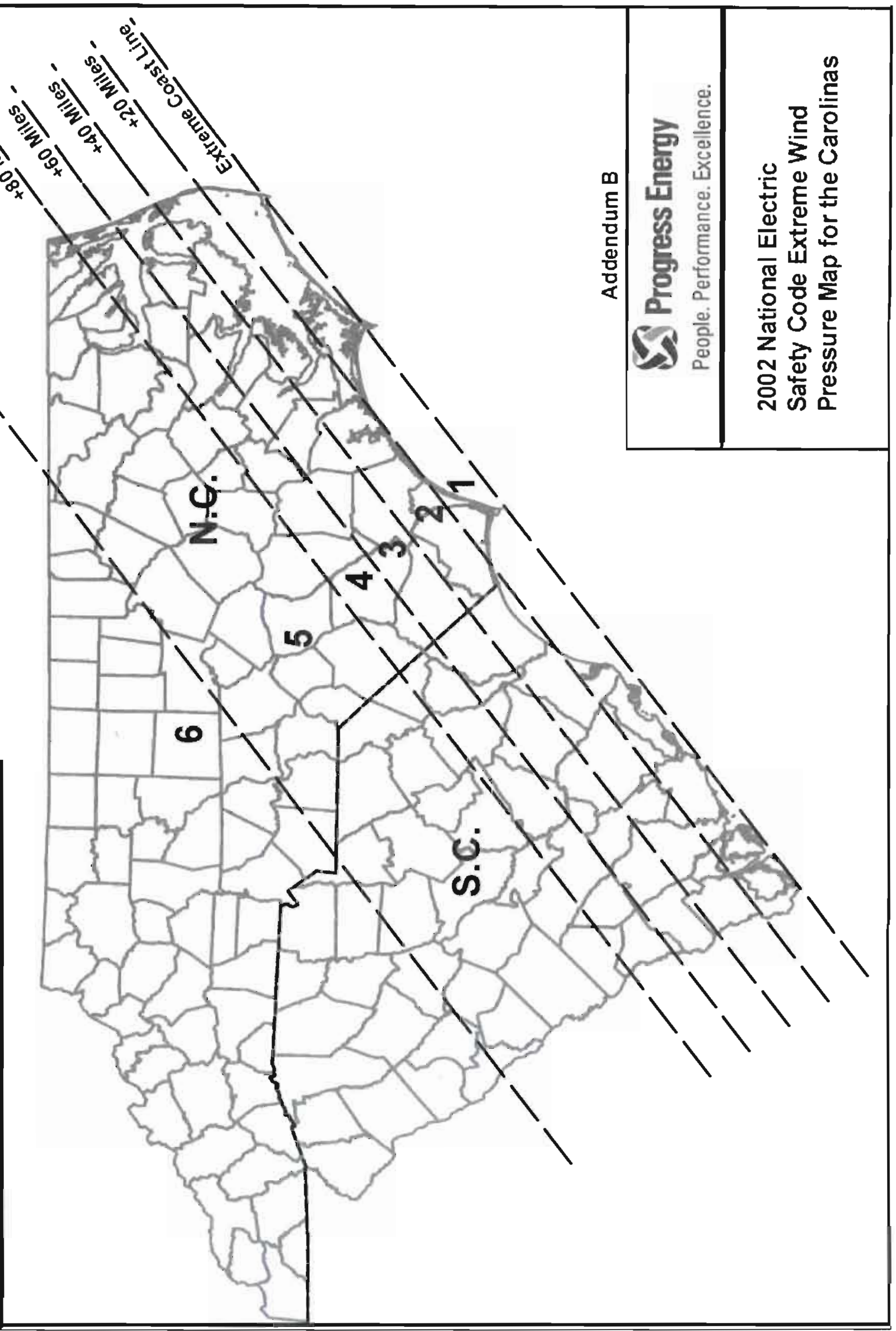
NESC Extreme Wind Regions & Corresponding Design Wind Speeds (mph)		
Reliability Class	**2002 NESC Wind Region**	
	1[4]	**2[5]**
1[2]	145	130
2[3]	135	120

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.

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	

Reliability	2002 NESC Wind Region		
	1	2	
1	53.7	42.4	PSF
2	46.7	36.9	

Addendum C

Progress Energy
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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 1.8
March 2009

Table of Contents

Table of Contents

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 soil (when utilizing maintenance equivalent poles) should be utilized where ever possible along roads due to the possibility of future road widening projects. Concrete backfill in these areas 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

<u>Note</u>: 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 soil 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	Rated Breaking Strength	NESC Grade B Light Loading & PEF Extreme Wind Tension (90%)
3/8" H.S.	10,800#	9,720#
7/16" U.G.	18,000#	16,200#
1/2" E.H.S.	26,900#	24,210#
9/16" E.H.S.	33,700#	30,330#
5/8" E.H.S.	40,200#	36,180#
3/4" E.H.S.	58,300#	52,470#

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 latest edition of NESC Grade B light loading, NESC extreme wind, and PEF extreme wind loading.

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.

13 Revision History

Revision No.	Revision description

Progress Energy

2009 Annual Reliability Report

March 1, 2010

II. Storm Hardened Facilities

Pursuant to the Stipulation regarding the "Process within the Process" entered into and filed jointly by the third-party attachers and IOU's with the FPSC on September 26, 2007, paragraph 7 requires each electric utility to file by March 1 each year a status report of its implementation of its storm hardening plan. Please see Attachment I - "Spreadsheet of Storm Hardening Project Status".

PEF continues to maintain an open line of communication with third-party attachers pertaining to storm hardening projects in PEF's territory.

a. Describe each storm hardening activity undertaken in the field during 2009.

<u>Distribution</u>

In addition to the activities identified in PEF's Storm Hardening Plan (Attachment J), Wood Pole Inspection Plan (Attachment K), and other initiatives identified and discussed herein, Progress Energy Florida Distribution undertook the following specific activities that deliver a storm hardening benefit during 2009:

<u>Existing Overhead to Underground Conversion:</u>

See Attachment L - "Major Conversions Historical Data".

<u>New Construction Cable footage installed underground:</u>
In 2009, PEF installed 44 circuit miles of new underground cable. Overall, the PEF distribution system consists of 41.4% primary underground circuit miles (12,834 circuit miles).

<u>Network Maintenance and Replacement:</u>
2009 Actuals - $1.3M
Livefront Switchgear Replacement – 2009 Actuals - $240k

<u>Midfeeder Electronic Sectionalizing (Reclosers):</u>
2009 Actuals - $320k

<u>Wood Pole Inspection and Treatment:</u>
2009 Actuals - $3.3M

<u>Wood Pole Replacement:</u>
2009 Actuals - $5.5M

<u>Padmount Transformer Replacement:</u>
2009 Actuals - $4.8M

<u>Storm Hardening Pilot Projects</u>
2009 Actuals - $3.6M

Transmission

In addition to the activities identified in PEF's Storm Hardening Plan (Attachment J), Wood Pole Inspection Plan (Attachment K), and other initiatives identified and discussed herein, Progress Energy Florida Transmission undertook the following specific Storm Hardening Activities during 2009:

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 704 wood poles with steel or concrete during 2009.

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 794 poles with steel or concrete during 2009.

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.

For additional information, please see Attachment J - PEF's Storm Hardening Plan.

Transmission

Maintenance Change outs
Poles that require change out are identified by Procedure MNT-TRMX-00053, "Ground Patrols" (See Attachment M). 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.

For additional information, please see Attachment J - PEF's Storm Hardening Plan.

c. **Provide the costs incurred and any quantified expected benefits.**

Distribution

See Subsection (a) above.

Transmission

Line Maintenance Change outs
Progress Energy Florida Transmission spent approximately $15,731,620 for Capital Improvements in 2009. Capital Improvements includes pole change outs and complete insulator replacements.

Quantified benefits will be a stronger and more consistent material supporting Transmission Circuits. Over the next 10 years, the percentage of wood poles on Progress Energy Florida's Transmission system should reduce wood poles on the system from approximately 75% to 50%.

DOT/Customer Relocations and Line Upgrades and Additions
Progress Energy Florida Transmission spent approximately $84,090,391 for DOT/Customer Relocations and Line Upgrades and Additions in 2009.

Quantified benefits will be a stronger and more consistent material supporting Transmission Circuits. Over the next 10 years, the percentage of wood poles on Progress Energy's Transmission system should reduce wood poles on the system from approximately 75% to 50%.

d. **Discuss any 2010 projected activities and budget levels.**

Distribution

Progress Energy Florida Distribution's storm hardening strategy and activities for 2010 are still ongoing and under development. At this time, however, Progress Energy Distribution reports as follows:

Existing Overhead to Underground Conversion:

Major Underground Conversions are a customer driven activity based upon a willingness to pay the conversion costs. While specific annual totals are difficult to forecast, the trend indicated by Attachment L, "Major Conversions Historical Data" over the last 7 years is expected to continue.

New Construction Cable footage installed underground:
The specific span miles of new underground cable installed is driven by the level of new connect activity. While the number of span miles installed varies from year to

year, the percentage of new primary distribution span miles installed underground is expected to continue.

<u>Network Maintenance and Replacement:</u>
2010 Projections - $1.3M
Livefront Switchgear Replacement – 2010 Projections - $300k

<u>Wood Pole Inspection and Treatment:</u>
2010 Projections - $3.1M

<u>Wood Pole Replacement:</u>
2010 Projections - $7.2M

<u>Padmount Transformer Replacement:</u>
2010 Projections - $7.0M

<u>Storm Hardening Pilot Projects</u>
2010 Projections - $3.8M

<u>Transmission</u>

Progress Energy Florida Transmission's storm hardening strategy and activities for 2010 are still ongoing and under development. At this time, however, Progress Energy Transmission reports as follows:

<u>Line Maintenance Change outs</u>
Progress Energy Florida Transmission should replace approximately 750 poles for 2010. Capital Budget for Line Maintenance is $13,573,115 for 2010 which includes pole change outs, insulator replacements and any overhead ground wire (OHGW) replacements.

<u>DOT/Customer Relocations and Line Upgrades and Additions</u>
Progress Energy Florida Transmission should replace approximately 800 poles for 2010. Current identified DOT/Customer Relocation Projects and Line Upgrades and Additions has a capital budget of $89.7 million.

IV. Wood Pole Inspection Program

a. Provide a detailed description of the Company's wood pole inspection program.

PEF's wood pole inspection program philosophy 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.

As mentioned in last year's report, 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 all poles with the exception of CCA poles less than 16 years of age. For CCA poles less than 16 years of age, OSMOSE is using visual inspection and sound and selective boring to determine the pole condition. 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.

For additional information, please see Attachment K - "Wood Pole Inspection Plan".

b. 2009 accomplishments

Distribution

PEF inspected 95,867 wood poles that were scheduled for 2009 inspection from January through December 2009. PEF also inspected an additional 9,453 wood poles originally scheduled for 2010, in the month of December 2009. This total keeps PEF on target 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 105,320 wood poles.

Transmission

In 2009, PEF Transmission ground patrol inspected 4,585 wood pole structures. This represents approximately 16.2% of the wood pole structures on the PEF Transmission system.

c. Projected accomplishments for 2010

Distribution

Among other things, PEF's goal for 2010 is to inspect at least 96,000 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 3,500 wood poles. We also will aerial patrol the entire transmission system two (2) times during 2010.

d. Wood pole inspection reports.

Each wood pole inspection report contains the following:

- A description of the methods used for structural analysis and pole inspection,
- A description of the selection criteria that was used to determine which poles would be inspected, and
- A summary report of the inspection data.

Distribution

Please see Attachment O - 2009 Annual Wood Pole Inspection Report filed with the FPSC on March 1, 2010.

For a description of the methods used for structural analysis and pole inspection – please refer to Attachment K - "Wood Pole Inspection Plan", pages 1 - 4 and 6 - 8.

For the summary report of the inspection data - See Attachment P - CD Rom containing Excel files - "2009 Distribution Pole Inspection Data" and "2010 Distribution Pole Inspection Data".

Transmission

Please see Attachment O - 2009 Annual Wood Pole Inspection Report filed with the FPSC on March 1, 2010.

For a description of the methods used for structural analysis and pole inspection – please refer to Attachment K - "Wood Pole Inspection Plan", pages 1 - 4 and 6 - 8.

For the summary report of the inspection data – See Attachment Q – CD containing Excel file - "2009 Transmission Pole Inspection Data".

CCA Pole Sampling Report

Pursuant to Order No. PSC-08-0615-PAA-EI issued September 23, 2008 in Docket No. 080219-EI, the Commission approved modification to the sounding and boring excavation requirements of Order No. 06-0144-PAA-EI with regard to CCA wood poles less than 16 years old. On Pages 3 and 4 of Order No. PSC-08-0615-PAA-EI, it states, *"ORDERED that, consistent with the deviation granted to Gulf Power Company in Order No. PSC-07-0078-PAA-EU, Progress Energy Florida, Inc., Florida Power & Light Company, and Tampa Electric Company shall be required to sound and selectively bore all CCA poles under the age of 16 years, but shall not be required to perform full excavation on these poles. It is further*

ORDERED that Progress Energy Florida, Inc., Florida Power & Light Company, and Tampa Electric Company shall also be required to perform full excavation sampling to validate their inspection method. It is further

ORDERED that the results of the utilities' sampling shall be filed in their annual distribution reliability reports."

<u>2009 CCA Pole Sampling Results</u>

Please see Attachment O – PEF's 2009 Annual Wood Pole Inspection Report filed with the FPSC on March 1, 2010. The "CCA Sampling Results for 2009" is included in PEF's Wood Pole Inspection Report as "Attachment B".

V. <u>EIW Initiatives</u>

Vegetation Management – Three Year Cycle (*Initiative 1*)

a. **Provide a complete description of the Company's vegetation management program (policies, guidelines, practices) for 2009 and 2010 in terms of both activity and costs.**

- *See Attachment R - "PEF's Storm Preparedness Plan".*
- *See Attachment S - "Internal Policy & Guidelines".*
- *For activities and costs - See information herein on pages 43-46.*

b. **Describe tree clearing practices in utility easements and authorized rights-of-ways.**

See Attachment S - "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 specific 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 S - "Internal Policy & Guidelines".

e. **Describe tree clearing practices outside of utility easements and authorized rights-of-ways.**

See Attachment S - "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 specific 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 S - "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 specific 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 T - "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 2010 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 *	145	N/A *	N/A *	8,778	N/A *
(B) Customer Interruptions	N/A *	132,913	N/A *	N/A *	318,553	N/A *
(C) Miles Cleared	N/A *	467.27	N/A *	N/A *	3177.48	N/A *
(D) Remaining Miles	N/A *	0.00	N/A *	N/A *	0.00	N/A *
(E) Outages per Mile [A ÷ (C + D)]	N/A *	0.31	N/A *	N/A *	2.76	N/A *
(F) Vegetation CI per Mile [B ÷ (C + D)]	N/A *	284.45	N/A *	N/A *	100.25	N/A *
(G) Number of Hotspot trims	N/A *	6,906	N/A *	N/A *	27,627	N/A *
(H) All Vegetation Management Costs	N/A *	$4,186,217	N/A *	N/A *	$16,744,866	N/A *
(I) Customer Minutes of Interruption	N/A *	4,382,773	N/A *	N/A *	34,508,193	N/A *
(J) Outage restoration costs	N/A *	****	N/A *	N/A *	****	N/A *
(K) Vegetation Management Budget (current year) – 2009	N/A *	$4,154,605	N/A *	N/A *	$16,618,418	N/A *
(L) Vegetation Goal (current year) - 2009	N/A *	330.52 miles	N/A *	N/A *	2,541.94 miles	N/A *
(M) Vegetation Management Budget (next year) – 2010	N/A *	$3,200,000	N/A *	N/A *	$12,800,000	N/A *
(N) Vegetation Management Goal (next year) – 2010	N/A *	433 miles	N/A *	N/A *	1,734 miles	N/A *
(O) Trim-Back Distance	N/A *	***	N/A *	N/A *	***	N/A *

Note: Total miles cleared in 2009 was 3,645. Annual variations from target are expected as PEF manages resource and unit cost factors associated with its integrated vegetation management plan. Based on the 3-year feeder / 5- year lateral tree trimming cycle, since 2006 initiation, PEF is at 14% of total 3-year cycle feeder miles and 74% of total 5-year cycle lateral miles.

* There is no unadjusted data on tree caused storm events that would be relevant to PEF's tree trimming program. It would not be reasonably possible 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 reasonably possible 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 is actual complete in 2009 and scheduled in 2010.

*** 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 still being investigated.

MANAGEMENT REGION (NORTH CENTRAL) VEGETATION MANAGEMENT PERFORMANCE METRICS

	Feeders			Laterals		
	Unadjusted*	Adjusted	Diff.	Unadjusted*	Adjusted	Diff.
(A) Number of Outages	N/A *	32	N/A *	N/A *	2,128	N/A *
(B) Customer Interruptions	N/A *	19,715	N/A *	N/A *	81,572	N/A *
(C) Miles Cleared	N/A *	95.10	N/A *	N/A *	649.91	N/A *
(D) Remaining Miles	N/A *	0.00	N/A *	N/A *	0.00	N/A *
(E) Outages per Mile [A ÷ (C + D)]	N/A *	0.34	N/A *	N/A *	3.27	N/A *
(F) Vegetation CI per Mile [B ÷ (C + D)]	N/A *	207.31	N/A *	N/A *	125.51	N/A *
(G) Number of Hotspot trims	N/A *	2,846	N/A *	N/A *	11,385	N/A *
(H) All Vegetation Management Costs	N/A *	$1,041,085	N/A *	N/A *	$4,164,341	N/A *
(I) Customer Minutes of Interruption	N/A *	556,207	N/A *	N/A *	9,268,605	N/A *
(J) Outage restoration costs	N/A *	****	N/A *	N/A *	****	N/A *
(K) Vegetation Budget (current year) – 2009	N/A *	$1,041,085	N/A *	N/A *	$4,164,341	N/A *
(L) Vegetation Goal (current year) – 2009	N/A *	44.03 miles	N/A *	N/A *	507.83 miles	N/A *
(M) Vegetation Budget (2010)	N/A *	$958,074	N/A *	N/A *	$3,832,296	N/A *
(N) Vegetation Management Goal (next year) - 2010	N/A *	106 miles	N/A *	N/A *	427 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 *	19	N/A *	N/A *	1,104	N/A *
(B) Customer Interruptions	N/A *	14,822	N/A *	N/A *	34,219	N/A *
(C) Miles Cleared	N/A *	109.59	N/A *	N/A *	563.23	N/A *
(D) Remaining Miles	N/A *	0.00	N/A *	N/A *	0.00	N/A *
(E) Outages per Mile [A ÷ (C + D)]	N/A *	0.17	N/A *	N/A *	1.96	N/A *
(F) Vegetation CI per Mile [B ÷ (C + D)]	N/A *	135.25	N/A *	N/A *	60.75	N/A *
(G) Number of Hotspot trims	N/A *	1,208	N/A *	N/A *	4,833	N/A *
(H) All Vegetation Management Costs	N/A *	$759,759	N/A *	N/A *	$3,039,035	N/A *
(I) Customer Minutes of Interruption	N/A *	529,236	N/A *	N/A *	3,923,182	N/A *
(J) Outage restoration costs	N/A *	****	N/A *	N/A *	****	N/A *
(K) Vegetation Management Budget (current year) – 2009	N/A *	$815,659	N/A *	N/A *	$3,262,635	N/A *
(L) Vegetation Goal (2009)	N/A *	88.29 miles	N/A *	N/A *	442.88 miles	N/A *
(M) Vegetation Management Budget (next year) – 2010	N/A *	$603,743	N/A *	N/A *	$2,414,971	N/A *
(N) Vegetation Management Goal (next year) – 2010	N/A *	85 miles	N/A *	N/A *	339 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 *	51	N/A *	N/A *	2,708	N/A *
(B) Customer Interruptions	N/A *	46,634	N/A *	N/A *	87,021	N/A *
(C) Miles Cleared	N/A *	99.43	N/A *	N/A *	1231.15	N/A *
(D) Remaining Miles	N/A *	0.00	N/A *	N/A *	0.00	N/A *
(E) Outages per Mile [A ÷ (C + D)]	N/A *	0.51	N/A *	N/A *	2.20	N/A *
(F) Vegetation CI per Mile [B ÷ (C + D)]	N/A *	469.01	N/A *	N/A *	70.68	N/A *
(G) Number of Hotspot trims	N/A *	1,274	N/A *	N/A *	5,098	N/A *
(H) All Vegetation Management Costs	N/A *	$997,318	N/A *	N/A *	$3,989,273	N/A *
(I) Customer Minutes of Interruption	N/A *	1,915,915	N/A *	N/A *	9,959,971	N/A *
(J) Outage restoration costs	N/A *	****	N/A *	N/A *	****	N/A *
(K) Vegetation Budget (current year) – 2009	N/A *	$913,363	N/A *	N/A *	$3,653,453	N/A *
(L) Vegetation Goal (2009)	N/A *	73.20 miles	N/A *	N/A *	1,032.23 miles	N/A *
(M) Vegetation Budget (2010)	N/A *	$685,240	N/A *	N/A *	$2,740,960	N/A *
(N) Vegetation Management Goal (next year) - 2010	N/A *	159 miles	N/A *	N/A *	635 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 *	43	N/A *	N/A *	2,838	N/A *
(B) Customer Interruptions	N/A *	51,742	N/A *	N/A *	115,741	N/A *
(C) Miles Cleared	N/A *	163.15	N/A *	N/A *	733.19	N/A *
(D) Remaining Miles	N/A *	0.00	N/A *	N/A *	0.00	N/A *
(E) Outages per Mile [A ÷ (C + D)]	N/A *	0.26	N/A *	N/A *	3.87	N/A *
(F) Vegetation CI per Mile [B ÷ (C + D)]	N/A *	317.14	N/A *	N/A *	157.86	N/A *
(G) Number of Hotspot trims	N/A *	1,578	N/A *	N/A *	6,311	N/A *
(H) All Vegetation Management Costs	N/A *	$1,388,054	N/A *	N/A *	$5,552,217	N/A *
(I) Customer Minutes of Interruption	N/A *	1,381,415	N/A *	N/A *	11,356,435	N/A *
(J) Outage restoration costs	N/A *	****	N/A *	N/A *	****	N/A *
(K) Vegetation Management Budget (current year) – 2009	N/A *	$1,278,647	N/A *	N/A *	$5,114,587	N/A *
(L) Vegetation Management Goal (current year) – 2009	N/A *	125 miles	N/A *	N/A *	559 miles	N/A *
(M) Vegetation Management Budget (next year) – 2010	N/A *	$952,943	N/A *	N/A *	$3,811,773	N/A *
(N) Vegetation Management Goal (next year) - 2010	N/A *	83 miles	N/A *	N/A *	333 miles	N/A *
(O) Trim-Back Distance	N/A *	***	N/A *	N/A *	***	N/A *

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 64-67.

PriorityTrees

a) Number of priority trees removed? **4,039**
b) Expenditures on priority tree removal? **$239,914 (includes tree removal, removal trims, overhang & vines)**
c) Number of request for removals that were denied? **162 (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 and Laterals: 100%*
b) **Date audit conducted?** *A Joint-Use Pole Loading Analysis is conducted every 8 years per FPSC mandates. In 2009, one eighth (1/8) of the joint attachments were audited to fulfill the 8-year requirement.*
c) **Date of previous audit?** *2008 Partial Joint Use Structural Analysis System Audit.*
d) **List of audits conducted annually.** *Partial system audits are conducted annually. A full Joint-Use Pole Loading Analysis is conducted every eight years.*

2009 Joint-Use Structural Audits – Distribution Poles (all pole types)

(A) Number of company owned distribution poles.	900,915
(B) Number of company distribution poles leased.	501,545
(C) Number of owned distribution pole attachments (cable & phone attachments on PE poles)	851,1024
(D) Number of leased distribution pole attachments. (PE attachments on phone poles)	13,126
(E) Number of authorized attachments.	851,102
(F) Number of unauthorized attachments. (next pole audit is scheduled in 2011)	0
(G) Number of distribution poles strength tested. (complete loading analysis needed)	72,197
(H) Number of distribution poles passing strength test. (complete loading analysis needed) *	71,899
(I) Number of distribution poles failing strength test (overloaded).	299
(J) Number of distribution poles failing strength test (other reasons). (Hardware upgrades required)	3
(K) Number of distribution poles to be corrected (strength failure) (added down guy)	232
(L) Number of distribution poles corrected (other reasons).	0
(M) Number of distribution poles to be replaced. (Overloaded poles entered into the DARTS database)	64
(N) Number of apparent NESC violations involving electric infrastructure.	None
(O) Number of apparent NESC violations involving 3rd party facilities.	None

* *For each group of poles in a tangent line, the pole that had the most visible loading, line angle, and longest or uneven span length was selected to be modeled for wind loading analysis. If that one pole failed, the next worst case pole in that group of tangent poles was analyzed as well. Each pole analyzed determined the existing pole loading of all electric and communication attachments on that pole. If the existing analysis determined the pole was overloaded, that pole was added to a current year work plan to be corrected. Should the original pole analyzed meet the NESC loading requirements, all similar poles in that tangent line of poles was noted as structurally sound and entered into the database as "PASSED" structural analysis.*

2009 Joint-Use Attachment Audits – Transmission Poles (all pole types)

(A) Number of company owned transmission poles.	46,772
(B) Number of company transmission poles leased.	2,488
(C) Number of owned transmission pole attachments (cable & phone attachments on PE poles)	5,922
(D) Number of leased transmission pole attachments. (PE attachments on phone poles)	0
(E) Number of authorized attachments.	5,922
(F) Number of unauthorized attachments.	0
(G) Number of transmission poles strength tested.	103
(H) Number of transmission poles passing strength test.	38
(I) Number of transmission poles failing strength test (overloaded).	65
(J) Number of transmission poles failing strength tests (other reasons).	0
(K) Number of transmission poles corrected (sent to transmission to be scheduled for change out)	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.	2

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 conducts partial audits of its pole attachments throughout the year. A full Joint-Use Pole Loading Analysis is conducted every eight 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.

Transmission Circuit, Substation and Other Equipment Inspections

	2009 Activity		2009 Current Budget		Next Year (2010)	
	Goal	Actual	Budget	Actual	Goal	Budget
(A) Total transmission circuits.	N/A	463	$2,515,236	$2,171,157	N/A	$2,706,396
(B) Planned transmission circuit inspections.	0	31	N/A	N/A	120	N/A
(C) Completed transmission circuit inspections.	N/A	31	N/A	N/A	N/A	N/A
(D) Percent of transmission circuit inspections	N/A	6.7%	N/A	N/A	28%	N/A
(E) Planned transmission substation inspections.	N/A	481	$13,657,318	$13,910,179	461	$14,175,025
(F) Completed transmission substation inspections.	N/A	481	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

	2009 Activity		2009 Current Budget		Next Year (2010)	
	Goal	Actual	Budget	Actual	Goal	Budget
(A) Total transmission tower structures.	N/A	3,431	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	299	N/A	N/A	N/A	N/A
(D) Percent of transmission tower structure inspections completed.	N/A	8.7%	N/A	N/A	N/A	N/A

Note 1: *Please see the previous budget and actuals on page 50 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.*

Transmission Pole Inspections

	2009 Activity		Current Budget (2009)		Next Year (2010)	
	Goal	Actual	Budget	Actual	Goal	Budget
(A) Total number of transmission pole structures.	N/A	43,809	$2,515,236 See Note	$2,171,157 See Note 1	N/A	$2,706,396 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: 103 B: 4,585	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: 38 B: 4,171	N/A	N/A	N/A	N/A
(D) Number of transmission poles failing strength test (overloaded).	N/A	65	N/A	N/A	N/A	N/A
(E) Number of transmission poles failing for other reasons – *Ground Inspection (See Note 2)*	N/A	414	N/A	N/A	N/A	N/A
(F) Number of transmission poles corrected (strength failure).	N/A	0 See note 4	N/A	N/A	N/A	N/A
(G) Number of transmission poles corrected for other reasons - *Ground Inspection*	N/A	704 see note 2	N/A	N/A	N/A	N/A
(H) Total transmission poles replaced.	N/A	704	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.

Note 4: PEF Transmission identified the potential strength failure using approximate calculations. The identified strength failing poles are being reviewed using exact wind and weight spans of attachments. The poles that fail the strength requirement will be prioritized to be replaced.

Please also see Attachment O – "Wood Pole Inspection Report" filed on March 1, 2010 with the FPSC.

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

	2009 Activity		Current Budget (2009)		Next Year (2010)	
	Goal	Actual	Budget	Actual	Goal	Budget
(A) Transmission structures scheduled for hardening.	1,750	N/A	$99.75M	N/A	1,550	$103.2M
(B) Transmission structures hardening completed.	N/A	1498	N/A	$99.8M	N/A	N/A
(C) Percent transmission structures hardening	N/A	86%	N/A	N/A	N/A	N/A

Note: *Budget and Actual costs include maintenance pole change-outs, insulator replacements, and other capital costs. The budget and actual figures also include DOT/Customer Relocations, line rebuilds and System Planning additions. Structures are designed to withstand current NESC Wind Requirements and are build utilizing steel or concrete structures. PEF does not break out the cost of the structures separately and is reporting the entire construction costs for the Transmission Line Projects.*

GEOGRAPHIC INFORMATION SYSTEM (GIS) (*Initiative 5*)

PEF completed the transition to the new G-electric system and retired the old FRAMME GIS system in 2008. G-electric puts both Progress Energy Florida and Progress Energy Carolina under the same operating platform for improved efficiency and cost.

The move to G-electric is the first step in a multi-year, resource intensive process to move from a location based GIS system to an asset based GIS system consistent with Commission Order No. PSC-06-0351-PAA-EI.

In addition to the migration to G-electric, Progress Energy created a team dedicated to upgrading our work management system. The scope of this project includes the implementation of the Facilities Management Data Repository (FMDR) along with the Compliance Tracking System (CTS) which combined, will facilitate the compliance tracking, maintenance, planning, & risk management of major distribution assets. This project is a multi-year commitment that is still in the design phase with a current targeted in-service date of 2011.

Distribution OH Data Input

	Activity (2009)		Current Budget (2009)		Next Year (2010)	
	Goal	Actual	Budget	Actual	Goal	Budget
(A) Total number of system wide OH assets for input.	N/A	N/A	N/A	N/A	N/A	N/A
(B) Number of OH assets currently on system.	N/A	1,306,956	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 (2009)		Current Budget (2009)		Next Year (2010)	
	Goal	Actual	Budget	Actual	Goal	Budget
(A) Total number of system wide UG assets for input.	N/A	N/A	N/A	N/A	N/A	N/A
(B) Number of UG assets currently on system.	N/A	166,741	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

As mentioned above, PEF completed the transition to the new G-electric system and retired the old FRAMME GIS system in 2008. *The total **Florida** costs related to the new G-Electric project = $2,800,448.*

Breakdown of total costs by year:

- 2006 - $1,103,448
- 2007 - $1,270,000
- 2008 - $427,000

$2,800,448 **represents 50%** of the total project costs. The project was a joint venture with Progress Energy Carolinas who paid the remaining 50%.

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	47240	N/A	N/A	N/A	N/A
(B) Number of OH transmission assets currently on system.	N/A	46,772	N/A	N/A	N/A	N/A
(C) Percent of OH transmission assets already on system.	N/A	99%	99%	N/A	99%	N/A
(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
c(F) Annual percent of OH transmission assets input.	N/A	N/A	1%	N/A	1%	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	69.87 miles	N/A	N/A	N/A	N/A
(B) Number of UG transmission assets currently on system.	N/A	69.87 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	100	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

Progress Energy

April 1, 2009

VIA HAND DELIVERY

Mr. Timothy Devlin, Director
Division of Economic Regulation
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, FL 32399-0850

Re: Wood Pole Inspection Plan; Undocketed

Dear Mr. Devlin:

Pursuant to the requirements of Order No. PSC-06-0144-PAA-EI, please find enclosed Progress Energy Florida, Inc.'s updated Wood Pole Inspection Plan.

Thank you for your assistance with this matter. Please feel free to call me at (727) 820-5184 should you have any questions.

Sincerely,

John T. Burnett lms

John T. Burnett

JTB/lms
Enclosure

Progress Energy

Comprehensive Wood Pole Inspection Plan

Purpose and Intent of the Plan:

To implement and update a 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. 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 accomplishes 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 also assesses 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 result in one of four or a combination of the following actions: (1) No action required; (2) Application of treatment; (3) Repaired; (4) Replaced.

B. General Plan Provisions

(i). Pole Inspection Selection Criteria

Transmission performs ground patrols to inspect transmission system line assets to allow for the planning, scheduling, and prioritization of corrective and preventative maintenance work. These patrols assess the overall condition of the assets including insulators, connections, grounding, and signs, as well as an assessment of pole integrity. These patrols are be done on a three-year cycle and the assessment data and reports generated from these patrols are used to plan the ground-line inspections set forth in Section 1B(ii) below. The ground patrol inspections categorize wood poles into four conditions or states (State 2-5). PEF conducts ground-line inspections of State 2 and 3 poles. State 3 poles are given priority for ground-line inspection scheduling. PEF replaces State 4 and 5 poles. PEF no longer utilizes 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.

State 5 : 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). Ground-Line Inspections

Ground-line inspections of wood transmission poles are conducted by qualified pole inspectors on an average 8-year cycle. This results 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 is 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) <u>Structural Integrity Evaluation</u>

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). <u>Records and Reporting</u>

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. Total number of wood poles in Company inventory.
    b. Number of pole inspections planned.
    c. Number of poles inspected.
    d. Number of poles failing inspection.
    e. Pole failure rate (%) of poles inspected.
    f. Number of poles designated for replacement.
    g. Total number of poles replaced.
    h. Number of poles requiring minor follow-up.
    i. Number of poles overloaded.
    j. Methods of inspection used.
    k. Number of pole inspections planned for next annual inspection cycle.
    l. Total number of poles inspected (cumulative) in the 8-year cycle to date.
    m. Percentage of poles inspected (cumulative) in the 8-year cycle to date.

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

- PEF continues 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, but may vary from year to year depending on previous years' accomplishments.

PEF is currently on track to meet the 8-year cycle requirements. The number of poles inspected may vary year to year depending on the previous year's accomplishments with the intent to complete inspections in the required timeframe. The estimated figures in the chart below 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	On average; may vary year to year
Assumed poles replaced*	5%	Current future projections
O&M Cost		
GL Inspection & Treatment	$300,000	On average; may vary year to year
Capital Cost		
Pole & Insulator Replacements	$6,000,000	On average; may vary year to year
Hurricane Hardening	$7,000,000	On average; may vary year to year

* Assumption is made that approximately 5% 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 inspects Company-owned wood poles on an average 8-year cycle. These inspections determine the extent of pole decay and any associated loss of strength. The information gathered from these inspections is 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 is used to populate regulatory reporting requirements, provide data for loading analyses, identify other equipment maintenance issues, and used to track the results of the inspection program over time.

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). Pole Inspection Process

When a wood distribution pole, other than a CCA pole, is inspected, the tasks listed below will be performed. For a CCA type wood distribution pole less than 16 years of age, the inspection will consist of a visual above ground inspection and sounding with hammer, both procedures are described below. For CCA poles 16 years of age and greater, all inspection methods described below are used. Boring at Ground Line is also performed on type CCA poles when decay is present.

- 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 2% of the Distribution pole population cannot be excavated due to obstruction from concrete. If 2% of the poles inspected out of the 96,000 inspections per year are assumed to be encased in concrete, 1,920 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 38 poles out of the 1,920 concrete encased poles inspected in one wood pole inspection year would go undiscovered as "reject poles." PEF previously piloted the use of RMD testing (resistograph method) to improve the results provided by traditional sound and bore on such poles. The results were similar to the traditional sound and bore method, but more costly. In

2008, PEF filed a petition for modifications and relief from using the RMD method for concrete-encased wood poles. Order No. PSC-08-0644-PAA-EI issued October 6, 2008 allowed PEF the flexibility to perform the least costly inspections without adversely affecting safety and reliability.

(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. Total number of wood poles in Company inventory.
   b. Number of pole inspections planned.
   c. Number of poles inspected.
   d. Number of poles failing inspection.
   e. Pole failure rate (%) of poles inspected.
   f. Number of poles designated for replacement.
   g. Total number of poles replaced.
   h. Number of poles requiring minor follow-up.
   i. Number of poles overloaded.
   j. Methods of inspection used.
   k. Number of pole inspections planned for next annual inspection cycle.
   l. Total number of poles inspected (cumulative) in the 8-year cycle to date.
   m. Percentage of poles inspected (cumulative) in the 8-year cycle to date.

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

PEF continues to successfully meet the obligations set forth in Order No. PSC-06-0144-PAA-EI and continues to inspect poles based on the 8-year cycle as mandated by the FPSC. The number of poles inspected per year is expected to be approximately 96,000 poles, but may vary from year to year depending on previous years' accomplishments with the intent to complete inspections in the required timeframe. Funding requirements to meet all aspects of this program will be adjusted from year to year, as well. PEF is currently on track to meet the 8-year cycle requirements.

The estimated figures in the charts below are "best estimates," given information and facts known at this time and are subject to change or modification.

Annual Unit Estimate *

Years per Cycle	# of Wood Poles to be inspected per year	Non-CCA Replacements	CCA Replacements	Non-CCA Bracing	CCA Bracing	Non-CCA Treatments	CCA Treatments
8	96,000	1,858	28	980	20	20,578	15,998

* *Assumption is made that approximately 2% of the non-CCA poles inspected will be identified for replacement.*

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	$2,444,455	$655,003	$7,939,122	$360,878	$3,099,458	$8,300,000	$11,399,458

3) Joint Use Pole Inspection Plan

A. Introduction

PEF currently has approximately 745,000 joint use attachments on distribution poles and approximately 5,800 joint use attachments on transmission poles. On average, PEF receives approximately 10,000 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 is 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). Structural Analysis for a Transmission Pole New Joint Use Attachment

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). Analysis of Existing Joint Use Attachments On Distribution Poles

There are approximately 745,000 joint use attachments on approximately 510,000 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). Analysis of Existing Joint Use Attachments On Transmission Poles

There are approximately 5,800 joint use attachments on approximately 2,700 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 745,000 joint use attachments on approximately 510,000 distribution poles and approximately 5,800 joint use attachments on approximately 2,700 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 requires 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	10% of Transmission poles replaced	Total cost to analyze poles (O&M)	Total cost to replace poles (capital)
510,000	63,750	6,375	191	2,700	338	101	10	$607,183	$505,600

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:

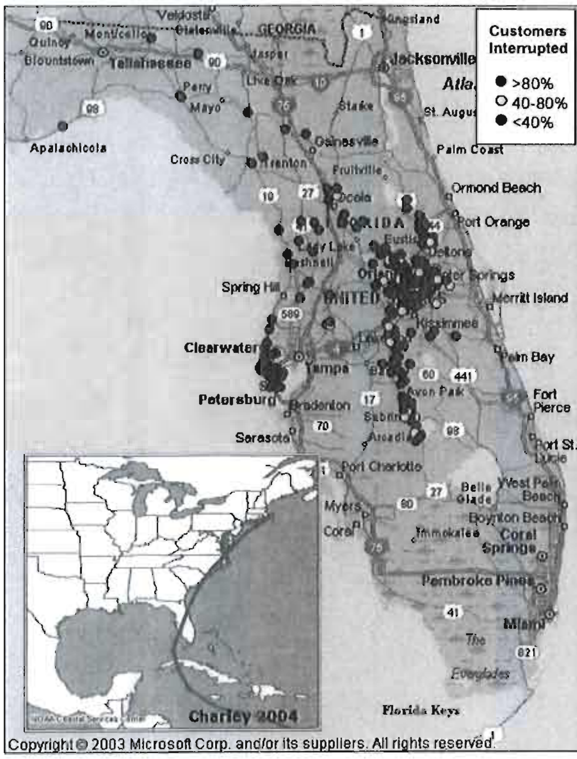
Breakers
Electronic Reclosers
Fuses
Hydraulic Reclosers
Interrupters
Motor Operated Switches
OH Conductors
OH Transformers
Primary Meters
Switch Gear Fuses
Sectionalizers
Services
Switches
Terminal Pole Fuses
Under Ground Conductors
Under Ground Transformers

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.

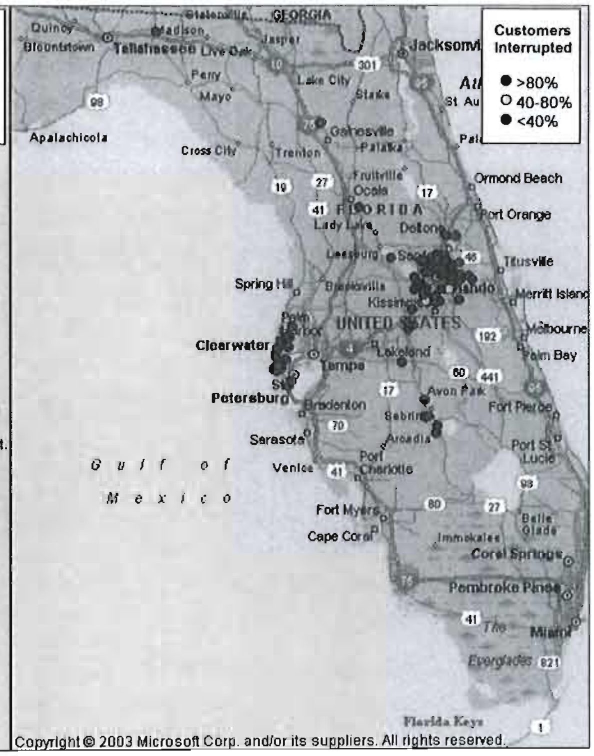
Once this information is collected, the percentage of customers interrupted will be calculated by dividing the sum of customers interrupted per feeder circuit by the total customers served for that feeder circuit. This process is applied as the sum of customers interrupted by all overhead devices on 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:

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.

Ongoing Storm Preparedness Plan

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.

- 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

Progress Energy

JOINT USE

POLE ATTACHMENT

GUIDELINES

4/16/2010

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, telecommunications carriers, WiFi and DAS attachers 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 or notification 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 for Progress Energy Carolinas (PEC)

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.

3. Third party attachers do not need to provide measurements when submitting an Exhibit A Pole Attachment Request. The following is the minimum required on each submitted permit: company name, representative's name, telephone number and e-mail address, county name, project reference number, PE pole numbers, type of cable (coax, fiber), cable size and messenger size. All poles are subject to wind loading and ice loading as applicable.

4. 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 AND OVERLASH APPLICATION PROCEDURES for Progress Energy Florida (PEF)

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.

3. Third party attachers do not need to provide measurements when submitting an Exhibit A Pole Attachment Request. The following is the minimum required on each submitted permit: company name, representative's name, telephone number and e-mail address, county name, project reference number, PE pole numbers, type of cable (coax, fiber), cable size and messenger size. All poles are subject to wind loading and ice loading as applicable.

4. 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.

5. Member-operators of the Florida Cable Telecommunications Association shall submit to PEF a notification for overlash or rebuild consistent with the terms and conditions outlined in the Stipulation and Agreement dated 10/1/07.

6. Attachments to transmission poles with distribution underbuild will be accepted for application and should identify the transmission poles on the permit. Attacher's request is subject to 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.

Pole attachment requests are to be submitted to the following addresses.

In the Carolinas:
Progress Energy Carolinas, Inc.
Joint Use
100 E. Davie Street, TPP16
Raleigh, NC 27601
(919) 546-3297

In Florida:
Progress Energy Florida, Inc.
Joint Use
3300 Exchange Place, NP4D
Lake Mary, FL 32746
(407) 942-9425

Contact PE's Joint Use Manager at (407) 942-9415 for clarification and examples of any of the above items.

PE utilizes NJUNS (National Joint Utilities Notification System) for transfer notification purposes and will require all third party attachers on PE poles to utilize the system. When poles are replaced, PE will use NJUNS to provide an electronic notification to third party attachers to transfer their facilities in a timely manner per their Pole Attachment Agreement and the FCC guidelines. Attachers will 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.

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, make-ready options and costs may be made available for review. 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.

A structural analysis will be performed on all worst case poles in a branch line. Should a pole fail the analysis, the next worst case pole in that branch will be analyzed until a pole passes. A new branch line will be considered when the line angle on the pole is greater than 15%. A new branch line will be considered when the span length between any three (3) poles is greater than a 50% difference. For example, wire runs for 150' from pole 1 to pole 2. The wire span from pole 2 to pole 3 is 226'. The spans on either side of pole 2 are greater than 50% of the difference. All costs associated with this work will be paid by the third party attacher proposing the attachment or overlash.

Once the clearance analysis is completed, the attacher will receive an approved permit within 45 days of receipt of 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 45 days will serve as PE's authorization to perform the make-ready construction. Failure to provide payment within the 45 days may result in denial of the affected poles. Following receipt of make-ready payment, 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. If the attacher chooses to construct its facilities on a portion of the permit, the authorization on the remaining poles will be voided for non-construction. An Exhibit B Removal Request form must be submitted to discontinue future pole rent charges.

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.

All permits are subject to a post inspection within 365 days of the permit's approval to verify the attacher's construction is in compliance with PE and NESC standards. If any pole on the permit fails inspection, the attacher will be given 30 days to make the necessary correction. If the failed poles are still in non-compliance at the time of the second post inspection, the attacher will be in default of the Pole Attachment Agreement. No additional permits will be approved until the violation is corrected.

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 a minimum interval of every four (4) 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 identifying tags are not installed at the time of new construction, the permit will fail post inspection.

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 cannot be reserved by a tenant.

At the time of installation, all communications facilities shall be located a minimum of 40" below PE power facilities (secondary, neutral or top of conduit) per NESC rules 235C and 238.

At the time of installation, all communications facilities passing above or below street light brackets shall be a minimum of 12" away from such brackets per NESC rule 238C. 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.

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 from other communication cables and 30" separation at midspan from PE facilities. The cable shall follow Progress Energy's route so as not to compromise the structural integrity of Progress Energy poles. 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.

The following 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.

The NESC covers the use of guys. Progress Energy expects the third party attachers to place guys where Progress Energy has installed a guy.

OTHER

No permanent climbing aids are allowed on PE poles.

All power supply installations must have appropriate disconnect devices. All new power supplies and new metering equipment shall be mounted only on attacher owned facilities as per PE specification drawing #09.04-12 and #09.04-13. Ground blocks, pedestals and power supplies may not be attached to the pole.

Air dryers, nitrogen bottles, cabinets, load coils, etc. shall not be attached to PE poles.

All vertical runs (pole risers) installed by attacher shall be placed in conduit and attached to the pole using U-guards and other protective covering. Each communication company shall be allowed one riser per pole to facilitate all pole-to-ground attachments. Unguarded cable and service drops stapled or nailed to the pole will fail post inspection until corrected. Vertical runs must be on a 45° angle from the communication company's attachment and never on the face of the pole. See PE specification drawing #09.04-04.

Horizontal attachments to PE poles must be made by use of a three-bolt suspension clamp with a center through bolt. A four-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.

Strand 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 24" 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.

All communication messengers shall be bonded to electrical ground wherever a vertical ground wire exists.

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

The minimum information required by PE includes: pole number, address/location, plat of proposed work, radio frequency information, aerial construction details (dimension, weight connectivity), direction of antennae, and wireless component specifications. Contact the Joint Use Manager at (407) 942-9415.

Only one wireless device (receiver, transmitter, or combination unit) will be allowed per pole. Multiple wireless attachers are not permitted on a single pole. Amplifiers and equipment other than wireless devices will not be allowed on poles. All other locations will be reviewed based on field conditions and approved by PE.

WiFi standards exist for wood and static cast concrete streetlight poles. Please reference PE specification drawings #30.10-22, #09.04-32, and #09.04 -35.

DAS standards exist. Please reference PE specification drawing #09.04-30.

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	$1298.29	$578.67
Replace 40' with 45' Pole, Tangent, 3 Phase, Transformer	$2945.16	$1629.20
Replace 35' with 40' Pole, Angle, 1 Phase, Transformer	$2810.51	$1551.65
Replace 40' with 50' Pole, Vertical Angle, 3 phase, Transformer	$4254.21	$2685.09
Replace 40' with 45' Pole, Dead End, 3 Phase, Transformer	$7719.21	$2537.58
Replace 45' with 50' Pole, Vertical DDE, 3 Phase, No equipment	$5074.28	$2961.03
Replace 45' with 50' Pole, Angle, 3 phase, Double Circuit	$5099.25	$2849.75
Replace 35' with 40' Pole, Secondary, UG Dip	$1489.27	$1180.36
Replace 50' with 60' Pole, 3 Phase, 3 Phase Tap, (congested)	$5153.55	$2446.88
Replace 45' with 50' Pole, 3 Phase, 3 Phase UG Dip	$7086.19	$3484.80
Replace 45' with 50' Pole, 3 Phase, 1200 Capacitor Bank	$6327.15	$3173.32
Install 45' Pole, 3 Phase, In-line	$1270.26	$942.64
Relocate Riser/U-Guard on Pole	$1132.32	$1028.70
Replace 30' with 35' Pole, Secondary and/or Service, Down Guy	$896.09	$832.60
Replace 40' with 45' pole Tangent, 3 Phase, Transformer Vertical	$2964.61	$1629.20
Add Section of U- Guard	$420.14	$368.24
Raise Street Light	$460.96	$393.92

Replace Open Wire Secondary with Triplex	$698.70	$505.70
Relocate Transformer on Pole	$974.19	$381.27
Clip Secondary to Neutral	$312.29	$202.93
Resag Neutral and Dress Transformer Loops	$520.48	$222.47

**Note:* *This document is a rough guide and intended only to be used as a tool for the licensee in planning their plant route or design. Costs shown do not include crew overtime rates, outage coordination, tree trimming, or other possible additional charges. PE can provide "Detailed Estimates" at the most current hourly engineering rate.*

Revised
11/20/2008

POST INSPECTIONS

CODE	DESCRIPTION	SEPARATION
PC1	Neutral or secondary separation at the pole	40”
PC2	Grounded equipment separation at the pole	30”
PC3	Separation from secondary or transformer drip loops	40”
MC1	Secondary conductor separation at midspan	30”
MC2	Neutral separation at midspan	30”
SL1	Streetlight separation from SL bracket	12”
SL2	Streetlight separation from SL drip loop	12”
V1	Cable is crossing under PE neutral from different structure	24”
R1	Clearance from top of PE primary or secondary riser conduit	40”
C1	Cable or service drop above state maintained roadway	18’ 0”
C2	Cable above non-state maintained roadway OR subject to truck traffic	15’ 6”
RC1	Cable or service drop above residential driveway, not subject to truck traffic	12’0”
C3	Cable or service drop above areas of pedestrian access only	9’6”
C4	Cable or service drop above other areas subject to truck traffic	15’6”
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 is slack or damaged	
G3	Guy attached to PE anchor	
G4	Guy marker needed	
GR	Ground; messenger cable must be bonded to PE ground wire	
L	Cable tagging; missing or unreadable	
AC1	Floating cable; need to properly attach	
TC1	Transfer cable to new pole	
CS1	Communication separation does not meet NESC or PE specifications at the pole	12”
CS2	Communication separation does not meet NESC or PE specifications at midspan	12”
MD	Failure to follow make-ready directives	
NC	Not constructed; original attachment approval voided	
RA	Remove unauthorized attachments	

Progress Energy

Ot05387:
This worksheet is protected. Please complete the areas highlighted in beige.

USE

- [ ] **EXHIBIT A Attachment Request**
  - ( ) New
  - ( ) Rebuild
  - ( ) Service Drop
  - ( ) Overlash 3rd Party
  - (•) Overlash Self
- [ ] **EXHIBIT B Removal Request**

Permit # ____________________

Op Center __________

COMPANY NAME: ______________________________ Acct. # __________

Reference # ____________________ Location (County, City, State) ____________________

Map #: __________ Node: __________ Project Address: ____________________

EXHIBIT A: 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. Applicant is responsible for coordinating the transfer or rearrangement of another attacher's facilities due to the appicant's proposed attachments and for reimbursement of expenses due to those entities. Such work must be completed before applicant commences construction of its attachments.

EXHIBIT B: In accordance with the terms and conditions of the existing Attachment Agreement, PE will remove from its records the attachment(s) from the poles listed below. Applicant represents that it has removed <u>all</u> communication facilities previously attached to the below referenced poles.

Progress Energy Pole No.	✓ for Transmission	House and Street Address *and / or* Comments	Progress Energy Pole No.	✓ for Transmission	House and Street Address *and / or* Comments

ATTACHMENTS REQUESTED / REMOVED:

__________ Distribution __________ Transmission __________ Telecommunications

SUBMITTED BY:

Name ____________________

Address ____________________

____

Phone No. ____________________

<u>CABLE DETAILS</u>

- [ ] Coaxial
- [ ] Fiber Optic

__________ Cable Size

__________ Messenger Size

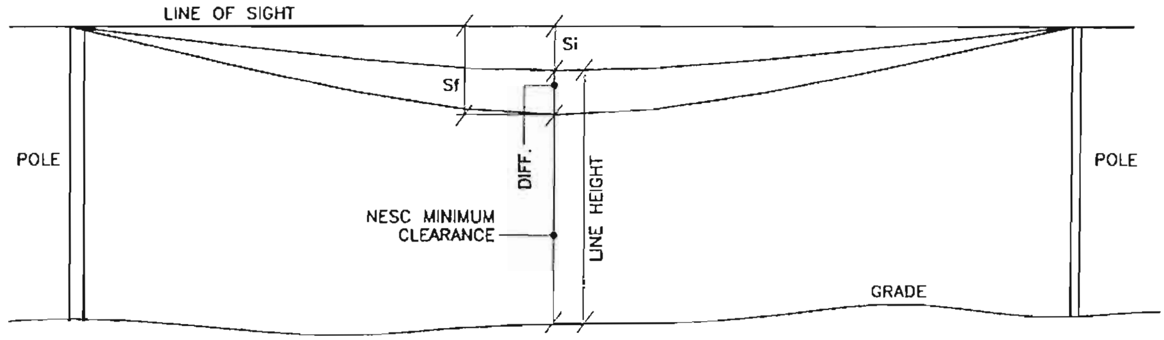
CUSTOMER SIGNATURE & DATE REQUIRED: ______________________________

Double click to open in Excel format

Progress Energy

Progress Energy Construction Standards

Table of Contents –



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	HORT	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

NO POTENTIAL SOURCE OF CONTAMINATION CAN BE LOCATED WITHIN 100 FEET OF A COMMUNITY WELL. TRANSFORMERS (POLE MOUNTED, PAD-MOUNTED 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 SERVE 25 OR MORE PERSONS. A SINGLE FAMILY RESIDENTIAL WELL IS NOT CLASSIFIED AS A COMMUNITY WELL. THIS REGULATION IS FOR NEW NEW INSTALLATIONS ONLY. EXISTING COMMUNITY WELLS WHICH HAVE OIL FILLED EQUIPMENT LOCATED WITHIN 100 FEET ARE GRANDFATHERED.

REVISED		BY	CK'D	APPR.
3				
2				
1	6/30/09	GUINN	GUINN	ELKINS
0	7/24/02	HOYT	ROBESON	WOOLSEY

EQUIPMENT AND CIRCUITS NEAR NATURAL GAS OR GASOLINE FACILITIES AND COMMUNITY WELL CLEARANCES

Progress Energy

PGN DWG. 09.00-02

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 – 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 1. TO PORTIONS THAT ARE READILY ACCESSIBLE TO PEDESTRIANS	4.5'	5.0'	5.5' (3.5')	7.5' (4.5')
2. TO PORTIONS THAT ARE NOT READILY ACCESSIBLE TO PEDESTRIANS	3.0'	3.5'	5.5' (3.5')	7.5' (4.5')
B. VERTICAL 1. OVER OR UNDER CATWALKS AND OTHER SURFACES UPON WHICH PERSONNEL WALK	10.5'	11.0'	11.5'	13.5'
2. OVER OR UNDER OTHER PORTIONS OF SUCH INSTALLATIONS	3.0'	3.5'	6.0'	8.0'
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.

**CLEARANCES SHOWN ARE FOR CONDUCTORS AT REST. THE CLEARANCE IN PARENTHESES IS THE CLEARANCE REQUIRED WITH WIND DISPLACEMENT. THE WIND DISPLACEMENT FOR VARIOUS CONDUCTORS AND SPAN LENGTHS CAN BE FOUND IN THE SAG TABLES IN SECTION 05. SUBTRACT THE WIND DISPLACEMENT FROM THE REQUIRED CLEARANCE AT REST. THE REMAINING CLEARANCE MUST BE EQUAL TO OR MORE THAN THE CLEARANCES SHOWN IN PARENTHESES.

REVISED		BY	CK'D	APPR.
3				
2	12/14/07	[illegible]	[illegible]	HOYT
1	[illegible]	CECCONI	[illegible]	HOYT
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. 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.

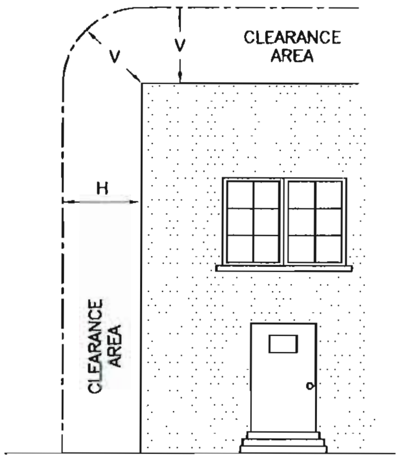
6. REFER TO NATIONAL ELECTRICAL SAFETY CODE RULE 234 FOR EXCEPTIONS AND REFINEMENTS.

REVISED		BY	CK'D	APPR.
3				
2				
1	9/8/05	CECCONI	NUNNERY	HOYT
0	7/24/02	HOYT	ROBESON	WOOLSEY

MINIMUM FINAL SAG CLEARANCES TO BUILDINGS, ETC.

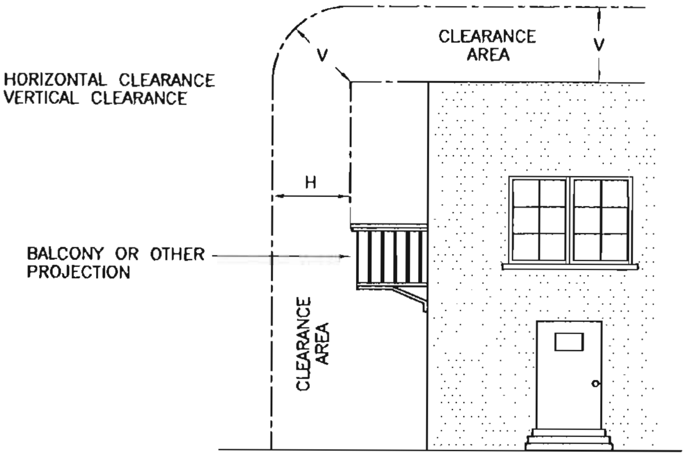
Progress Energy

PGN DWG. 09.01-01B

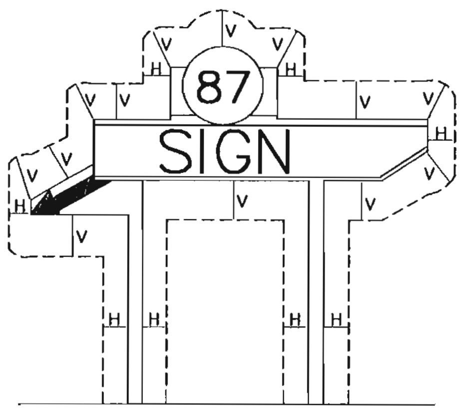


BUILDING ELEVATION

H = HORIZONTAL CLEARANCE
V = VERTICAL CLEARANCE



BUILDING ELEVATION



*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}

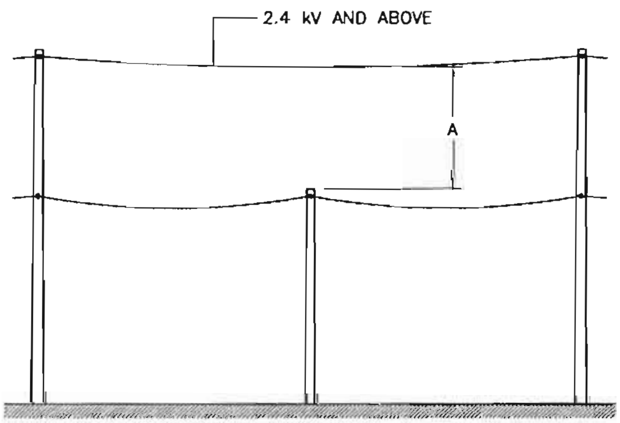
{2} FOR VOLTAGES TO GROUND OVER 50kV – 10 FEET (305 CM) PLUS 4 INCHES (10 CM) FOR EVERY 10kV OVER 50kV.

1910.333(c)(3)(i)(B)

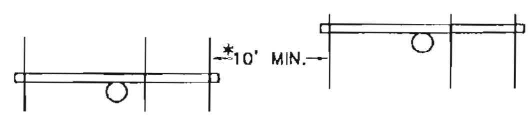
(B) WHEN AN UNQUALIFIED PERSON IS WORKING ON THE GROUND IN THE VICINITY OF OVERHEAD LINES, THE PERSON MAY NOT BRING ANY CONDUCTIVE OBJECT CLOSER TO UNGUARDED, ENERGIZED OVERHEAD LINES THAN THE DISTANCES GIVEN IN PARAGRAPH (c)(3)(i)(A) OF THIS SECTION.

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:

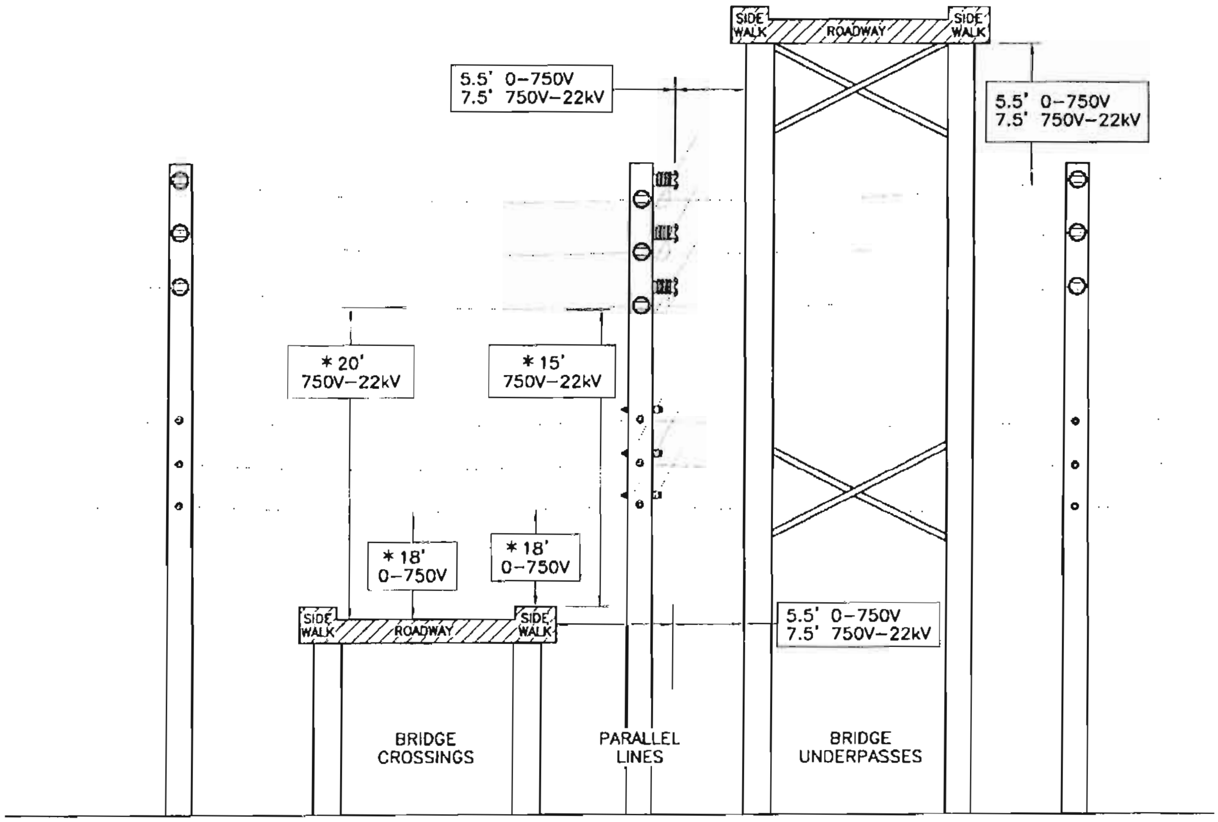
1. BOTH TOP AND BOTTOM CIRCUITS ARE OPERATED AND MAINTAINED BY THE SAME COMPANY.
2. EMPLOYEES WILL NOT BE WORKING ABOVE THE INTERMEDIATE POLE WHILE THE UPPER LINE IS ENERGIZED.

3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

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.

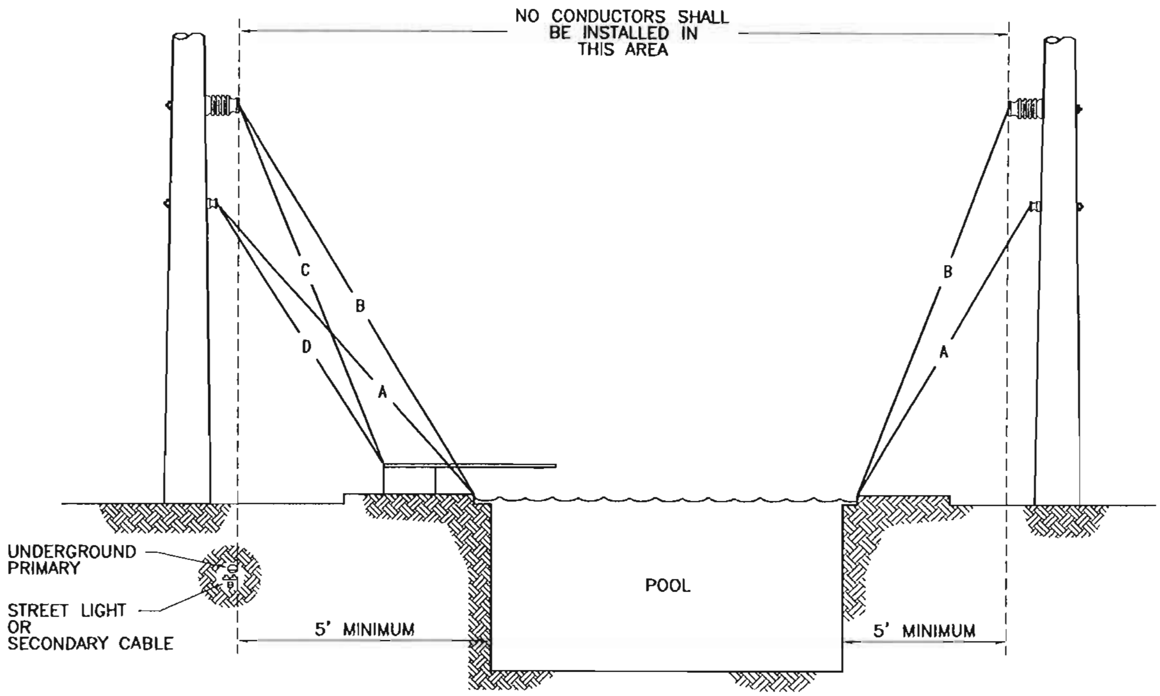
*THESE CLEARANCES ARE TO THE ROADWAY SURFACE OF THE BRIDGE.

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



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	NUNNERY	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 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:

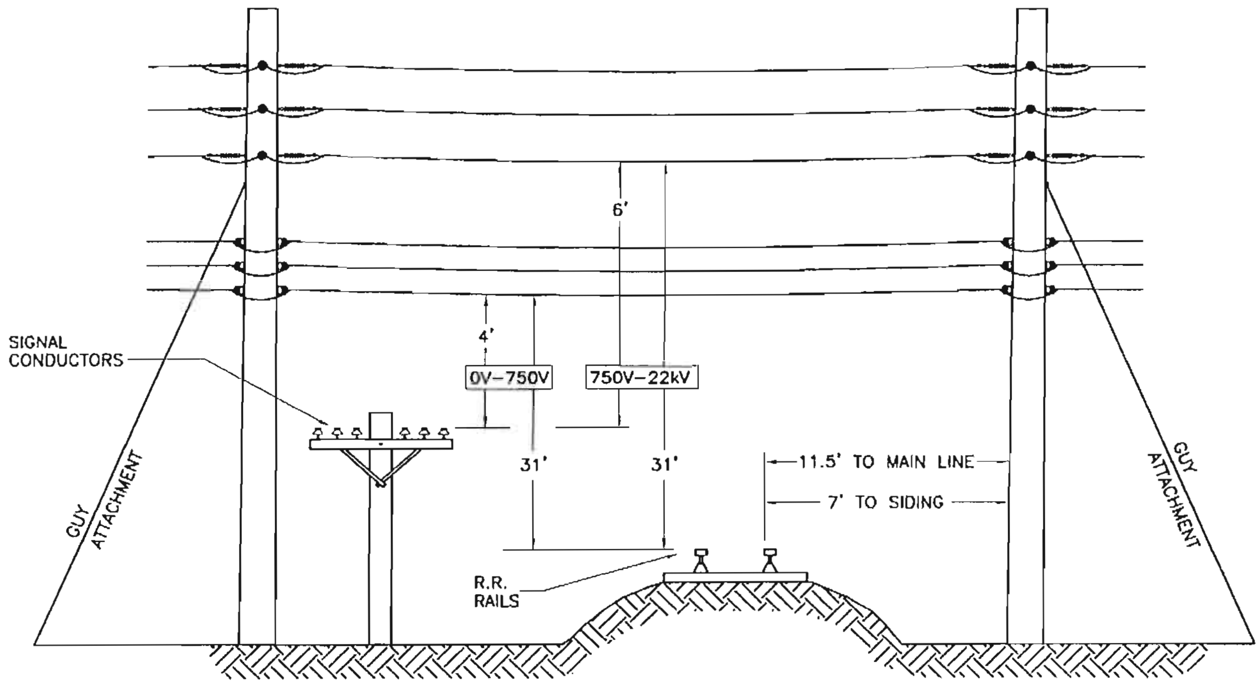
1. THE ABOVE MINIMUM CLEARANCES IN THE TABLE MUST BE MET USING THE FOLLOWING ICE AND WIND CONDUCTOR LOADING. THE VALUES CAN BE FOUND IN THE SAG AND TENSION TABLES FOR EACH COMPANY:
   FLORIDA: CONDUCTOR TEMPERATURE 170°F, NO WIND DISPLACEMENT
   CAROLINAS: USE THE FOLLOWING LOADING CONDITION THAT PRODUCES 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. 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.

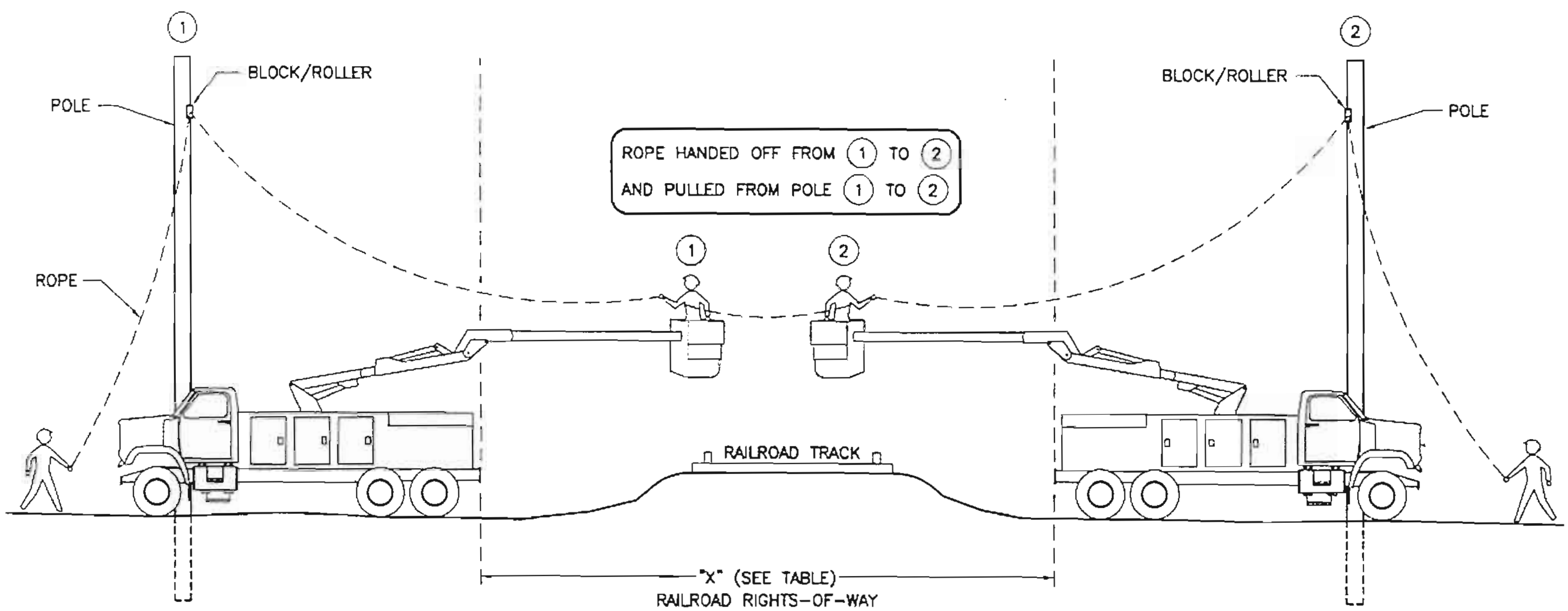
2. SEE PGN DWG. 09.02–02B FOR RIGHTS–OF–WAY CONSTRUCTION.

3				
2				
1				
0	7/24/08	SIMPSON	SIMPSON	HOYT
REVISED		BY	CK'D	APPR.

MINIMUM FINAL SAG CLEARANCES
RAILROAD AND SIGNAL CROSSINGS

Progress Energy

PGN DWG. 09.02–02A



WORKING "OVER" RAILROAD RIGHT-OF-WAY WITHOUT BEING "IN" RAILROAD ROW

PLACE ONE MAN WITH RADIO APPROXIMATELY 7 MILES UP-TRACK AND DOWN-TRACK (TWO MEN TOTAL) TO WATCH FOR TRAIN COMING – SIGNALS WORKERS TO CLEAR TRACK AREA (15 MINUTES TO CLEAR)

TWO TRUCKS (BUCKET) SET UP ON OPPOSITE SIDE OF ROW

ROLLERS/BLOCK INSTALLED ON EACH SIDE POLE

WORKER (1) HANDS ROPE OFF TO WORKER (2)

ROPE PULLED IN AIR TO CLEAR TRACKS

WIRE PULLED OVER TRACKS VIA ROPE

TRUCK	APPROX. BUCKET REACH	"X"
55' MH	40'	80'
85' MH*	48'	~100'
100' MH*	50'	~100'

*TRANSMISSION

NOTES:

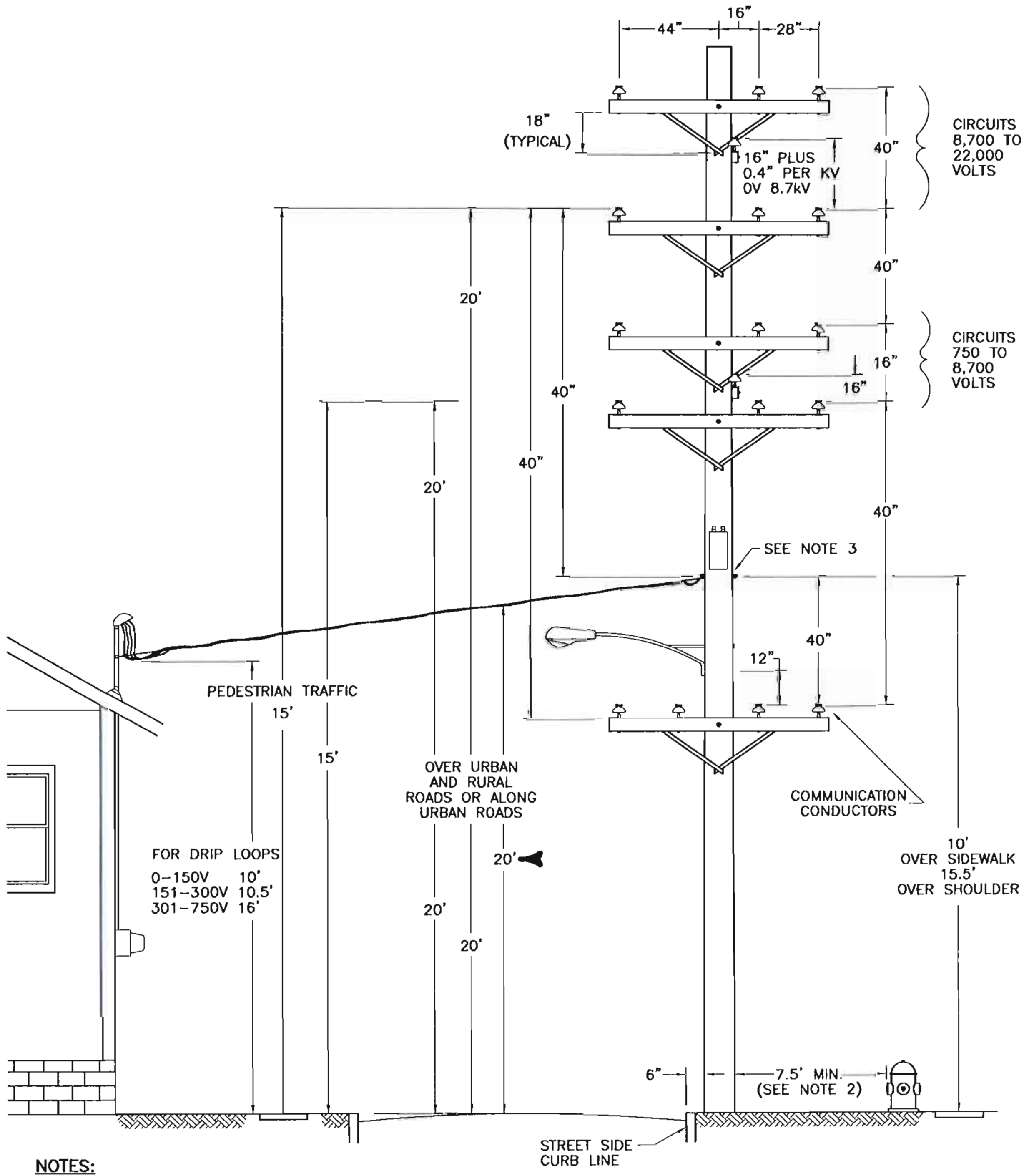
1. SEE DWG. 09.02-02A FOR CLEARANCES.
2. PLAN WORK TO MINIMIZE TIME OVER RIGHTS-OF-WAY.
3. DO NOT PERFORM WORK OVER A MOVING TRAIN.

REVISED		BY	CK'D	APPR.
0	7/24/08	SIMPSON	SIMPSON	HOYT
1				
2				
3				

RAILROAD RIGHTS-OF-WAY CONSTRUCTION

Progress Energy

PGN DWG. 09.02-02B



NOTES:

1. ALL VOLTAGES ARE MAXIMUM TO GROUND ON GROUNDED SYSTEMS, AND PHASE TO PHASE ON DELTA SYSTEMS.
2. THIS CLEARANCE CAN ONLY BE REDUCED BELOW 7.5' WITH APPROVAL OF LOCAL FIRE AUTHORITY.
3. THE NEUTRAL POSITION SHOWN INDICATES THERE IS ONLY ONE NEUTRAL ON THE POLE SHARED BY ALL CIRCUITS. IF MULTIPLE NEUTRALS ARE USED, ADDITIONAL CLEARANCES ARE REQUIRED TO ACCOMMODATE ADDITIONAL NEUTRALS. SEE DWG. 09.03-01.

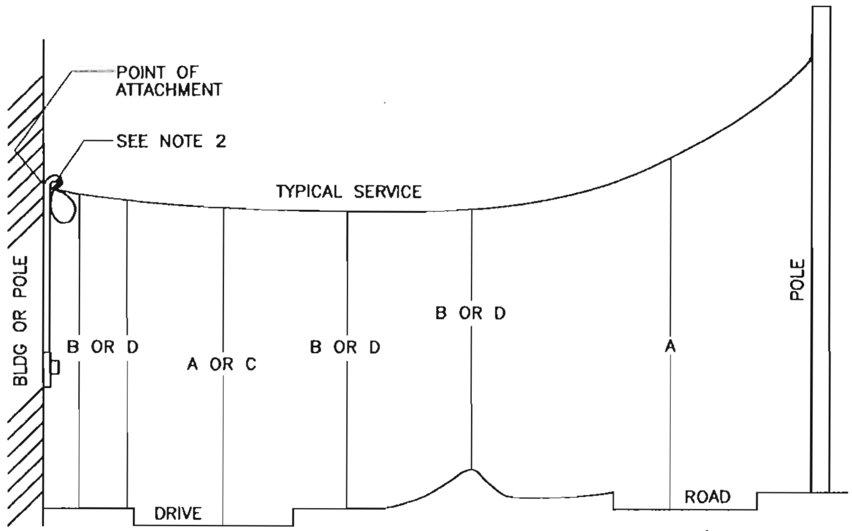
3				
2				
1				
0	6/23/09	GUINN	GUINN	ELKINS
REVISED		BY	CK'D	APPR.

MINIMUM FINAL SAG CLEARANCES FOR CONDUCTOR

Progress Energy

FLA 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:

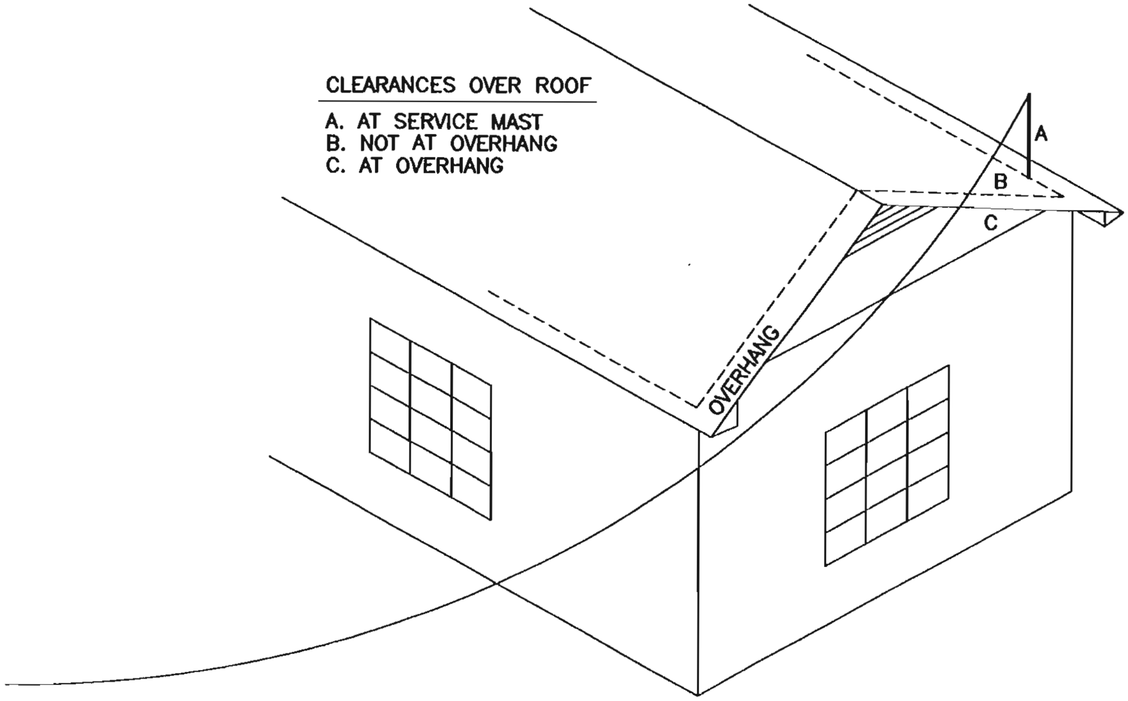
1. THE ABOVE TABLE GIVES REQUIRED MINIMUM INSTALLATION HEIGHTS. THESE INSTALLATION HEIGHTS ARE APPLICABLE TO SERVICE DROP MULTIPLEX CABLES INSTALLED USING THE STANDARD SAGS FOR NORMAL STRINGING TEMPERATURES.
2. POINT OF ATTACHMENT OF SERVICE DROP AT BOTH BUILDING AND POLE MUST BE AT A HEIGHT SUFFICIENT 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.

3			
2			
1			
0 7/24/02	HOYT	ROBESON	WOOLSEY
REVISED	BY	CK'D	APPR.

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)

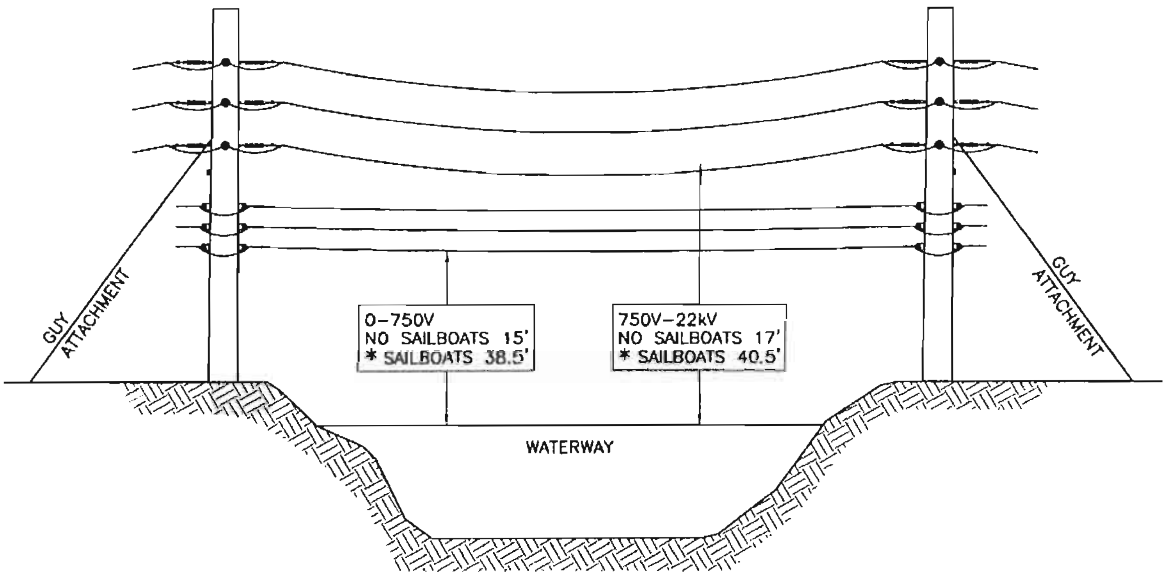
5. POINT OF ATTACHMENT OF SERVICE TO BUILDING SHALL BE HIGH ENOUGH TO PROVIDE THE GROUND CLEARANCES OF DWG. 09.02–04, BUT SHALL NOT EXCEED 25' ABOVE GRADE AT TIME OF INSTALLATION AND SHALL NOT REQUIRE THE USE OF A LADDER ON CARPORT OR OTHER ROOF.

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.

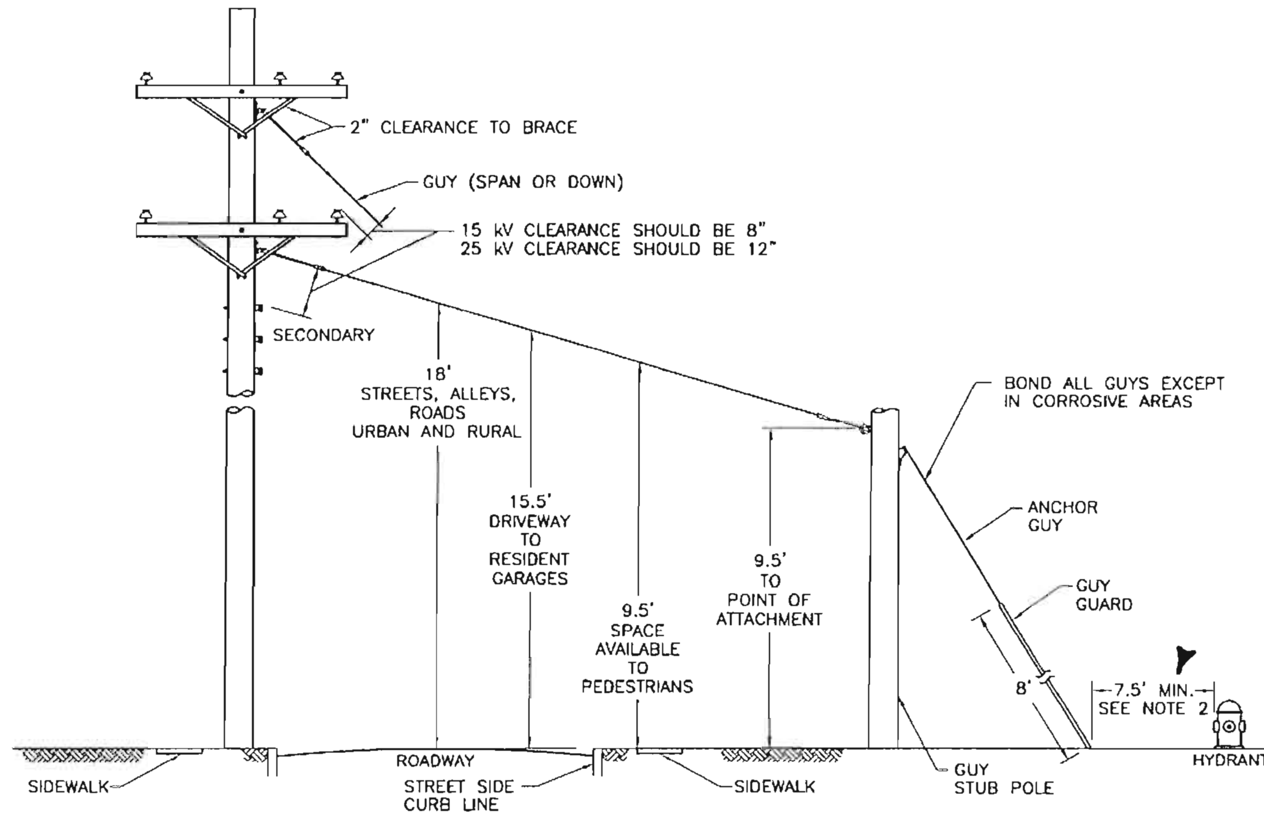
NOTE: CONSULT ENGINEERING FOR MANUAL GUYING REQUIREMENTS.

3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

MINIMUM FINAL SAG CLEARANCES OVER WATERWAYS

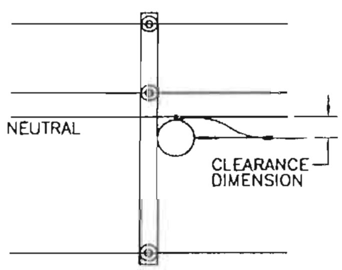
Progress Energy

PGN DWG. 09.02–06



MINIMUM CLEARANCE SPECIFICATION FOR THE INSTALLATION
<u>OF GUYS ON THE COMPANY'S DISTRIBUTION SYSTEM</u>

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 02** OR FLORIDA **SECTION 02**.

3. FOR MINOR EXCEPTIONS, SEE TABLES 232-1, 235-6, AND 239-2 OF THE NESC.

<u>NOTES:</u>

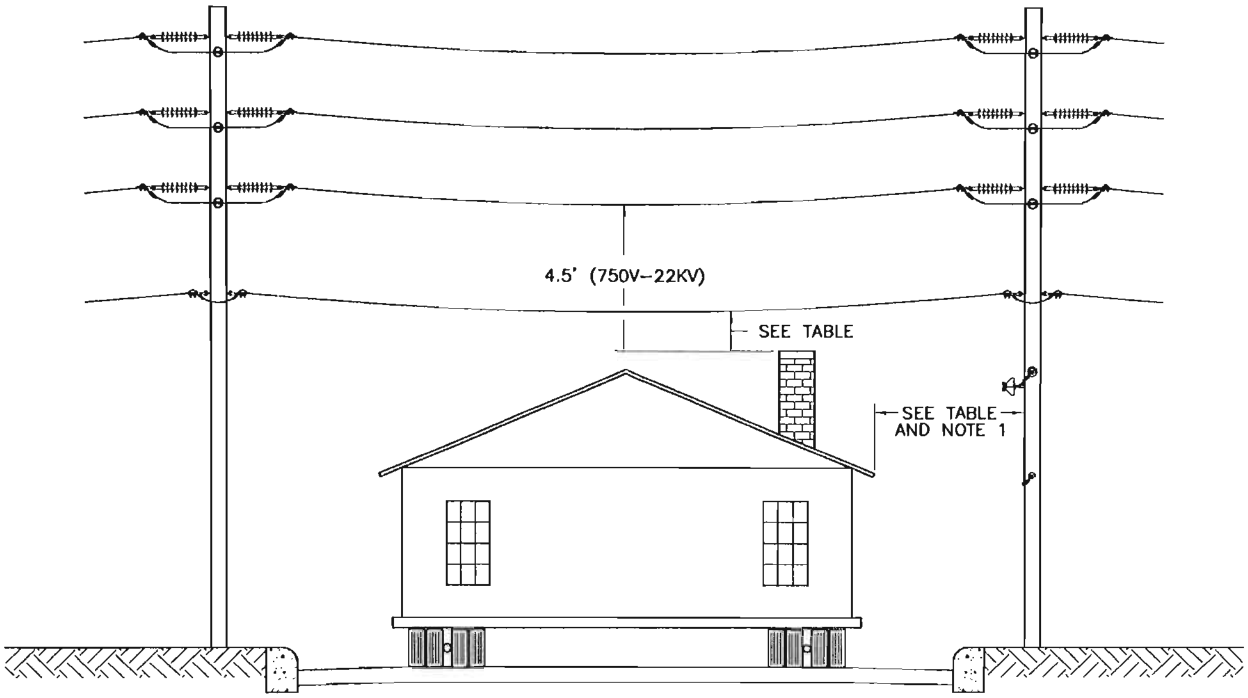
1. THE USE OF GUY INSULATORS DOES NOT NEGATE OR REDUCE ANY OF THE DIMENSIONS ON THIS PAGE.
2. IN CAROLINAS, THIS CLEARANCE CAN BE REDUCED TO 3' WHERE CONDITIONS DO NOT PERMIT 7.5'. IN FLORIDA, THIS CLEARANCE CAN ONLY BE REDUCED BELOW 7.5' WITH APPROVAL OF LOCAL FIRE AUTHORITY.

REVISED		BY	CK'D	APPR.
3				
2	8/18/06	CECCONI	QUINN	HOYT
1	3/4/04	ROBESON	NUNNERY	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY

MINIMUM GUY CLEARANCE

Progress Energy

PGN DWG. 09.02-07



THE CLEARANCE OF A BUILDING BEING TRANSPORTED UNDER DISTRIBUTION LINES IS TREATED THE SAME AS A MOVING VEHICLE PER THE NESC UNIFORM SYSTEM OF CLEARANCES. THE VERTICAL CLEARANCE ABOVE GROUND CONSISTS OF A REFERENCE COMPONENT WHICH IN THIS CASE WOULD BE THE HEIGHT OF THE BUILDING ON THE TRANSPORT VEHICLE, PLUS A MECHANICAL AND ELECTRICAL COMPONENT AS FOLLOWS:

CLEARANCE REQUIREMENTS		
CATEGORY	VERTICAL CLEARANCE REQUIRED (FT)	HORIZONTAL CLEARANCE REQUIRED (FT)
INSULATED COMMUNICATIONS: GROUNDED NEUTRALS GROUNDED GUYS AND SPAN GUY	1.5	3
TRIPLEX OR QUADRUPLEX	2	3.5
OPEN SECONDARY	2.5	5.5*
PRIMARY (750-22 KV PHASE TO GROUND)	4.5	7**

* MUST MAINTAIN 3.5 FT WHEN DISPLACED BY WIND
** MUST MAINTAIN 4.5 FT WHEN DISPLACED BY WIND

NOTES:

1. IF NO LINES EXIST ON THE POLE AT THIS LEVEL, THE HORIZONTAL CLEARANCE CAN BE REDUCED TO 3 INCHES TO GROUNDED EQUIPMENT ON POLE OR POLE SURFACE.

2. DISCONNECTING LINES:
   NO CONDUCTOR IS PERMITTED TO BE TAKEN DOWN (INCLUDING THE NEUTRAL) UNLESS A PROPER CLEARANCE IS OBTAINED FOR THE LINE, THE CIRCUIT CLEARED AND PROPERLY GROUNDED.

3. PUSHING CONDUCTORS/CABLES UP WITH INSULATED STICKS OR TEMPORARILY RAISING CONDUCTORS/CABLES:
   IN MOST CASES, PUSHING A CONDUCTOR/CABLE UP TOWARD A PRIMARY WILL RESULT IN A VIOLATION OF THE 4.5 FOOT PRIMARY CONDUCTOR CLEARANCE REQUIRED FROM THE TOP OF THE STRUCTURE/HOUSE BEING MOVED. IT IS ALSO CONSIDERED A HAZARD TO DO SO SINCE IT IS DIFFICULT TO JUDGE HOW CLOSE THE PUSHED UP CONDUCTOR MAY BE TO THE ENERGIZED CONDUCTOR. THEREFORE THE PRACTICE IS NOT PERMITTED.

   CONDUCTORS/CABLES MAY BE TEMPORARILY RAISED/RELOCATED BY RAISING SUPPORTS AT THE POLES. HOWEVER, THE NESC REQUIRES THAT CLEARANCE MUST BE MAINTAINED AS IF IT WERE A PERMANENT INSTALLATION.

4. DURING TRANSPORT OF THE BUILDING:
   A. NO ONE IS PERMITTED ON TOP OF THE BUILDING.
   B. ROAD AND OTHER CONDITIONS CAN CHANGE FROM THE TIME LINE CLEARANCES ARE CHECKED TO THE DAY OF THE MOVE. IT IS RECOMMENDED THAT A PROGRESS ENERGY EMPLOYEE ACCOMPANY THE MOVING BUILDING AND RE-CHECK CLEARANCES AS THE BUILDING APPROACHES EACH LINE.

3			
2			
1			
0 1/22/08	ROBESON	GUINN	HOYT
REVISED	BY	CK'D	APPR.

LINE CLEARANCES FOR MOVING STRUCTURE/HOUSE

Progress Energy

PGN DWG. 09.02-08

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:

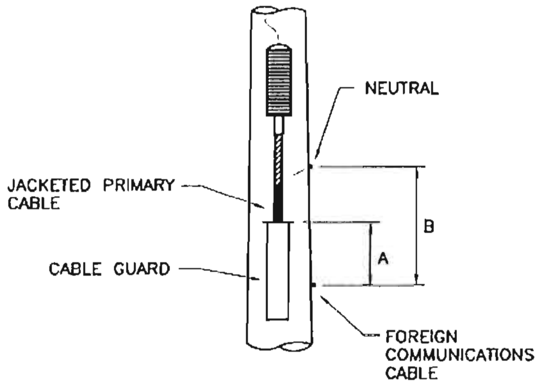
1. NO VERTICAL CLEARANCE IS REQUIRED BETWEEN WIRES ELECTRICALLY INTERCONNECTED AT THE CROSSING.
2. THE ABOVE CLEARANCES ARE FOR ANY LOCATION WHERE THE SUBJECT WIRES CROSS OR COULD BE CLOSEST TOGETHER, REGARDLESS OF SPAN LENGTHS. REFER TO NESC RULE 233.A.1 FOR APPLICABLE WIRE LOADING CONDITIONS TO USE 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.
10. CROSSINGS SHOULD BE MADE ON A COMMON SUPPORTING STRUCTURE, WHERE PRACTICAL.

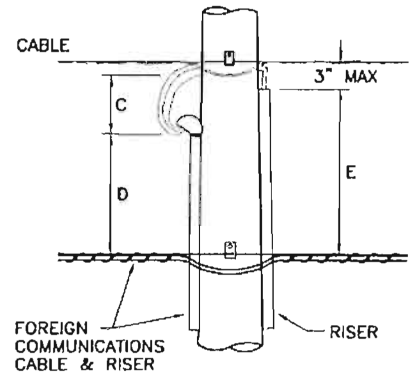
REVISED		BY	CK'D	APPR.
3				
2	12/20/07	SIMPSON	GUINN	HOYT
1	12/1/03	NUNNERY	NUNNERY	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY

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.

3				
2				
1	9/12/02	HOYT	ROBESON	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

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.

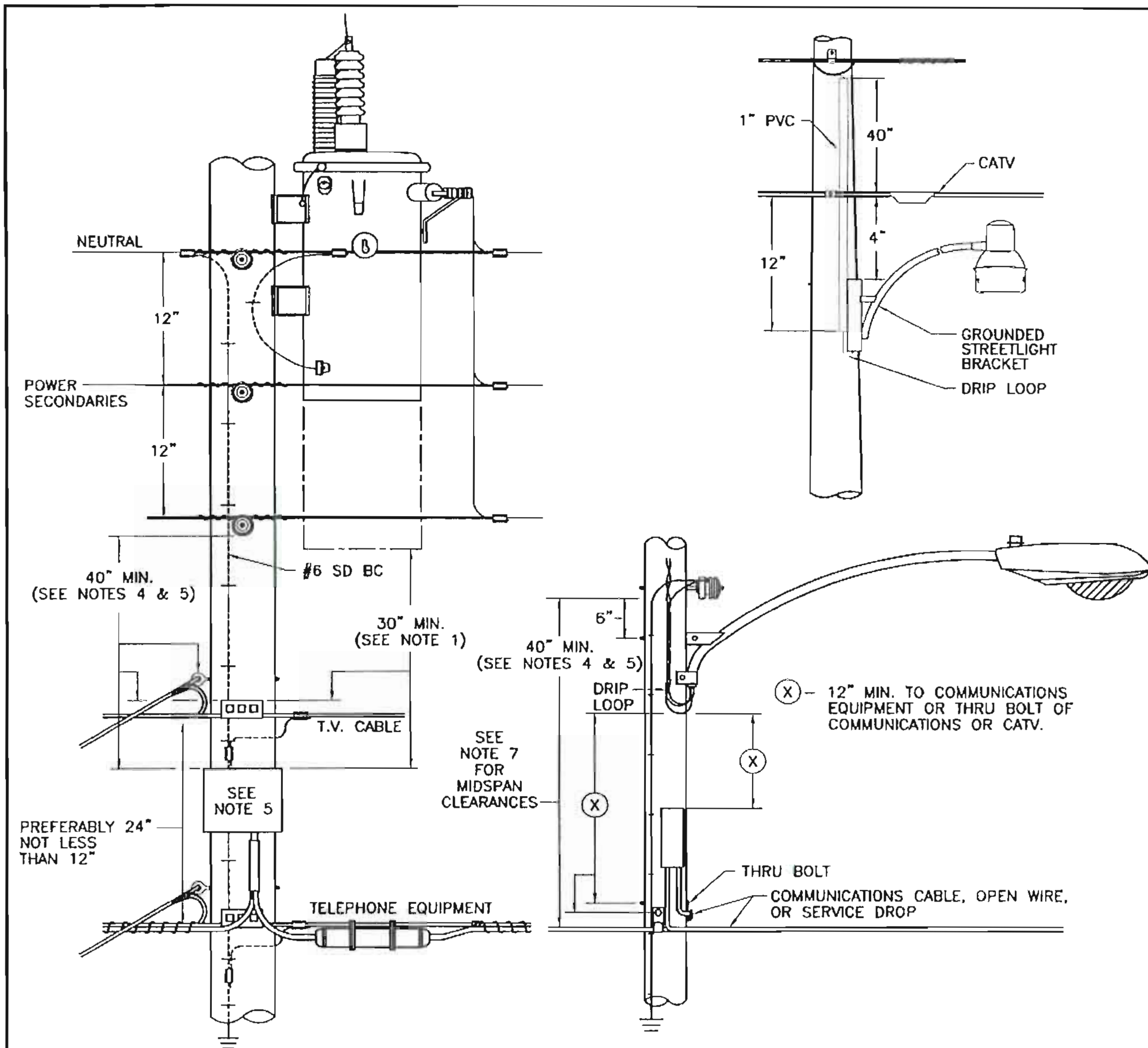
11. REQUESTS FOR EXCEPTIONS TO THIS DESIGN GUIDE SHALL BE REFERRED TO THE JOINT USE UNIT. ANY EXCEPTIONS APPROVED WILL BE DISTRIBUTED TO THE REGIONS FOR UNIFORM APPLICATION ON A SYSTEM-WIDE BASIS.

3				
2				
1	8/12/04	ROBESON	NUNNERY	SPRINGER
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

FOREIGN ATTACHMENTS & CLEARANCES

Progress Energy

PGN DWG. 09.04-01



NOTES:

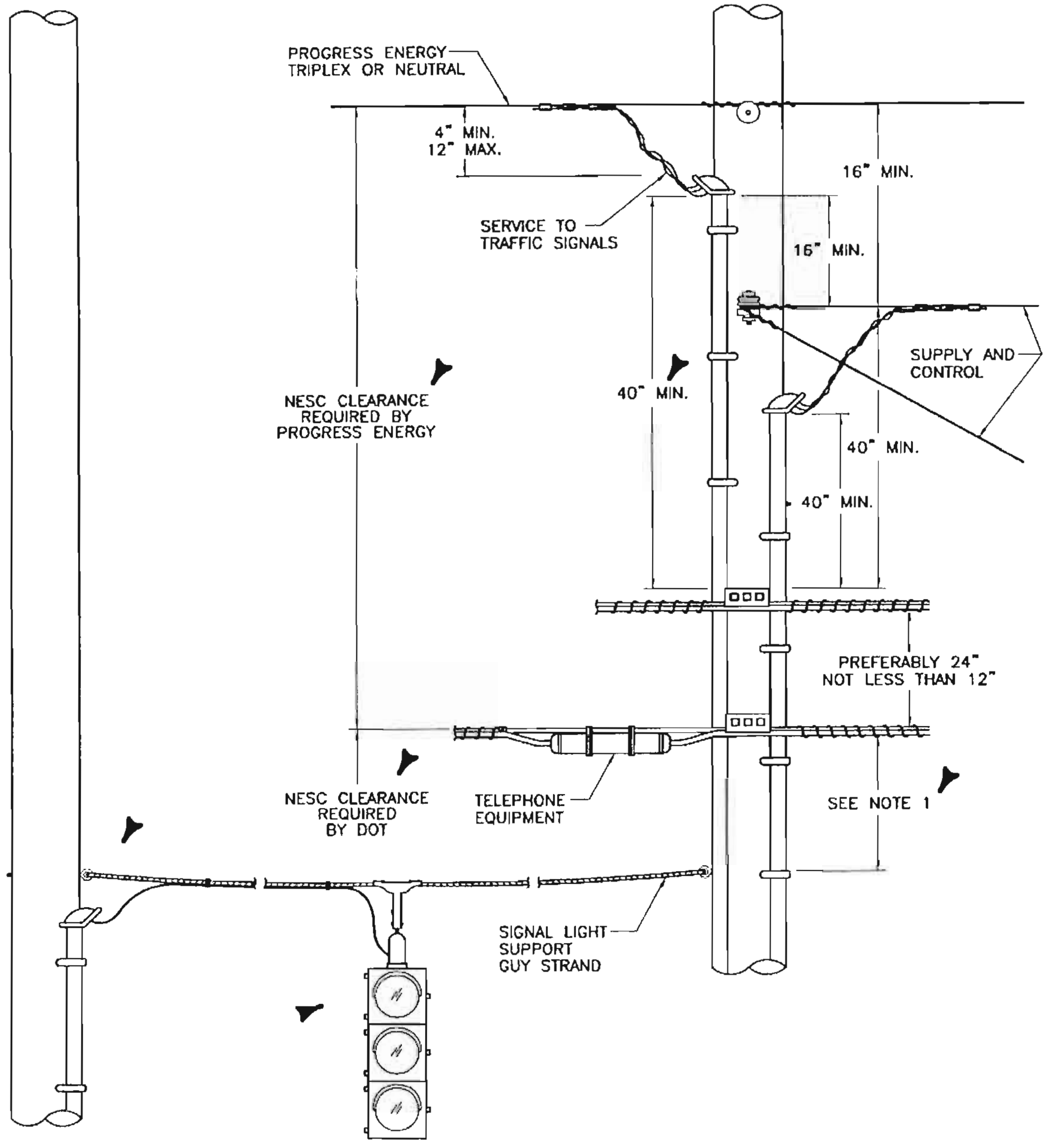
1. THIS DIMENSION OF NOT LESS THAN 30" APPLIES BETWEEN CONDUCTORS AND NON-CURRENT CARRYING PARTS OF EQUIPMENT THAT ARE EFFECTIVELY GROUNDED.
2. WHERE T.V. CABLE DOES NOT EXIST, MINIMUM DIMENSIONS APPLY TO TELEPHONE EQUIPMENT.
3. WHERE POWER AND COMMUNICATION LINES ARE BETWEEN THE SAME POLES, THESE CLEARANCES 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.
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.
9. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

8	9/23/08	GUINN	GUINN	HOYT
7	11/19/07	CECCONI	SIMPSON	HOYT
6	10/6/05	MCINTIRE	GUINN	HOYT
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. DOT REQUIREMENTS:
   FOR EFFECTIVELY BONDED SPAN WIRES, THIS CLEARANCE MAY BE 4" (12" PREFERRED). FOR UNBONDED SPAN WIRES, THE CLEARANCE MUST BE 20".

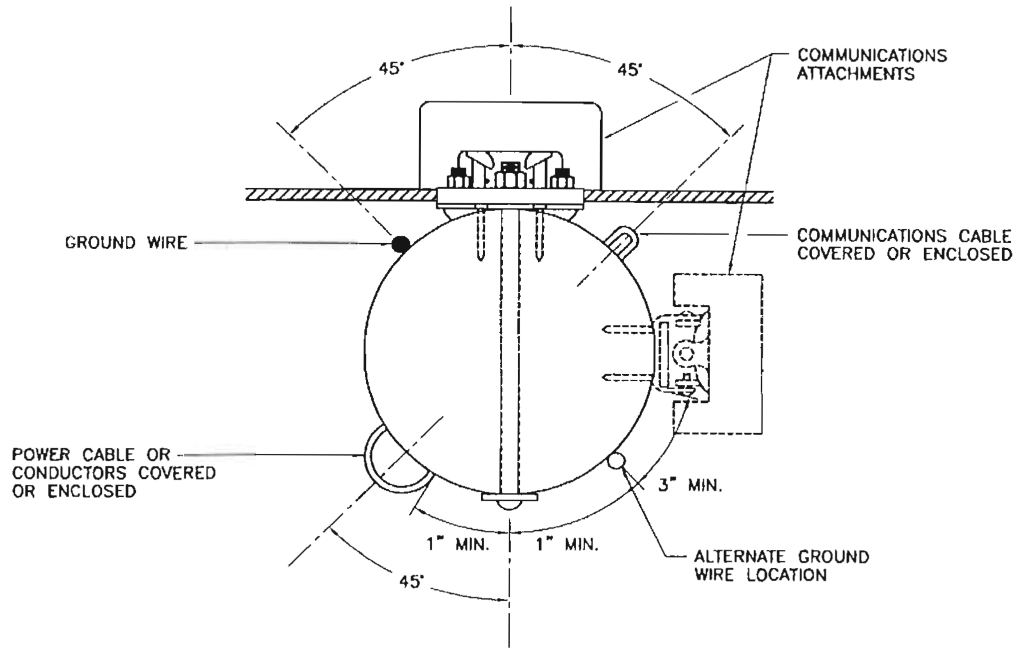
3				
2	12/5/07	ROBESON	QUINN	HOYT
1	4/1/04	ROBESON	NUNNERY	WOOLSEY
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

JOINT USE CONSTRUCTION
TRAFFIC SIGNAL SUPPORT AND
POWER OPERATING CIRCUIT CLEARANCES

Progress Energy

PGN DWG. 09.04–03

LOCATION OF VERTICAL RUNS

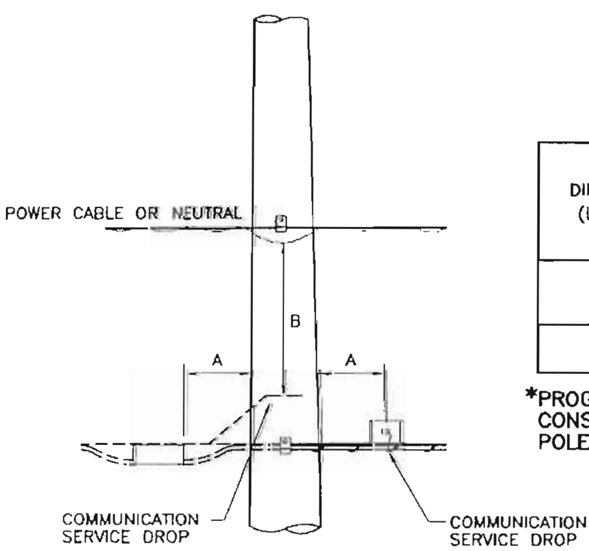


STREET SIDE

NOTES:

1. DO NOT LOCATE GROUNDED EQUIPMENT LESS THAN 1" FROM A BOLT OR STAPLE.
2. LOCATE U-GUARD ON SIDE OF POLE AWAY FROM TRAFFIC.

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

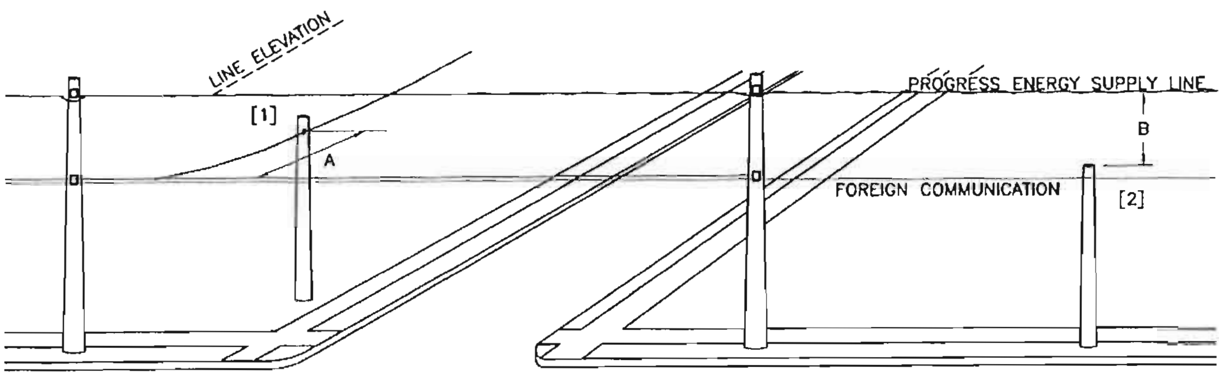
*PROGRESS ENERGY REQUIREMENT – NOT OPTIONAL ON NEW CONSTRUCTION – THIS CLEARANCE TO FACILITATE FUTURE POLE CHANGE OUT AND CLIMBING SPACE.

3			
2			
1	6/3/07 GUNN	GUNN	HOYT
0	7/24/02 HOYT	ROBESON	WEBSTER
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.

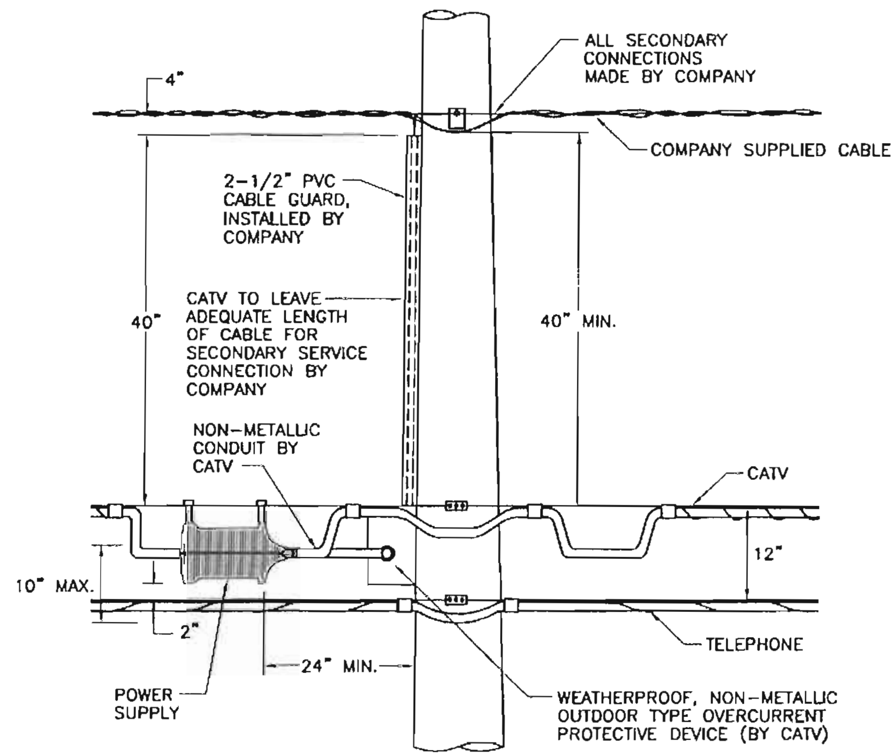
3				
2				
1				
0	7/24/02	HOYT	ROBESON	WOOLSEY
REVISED		BY	CK'D	APPR.

FOREIGN POLE CLEARANCE AT FINAL SAG

Progress Energy

PGN DWG. 09.04−05

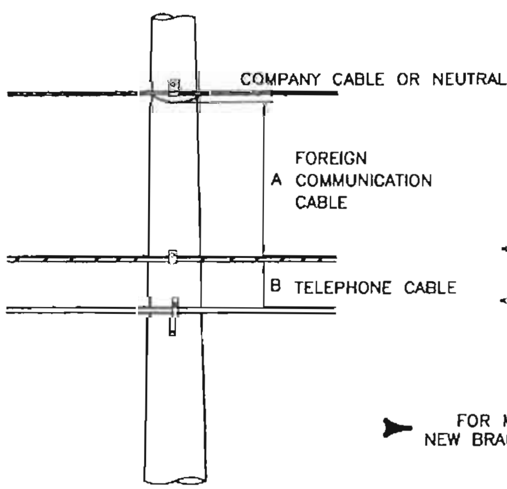
STRAND MOUNTED POWER SUPPLY

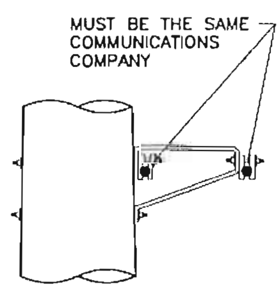


MTNC ONLY

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

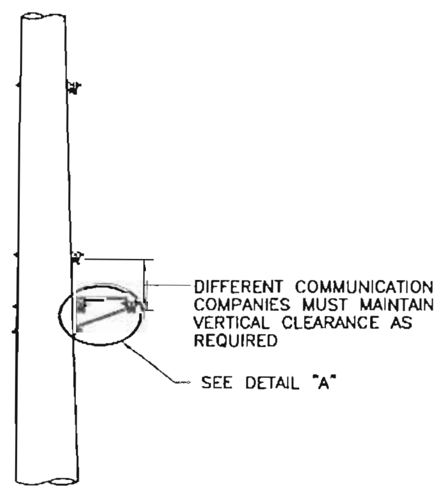
* COMPANY REQUIREMENT — NOT OPTIONAL





DETAIL "A"

FOR MAINTENANCE ONLY
NEW BRACKETS NOT PERMITTED



NOTES:

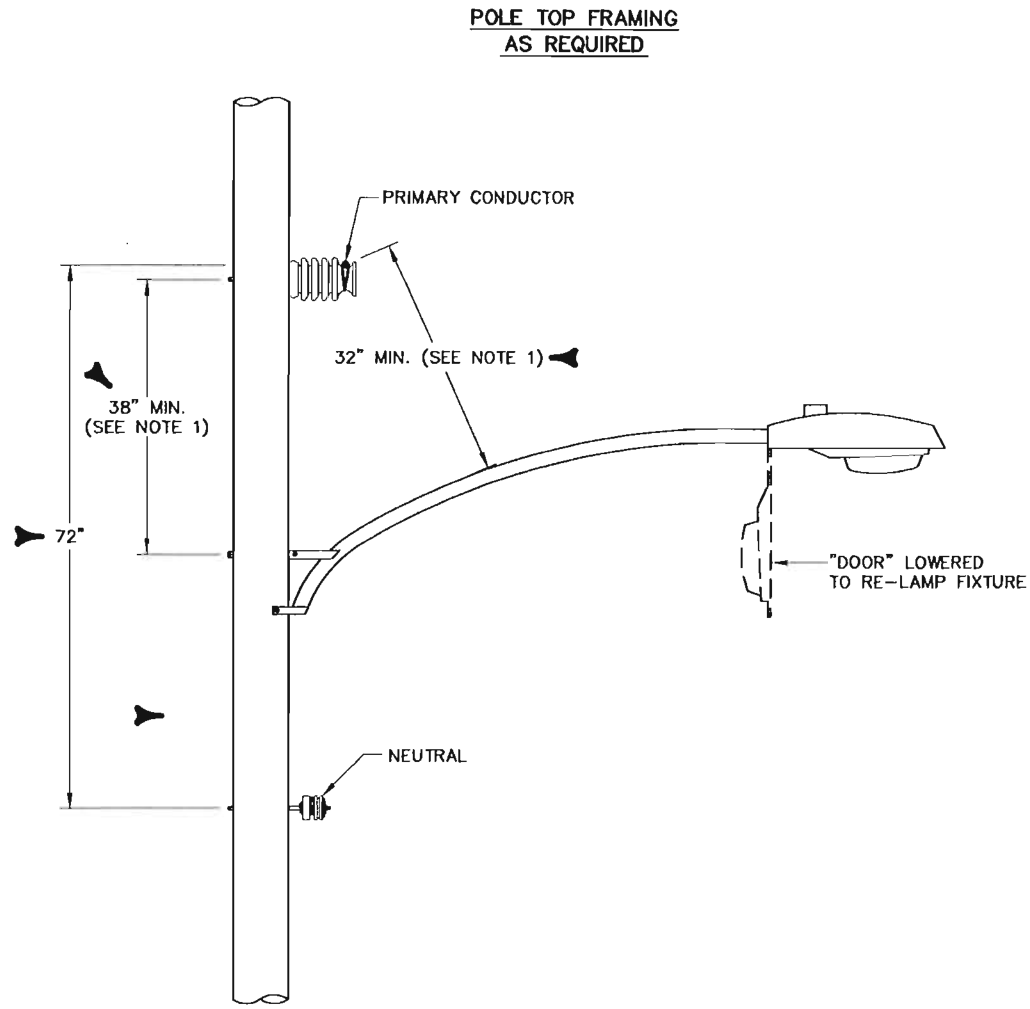
1. EXTENSION BRACKET MUST BE MOUNTED ON EXISTING CABLE SIDE ONLY.
2. EXTENSION BRACKET MAY BE UTILIZED IN TANGENT SITUATIONS ONLY, NOT APPROVED FOR DEAD-END POLES.
3. EXTENSION BRACKET MANUFACTURER'S SPECIFICATIONS MUST RECEIVE COMPANY APPROVAL PRIOR TO UTILIZATION.

	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



LIGHTING UNIT ABOVE NEUTRAL

NOTES:

1. THIS DRAWING SHOWS MINIMUM CLEARANCE, PRIMARY CONDUCTOR TO BRACKET, FOR ONE TYPE OF BRACKET. THIS CLEARANCE SHALL BE MAINTAINED FOR ALL STYLES OF BRACKETS, OR ANY PART OF THE BRACKET. SEE OTHER DRAWINGS AND/OR ENGINEER'S INSTRUCTIONS FOR ACTUAL MOUNTING HEIGHTS.

2. FOR CLEARANCES – LIGHTING UNITS BELOW SECONDARY AND ABOVE COMMUNICATION CIRCUITS OR EQUIPMENT, SEE DWG. 09.04-02.

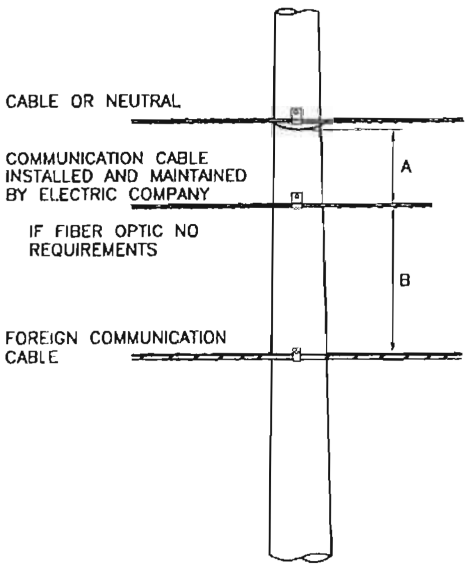
3. SEE DWG. 09.04-02 IF TELECOM IS ATTACHED.

3				
2				
1				
0	1/13/09	GUINN	GUINN	ELKINS
REVISED		BY	CK'D	APPR.

CLEARANCES – LIGHTING UNITS TO POWER CIRCUITS OR EQUIPMENT

Progress Energy

FLA DWG. 09.04-07



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.

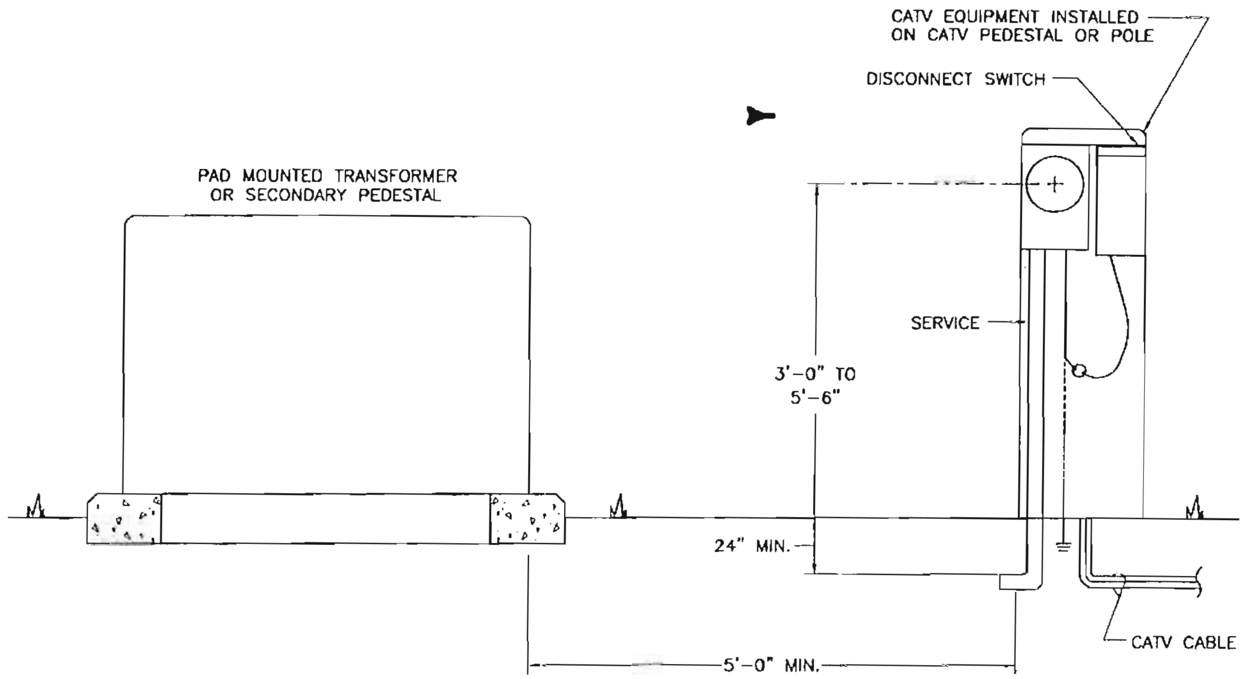
NO CLEARANCE IS SPECIFIED BETWEEN SUPPLY CONDUCTORS AND FIBER-OPTIC SUPPLY CABLES THAT ARE COMPLETELY DIELECTRIC (INCLUDING THE MESSENGER).

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. UNDERGROUND SERVICE FROM TRANSFORMER OR PEDESTAL TO METER SOCKET.
   B. METER

   EXCEPTION:

   THE NORMAL POD IS AT THE SOURCE LUGS OF CATV METER SOCKET. THEREFORE, COMPANY WILL PROVIDE THE SERVICE. HOWEVER, IF CATV COMPANY DESIRES TO INSTALL A SERVICE TO THE EDGE OF THE PADMOUNT OR SECONDARY PEDESTAL, AND LEAVE ENOUGH CABLE TO MAKE THE CONNECTION INSIDE THE PADMOUNT OR PEDESTAL, WE WILL RING IT OUT AND MAKE THE CONNECTION. CATV CABLES SHALL BE TAGGED IN THE METER BASE AND AT THE SOURCE END AS CATV OWNED BY THE CATV COMPANY. THE TAGS SHALL REMAIN WITH THE CABLE WHEN CONNECTED. IT WILL ALSO GENERALLY BE A DIFFERENT CABLE THAN WE NORMALLY USE SO IT SHOULD BE EASY TO IDENTIFY.

2. CATV COMPANY PROVIDE AND INSTALL:

   A. METER POLE OR PEDESTAL
   B. SERVICE EQUIPMENT BEYOND METER (IF REQUIRED)
   C. SERVICE EQUIPMENT GROUND
   D. METER SOCKET

3. ALL EQUIPMENT AND ATTACHMENTS MUST BE EFFECTIVELY GROUNDED.

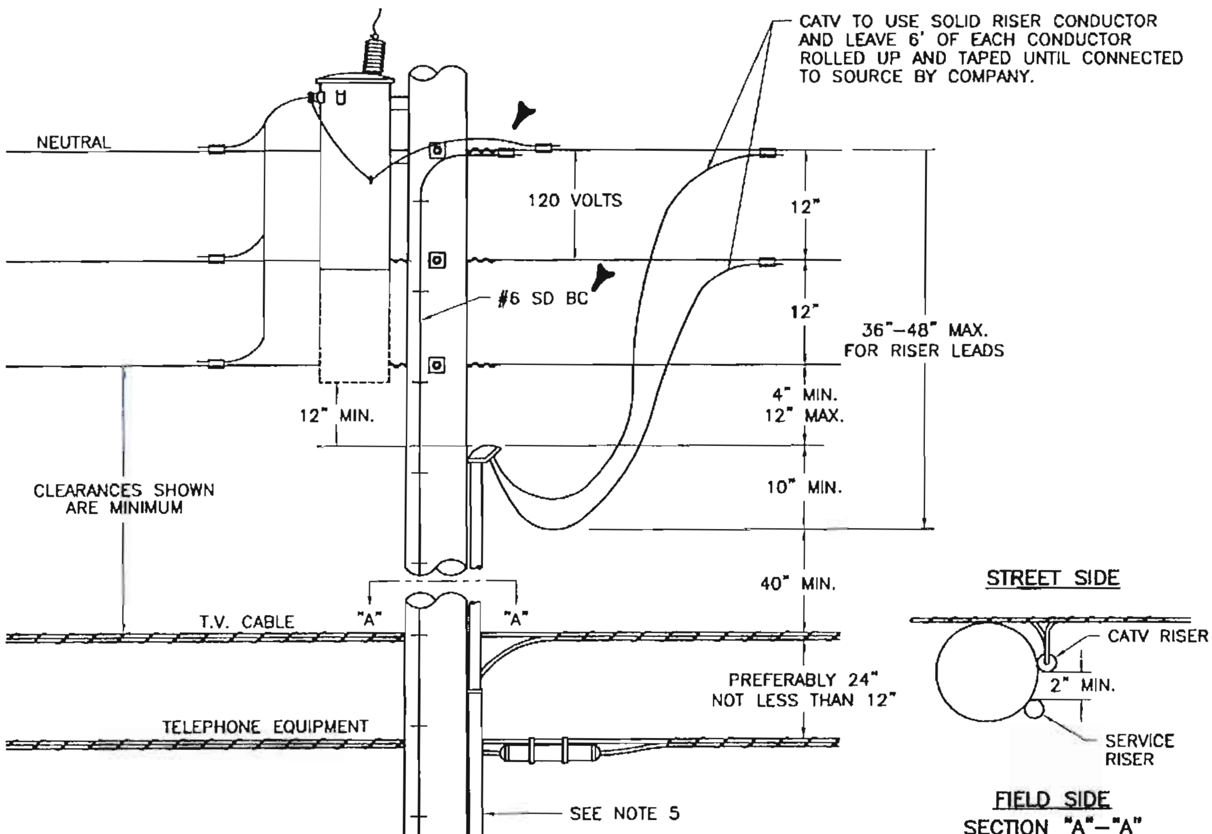
4. BONDING SHOULD BE PROVIDED BETWEEN ALL ABOVE GROUND METALLIC POWER AND COMMUNICATIONS APPARATUS (PEDESTALS, TERMINALS, APPARATUS CASES, TRANSFORMER CASES, ETC.) THAT ARE SEPARATED BY A DISTANCE OF 6' OR LESS.

3				
2				
1	12/29/06	QUINN	QUINN	HOYT
0	9/1/04	ROBESON	NUNNERY	SPRINGER
REVISED		BY	CK'D	APPR.

UNDERGROUND SERVICE–CATV
(PADMOUNTED TRANSFORMER OR
SECONDARY PEDESTAL)

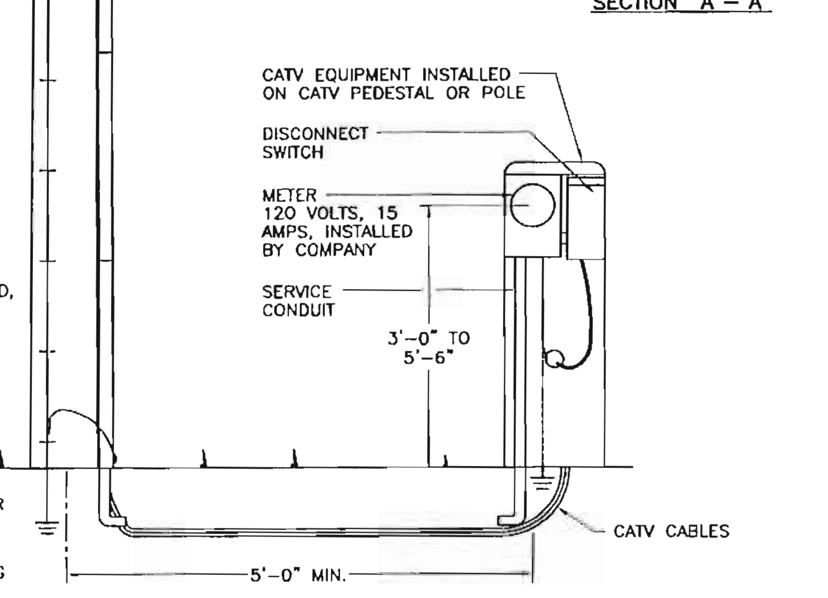
Progress Energy

CAR 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.
6. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

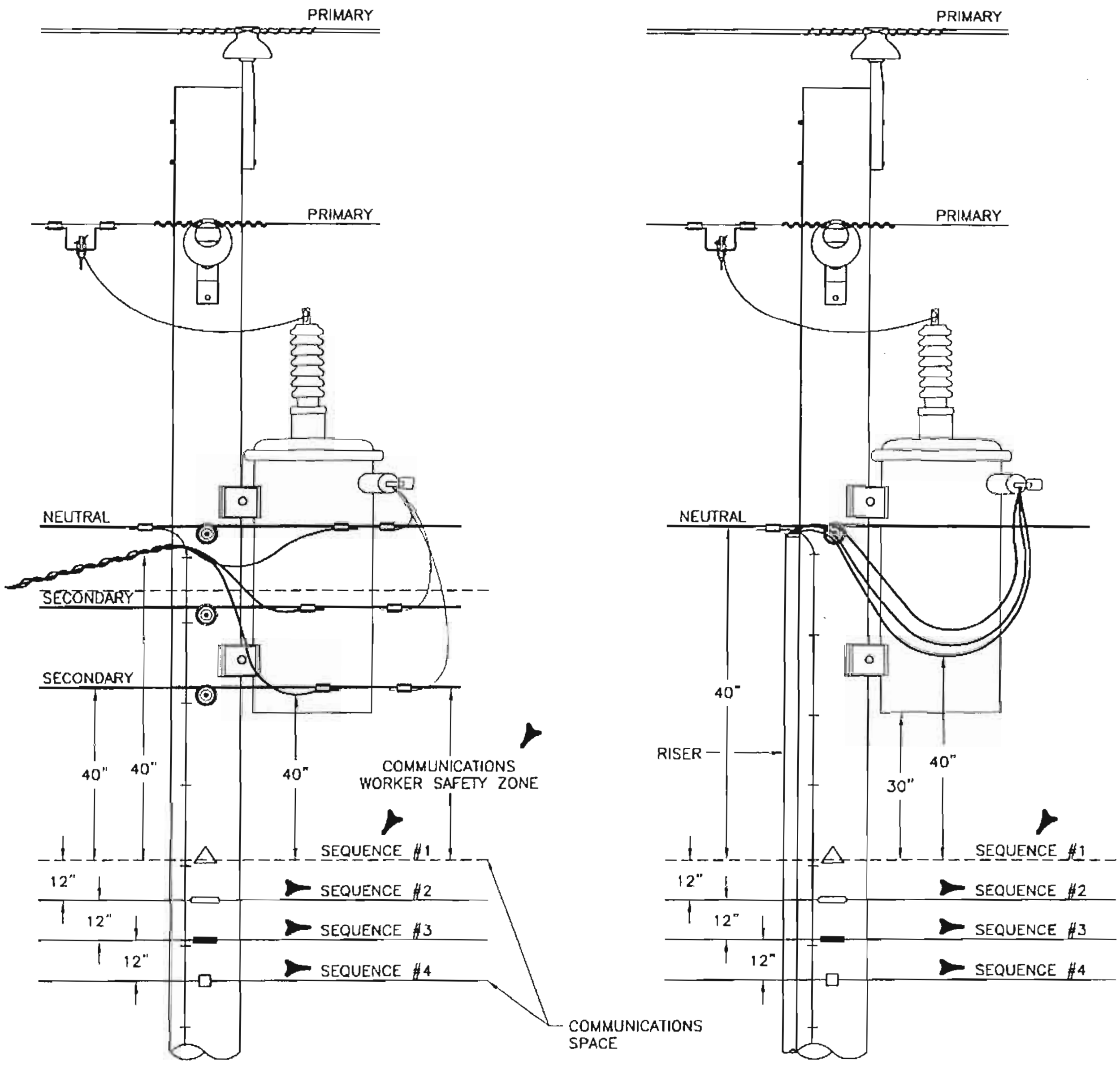


3				
2				
1	11/19/07	CECCONI	SIMPSON	HOYT
0	9/1/04	ROBESON	NUNNERY	SPRINGER
REVISED		BY	CK'D	APPR.

CATV INSTALLATION
120 VOLT UNDERGROUND SERVICE
(PREFERRED INSTALLATION)

Progress Energy

CAR DWG. 09.04–13



FRONT VIEW　　　　FRONT VIEW

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:

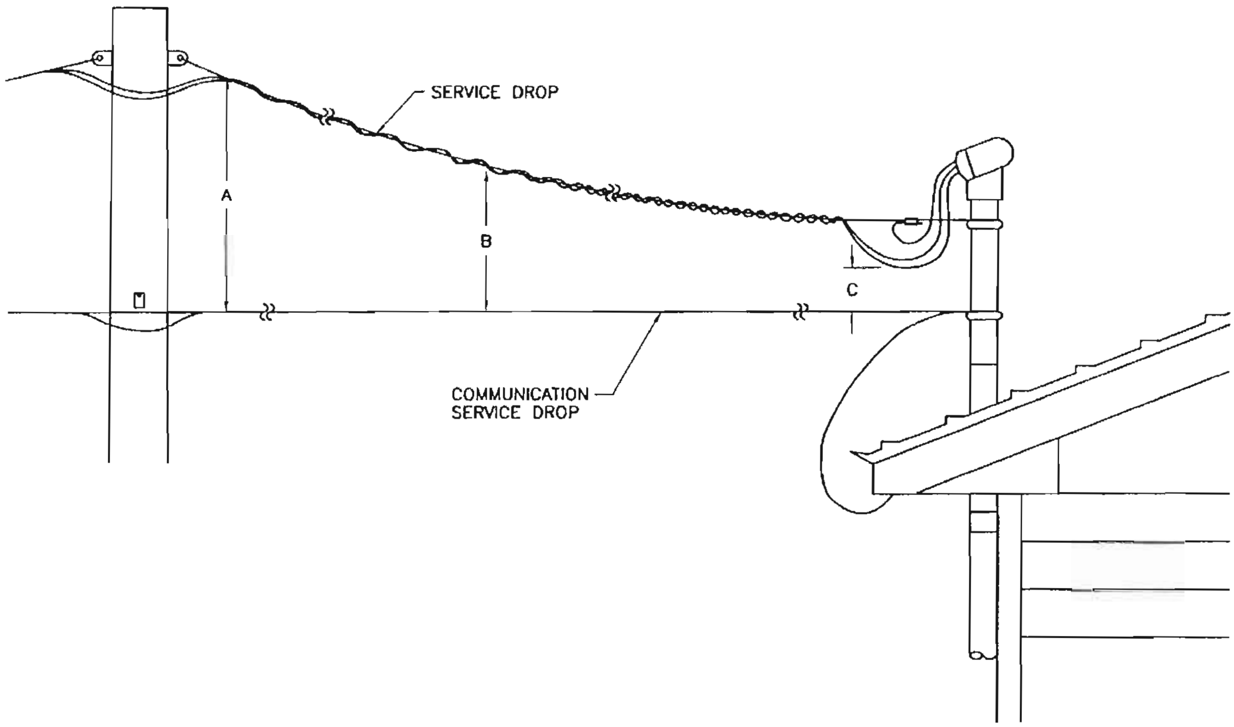
1. PROGRESS ENERGY FIBER OPTIC CABLE LOCATED AT THE BOTTOM OF THE SUPPLY SPACE (i.e. LESS THAN 40" FROM POWER) MUST HAVE A MINIMUM CLEARANCE OF 40" BETWEEN THE FIBER OPTIC CABLE AND THE TOP COMMUNICATIONS CABLE TO ENSURE THE 40" COMMUNICATION WORKER SAFETY ZONE IS NOT VIOLATED.
2. THE PEC JU-TRANSFER 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	8/29/04	ROBESON	NUNNERY	SPRINGER
1	4/27/04	BUNCH	NUNNERY	WOOLSEY
0	2/26/03	ROBESON	NUNNERY	WOOLSEY
REVISED		BY	CK'D	APPR.

JOINT USE CLEARANCE REQUIREMENTS

Progress Energy

PGN　DWG. 09.04-14



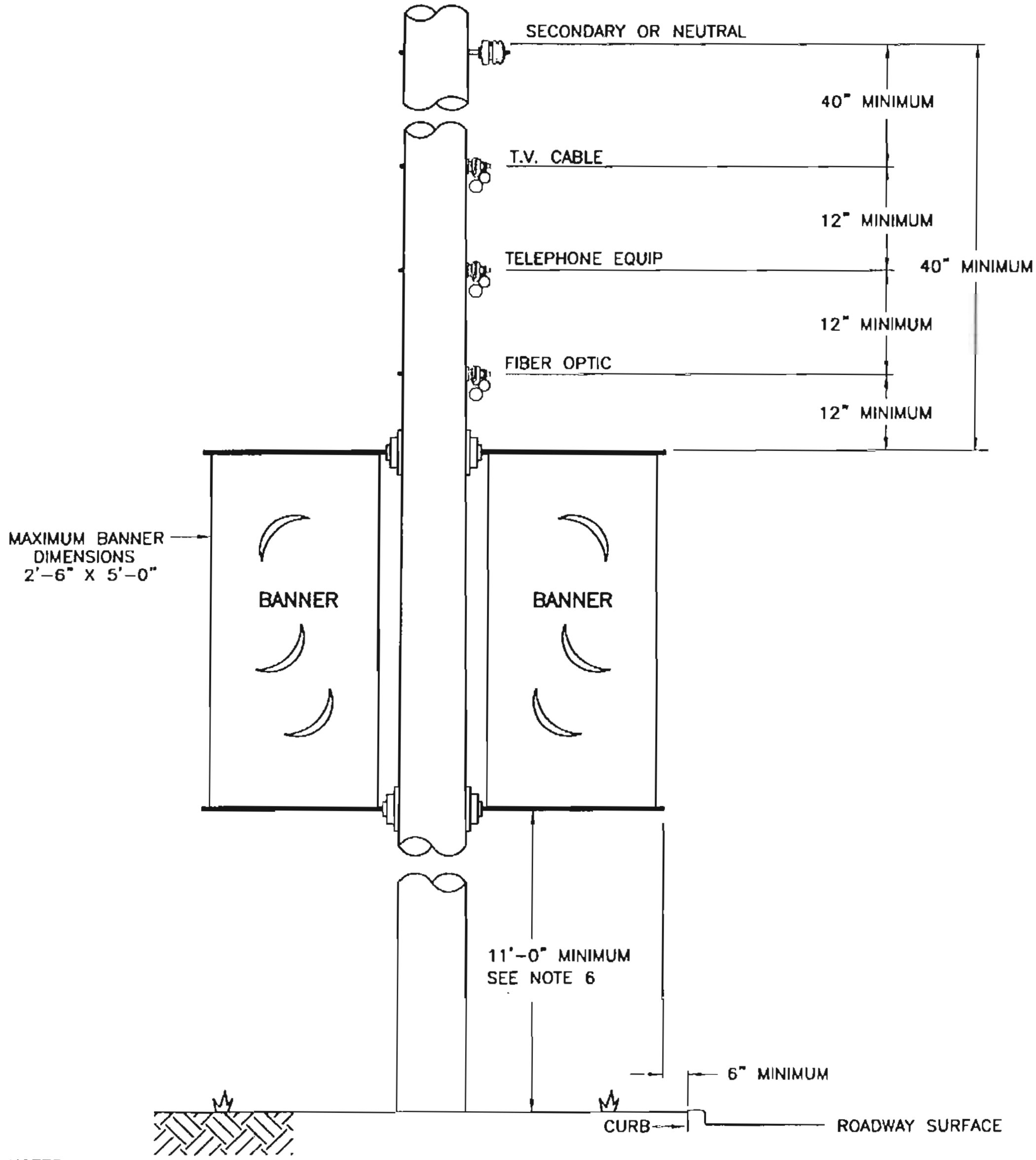
DIMENSION (LETTER)	*NESC MINIMUM REQUIREMENT	PROGRESS ENERGY PREFERRED MINIMUM REQUIREMENT	NESC APPLICABLE REFERENCE SECTION
A	40"	40"	235–5
B	12"	12"	235 C1 EXCEPTION 3
C	12"	12"	235 C1 EXCEPTION 3

3				
2				
1				
0	8/31/04	ROBESON	[illegible]	SPRINGER
REVISED		BY	CK'D	APPR.

SERVICE DROP CLEARANCE
TO COMMUNICATION CABLES

Progress Energy

PGN DWG. 09.04–16



NOTES:

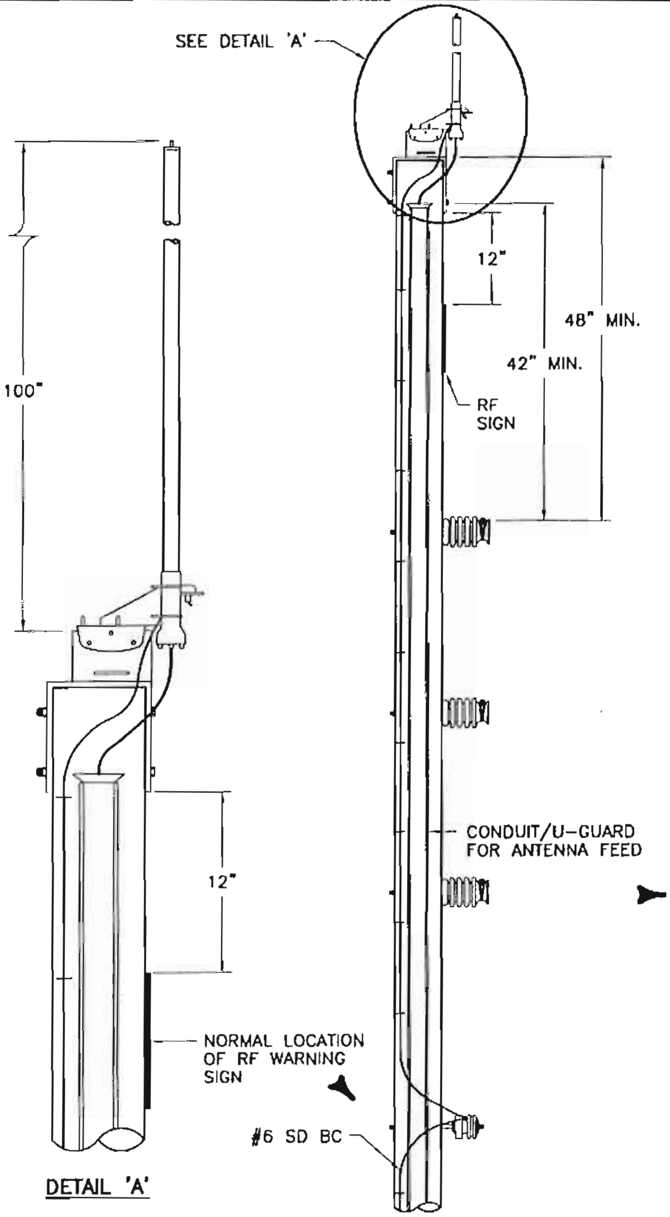
1. POLE MUST BE INSPECTED FOR STRUCTURAL INTEGRITY PRIOR TO BANNER ATTACHMENT.
2. BANNERS SHOULD NOT BE ATTACHED TO POLES WITH YELLOW OR WHITE INSPECTION TAGS.
3. BANNER AGREEMENT MUST BE COMPLETED PRIOR TO BANNER ATTACHMENT TO COMPANY DISTRIBUTION POLES.
4. BANNERS ATTACHED TO POLES SHOULD BE PERPENDICULAR 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

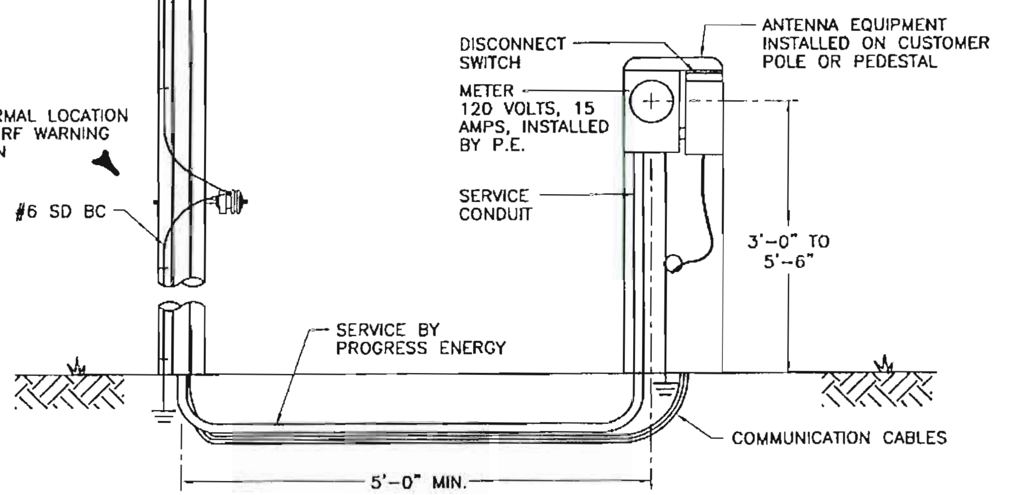
Progress Energy

CAR CAROLINAS DWG. 09.04-25



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.
9. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.



LINE INSULATION:
BECAUSE POLE GROUND GOES TO TOP OF POLE, EXISTING LINE INSULATORS MUST BE HIGHER VOLTAGE THAN NORMAL.

12KV SYSTEM:
USE 35KV INSULATOR

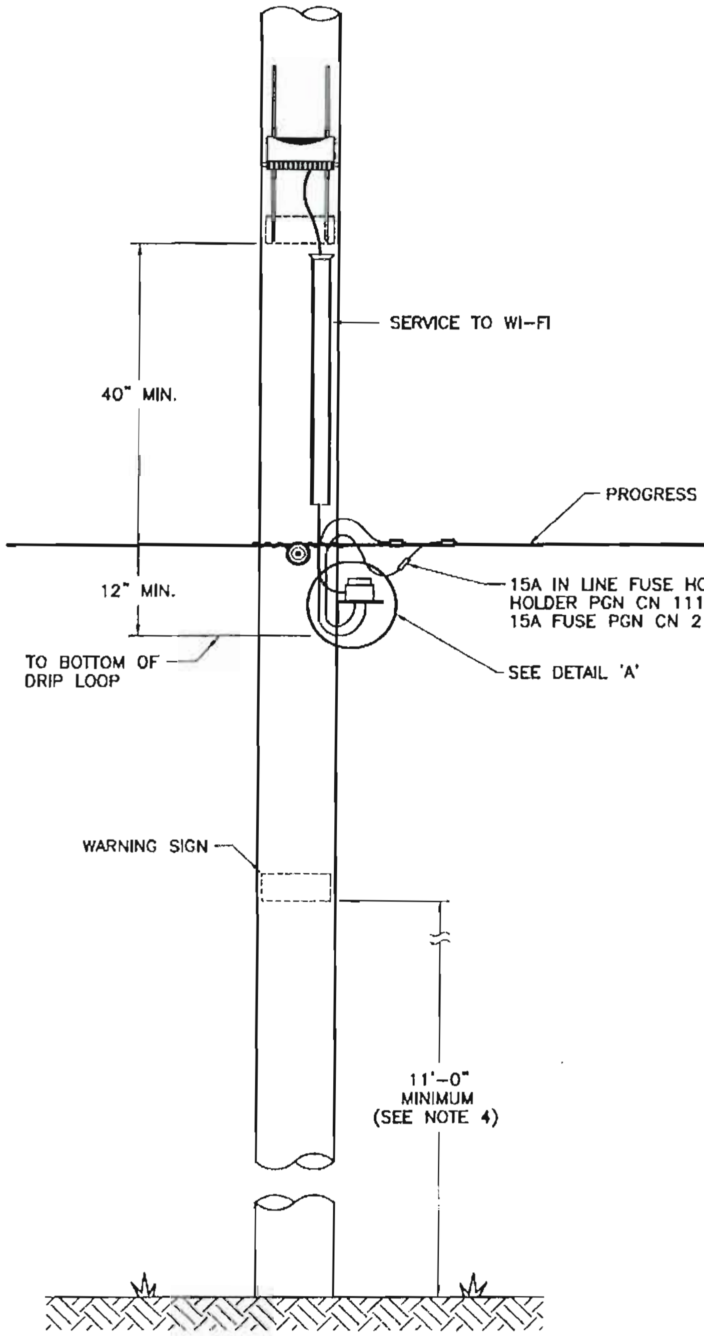
23KV SYSTEM:
USE 45KV INSULATOR

REVISED		BY	CK'D	APPR.
3				
2	11/19/07	CECCONI	SIMPSON	HOYT
1	8/26/05	ROBESON	GUINN	HOYT
0	6/15/05	NUNNERY	NUNNERY	HOYT

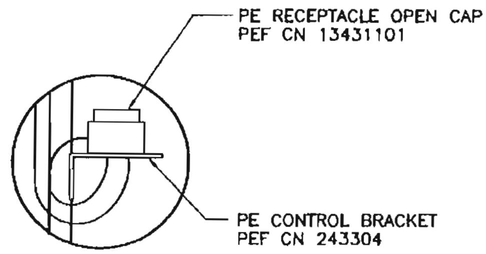
JOINT USE CONSTRUCTION
(DAS) DISTRIBUTED ANTENNA SYSTEMS

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
4. RECEPTACLE OPEN CAP

ANTENNA COMPANY PROVIDE AND INSTALL:

1. ANTENNA
2. CONDUIT/ U-GUARD
3. SERVICE CABLE
4. WARNING SIGN – "WARNING – ANTENNA RADIATION. MINIMUM APPROACH DISTANCE IS X FT".
5. PROPER GROUNDING IN ACCORDANCE WITH NESC REQUIREMENTS.
6. WI-FI ANTENNA INSTALLER MUST BE QUALIFIED TO WORK IN SUPPLY SPACE.

NOTES:

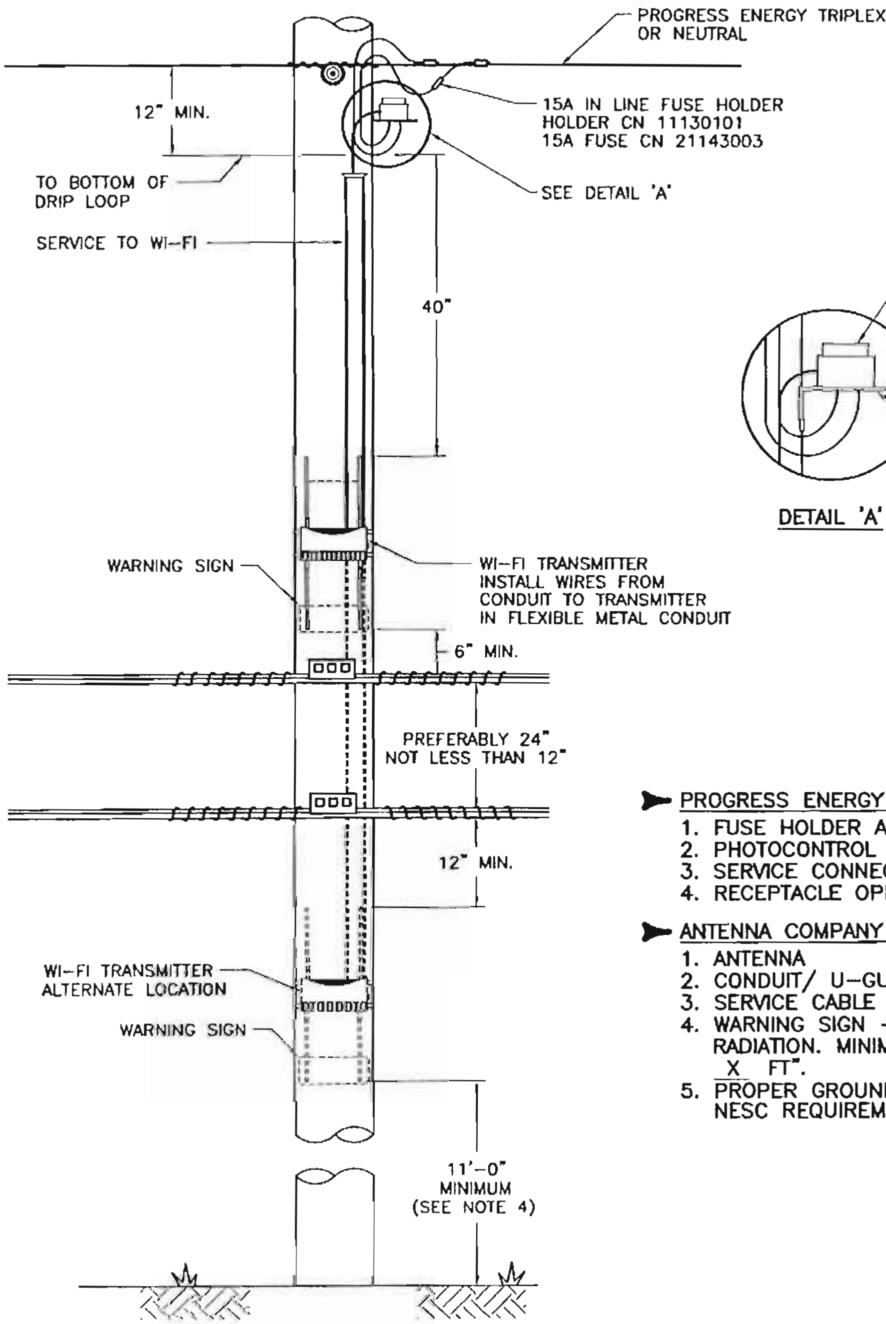
1. DO NOT INSTALL ANTENNAS ON EQUIPMENT POLES SUCH AS CAPACITOR BANKS, RECLOSERS, REGULATOR, SWITCHES, U.G. DIP, ETC.
2. ALL ANTENNA LOCATIONS MUST BE APPROVED BE BY A PROGRESS ENERGY DISTRIBUTION ENGINEER.
3. ONLY ONE ANTENNA PER POLE ALLOWED.
4. MINIMUM CLEARANCE IS BASED ON NESC TABLE 232-2(1)d.

3				
2				
1				
0	10/17/08	ROBESON	GUNN	HOYT
REVISED		BY	CK'D	APPR.

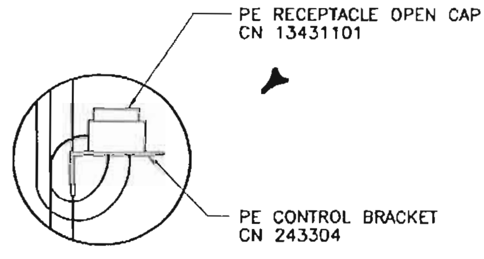
JOINT USE CONSTRUCTION
WI-FI ANTENNA INSTALLATION
ON SERVICE POLE

Progress Energy

PGN DWG. 09.04-32



FRONT VIEW



DETAIL 'A'

PROGRESS ENERGY PROVIDE AND INSTALL:

1. FUSE HOLDER AND FUSE
2. PHOTOCONTROL BRACKET
3. SERVICE CONNECTION
4. RECEPTACLE OPEN CAP

ANTENNA COMPANY PROVIDE AND INSTALL:

1. ANTENNA
2. CONDUIT/ U-GUARD
3. SERVICE CABLE
4. WARNING SIGN – "WARNING – ANTENNA RADIATION. MINIMUM APPROACH DISTANCE IS _X_ FT".
5. PROPER GROUNDING IN ACCORDANCE WITH NESC REQUIREMENTS.

NOTES:

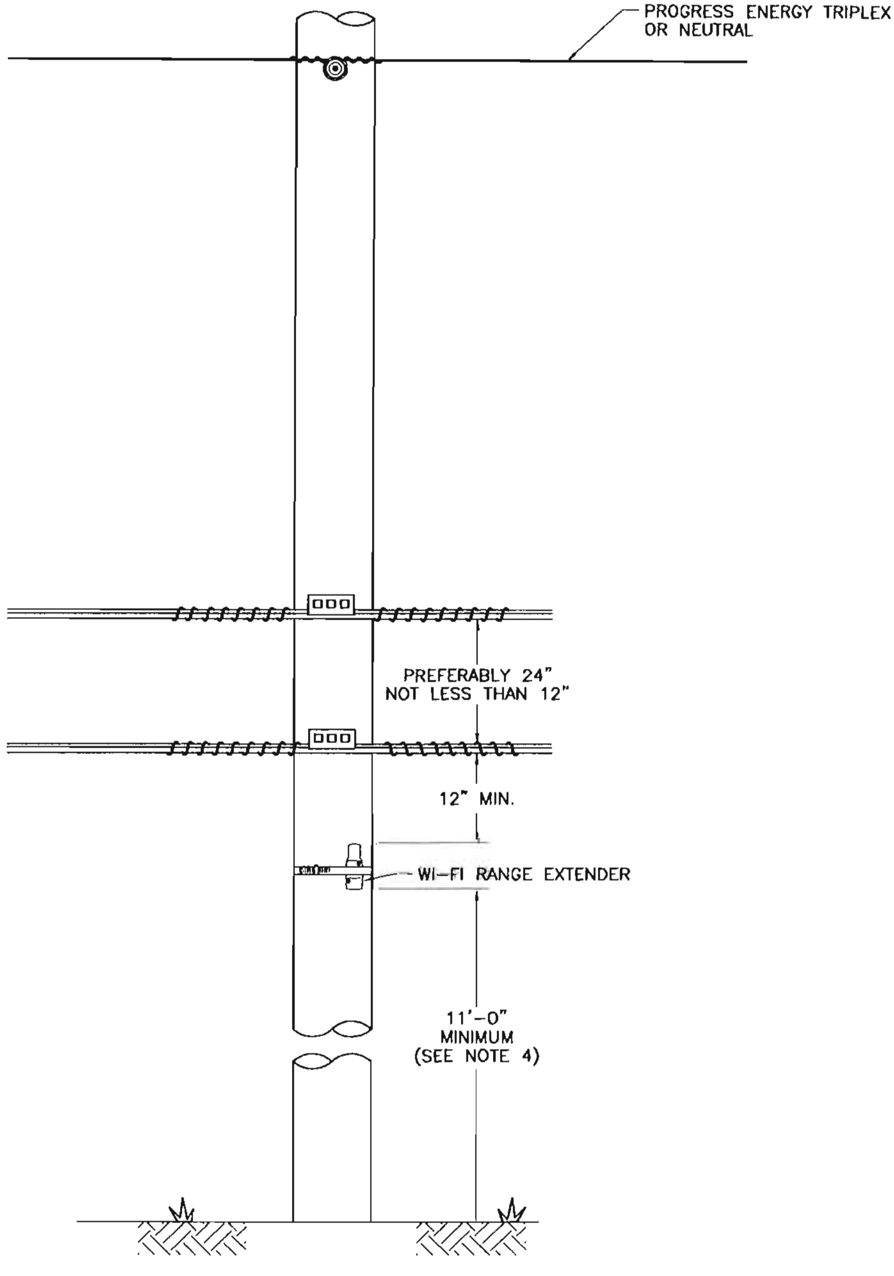
1. DO NOT INSTALL ANTENNAS ON EQUIPMENT POLES SUCH AS CAPACITOR BANKS, RECLOSERS, REGULATOR, SWITCHES, U.G. DIP, ETC.
2. ALL ANTENNA LOCATIONS MUST BE APPROVED BE BY A PROGRESS ENERGY DISTRIBUTION ENGINEER.
3. ONLY ONE ANTENNA PER POLE ALLOWED.
4. MINIMUM CLEARANCE IS BASED ON NESC TABLE 232-2(1)d.

3	[illegible]	ROBESON	GUNN	HOYT
2	[illegible]	MCINTIRE	GUNN	HOYT
1	[illegible]	ROBESON	GUNN	HOYT
0	[illegible]	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:

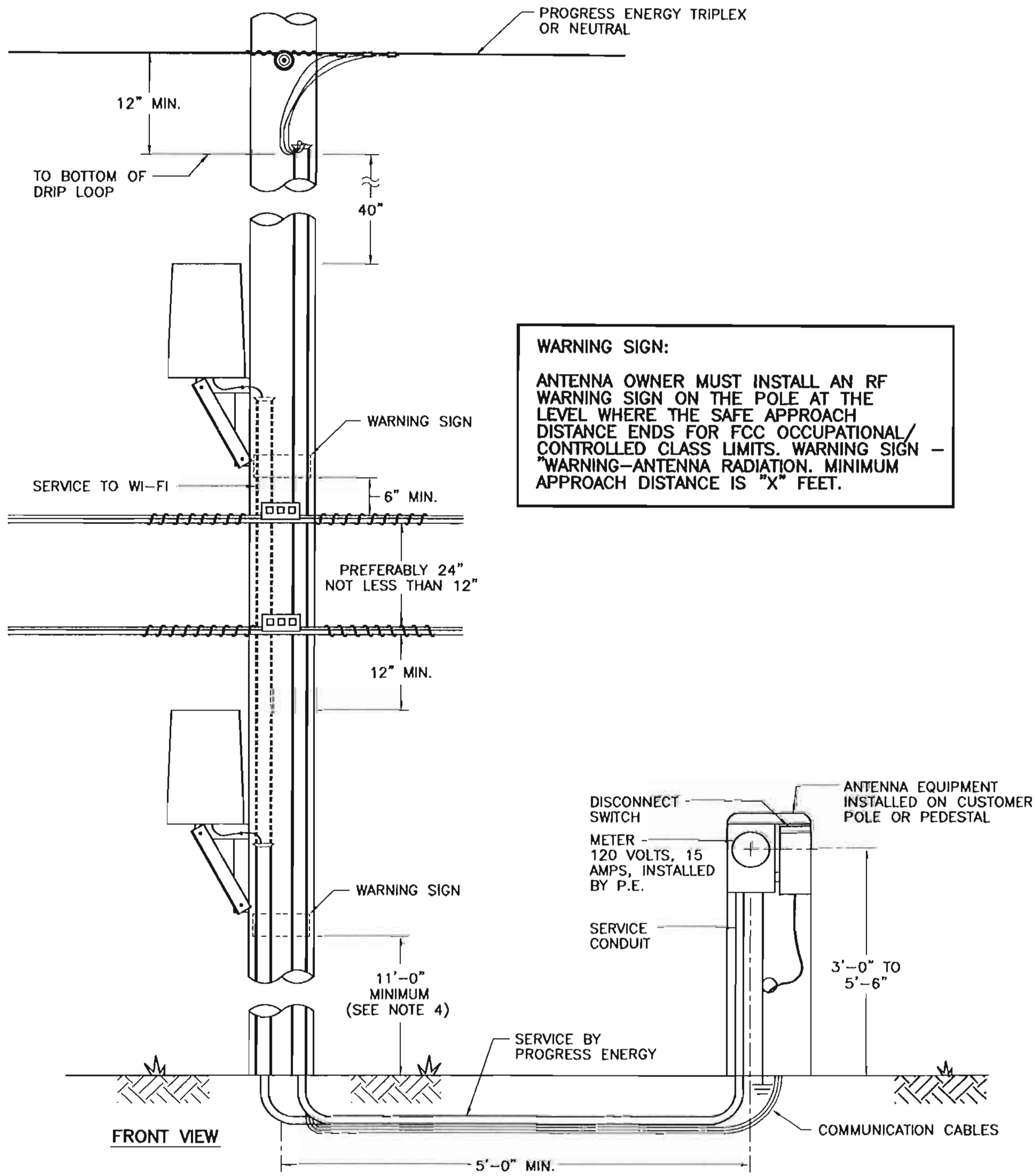
1. **DO NOT** INSTALL ANTENNAS ON EQUIPMENT POLES SUCH AS CAPACITOR BANKS, RECLOSERS, REGULATOR, SWITCHES, U.G. DIP, ETC.
2. ALL ANTENNA LOCATIONS MUST BE APPROVED BE BY A PROGRESS ENERGY DISTRIBUTION ENGINEER.
3. ONLY ONE ANTENNA PER POLE ALLOWED.
4. MINIMUM CLEARANCE IS BASED ON NESC TABLE 232-2(1)d.

3				
2				
1				
0	2/27/09	BURLISON	GUINN	HOYT
REVISED		BY	CK'D	APPR.

JOINT USE CONSTRUCTION
WI-FI ANTENNA INSTALLATION

Progress Energy

PGN DWG. 09.04-36



FRONT VIEW

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 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.

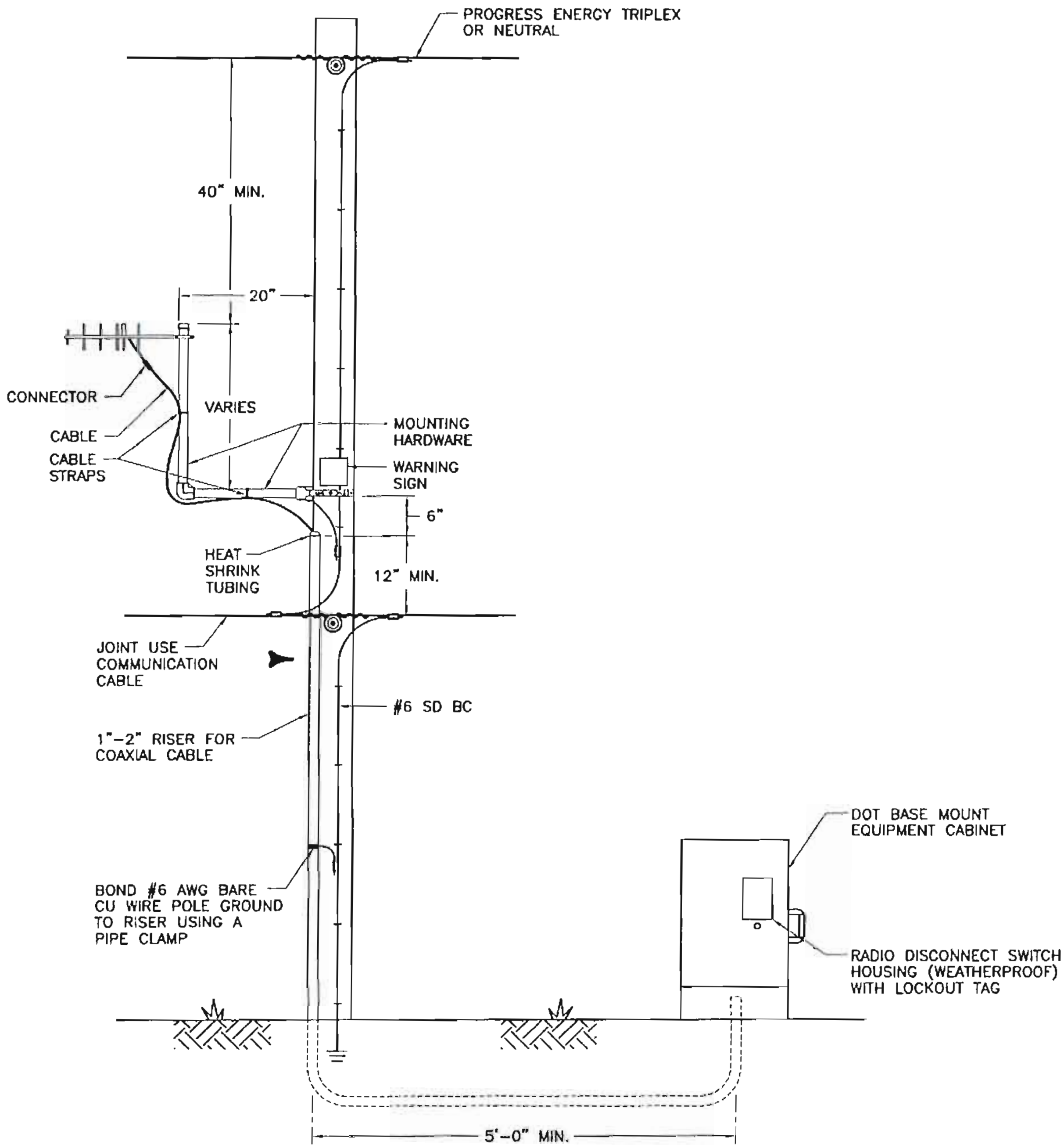
3				
2				
1				
0	3/31/10	ROBESON	[illegible]	ELKINS
REVISED		BY	CK'D	APPR.

JOINT USE CONSTRUCTION

DAS ANTENNA INSTALLATION

Progress Energy

PGN DWG. 09.04–37



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".
6. SEE SECTION 01 FOR ADDITIONAL GROUNDING DETAILS.

3				
2				
1	11/19/07	CECCONI	SIMPSON	HOYT
0	7/27/05	ROBESON	INUNNERY	HOYT
REVISED		BY	CK'D	APPR.

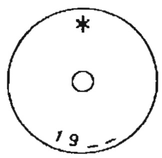
JOINT USE CONSTRUCTION

TRAFFIC SIGNAL ANTENNA

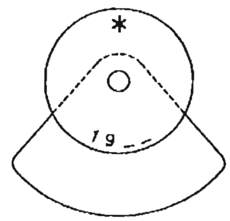
Progress Energy

PGN DWG. 09.04-40

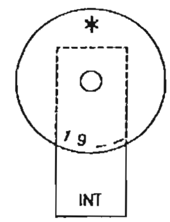
1. GROUND LINE TREATED.



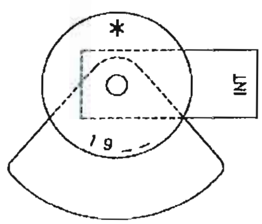
2. GROUND LINE TREATED AND FUMIGANT TREATED.



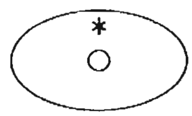
3. GROUND LINE TREATED AND INTERNAL TREATED.



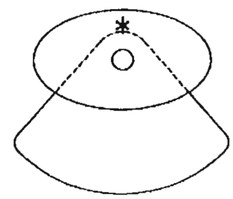
4. GROUND LINE TREATED. WOODFUMED AND INTERNAL TREATED OR WOODFUMED AND INTERNAL TREATED ONLY.



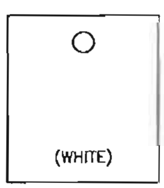
5. VISUAL BUT NOT GROUND LINE TREATED (VISUAL OR SOUND AND BORE).



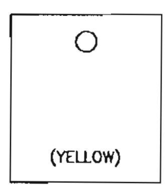
6. FUMIGANT TREATED ONLY.



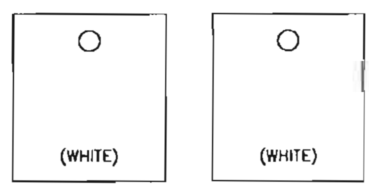
7. REJECT-POLE DOES NOT MEET STRENGTH REQUIREMENTS AND SHOULD BE REPLACED.



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:

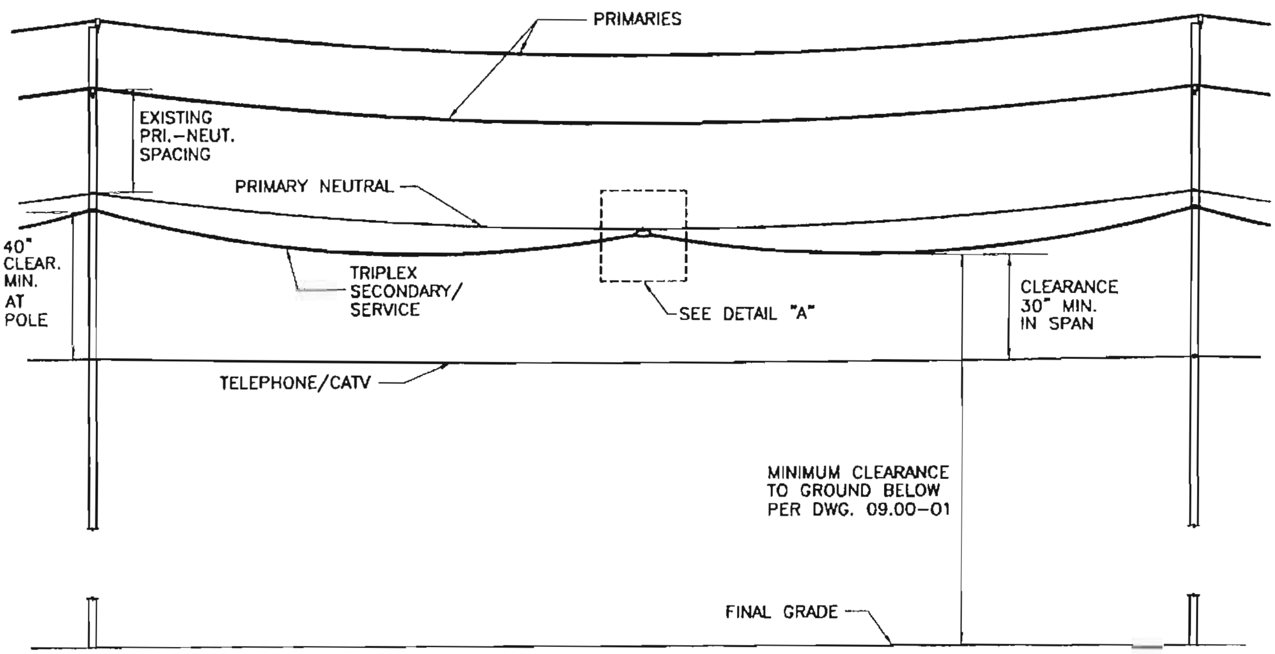
1. ALL OF THE INSPECTION TAGS SHOWN ABOVE ARE ALUMINUM.
2. INSPECTION TAGS 7, 8 AND 9 SHOWN ABOVE ARE PAINTED THE COLOR INDICATED ON THE TAG.
3. INSPECTION TAGS 7, 8 AND 9 (REJECT TAGS) ARE ATTACHED AND CENTERED ON EXISTING POLES 2" BELOW THE DIS NUMBER. IF FOUND, REPORT TO LOCAL OPERATIONS CENTER.

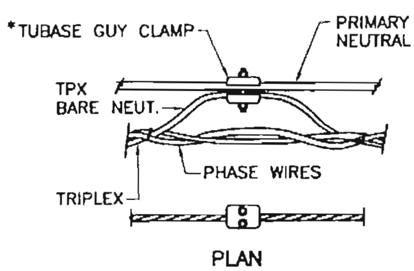
3				
2				
1				
0	3/22/02	YOUNTS	SIMPSON	CRANE
REVISED		BY	CK'D	APPR.

OSMOSE POLE INSPECTION TAGS (O&M)

Progress Energy

PGN DWG. 02.08-04





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:

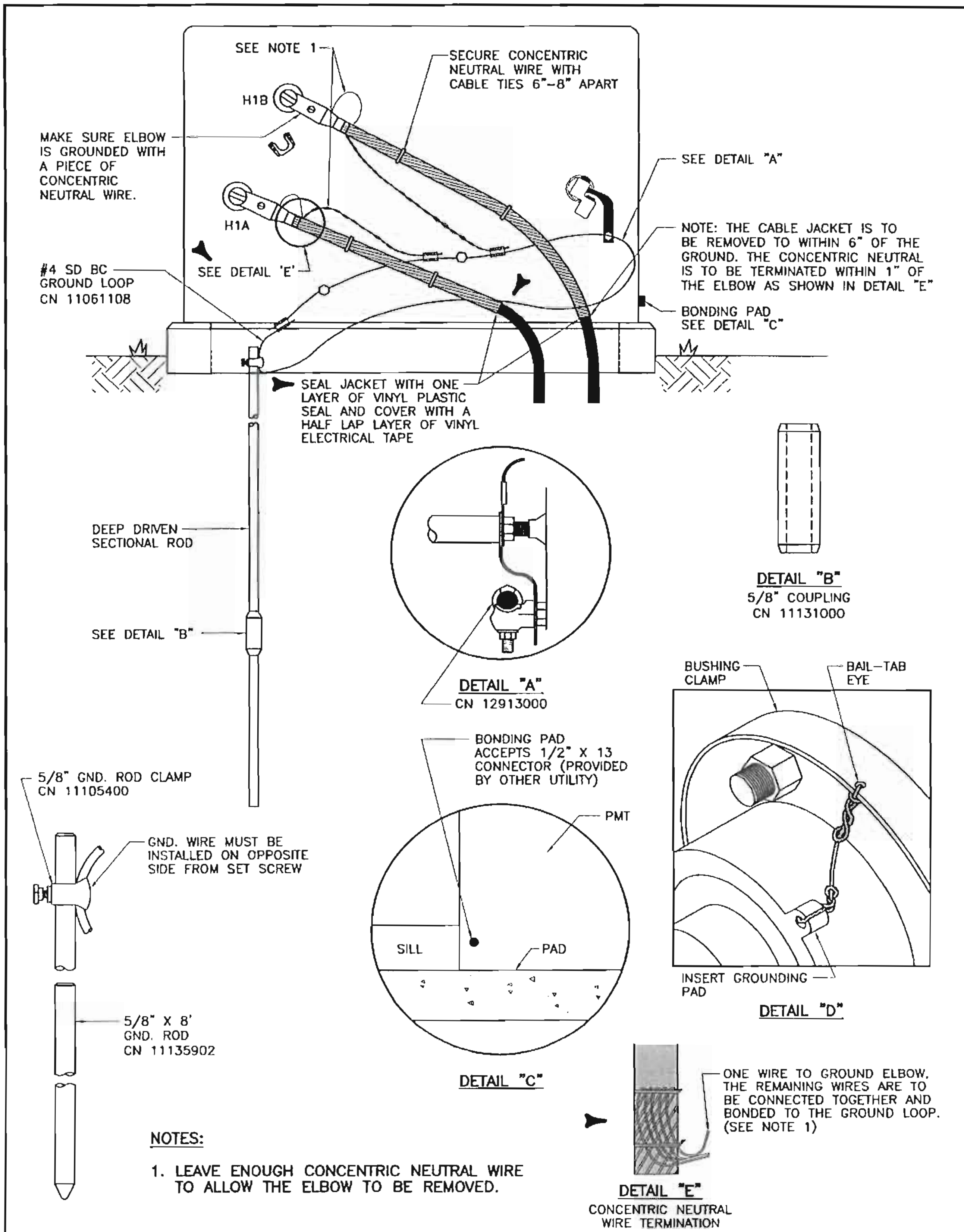
1. THE PREFERRED METHOD IS TO INSTALL THE TRIPLEX BENEATH THE PRIMARY NEUTRAL, CLEAR-SPANNING FROM POLE TO POLE.
2. THE TRIPLEX AT ITS LOWEST POINT MUST BE AT LEAST 30" ABOVE THE TELEPHONE/CATV LINES BELOW. IF THERE ARE NO TELEPHONE/CATV LINES, THE TRIPLEX AT ITS LOWEST POINT MUST HAVE THE APPROPRIATE 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	CKD	APPR.

OVERHEAD TRIPLEX SECONDARIES

Progress Energy

CAR CAROLINAS DWG. 04.04-08



NOTES:

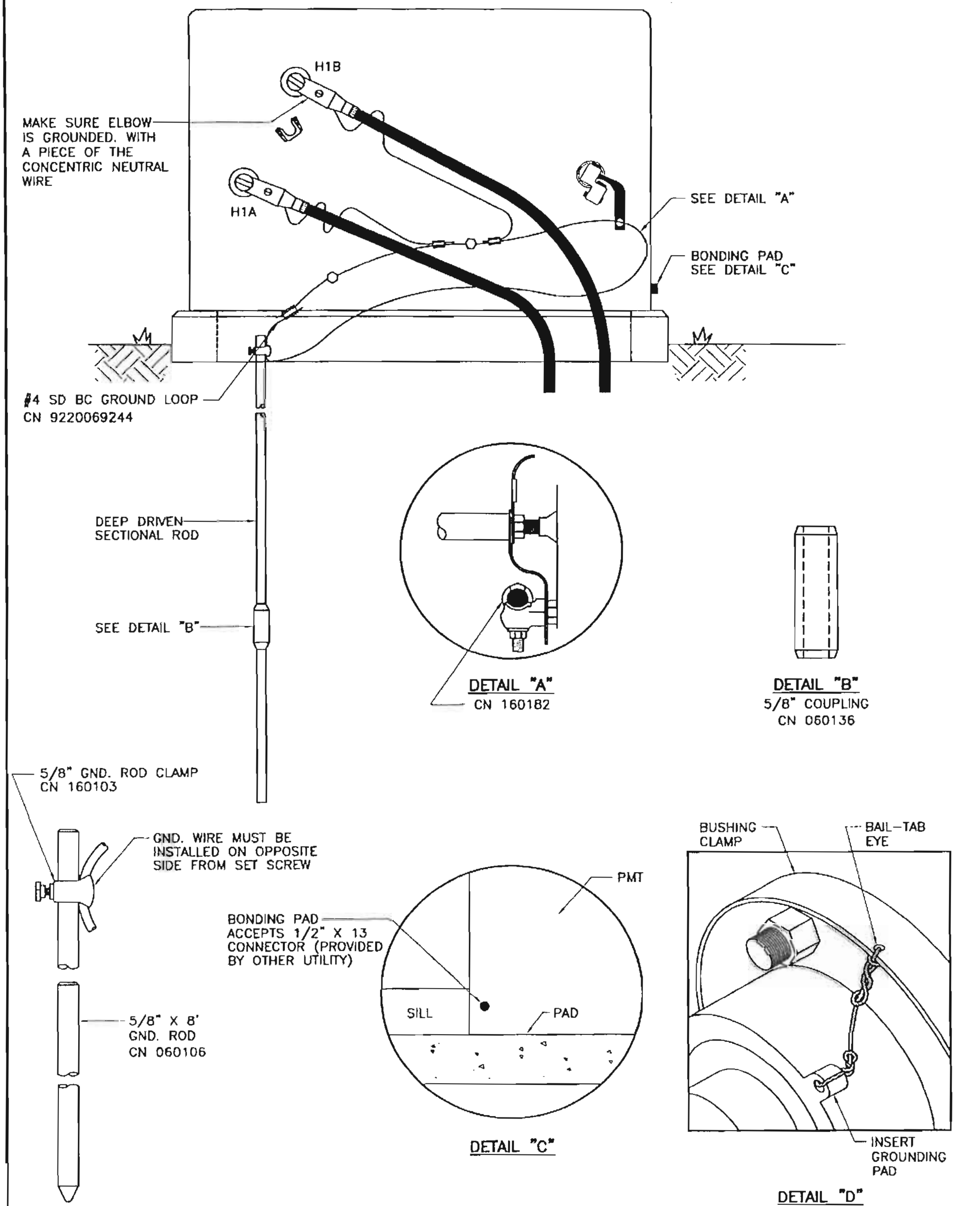
1. LEAVE ENOUGH CONCENTRIC NEUTRAL WIRE TO ALLOW THE ELBOW TO BE REMOVED.

3				
2				
1				
0	2/20/09	ROBESON	CUNN	HOYT
REVISED	BY	CK'D	APPR.	

GROUNDING DETAILS FOR SINGLE-PHASE
LOW-PROFILE PAD-MOUNTED TRANSFORMERS

Progress Energy

CAR DWG. 27.01-03

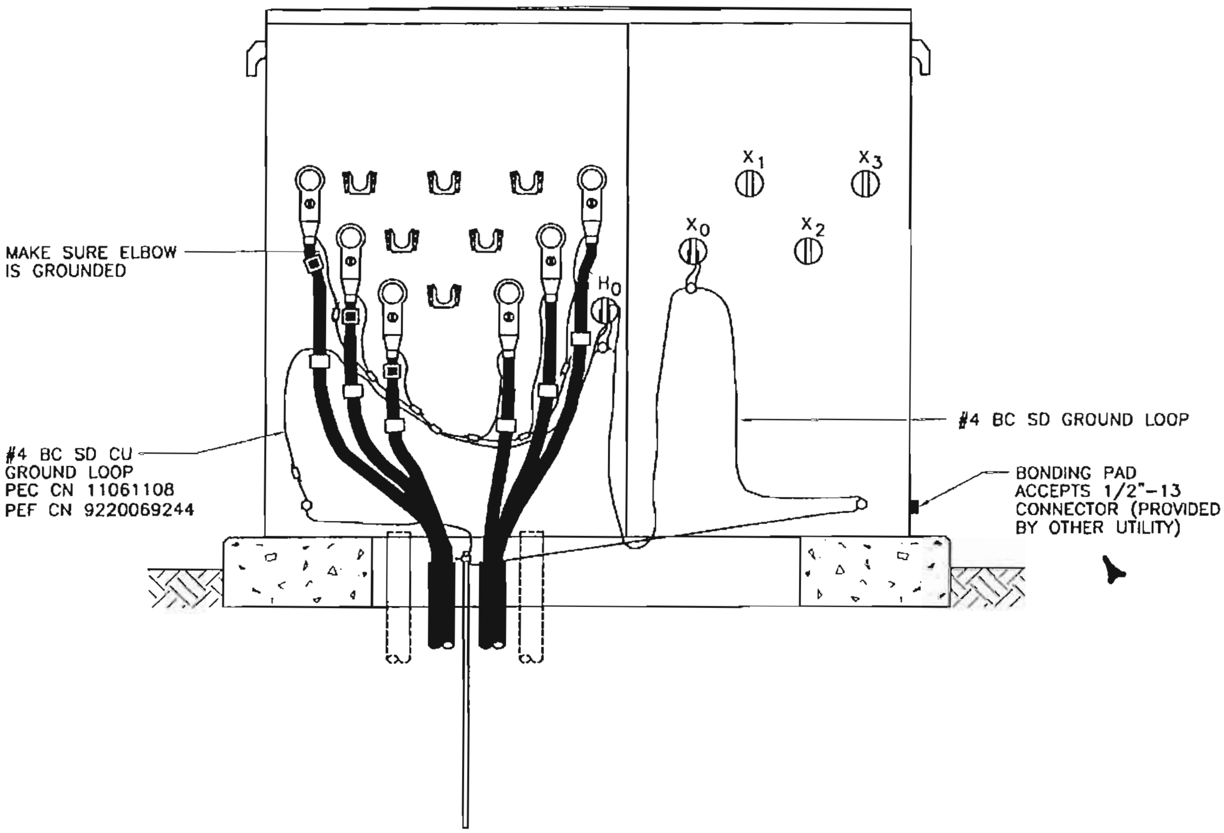


4				
3				
2				
0				HOYT
REVISED	BY	CK'D	APPR.	

GROUNDING DETAILS FOR SINGLE-PHASE LOW-PROFILE PAD-MOUNTED TRANSFORMERS

Progress Energy

FLA 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.

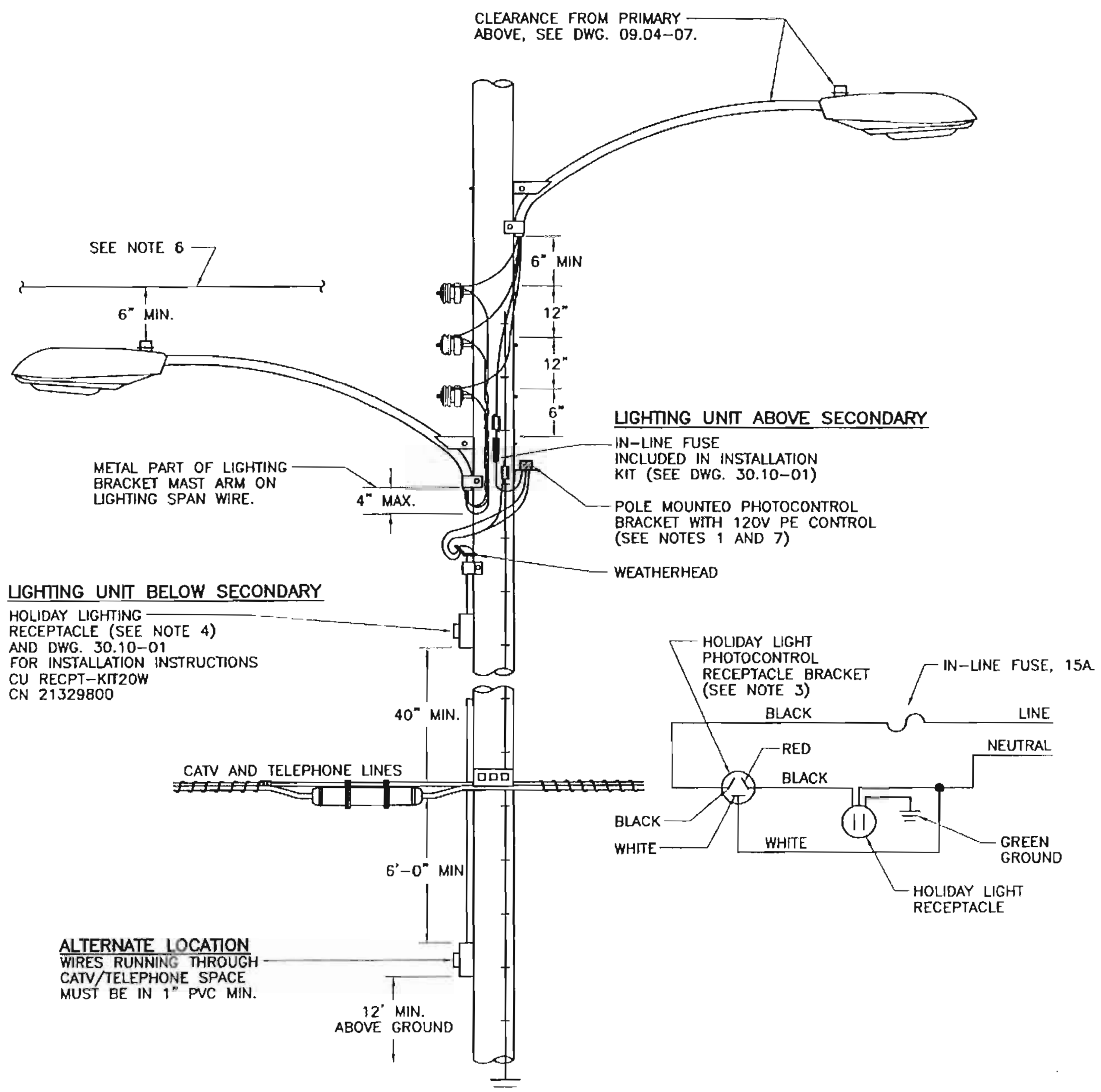
3. FOR TRANSFORMERS WITH A SEPARATE H0 AND X0 BUSHING USED TO PROVIDE 480Y 3 WIRE SERVICES, THE GROUNDING STRAP SHOULD BE REMOVED FROM THE X0 BUSHING. DO NOT REMOVE THE GROUNDING STRAP ON THE H0 BUSHING.

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



NOTES:

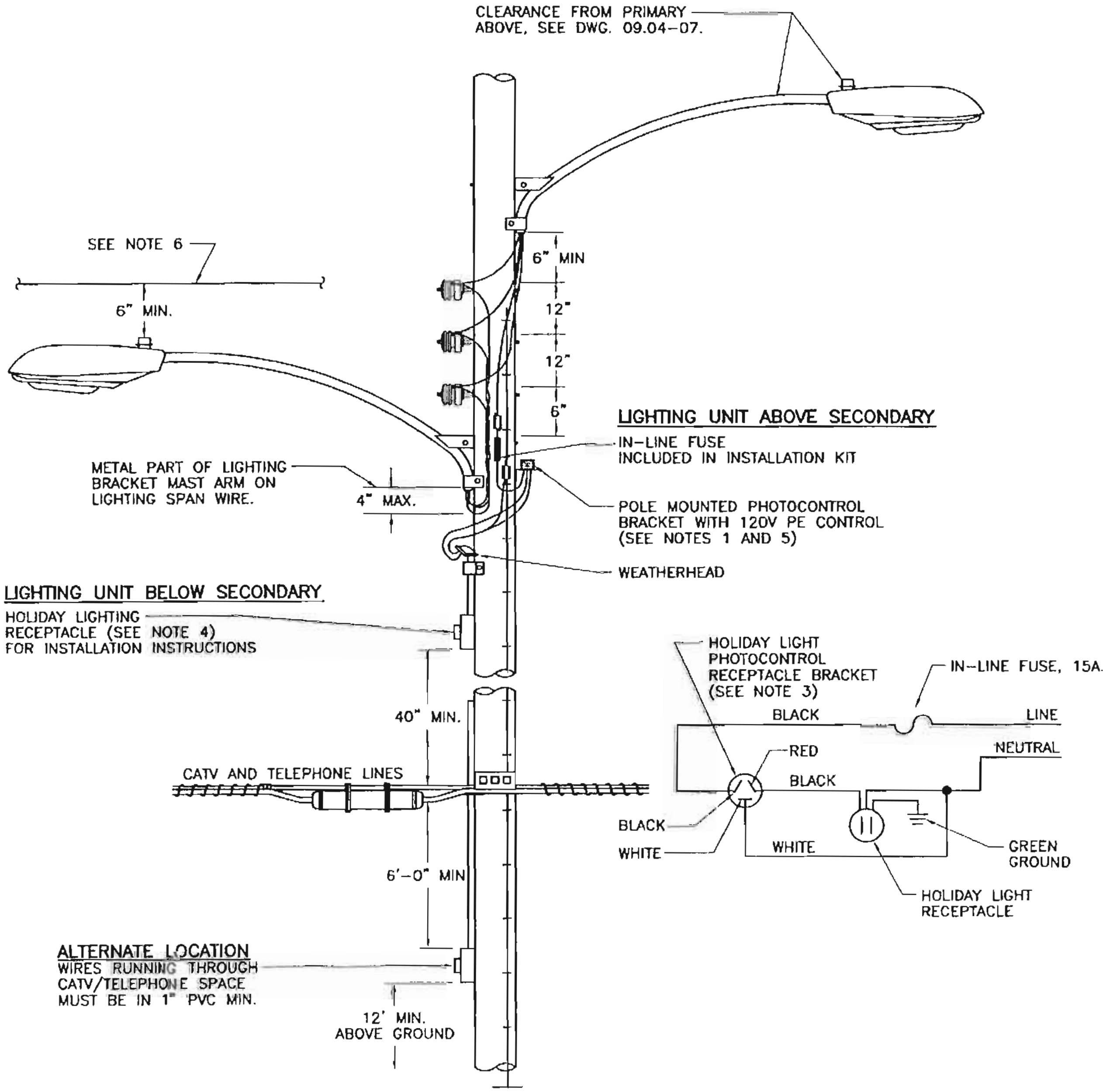
1. MOUNT THE HOLIDAY LIGHT PHOTOCONTROL RECEPTACLE BRACKET (CU PC-RECPT-BKT, CN 243304) ON THE OPPOSITE SIDE OF POLE FROM ELECTRICAL RECEPTACLE AND LIGHT.
2. PHOTOCONTROL BRACKET MUST BE WIRED IN SERIES WITH THE RECEPTACLE; SEE WIRING DIAGRAM.
3. ALL LIGHTING BRACKETS MUST BE GROUNDED.
4. RECEPTACLE FOR HOLIDAY LIGHTS: TO INSTALL RECEPTACLES ON WOOD POLES FOR HOLIDAY LIGHTS, THE FOLLOWING MATERIAL WILL BE REQUIRED: RECEPTACLE KIT (CU RECPT-KIT20W, CN 21329800), 1" PVC CONDUIT (CN 21004601), PVC CEMENT, CONDUIT STRAPS (CU STRAP1, CN 30637805). RECEPTACLE BOX MUST BE A MINIMUM OF 40" CLEARANCE FROM ANY TELEPHONE OR CATV ATTACHMENTS.
5. WHEN HOLIDAY LIGHTS ARE TO BE KEPT ON CONTINUOUSLY, PLACE A SHORTING CAP IN THE HOLIDAY LIGHT PE RECEPTACLE (CN 13431002).
6. ANY NEUTRAL, SECONDARY, SERVICE OR STREET LIGHT CONDUCTOR RUNNING ABOVE THE LUMINAIRE SHALL MAINTAIN A 6" MIN. CLEARANCE FROM THE TOP OF PHOTOCELL OR ANY PART OF THE FIXTURE.
7. PHOTOCONTROL BRACKET IS NOT INCLUDED OR REQUIRED. THIS BRACKET IS USED TO CONTROL HOLIDAY LIGHTING. A 2% MFC CUSTOMER CHARGE IS APPLICABLE.

3				
2				
1				
0	1/14/09	HENDERSON	GUY	LARSEN
REVISED	BY	CK'D	APPR.	

HOLIDAY DECORATIONS RECEPTACLE INSTALLATION

Progress Energy

CAR DWG. 30.10-20



NOTES:

1. MOUNT THE HOLIDAY LIGHT PHOTOCONTROL RECEPTACLE BRACKET (CN 243304) ON THE OPPOSITE SIDE OF POLE FROM ELECTRICAL RECEPTACLE AND LIGHT.

2. PHOTOCONTROL BRACKET MUST BE WIRED IN SERIES WITH THE RECEPTACLE; SEE WIRING DIAGRAM.

3. ALL LIGHTING BRACKETS MUST BE GROUNDED.

4. RECEPTACLE FOR HOLIDAY LIGHTS: TO INSTALL RECEPTACLES ON WOOD POLES FOR HOLIDAY LIGHTS, THE FOLLOWING MATERIAL WILL BE REQUIRED: RECEPTACLE KIT (CU RECP, CN 21329800), 1" PVC CONDUIT (CN 21004601), PVC CEMENT, CONDUIT STRAPS (CN 30637805). RECEPTACLE BOX MUST BE A MINIMUM OF 40" CLEARANCE FROM ANY TELEPHONE OR CATV ATTACHMENTS.

5. WHEN HOLIDAY LIGHTS ARE TO BE KEPT ON CONTINUOUSLY, PLACE A SHORTING CAP IN THE HOLIDAY LIGHT PE RECEPTACLE (CN 242803).

6. ANY NEUTRAL, SECONDARY, SERVICE OR STREET LIGHT CONDUCTOR RUNNING ABOVE THE LUMINAIRE SHALL MAINTAIN A 6" MIN. CLEARANCE FROM THE TOP OF PHOTOCELL OR ANY PART OF THE FIXTURE.

3				
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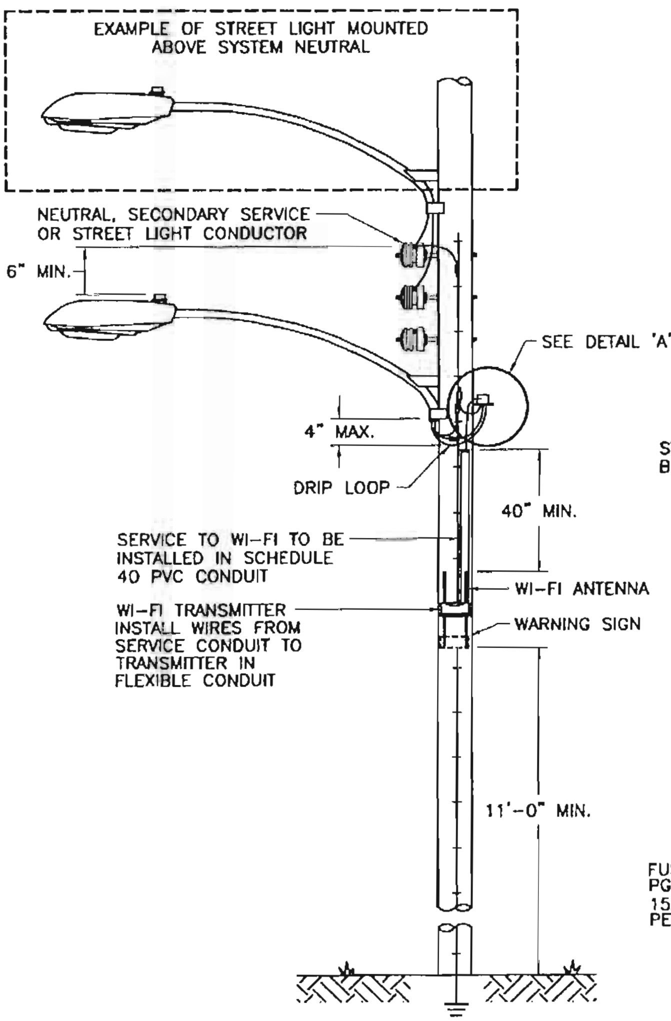
1				
0	1/27/[illegible]	[illegible]	[illegible]	LARSEN
REVISED		BY	CK'D	APPR.

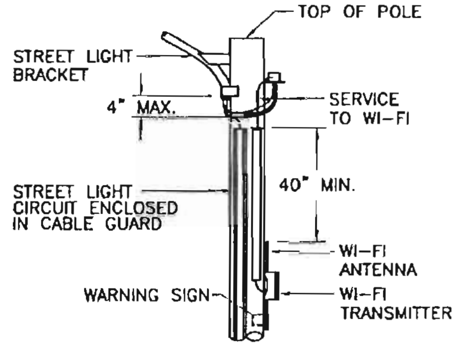
HOLIDAY DECORATIONS RECEPTACLE INSTALLATION

Progress Energy

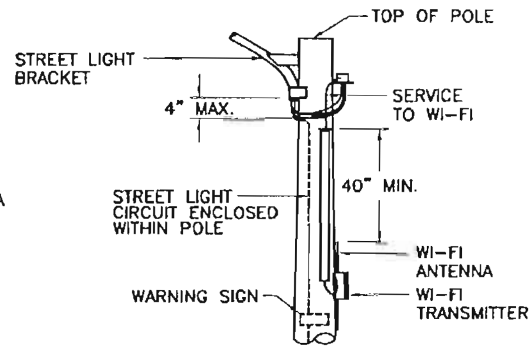
FLA

DWG. 30.10-20

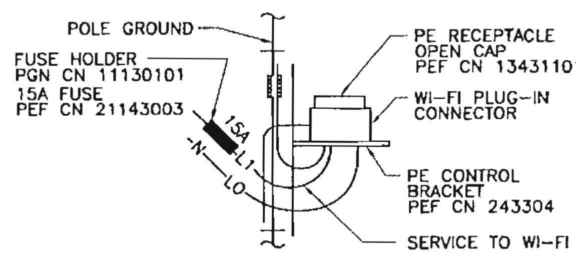




WOOD POLE INSTALLATION
UNDERGROUND FEED



CONCRETE POLE INSTALLATION
UNDERGROUND FEED



DETAIL 'A'

NOTES:

1. WHEN UTILIZING LIGHTING ONLY RENTAL POLES (STATIC CAST OR WOOD) CONTRACT MUST BE EXECUTED BY CUSTOMER OF RECORD FOR LIGHTING FACILITIES.
2. NO WI-FI EQUIPMENT SHALL BE INSTALLED ON DECORATIVE STREET LIGHT POLES.
3. ONLY ONE WI-FI UNIT IS ALLOWED PER POLE.
4. MOUNT PE RECEPTACLE BRACKET ON OPPOSITE SIDE OF POLE FROM LIGHT FIXTURE.
5. PROGRESS ENERGY TO INSTALL PE RECEPTACLE BRACKET AND MAKE CONNECTIONS TO L1 (LINE VOLTAGE), L0 (GROUND) & N (NEUTRAL).
6. PROGRESS ENERGY TO PLUG WI-FI SERVICE CORD TO PE RECEPTACLE & INSTALL OPEN CAP.
7. ALL POTENTIAL WI-FI LOCATIONS MUST BE INSPECTED FOR ELECTRICAL AND MECHANICAL SUITABILITY FOR THE SPECIFIC WI-FI EQUIPMENT THAT WILL BE INSTALLED AT THE SITE.
8. WI-FI EQUIPMENT VOLTAGE MUST MATCH THE LOCATIONS SOURCE VOLTAGE.
9. ALL WI-FI EQUIPMENT INSTALLED ON STREET LIGHT POLES MUST BE APPROVED BY PROGRESS ENERGY LIGHTING SOLUTIONS.
10. MANUFACTURER MUST SUPPLY THE WEIGHT OF THE EQUIPMENT AND THE EFFECTIVE PROJECTED AREA(S).
11. ALL WI-FI EQUIPMENT (INCLUDING ANTENNA) TO MAINTAIN A MINIMUM OF 40" BELOW ALL ENERGIZED CONDUCTORS INCLUDING DRIP LOOPS.
12. WHERE INSUFFICIENT SPACE RESULTS IN THE WI-FI UNIT BEING INSTALLED BELOW COMMUNICATIONS, WI-FI SERVICE WIRE TO BE INSTALLED IN 1 INCH, SCHEDULE 40 PVC CONDUIT NO CLOSER THAN 12 INCHES BELOW COMMUNICATION/CATV CABLE.
13. SEE DWG. 09.04-35 FOR JOINT USE ON DISTRIBUTION FACILITIES.

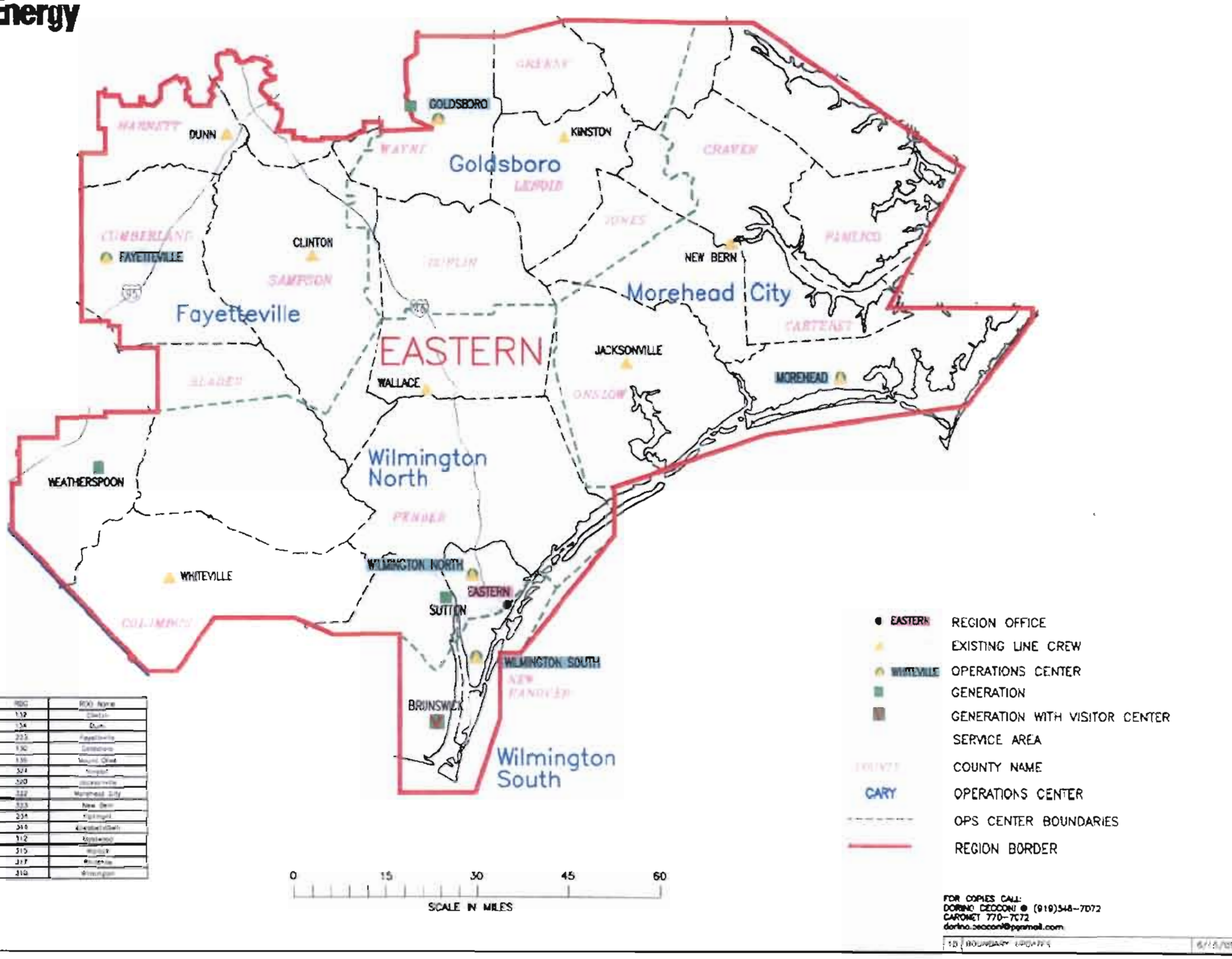
3				
2				
1				
0	[illegible]	DEFREITAS	JUDAH	LARSEN
REVISED		BY	CK'D	APPR.

INSTALLATION OF WI-FI EQUIPMENT
FOR WOOD AND STATIC CAST CONCRETE
STREET LIGHT POLES

Progress Energy

FLA | DWG. 30.10-22

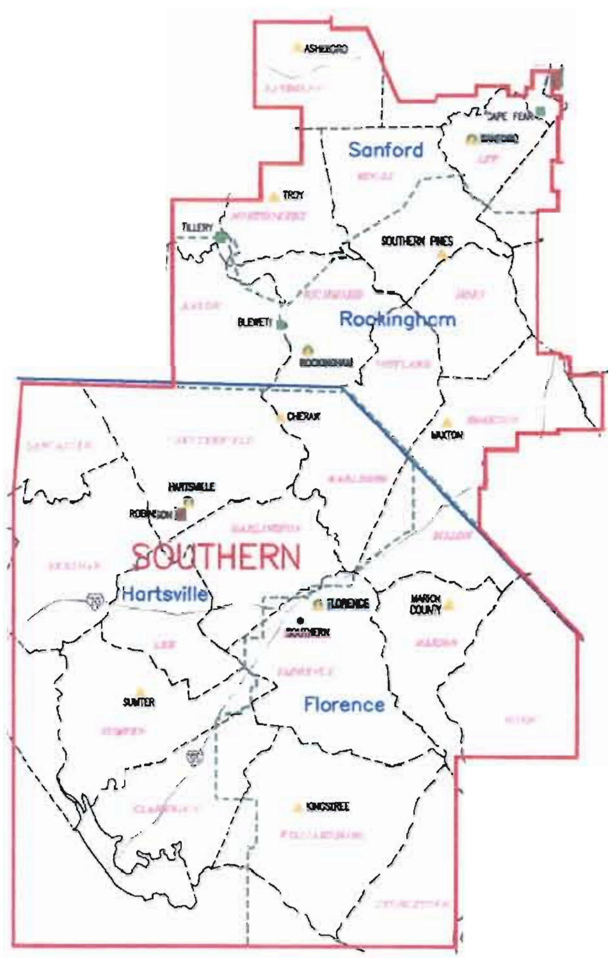
Progress Energy
Eastern Region



Region	OP Center	ROC	ROC Name
Eastern	Fayetteville	132	Clinton
		134	Dunn
		223	Fayetteville
	Goldsboro	130	Goldsboro
		135	Mount Olive
		324	Kinston
	Morehead City	320	Jacksonville
		322	Morehead City
		323	New Bern
	Wilmington North	234	[illegible]
		310	[illegible]
		312	[illegible]
		315	[illegible]
		317	[illegible]
	Wilmington South	310	Wilmington

Progress Energy
Southern Region

Region	OP Center	HOD	HOD Name
Southern	Florence	[illegible]	Florence
		[illegible]	[illegible]
		[illegible]	Kingstree
		524	Lake City
		525	Marion
	Hartsville	[illegible]	Darlington
		535	Sumter / Manning
		[illegible]	Bishopville
		534	Cheraw
		[illegible]	Hartsville
		[illegible]	Southern Pines
	Rockingham	333	Maxton
		234	Rockingham
		238	Wadesboro
	Sanford	[illegible]	Sanford
		221	Asheboro
		555	Troy



● SOUTHERN REGION OFFICE
EXISTING LINE CREW
SUMTER OPERATIONS CENTER
GENERATION
GENERATION WITH VISITOR CENTER
SERVICE AREA
COUNTY NAME
CARY OPERATIONS CENTER
OPS CENTER BOUNDARIES
REGION BORDER

0 20 40 60 80
SCALE IN MILES

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10	BOUNDARY UPDATES	6/13/05

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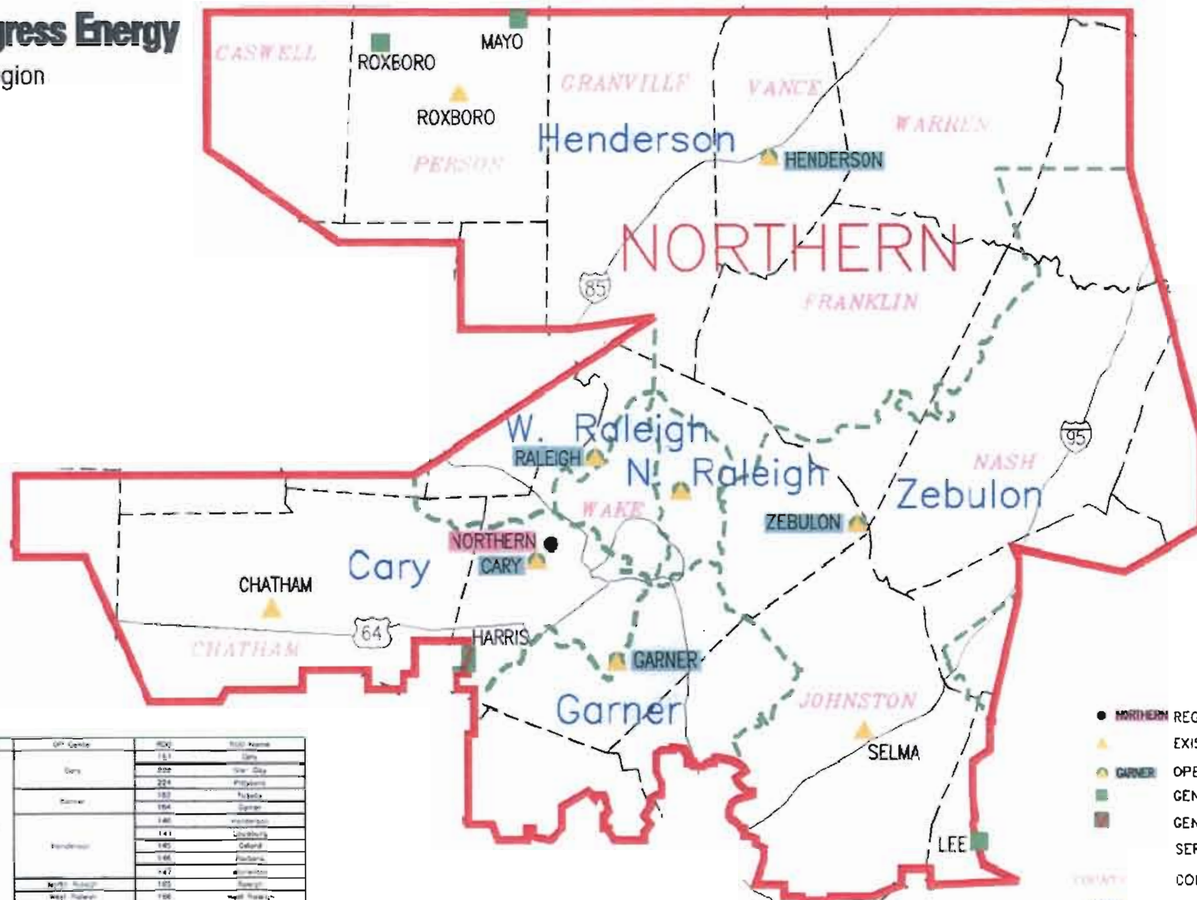
Northern Region



Region	OP Center	ROC	ROC Name
Northern	Cary	151	Cary
		[illegible]	Siler City
		224	Pittsboro
	Garner	182	[illegible]
		184	Garner
	Henderson	140	Henderson
		141	Louisburg
		145	Oxford
		146	Roxboro
		147	Warrenton
	North Raleigh	185	Raleigh
	West Raleigh	186	West Raleigh
	Zebulon	137	Selma
		184	Smithfield
		183	Zebulon

0 10 20 30 40

SCALE IN MILES

● NORTHERN REGION OFFICE

EXISTING LINE CREW

GARNER OPERATIONS CENTER

GENERATION

GENERATION WITH VISITOR CENTER

SERVICE AREA

COUNTY COUNTY NAME

CARY OPERATIONS CENTER

OPS CENTER BOUNDARIES

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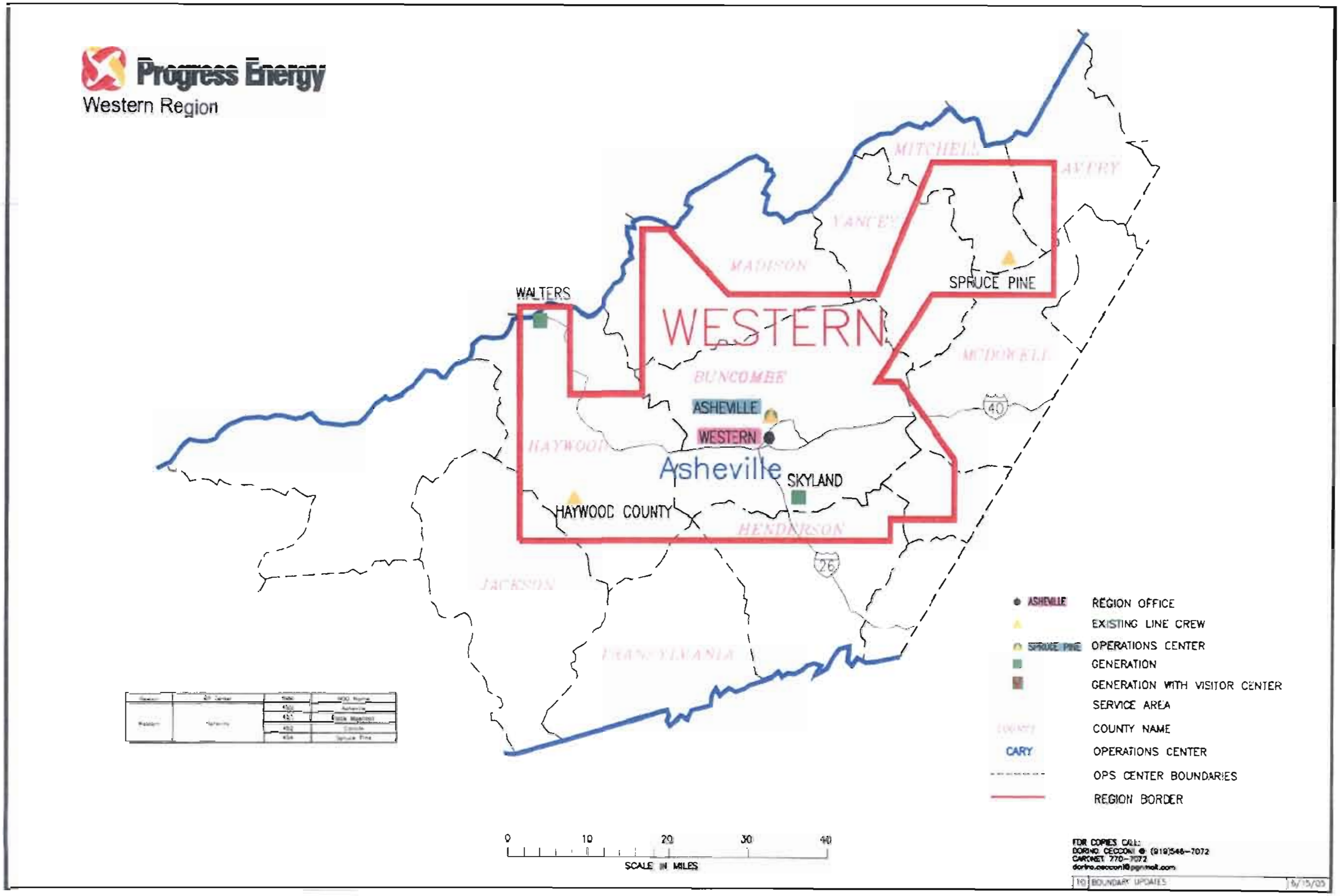
10	BOUNDARY UPDATES	6/15/05



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MITCHELL
AVERY
YANCEY
MADISON
SPRUCE PINE
WALTERS
WESTERN
BUNCOMBE
MCDOWELL
ASHEVILLE
WESTERN
HAYWOOD
Asheville
SKYLAND
HAYWOOD COUNTY
HENDERSON
JACKSON
TRANSYLVANIA
40
26
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OPERATIONS CENTER
GENERATION
GENERATION WITH VISITOR CENTER
SERVICE AREA
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