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April 29, 2016

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

Dear Ms. Stauffer:

In accordance with Rule 25-6.0342 and Order No. PSC-07-1022-FOF-EI, attached are the original and fifteen copies of Gulf Power Company's 2016-2018 Storm Hardening Plan.

Please call me if you have any questions.

Sincerely,

Robert L. McGee, Jr.  
Regulatory and Pricing Manager

md

enclosures

cc w/encl: Beggs & Lane  
Jeffrey A. Stone, Esq

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**BEFORE THE  
FLORIDA PUBLIC SERVICE COMMISSION**

**GULF POWER COMPANY**

**STORM HARDENING PLAN**  
**2016-2018**

**May 2, 2016**

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## **APPENDICES**

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## 1.0 Overview

Pursuant to Florida Public Service Commission (FPSC) Order No. PSC 07-1022-FOF-EI, Gulf Power Company (Gulf) submits the following Storm Hardening Plan (Plan) for calendar years 2016-2018. This proposed Storm Hardening Plan is intended to address the requirements set forth in Rule 25-6.0342, F.A.C.

Gulf Power continues to view this plan filing as an ongoing process to identify ways to minimize future storm damages and customer outages. As in the past, Gulf's objective is to build on what works well and to improve in areas that do not work as well as intended based on daily system operations and analysis of storm related damage data. Gulf is committed to the improvement of its electrical system by building upon its experience and supporting research to address the potential benefits of initiatives that will harden transmission and distribution facilities, which could lead to less-frequent outages, improved continuity of service, and reduced restoration times during both major storm-related events and typical seasonal weather.

As in Gulf's 2013-2015 Storm Hardening Plan, the proposed 2016-2018 Storm Hardening Plan incorporates the 10-Part Storm Preparedness Plan initiatives in Section 2.0 that were originally approved in Order Nos. PSC-06-0781-PAA-EI and PSC-06-0947-PAA-EI. These initiatives have been updated to reflect approved FPSC changes and the latest company information.

Section 3.0, Wood Pole Inspection Plan, will continue to incorporate Gulf's 8-year cycle of wood pole inspection approved by the FPSC in Order No. PSC-07-0078-PAA-EU to meet storm hardening requirements.

Performance data for Sections 2.0 and 3.0 initiatives are currently filed as part of the annual March 1<sup>st</sup> Distribution Reliability Report. These initiatives comprise the foundation of Gulf's Storm Hardening Plan.

Sections 4.0 through 9.0 will address each of the requirements contained in the FPSC Storm Hardening Rules 25-6.0341 and 25-06.0342. Specifically, Section 5.0 addresses extreme wind loading for distribution facilities, and Gulf will continue to focus its 2016 - 2018 extreme wind loading efforts on the continued conversion of critical infrastructure from Grade C construction standards to the stronger Grade B construction standards as approved in the previous Storm Hardening Plans. Gulf is proposing additional storm hardening initiatives in its 2016-2018 Plan that have the potential to mitigate future storm damages and reduce storm restoration times to both underground and overhead distribution facilities.

Section 10.0 summarizes Gulf's incremental cost estimates and benefits contained in the Plan. The details are provided in Appendix 4.

Sections 11.0 and 12.0 address storm hardening cost and impact to Third-Party Attachments.

In respect to overhead versus underground construction, Gulf Power Company's position does not favor one over the other as long as Gulf is able to recover associated costs. As data continues to be gathered and research progresses, Gulf will be better able to determine the best approach to storm hardening. Gulf recognizes the need to address the concerns expressed by both its customers and the FPSC to find ways to storm harden its system. At the same time, Gulf is obligated to balance storm hardening with the need to maintain reasonable costs and still achieve the expected results.

In summary, although Gulf Power Company continues to believe that the items contained in past Plans and this Plan may result in some mitigation of major storm damage, analysis of actual storm data collected over time is needed to determine their true effect and resulting benefits. Since the 2007 – 2009 Storm Hardening Plan filing there have been no major storms impacting Gulf to test the effectiveness of the extreme winding loading storm hardening efforts to date. Gulf will continue to focus on initiatives based on experience that have the greatest potential to reduce outages and restoration times during both major storm-related events and seasonal weather events.

## **2.0 Ten-Part Storm Preparedness Plan Initiatives**

### **2.1 Vegetation Management**

Gulf Power has assessed the performance of its vegetation management (VM) plan which was approved in FPSC Order No. PSC-10-0688-PAA-EI in 2010. This plan included:

- Three-year trim cycle on all main line feeders.
- Annual inspection and corrective action plan on the remaining two-thirds of main line feeders.
- Lateral distribution lines managed on a reliability-based program to achieve a four-year average cycle.

When evaluated on an annual basis, it can be difficult to determine trends in tree related reliability, since annual fluctuations in weather can greatly influence tree related reliability from year to year. Therefore, Gulf has analyzed its distribution VM program's effectiveness by analyzing total tree related reliability for each three-year storm hardening plan, using Gulf's initial 2007-2009 storm hardening plan as the baseline.

This program has been successful in improving overall vegetation-related reliability of Gulf's distribution system when evaluated on the basis of vegetation-caused Customer Interruptions (CI) and Customer Minutes of Interruption (CMI). Since the time period of the 2007 – 2009 Storm Hardening Plan, system-wide adjusted tree-caused CI has decreased 17.37% and unadjusted CI decreased 10.38%. Adjusted tree-caused CMI for the same time period decreased 18.42% while unadjusted CMI increased 13.1%. The tree-related performance of Gulf's system for this time period is summarized in Tables 1 – 4.

| <b>Table 1. Adjusted Distribution Vegetation Caused Customer Interruptions<br/>(Does not include storm outages)</b> |                  |                      |                   |                      |                 |                      |
|---|------------------|----------------------|-------------------|----------------------|-----------------|----------------------|
| <b>Plan Years</b>   | <b>Feeder CI</b> | <b>Inc /<br/>Dec</b> | <b>Lateral CI</b> | <b>Inc /<br/>Dec</b> | <b>Total CI</b> | <b>Inc /<br/>Dec</b> |
| 2007-2009   | 100,940          | -                    | 133,829           | -                    | 234,769         | -                    |
| 2010-2012   | 53,103           | -47.39%              | 139,130           | 3.96%                | 192,233         | -18.12%              |
| 2013-2015   | 53,432           | 0.62%                | 140,546           | 1.02%                | 193,978         | 0.91%                |
| <b>Total</b>  |                  | <b>-47.07%</b>       |                   | <b>5.02%</b>         |                 | <b>-17.37%</b>       |

| <b>Table 2. Unadjusted Distribution Vegetation Caused Customer Interruptions<br/>(Includes storm outages)</b> |                  |                      |                   |                      |                 |                      |
|---|------------------|----------------------|-------------------|----------------------|-----------------|----------------------|
| <b>Plan Years</b>   | <b>Feeder CI</b> | <b>Inc /<br/>Dec</b> | <b>Lateral CI</b> | <b>Inc /<br/>Dec</b> | <b>Total CI</b> | <b>Inc /<br/>Dec</b> |
| 2007-2009   | 114,605          | -                    | 153,764           | -                    | 268,369         | -                    |
| 2010-2012   | 63,726           | -44.40%              | 177,100           | 15.18%               | 240,826         | -10.26%              |
| 2013-2015   | 60,581           | -4.94%               | 179,929           | 1.60%                | 240,510         | -0.13%               |
| <b>Total</b>  |                  | <b>-47.14%</b>       |                   | <b>17.02%</b>        |                 | <b>-10.38%</b>       |

| <b>Table 3. Adjusted Distribution Vegetation Caused Customer Minutes of Interruption<br/>(Does not include storm outages)</b> |                  |                      |                   |                      |                 |                      |
|---|------------------|----------------------|-------------------|----------------------|-----------------|----------------------|
| <b>Plan Years</b>   | <b>Feeder CI</b> | <b>Inc /<br/>Dec</b> | <b>Lateral CI</b> | <b>Inc /<br/>Dec</b> | <b>Total CI</b> | <b>Inc /<br/>Dec</b> |
| 2007-2009   | 6,473,809        | -                    | 19,876,303        | -                    | 26,350,112      | -                    |
| 2010-2012   | 4,274,516        | -33.97%              | 19,092,585        | -3.94%               | 23,367,101      | -11.32%              |
| 2013-2015   | 4,398,808        | 2.91%                | 17,096,408        | -10.46%              | 21,495,216      | -8.01%               |
| <b>Total</b>  |                  | <b>-32.05%</b>       |                   | <b>-13.99%</b>       |                 | <b>-18.42%</b>       |



| <b>Table 4. Unadjusted Distribution Vegetation Caused Customer Minutes of Interruption<br/>(Includes storm outages)</b> |                  |                  |                   |                  |                 |                  |
|---|------------------|------------------|-------------------|------------------|-----------------|------------------|
| <b>Plan Years</b>   | <b>Feeder CI</b> | <b>Inc / Dec</b> | <b>Lateral CI</b> | <b>Inc / Dec</b> | <b>Total CI</b> | <b>Inc / Dec</b> |
| 2007-2009   | 8,065,242        | -                | 23,195,274        | -                | 31,260,516      | -                |
| 2010-2012   | 5,754,781        | -28.65%          | 28,375,018        | 22.33%           | 34,129,799      | 9.18%            |
| 2013-2015   | 5,194,068        | -9.74%           | 30,129,920        | 6.18%            | 35,323,988      | 3.50%            |
| <b>Total</b>  |                  | <b>-35.60%</b>   |                   | <b>29.90%</b>    |                 | <b>13.00%</b>    |

Gulf's distribution VM program recognizes the importance of placing emphasis on the mainline feeders in order to improve overall system reliability, since mainline outages have a major impact on system reliability. Gulf's mainline program of pruning 1/3 of its mainline feeders each year and performing an annual inspection and taking corrective action on the remaining 2/3 of its mainline feeders has been beneficial to Gulf's customers in terms of overall system reliability. As can be seen in the above data tables, Gulf's mainline feeder reliability has improved dramatically since Gulf adopted this philosophy in 2007.

Gulf has continued to utilize the Distribution Lock-Out Reporting process (DLOR) to evaluate all tree-caused outages on main line feeders. DLOR was created to track distribution feeder lock-outs, identify root causes of lock-outs, and identify systems and operational modifications that could be implemented to prevent future feeder lock-outs.

Tree-caused outages on mainline feeders are now predominately resulting from the structural failure of green trees located off the right of way. In recognition of this, Gulf's VM program has continued to target large overhanging limbs and structurally defective off right-of-way trees in its mainline feeder VM activities.

Gulf has maintained its lateral lines using a reliability based methodology to determine which areas require VM work while achieving an average four-year cycle. Gulf's initial storm hardening plan was approved for a six-year cycle on laterals. Beginning in 2010, Gulf began transitioning to a four-year cycle on laterals in response to a rapid rise of trouble tickets under the six-year cycle.

Using this management approach, tree related reliability on lateral lines has improved by 13.99% in terms of adjusted CMI, even though adjusted CI has increased slightly by 5.02%. Gulf's present distribution VM program has maintained a relatively stable level of tree related reliability on its lateral lines, while improving overall customer reliability.

Given the positive results of Gulf's present distribution vegetation program, as measured by the reduction in CI and CMI associated with vegetation, Gulf does not propose any modification of its trim cycles on its main line feeders or laterals for the next three years. Gulf will continue to monitor performance metrics to evaluate the effectiveness of the program on an annual basis. Gulf will also continue coordination with local officials on vegetation management activities, emphasize tree removals during new line construction, and continue public education efforts to encourage the planting of compatible tree species near power lines.

Gulf will also continue to provide "TreeGulf" as a proactive way for any employee to efficiently notify Gulf's Forestry Services Department of a potential vegetation problem.

## **2.2 Joint-Use Pole Attachment Audits**

Field audits of joint-use poles are conducted every five years as outlined in contractual agreements with third party attachers. The audit includes poles owned by the electric utility to which other utility attachments are made (i.e., telecommunication and cable) and poles not owned by the electric utility to which the electric utility has attached its equipment. Items collected and/or verified in the 2011 joint-use field audit included the GPS pole location, pole owner, pole type, pole treatment, pole height and class, manufacture date, attachment information, and pole identification numbers. It is anticipated that similar data will be collected and/or verified in the next field audit scheduled for 2016.

Any dangerous situations identified during the joint-use field audit are immediately reported to the pole owner. Dangerous conditions may include buckling, splitting or broken poles, or low hanging conductors or cables.

## **2.3 Inspection Cycle of Transmission Structures**

Gulf Power's current transmission inspection plans meet or exceed the approved 6-year inspection cycle of the FPSC. In 2004, Gulf adopted the Southern Company Transmission Line Inspection Standards as its program. The details of the program have been filed with the Commission as outlined in FPSC Order No. PSC-06-0144-PAA-EI. In general, Gulf contracts ground line inspections and uses a combination of company employees and contractors to perform comprehensive walking and aerial inspections. Gulf's transmission structure inspection program is based on two alternating twelve-year cycles, which results in a structure being inspected at least every six years. Gulf will continue the use of the same transmission inspection program in the 2016-2018 Storm Hardening Plan that was approved in the 2010-2012 Plan.

Historically, Gulf has not inspected a set number of poles each year. Gulf plans to utilize the same flexible approach in its proposed 2016-2018 Storm Hardening Plan to ensure the completion of its inspection cycle as required.

Gulf Power currently inspects all of its substations at least once annually. These inspections include visual inspection of all structures, buss work, switches and capacitor banks for defects. Gulf proposes to continue the same inspection process for the 2016-2018 Storm Hardening Plan.

## **2.4 Storm Hardening Activities for Transmission Structures**

Gulf Power will continue the design and construction of new facilities based on the standards set forth by the most current version of the National Electric Safety Code (NESC). In addition, when it is practical and feasible, consideration will be given to upgrade existing transmission facilities when capital maintenance is performed. It is Gulf's position that the adherence to current design and construction standards using generally accepted engineering practices, in conjunction with the recommended 6-year structure inspection program, will maintain adequate hardening of the system in all areas.

During the 2013–2015 Storm Hardening Plan, Gulf completed the replacement of 585 wood cross-arms on existing wooden H-frame structures.

Gulf plans to continue the replacement of wooden H-frame cross-arms with steel cross-arms on transmission facilities as part of the 2016-2018 Storm Hardening Plan. Because cross-arms are mounted horizontally they tend to hold water in small pockets on the top of the arm, which may lead to small pockets of rot. H-frame structures are designed such that the load is distributed between the two poles by the cross-arm, and these small pockets of possible rot could reduce the strength of the structure. Replacing the wooden cross-arm with steel eliminates this problem. Gulf has 355 cross-arm replacements remaining to complete the program.

With respect to storm hardening for new transmission facilities in the 2016-2018 Storm Hardening Plan, Gulf Power will continue the best practice of designing all new transmission construction facilities using loading criteria found in the NESC with a 1.0 overload factor. This includes both NESC rule 250C (extreme wind loading) and 250D (extreme ice with concurrent wind loading) criteria found on page 212, Table 253-1, in Section 25 of the 2012 NESC book. The overload factors of 1.0 call for Grade B construction, which is the standard used by Gulf on all new transmission lines. The main objective is to design a structure that has a capacity greater than the

maximum expected load. The combined effect of load factors and strength factors provides an appropriate level of safety and reliability.

## **2.5 Geographic Information System (GIS)**

Gulf Power's Geographic Information System (GIS) uses database information that is continuously maintained and updated with Transmission, Distribution and Land information from across the service area.

The distribution side of the system is using DistGIS, which is an abbreviation for Gulf's Distribution Geographic Information System. The system is designed to be a complete electronic model of Gulf's electrical system overlaid on a representation of the land base. DistGIS is actually a system composed of many parts based on GIS software from ArcGIS/ArcMap from Environmental Systems Research Institute (ESRI). The system also provides consistent, high-quality data to other systems such as Gulf's Trouble Call Management System (TCMS).

The Transmission Department uses the latest ERSI GIS software to document all transmission system assets, including but not limited to lines, structures, substations, switches, and fiber optics in enterprise databases. The primary transmission database is called the CTDB (Common Transmission Database). The CTDB is the primary data source for information for a number of transmission programs such as Standard Transmission Operation & Maintenance Program (STOMP), Transmission Line Inspection System (TLIS), Transmission Line Maintenance System (TLMS), Transmission Trouble Reporting System (TTRS), and TransView.

Gulf Power's transmission and distribution data that is essential for asset management and forensic data analysis were mapped in GIS as part of the 2007-2009 Storm Hardening Plan. This GIS data will be maintained and updated as needed for the 2016-2018 Storm Hardening Plan.

## **2.6 Post-Storm Data Collection and Forensic Analysis**

Gulf Power has in place a post-storm forensic process for the collection, evaluation, and reporting of storm damage data. Contractors will aid Gulf in the collection of field data after a major storm. Hand-held computers (downloaded with Gulf's GIS database) will be utilized to collect the pertinent field data. This data will be collected on pre-determined projects constructed to extreme wind loading criteria and in other designated overhead and underground areas. The information collected by the contractor will be utilized to perform a forensic analysis for Gulf. This analysis will be the basis of a report containing an executive summary, description of the data collected, preliminary storm data, areas affected and the analysis results in tabular and graphical forms. This "fact finding" assessment of existing

facilities will help in the evaluation of our construction standards going forward.

The data collection and transfer process is tested annually to ensure the process of collecting and exchanging information electronically between Gulf and its contractors will not present a problem during a storm situation.

Gulf Power did not experience an event during the 2013-2015 Storm Hardening Plan years that warranted implementation of its forensic data collection process. Gulf will utilize the above forensic program as part of its 2016-2018 Storm Hardening Plan. On-going refresher training will be given as needed over the next three years to ensure all responsible parties are fully prepared to execute the program.

## **2.7 Outage Data differentiating between Overhead and Underground Systems**

Gulf will continue to record the number of overhead (OH) and underground (UG) customers on its system at the end of each year. This information will allow the calculation of SAIDI and SAIFI indices based on the experiences of both overhead and underground customers.

Gulf will also continue to collect the type of Underground cable construction or the Pole type for relevant outages. The data will include:

- UG cable construction is:
  - Direct Buried
  - Direct Buried with Injection Treatment
  - In Conduit
- Pole type is:
  - Concrete
  - Wood
  - Steel

Gulf Power will continue to collect Pole and UG Cable outage data for future analysis as recommended by the FPSC.

## 2.8 Coordination with Local Governments

Consistent with its 2013-2015 Storm Hardening Plan, Gulf Power will continue its current local government coordination efforts in North West Florida for the 2016-2018 Storm Hardening Plan.

Gulf Power district managers are located in Pensacola, Ft. Walton, and Panama City. Local managers, who report to the district managers, are located in Milton, Crestview, Niceville, and Chipley. These company positions interact with city and county personnel on a regular basis regarding numerous issues, including emergency preparedness as needed. These Gulf Power employees are also actively involved in joint government and business committees that focus on emergency preparedness needs in North West Florida. Examples of those include:

- Member of BRACE (Be Ready Alliance for Coordinating for Emergencies). BRACE is an Escambia County organization unique to Florida but part of a federal government directive that encourages communities to develop more effective preparedness programs for various types of disasters.
- Member of Okaloosa County Emergency Response Team (CERT). This Committee is a coordinated effort between government and business to address emergency preparedness issues on a monthly basis.

Gulf Power's Line Clearance specialists and Forestry Services technicians communicate routinely with local governmental officials, community groups, and homeowner associations to ensure local area involvement and communications regarding vegetation management projects are effectively maintained.

Gulf Power representatives are assigned to county emergency operations centers (EOCs) in Northwest Florida. The EOC representatives assist city and county agencies and officials during emergencies that warrant activation of the county EOCs. Gulf Power provides extensive coverage throughout the duration of the EOC activation.

Gulf Power will provide ongoing communications, pre-storm communications, and post-storm communications via the Corporate Communications department. Relevant and timely Gulf Power news releases will be provided to the county EOCs during storm restoration events to keep local government agencies and officials apprised of the latest restoration activities.

## **2.9 Collaborative Research**

As part of its 2016-2018 Storm Hardening Plan, Gulf Power will continue collaborative efforts to conduct research and development (R&D) on the effects of major hurricanes on the electrical system throughout the state of Florida. The Public Utility Research Center (PURC) located at the University of Florida continues to provide leadership necessary to serve as the R&D coordinator in the state. PURC has strong working relationships with Florida's investor-owned utilities, cooperatives and municipals.

Gulf Power will continue to participate in R&D activities that PURC initiates. These activities involve utility managers and hazard research professionals discussing means to prepare Florida's electrical infrastructure to better withstand and recover from hurricanes.

## **2.10 Disaster Preparedness and Recovery Plan**

### **2.10.1 Gulf's Storm Recovery Plan**

Gulf Power uses the plans described in its Storm Recovery Manual to respond to any disaster that may occur within its service area. These plans proved to be very effective during 2004 and 2005 in recovering from the multiple storms that impacted Gulf Power and its customers. As part of its annual operations, Gulf Power has developed and continues to refine its planning and preparations for the possibility of a disaster within Gulf Power's service area. This planning is updated annually to build on best practices and what works well and to improve the process. In these updates, Gulf Power strives for continuous improvement by building on recovery effort experiences within our service area, as well as off system events when assisting other utilities with their recovery from weather-related natural disasters. Gulf Power's plan has been encapsulated within a detailed and proprietary Storm Recovery Manual.

### **2.10.2 Gulf's Storm Recovery Preparations**

All Gulf Power employees are given a specific storm assignment as part of the planning process. At Gulf, the Corporate Emergency Management Center Specialist works with Human Resources to ensure that each restoration area is staffed with the appropriate number of employees and that every employee has the proper skill set to perform their storm assignment. Training manuals are updated, and training is conducted to ensure that employees are competent to perform the job to which they are assigned. As hurricane season approaches, there are internal communications reminding all employees to review their storm plans at work and for their homes and families. Additionally, storm preparedness

and storm responsibilities are included as one of the topics at new employee orientation meetings.

Members of the Company Emergency Management Center (CEMC) leadership team attend conferences such as the Southeastern Electric Exchange (SEE) Mutual Assistance meetings each year in an effort to benefit from lessons learned by others. Gulf Power also participates in the yearly statewide storm drill under the direction of the State Emergency Operations Center (SEOC).

Contracts are reviewed, negotiated and confirmed with vendors for services such as food, lodging, materials, transportation, fuel, staging sites, and other support functions. Gulf Power's Supply Chain Management department ensures that materials on hand, along with available supplies from material vendors, are sufficient to meet the anticipated demands of the storm season.

### **2.10.3 Gulf's Company Emergency Management Center**

The objective of the CEMC is to provide overall direction in the restoration of electric service to Gulf Power's customers as quickly as possible, while protecting the safety of everyone involved. In order to provide a coordinated response and to maximize the restoration effectiveness, Gulf organizes into three major restoration areas headquartered in Pensacola, Fort Walton Beach and Panama City. The CEMC consists of functional teams which provide support to Generation, Transmission, and Distribution as they restore their respective systems. The three primary leaders working in the CEMC are the CEMC Manager, the Human Resources Director, and the Logistics Director, who report directly to the Distribution General Manager. These three leaders work with each other to coordinate activities and resources necessary for field restoration efforts. The functional teams that are represented in the CEMC and that report to the CEMC Manager are: CEMC Staff; Accounting, Finance and Treasury; Aircraft Operations; Check-In Sites; Contractor Coordination; Customer Operations Support; Customer Service; Distribution; Environmental; Emergency Operations Center; Facilities; Fleet Services; Generation; External Affairs; Human Resources; Information Technology; Logistics; Public Affairs; Risk Management; Safety & Health; Security; Supply Chain Management and Transmission.

When the National Weather Service announces that a tropical storm or hurricane has entered the Gulf of Mexico, the CEMC leadership will communicate with appropriate management and the Gulf executives. Private weather services used by Gulf Power also issue notifications to selected Gulf officials. The storm is monitored as it develops, and if there is a possibility that Gulf Power's service area will be affected, the CEMC is



set up and readied for activation at Gulf Power's Pine Forest facility located in Cantonment, Florida. The hurricane is closely monitored when it may threaten Gulf Power's service area within 36 hours.

After evaluation of wind profiles and consultation with private weather services, a decision is made as to when it will become unsafe for employees to travel. At that time, and after consultation with senior management, the CEMC Manager, the Power Delivery Services Manager, or the CEMC Specialist will determine when the CEMC will be formally activated. CEMC leaders are notified of the activation plan and are responsible for ensuring their respective areas are in a state of readiness and properly staffed.

Once activated, the CEMC is staffed by a core group for the duration of the event. The CEMC is operational 24 hours a day, 7 days a week, until such time the power is substantially restored to all customers who are able to receive service. Depending on the severity of the event, repair work on the system may continue after the CEMC is deactivated.

### **3.0 Wood Pole Inspection Plan**

Gulf Power has been evaluating its distribution poles through ground-line inspection since the early 1990's. Gulf's distribution pole inspection program was originally based on a ten-year cycle, the first cycle having been completed in 2002. In 2007, Gulf Power moved from a ten-year cycle to an eight-year cycle as required by Order No. PSC-07-0078-PAA-EU. Gulf completed the first eight-year cycle one year ahead of schedule, concluding in 2013. In 2014, Gulf began its second eight-year cycle.

Historically, Gulf has not inspected a set number of poles each year. The number of poles inspected annually often varies, however, Gulf has successfully completed all pole inspection cycles on schedule utilizing this philosophy. Gulf will typically inspect poles in one year and ensure all necessary repairs are completed by the end of the following year. This is the same approach that was utilized in Gulf's 2007 - 2009, 2010 - 2012, and 2013 - 2015 Storm Hardening Plans. For the period 2016 – 2018, Gulf plans to continue the same inspection program and approach that has received FPSC approval since 2007 and has provided superior service to its customers.

Gulf utilizes an inspection matrix that ensures all poles (Creosote, Penta, and CCA) receive a visual inspection with sounding, boring and excavation as appropriate. This inspection matrix was approved by the FPSC in 2007, in 2010 and again in 2013. Utilizing this philosophy, Gulf's wooden pole plant has continued to perform admirably. Pole failures have been limited to times of extremely adverse weather, tree failures, or vehicle strikes.

Gulf Power's rate of rejection for distribution wood poles has fallen from approximately 15% during its first ten-year inspection cycle to less than 5% on the second inspection cycle. The annual pole rejection rates for the first eight-year inspection cycle are shown in Table 5.

Table 5: Annual pole rejection rates for Gulf Power's first eight-year ground line pole inspection cycle

| Year            | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|-----------------|------|------|------|------|------|------|------|
| Reject Rate (%) | 2.20 | 2.73 | 1.52 | 3.31 | 2.53 | 2.80 | 3.61 |

Gulf began its second eight-year cycle in 2014 and has inspected a total of 52,767 poles, or 26% of its wooden distribution poles. Reject rates for the two years were 2.48% in 2014 and 2.71% in 2015.

Gulf repaired or replaced all poles identified as rejects on schedule through the 2014 inspection. For the 2015 inspection, Gulf is on schedule to repair or replace all reject poles in 2016. As of January 31, 2016, Gulf had completed repairs on 67% of the poles identified as rejects in the 2015 inspection and has the remaining poles scheduled for repair or replacement before the end of 2016.

#### **4.0 Compliance with National Electric Safety Code (NESC) in regards to Storm Hardening**

##### **4.1 Distribution**

Gulf Power's distribution system complies with all applicable sections of the National Electric Safety Code and exceeds the NESC with the transition to Grade B construction on all new construction, major projects and maintenance work.

##### **4.2 Transmission**

Gulf Power's transmission system complies with all applicable sections of the National Electric Safety Code in effect at the time of initial construction.

### **4.3 Substation**

Gulf Power uses the American Society of Civil Engineers (ASCE) 7 extreme wind loading criteria for structure design and selection, which complies with the National Electric Safety Code extreme wind loading requirements for Gulf's service area.

## **5.0 Adoption of Extreme Wind Loading standards specified by Figure 250-2(d) of the 2012 edition of the NESC for Distribution Facilities**

Gulf's approved 2007-2009 Storm Hardening Plan proposed to exceed the National Electric Safety Code standards by transitioning to Grade B construction on all new distribution construction, major projects, and maintenance work. Gulf has continued this transition to Grade B construction standards on all new construction, major projects, and maintenance work during the 2013-2015 Storm Hardening Plan and will continue with Grade B construction as our standard in the 2016-2018 Storm Hardening Plan.

Although Gulf has completed the implementation of 1) Grade B construction into its construction practices, 2) extreme wind loading pilot projects, and 3) replacement of wooden poles with concrete poles on critical multiple feeder pole lines as outlined in the 2007-2009 and 2010-2012 Storm Hardening Plans, Gulf stills lack the data to support the benefits associated with the upgrades due to a lack of major storms during this time period to test the construction practices.

As a part of the approved 2013-2015 Storm Hardening Plan, Gulf moved away from undertaking extreme wind loaded pilot projects and continued to focus its efforts on upgrading all new construction, major projects, and maintenance work, including any work performed on critical infrastructure facilities, to bring them to Grade B construction standards. It also proceeded with strategic activities that may benefit the system during and after a storm. Gulf budgeted and invested approximately \$2.8 million for the initiatives over the past 3 years covered by the previous Plan.

Based on this, Gulf proposes to continue focusing its efforts for the 2016-2018 Storm Hardening Plan on upgrading all new construction, major projects, and maintenance work, including any work performed on critical infrastructure facilities, to Grade B construction standards and proceeding with strategic activities that may benefit the system during and after a storm. Gulf has budgeted approximately \$3.6 million for critical infrastructure upgrades over the 3-year period covered by this Plan.

Appendix 1 shows communities within Gulf's service area and the extreme wind loading standards lines as specified by figure 250-2(d) of the 2012 edition of the NESC.

## **6.0 Mitigation of damage to Underground Facilities and Supporting Overhead Transmission and Distribution Facilities due to Flooding and Storm Surges**

### **6.1 Distribution**

Gulf Power has developed overhead and underground storm hardening specifications (Appendices 2 and 3) to minimize damage in areas subject to flooding and storm surges. These specifications will continue to evolve as Gulf continues to seek out best practices and learns from the review of gathered forensic data with respect to storm hardening and storm surge mitigation.

As stated in the past, new underground installations and conversion of overhead facilities to underground facilities is customer driven.

### **6.2 Transmission**

Gulf Power Transmission utilizes overload and strength factors greater than or equal to those required in Sections 25 and 26 of the National Electric Safety Code. Gulf's loading criteria for new line design is derived from Section 25 of the National Electric Safety Code. At this time, Gulf is not designing transmission for any type of storm surge or flooding damage.

All future Gulf Power underground transmission projects located within the possible storm surge area will be engineered to consider the impact of flooding or storm surge from weather events.

## **7.0 Placement of New and Replacement Distribution Facilities so as to Facilitate Safe and Efficient Access for Installation and Maintenance**

Gulf Power has always recognized that access to distribution facilities is essential to safe and efficient maintenance and storm restoration. Therefore, Gulf continues to strive to promote placement of facilities adjacent to public roads; to use easements, public streets, roads and highways; to obtain easements for underground facilities; and to use road right-of-ways for conversions of overhead to underground.

Gulf will continue these initiatives in the 2016-2018 Storm Hardening Plan.

## **8.0 Other Key Elements**

### **8.1 Feeder Patrols**

Annually, by June 1, all critical lines will be inspected up to the first protective device for loose down guys, slack primary and leaning poles. All problems found will be corrected.

### **8.2 Infrared Patrols**

Annually, by June 1, infrared inspections of critical equipment on main line three phase feeders will be performed. Problematic devices identified, such as, feeder switches, capacitors, regulators and automatic over-current protective devices, will be repaired.

### **8.3 Wind Monitors**

Gulf Power believes Forensic Data Analysis will be critical to determining the effectiveness of the Storm Hardening Plan. A key part of the data gathering is obtaining "granular" storm wind speeds at strategic locations.

This data will be systematically obtained through meteorological data resources such as Gulf's existing wind stations and commercial weather reporting sources.

## **8.4 Additional Proposed Storm Hardening Initiatives**

### **8.4.1 Distribution Automation**

Gulf Power proposes to continue the installation of additional distribution automation devices to further segment the feeders for outage restoration. These devices, which protect our customers by limiting those affected by temporary faults and sustained outages. These devices will be either controlled by DSCADA and/or function as a part of automated restoration schemes.

### **8.4.2 Strategic Installation of Automated overhead Faulted Circuit Indicators**

Faulted Circuit Indicators (FCI's) are devices designed to indicate the passage of fault current. These devices will reduce customer outage time by expediting the location of outage causes, thereby aiding in the isolation of the problem and helping to restore service to some customers while the problem is being corrected.

Gulf proposes to continue to install new FCI's at strategic locations and upgrade existing ones annually as part of the 2016-2018 Storm Hardening Plan.

#### **8.4.3 Distribution Supervisory Control and Data Acquisition (DSCADA) System**

In order to reduce customer outage times, Gulf has implemented a DSCADA system used to remotely control and monitor the distribution system by Distribution Control Center personnel. The DSCADA system will continue to be expanded with the addition of line devices in this Plan.

### **9.0 Storm Plan Deployment Strategy for Distribution, Transmission and Substation**

#### **9.1 Description of the facilities affected, including technical design specification, construction standards, and construction methodologies employed**

##### **9.1.1 Distribution**

Gulf continues to develop overhead and underground storm hardening specifications which are contained in Appendices 2 and 3. These specifications continue to evolve as Gulf seeks out best practices and learns from the review of gathered forensic data.

As stated in Section 5.0, Adoption of Extreme Wind Loading standards specified by Figure 250-2(d) of the 2012 Edition of the NESC for Distribution Facilities, Gulf will continue transitioning to Grade B construction on all new construction, major projects and maintenance work, but Gulf does not propose proceeding with any additional extreme wind loading pilot projects. Gulf proposes to target critical infrastructure by focusing on sections of feeder pole lines that due to their geographic location have a higher exposure to possible storm damage and convert them to Grade B construction.

### **9.1.2 Transmission**

Gulf Power Transmission utilizes overload and strength factors greater than or equal to those required in Sections 25 and 26 of the National Electric Safety Code. Gulf's loading criteria for new line design is derived from Section 25 of the National Electric Safety Code. These design criteria are used on all new installation and complete rebuild projects throughout Gulf's service area.

### **9.1.3 Substation**

Coastal Substation Risk Assessments have been completed, and hardening measures are not required. As part of this process, a National Oceanic and Atmospheric Administration (NOAA) SLOSH (Sea, Lake and Overland Surges from Hurricanes) model was used to define the potential maximum. SLOSH is a computerized model run by the National Hurricane Center (NHC) to estimate storm surge heights and winds resulting from historical, hypothetical, or predicted hurricanes. A risk assessment at each substation location was completed based on the information provided by the SLOSH model.

An Emergency Response Plan has been established for all substations on Gulf's system.

## **9.2 Communities and areas affected and critical infrastructure as illustrated by Gulf Power Company Service Area/DistGIS Maps**

### **9.2.1 Distribution**

Appendix 1 shows communities within Gulf's service area and the extreme wind loading standards lines as specified by figure 250-2(d) of the 2012 edition of the NESC. Gulf proposes to continue focusing its efforts for the 2016-2018 Storm Hardening Plan on upgrading all new construction, major projects, and maintenance work, including any work performed on critical infrastructure facilities to Grade B construction standards and proceeding with strategic activities that may benefit the system during and after a storm.

### **9.2.2 Transmission**

The storm hardening initiative of replacement of wooden cross-arms with steel cross-arms on H-frame structures will continue to be implemented on the entire Gulf Power Transmission system.

## **10.0 Gulf Power Company's Estimate of Incremental Costs and Benefits**

The total estimated cost for Gulf Power's 2016-2018 Storm Hardening Plan is approximately \$61 million. As discussed in Sections 4.0 and 5.0 of this Plan, Gulf will continue its transition and implementation of Grade B construction. Gulf's actual costs for critical infrastructure improvements for the 2013-2015 Plan totaled approximately \$2.8 million. Gulf's 2016-2018 Plan proposes critical infrastructure improvement projects totaling approximately \$3.3 million.

In addition to the feeder patrols discussed in Section 8.0, Gulf plans to continue the storm hardening initiatives identified in Sections 6.1 and 8.4 at a cost of approximately \$18 million during the 2016-2018 Plan.

Gulf Power's 2016-2018 Storm Hardening Plan is designed to include initiatives which have the most potential to meet the intent of storm hardening and provide the most cost-effective approach based on Gulf's years of experience with transmission and distribution construction and storm restoration.

Due to the lack of data at this time, Gulf Power cannot estimate the reductions in storm restoration cost and outages that will result from storm hardening initiatives. The effectiveness of Grade B construction and the critical infrastructure storm hardening projects will be evaluated following major storm events in the future.

See Appendix 4 for an itemized summary of Gulf's storm hardening costs.

## **11.0 Impact of Collocation facilities**

### **11.1 Distribution**

Gulf Power evaluates attachments made to its poles, towers, and structures to provide storm hardening for the future through the following means:

- Pole Strength and Loading Engineering calculations are performed before attachment to any pole, tower or structure and before any existing cables are upgraded or overlashed in order to determine if the increase in pole loading would necessitate pole modifications.
- Attachers comply with a pre-notification process designed to inform Gulf Power of plans to attach, upgrade, or overlash cables to any Gulf Power poles, towers, or structures. This process includes a field pre-inspection with pole measurements, strength and loading calculations, work order preparation (if necessary), and a post inspection of all work. The requesting Attacher is responsible for post inspection costs and any corrective actions if needed.



- Specification plates reflect storm hardening initiatives such as additional guying standards and the use of pole foam in potential flood prone or storm surge areas.
- Gulf has provisions in its agreement with the Florida Cable Telecommunication Association (FCTA) Attachers to place an identification tag on their facilities for ease of contacting the Attachers when supporting poles or facilities are damaged and the Attacher is needed to help remove, clear the right-of-way, or transfer their cables to a new pole in emergencies, such as storm restoration.
- Every effort is made by all pole Attachers not to box or bracket a pole, tower, or structure on both sides. This practice ensures that the attachment will not encumber the climbing space or impede the ability to straighten a leaning pole in a timely manner.

## **11.2 Expansion, Rebuild, or Relocation of Distribution Facilities**

Each Attacher should refer to the contract they have with Gulf Power for details on notification protocol for new attachment permits and overflashing projects and any associated construction coordination. Gulf Power uses the National Joint Use Notification System (NJUNS) for joint-use notifications and coordination of construction activities with affected parties.

## **12.0 Estimate of Costs and Benefits**

### **12.1 Seeking Input from Attachers**

Pursuant to Rule 25-6.0342(6), Gulf Power continues to seek input from Third-Party Attachers in the development of its Storm Hardening Plan. The following Attachers were provided a draft copy of Gulf's 2016-2018 Storm Hardening Plan on March 21, 2016 for their input.

- AT&T
- Brighthouse Networks
- CenturyLink
- CHELCO
- City of Pensacola
- Comcast Joint Holding
- Cox Communications
- Escambia County Schools
- Fairpoint Communications
- Kentucky Data Link, Inc. / Windstream
- Knology

- Level 3 Communications
- Mediacom
- RSAE Labs
- Southern Light
- Springfield Cable
- Valparaiso Broadband Communications
- Verizon
- Walton County
- WOW

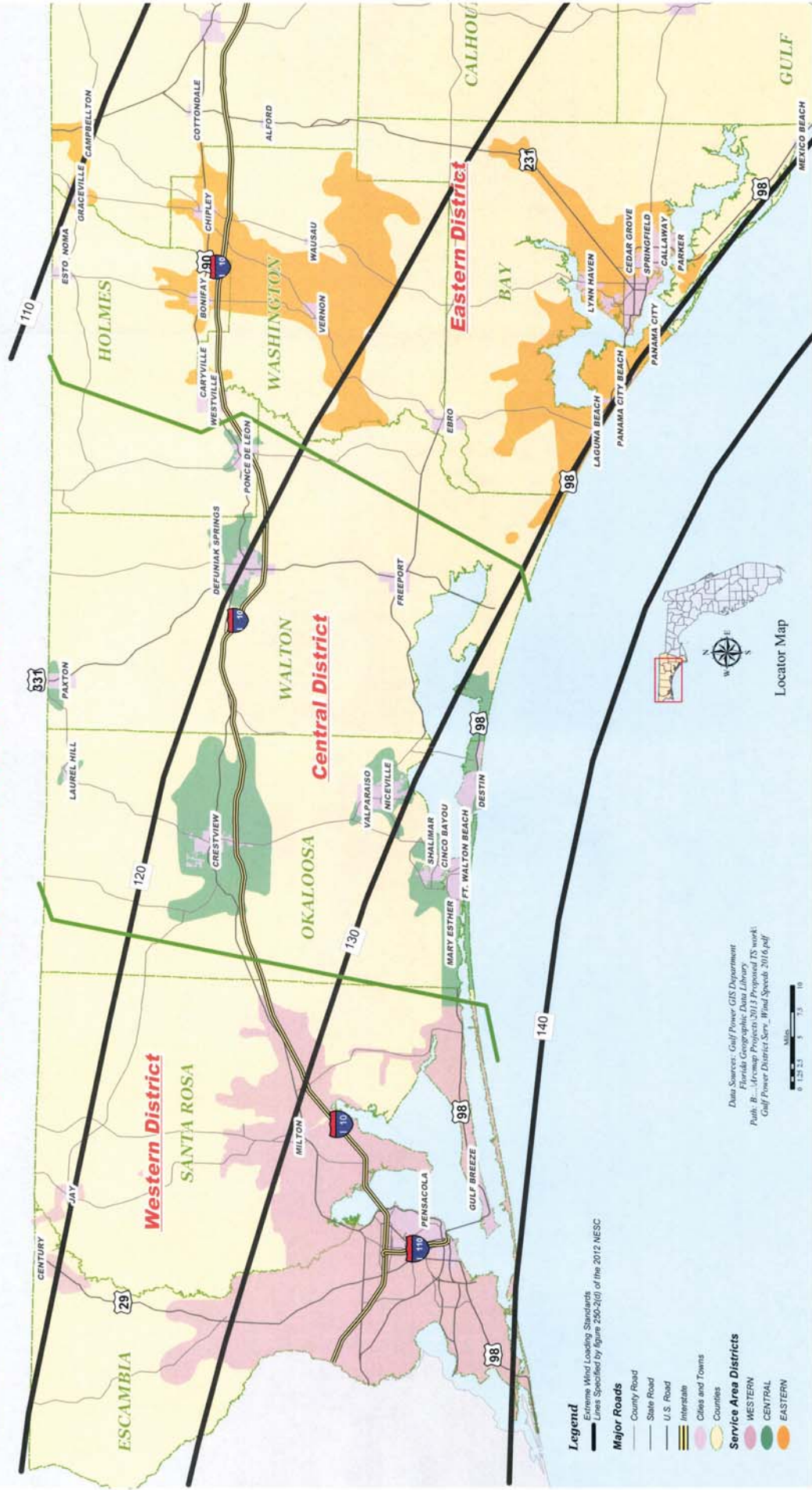
Gulf Power will continue to coordinate face-to-face semi-annual meetings with interested Third-Party Attachers to discuss major company and customer construction projects, construction standards, inspection programs, and operational issues.

## **12.2 Attachers Costs and Benefits**

No cost and benefit data was received from Third-Party Attachers prior to the published date of this Storm Hardening Plan. Gulf Power welcomes any such data that the Attachers desire to include at a later date.

# APPENDIX 1

# Map of Northwest Florida with Extreme Wind Loading Standards GULF POWER DISTRICT SERVICE AREAS



**Legend**  
 Extreme Wind Loading Standards  
 Lines Specified by figure 250-2(d) of the 2012 NESC

**Major Roads**  
 County Road  
 State Road  
 U.S. Road  
 Interstate

Cities and Towns  
 Counties

**Service Area Districts**  
 WESTERN  
 CENTRAL  
 EASTERN

**Data Sources:** Gulf Power GIS Department  
 Florida Geographic Data Library  
 Public Mapping Program (GIS) Support (7/2008)  
 Gulf Power District Serv. - Wind Speeds 2016.pdf

Miles  
 0 1.25 2.5 5 7.5 10



Locator Map

# APPENDIX 2

## OVERHEAD STORM HARDENING

Gulf Power Company Electrical Distribution Facilities shall be storm hardened to the extent practical using the methods described or shown in the specification plates in this section.

The definition of "Storm Guying" is as follows and is used throughout this section:

Storm type down guys are additional down guys and anchors, positioned perpendicular to the path of conductors. These storm type down guys are not normally needed for support of the structure but provide support in the event of high winds. They are installed in pairs with as much anchor lead as possible and have the same requirements as any other down guy as far as insulating and grounding.

### The following storm hardening methods shall be utilized:

Main feeder lines shall be located as far away as practical from the source of any storm surge and shall have storm guys on every pole where practical. The use of laterals from the main feeder to the coastline is highly encouraged.

Any controls for OCRs, capacitor banks, voltage regulators shall be placed as high as practical to avoid flooding with a storm surge. The use of wireless accessing is encouraged.

Any poles with OCRs, voltage regulators, capacitor banks, and underground riser poles shall be storm guyed where practical.

Pole Foreman shall be utilized to determine proper pole selection and proper anchoring. Emphasis needs to be placed upon the correct lead lengths for anchoring.

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DETAIL STORM HARDENING

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A- OZZ-I

## OVERHEAD STORM HARDENING

### Continued from plate OZZ-1.

Poles set in our coastal areas or storm surge areas should be set using Pole Foam to strengthen the base to lessen leaning after flooding. This is commodity number 05-5014-8 and is located in JETS under Misc. UG. Generally, one package of pole foam is used for each pole and each package comes with instructions for use.

These areas are generally defined as areas within 1 mile of the Gulf or large bays. Spec plates OSZ-1,2,3,4,5,6 & 7 illustrate these areas. Of course there are other areas where this may be useful as well.

In these areas, shorter spans should be utilized to strengthen the system. This involves the use of more poles especially in main line construction.

As a means to strengthen existing poles, Osmose or equivalent pole bracing can be used.

In a flood/storm surge prone area, customers should install meters and metering equipment above the expected maximum flood level. Where this results in meters or metering equipment being above the standard specified heights above the ground, the customer will need to build permanent platforms and stairs to allow reading and servicing of the meters and equipment, unless the location of the equipment coincides with existing porches or platforms with ready access by Gulf Power employees. The platform must extend at least three feet out from the wall and at least 18" to either side of the metering equipment. Refer the customer to the local building inspector for other requirements for the platform and stairs. Gulf metering handbook is another source of information.

Under normal circumstances, rear lot line construction shall be avoided and metering equipment shall not be placed on the rear of buildings.

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A- OZZ-2

OZZ-2

# OVERHEAD STORM HARDENING

## Joint-Use attachments

Third party attachers shall use proper anchoring and guying techniques to ensure that strength and integrity of the system is maintained.

Proper installation techniques shall be used. EX. Stringing of messengers shall be done between anchors.

Third party anchors shall be no closer than 4' from Gulf Power Company anchors to ensure integrity of the soil surrounding the anchors.

Third parties setting poles in flood prone or storm surge areas should utilize pole setting foam while setting poles to avoid leaning poles. These areas are generally defined as areas within 1 mile of the Gulf of Mexico or large bays.

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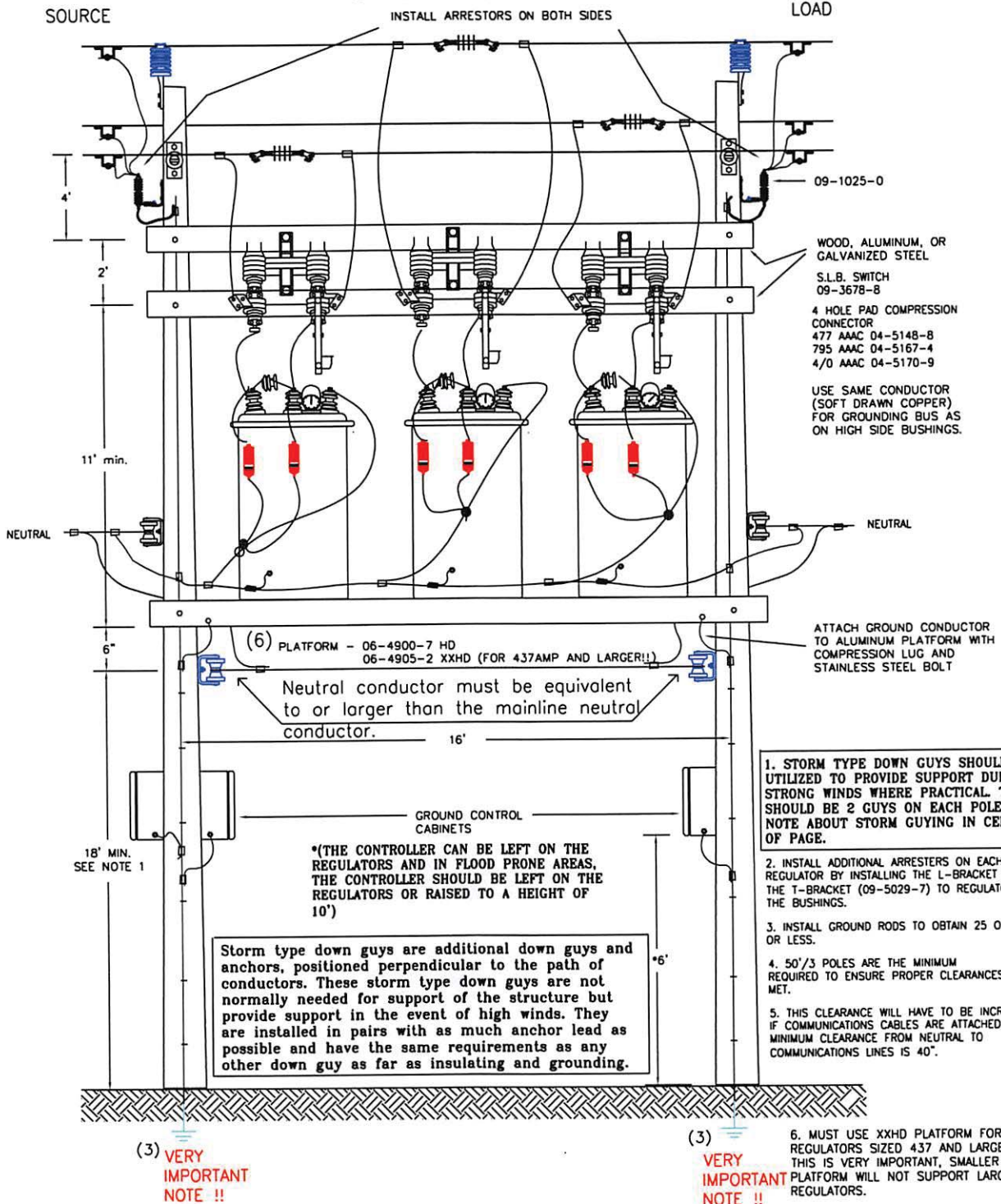


A- OZZ-3

OZZ-3



**Overhead Storm Hardening  
12 KV REGULATOR PLATFORM  
FOR THREE 150 AMP. OR LARGER REGULATORS**



1. STORM TYPE DOWN GUYS SHOULD BE UTILIZED TO PROVIDE SUPPORT DURING STRONG WINDS WHERE PRACTICAL. THERE SHOULD BE 2 GUYS ON EACH POLE. SEE NOTE ABOUT STORM GUYING IN CENTER OF PAGE.

2. INSTALL ADDITIONAL ARRESTERS ON EACH REGULATOR BY INSTALLING THE L-BRACKET FROM THE T-BRACKET (09-5029-7) TO REGULATOR NEAR THE BUSHINGS.

3. INSTALL GROUND RODS TO OBTAIN 25 OHMS OR LESS.

4. 50/3 POLES ARE THE MINIMUM REQUIRED TO ENSURE PROPER CLEARANCES ARE MET.

5. THIS CLEARANCE WILL HAVE TO BE INCREASED IF COMMUNICATIONS CABLES ARE ATTACHED, MINIMUM CLEARANCE FROM NEUTRAL TO COMMUNICATIONS LINES IS 40'.

6. MUST USE XXHD PLATFORM FOR REGULATORS SIZED 437 AND LARGER. THIS IS VERY IMPORTANT, SMALLER PLATFORM WILL NOT SUPPORT LARGER REGULATORS.

(3) **VERY IMPORTANT NOTE !!**

(3) **VERY IMPORTANT NOTE !!**

SUBJECT 12KV REGULATOR PLATFORM

DETAIL STORM HARDENING

Date 10-18-2007

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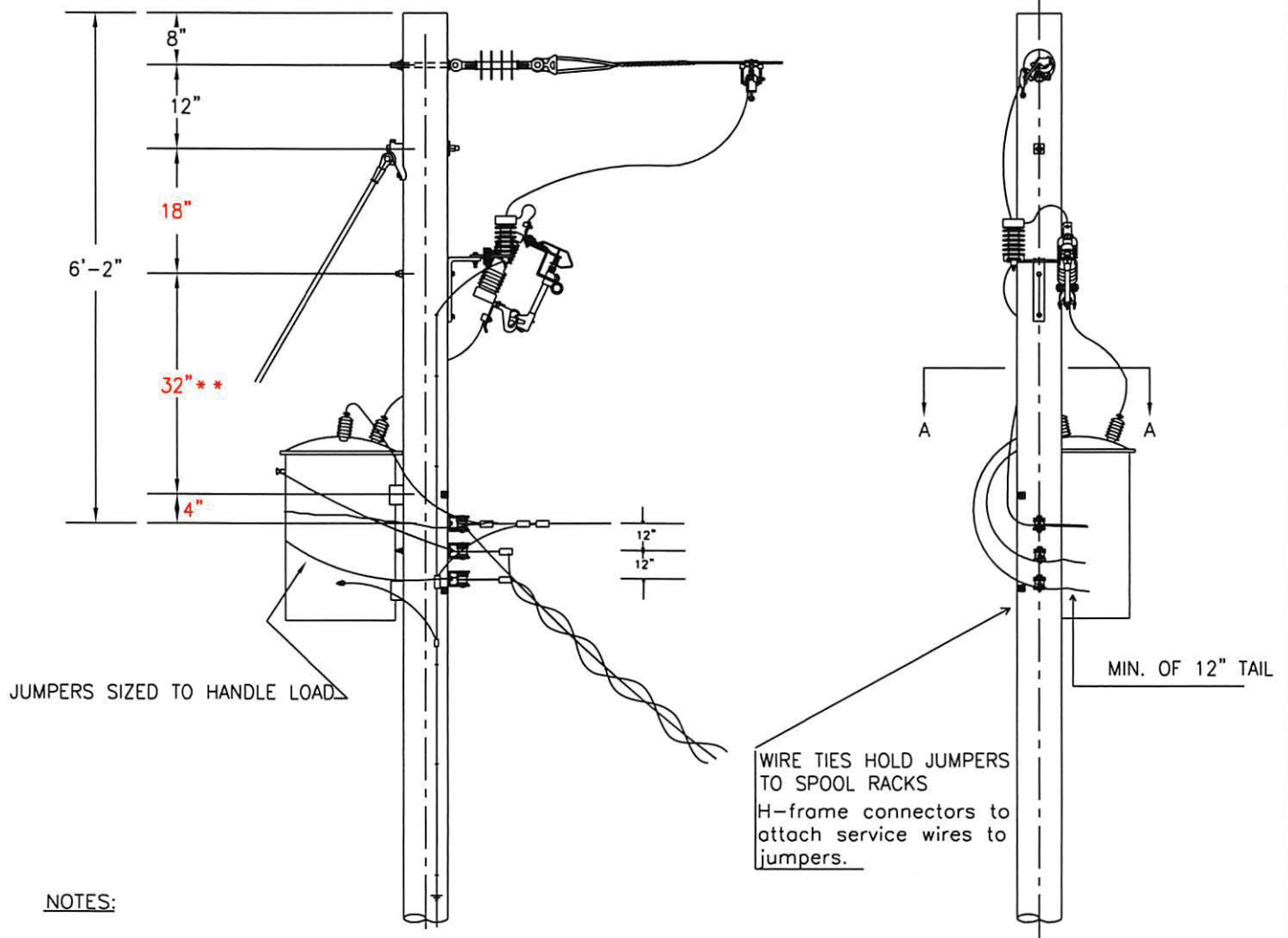
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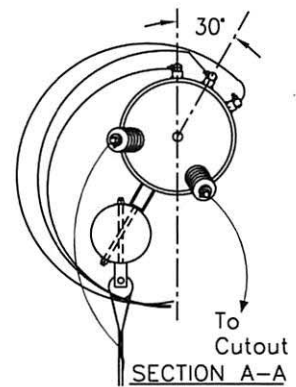
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# Overhead Storm Hardening



**NOTES:**

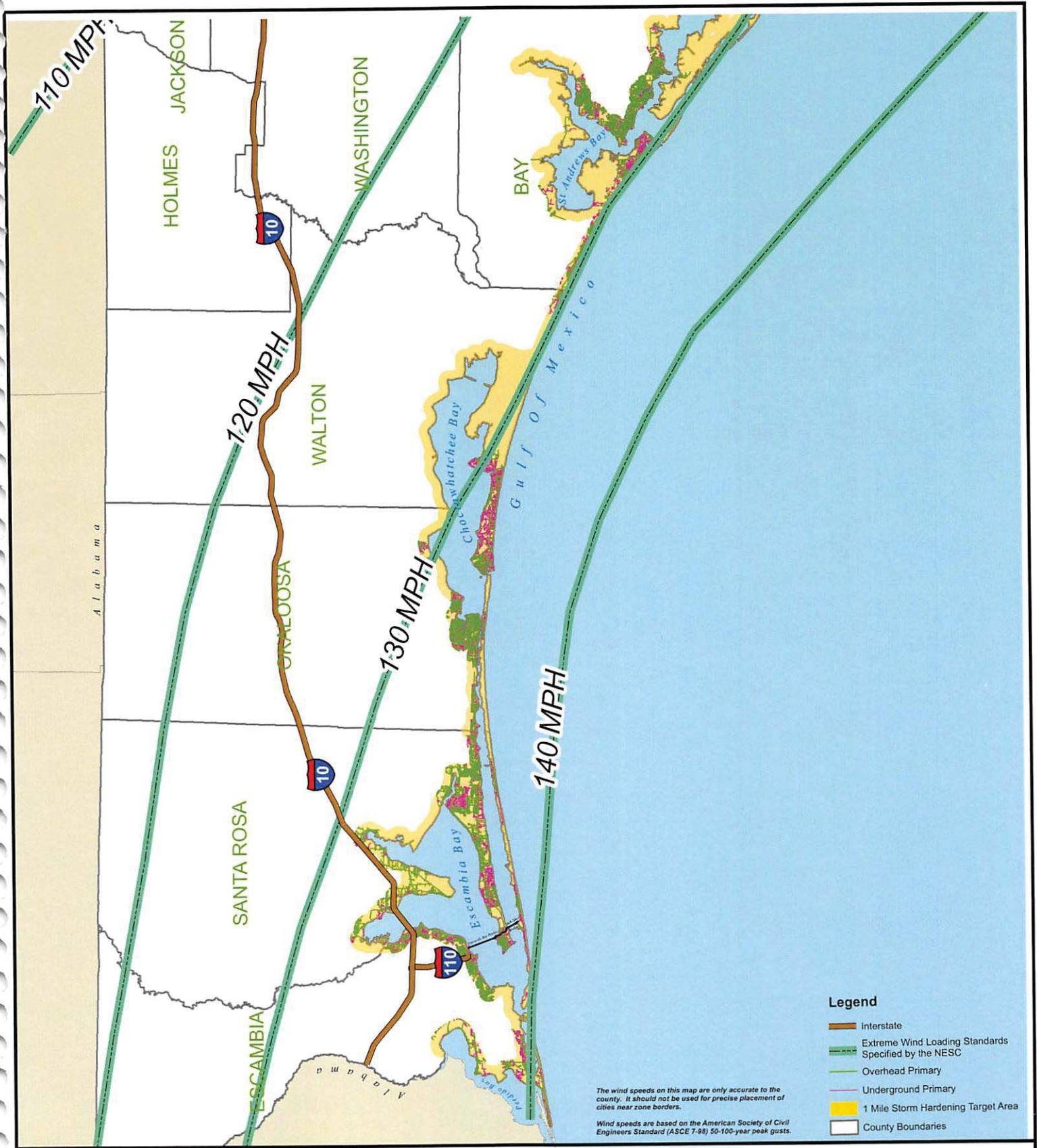
1. This example shows a one phase transformer. The same method is to be used for three phase installations as well.
2. Connect transformer secondary neutral lead to system neutral and leave approximately 12 inch tail for service neutral connections.
3. Use wildlife guards and covered riser wire in areas where wildlife is expected.
4. Avoid placing cutout directly above transformer.
5. If secondary is to extend in line, extend primary wire if practical to eliminate conflict between secondary and anchor guy.
6. "FLAG" connectors may be used instead of pin-type connectors at the transformer.



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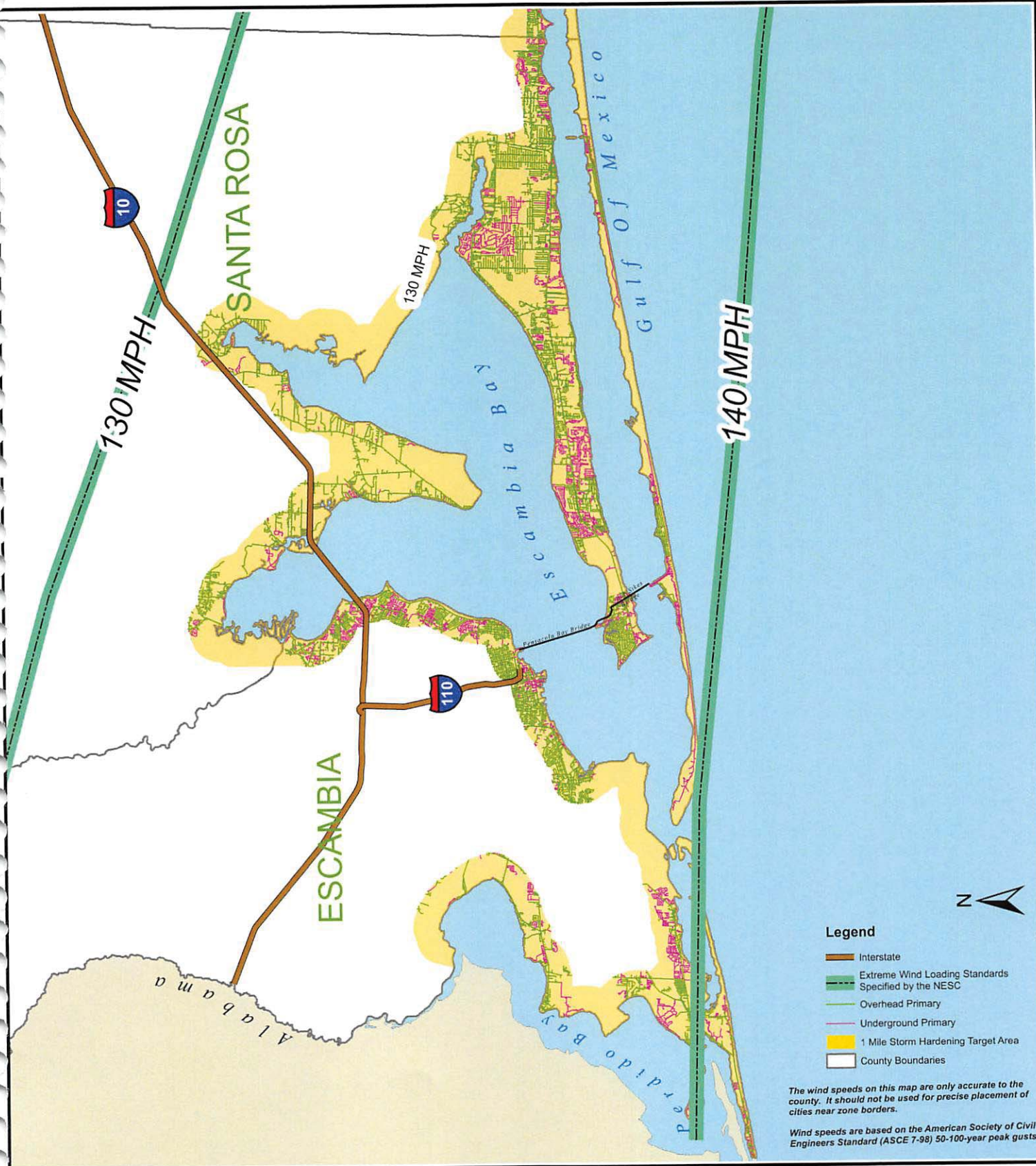
DETAIL STORM HARDENING

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| OZZ-5                  |                          |                                   |  |          |



SUBJECT OVERHEAD DISTRIBUTION  
 DETAIL GULF POWER STORM HARDENING AREAS

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|---------------------|--------------------------------|-----------------------------------|---|-----------------|



- Legend**
- Interstate
  - Extreme Wind Loading Standards Specified by the NESC
  - Overhead Primary
  - Underground Primary
  - 1 Mile Storm Hardening Target Area
  - County Boundaries

*The wind speeds on this map are only accurate to the county. It should not be used for precise placement of cities near zone borders.*

*Wind speeds are based on the American Society of Civil Engineers Standard (ASCE 7-98) 50-100-year peak gusts.*

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DETAIL WESTERN STORM HARDENING AREAS

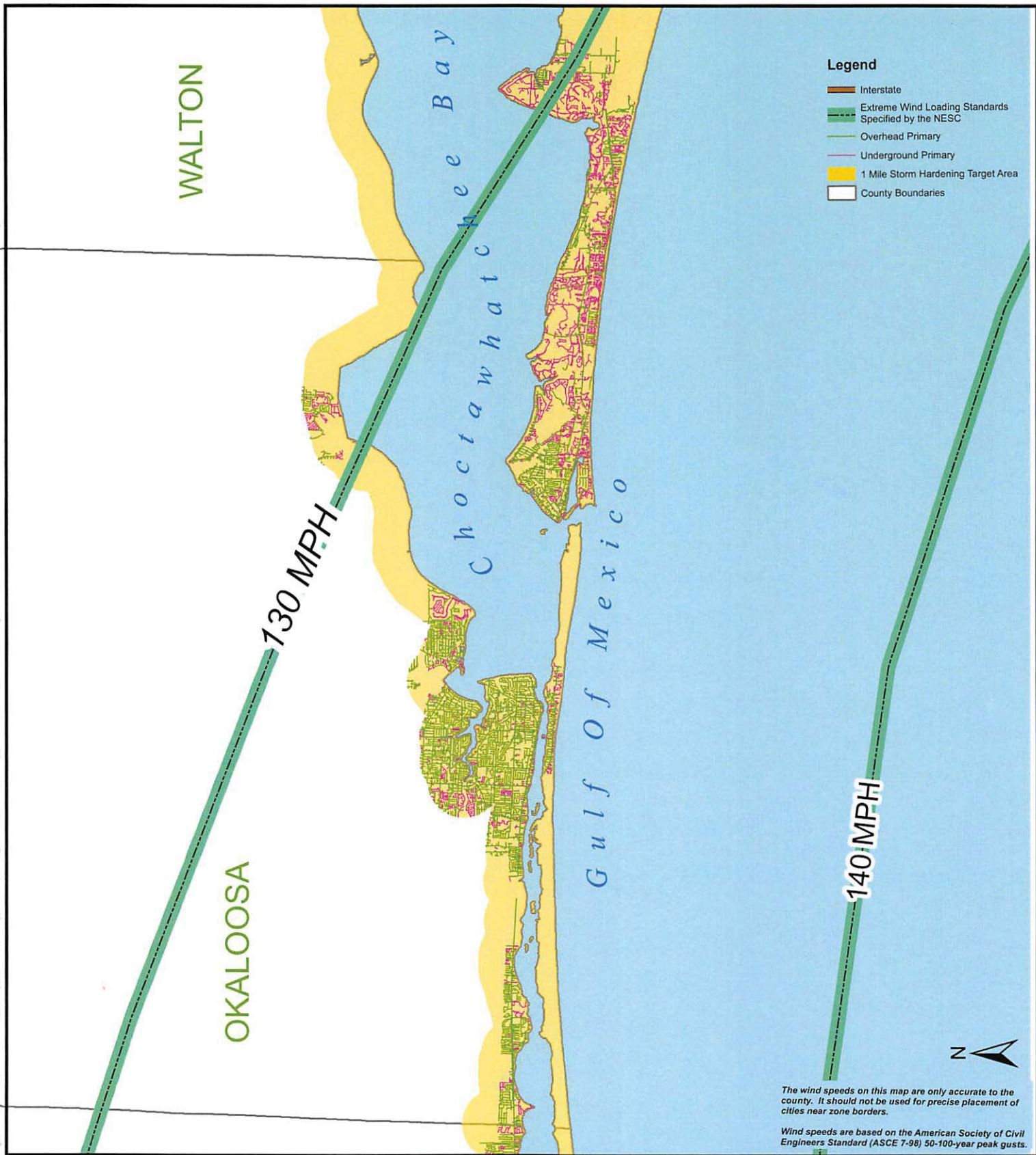
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DETAIL CENTRAL STORM HARDENING AREAS

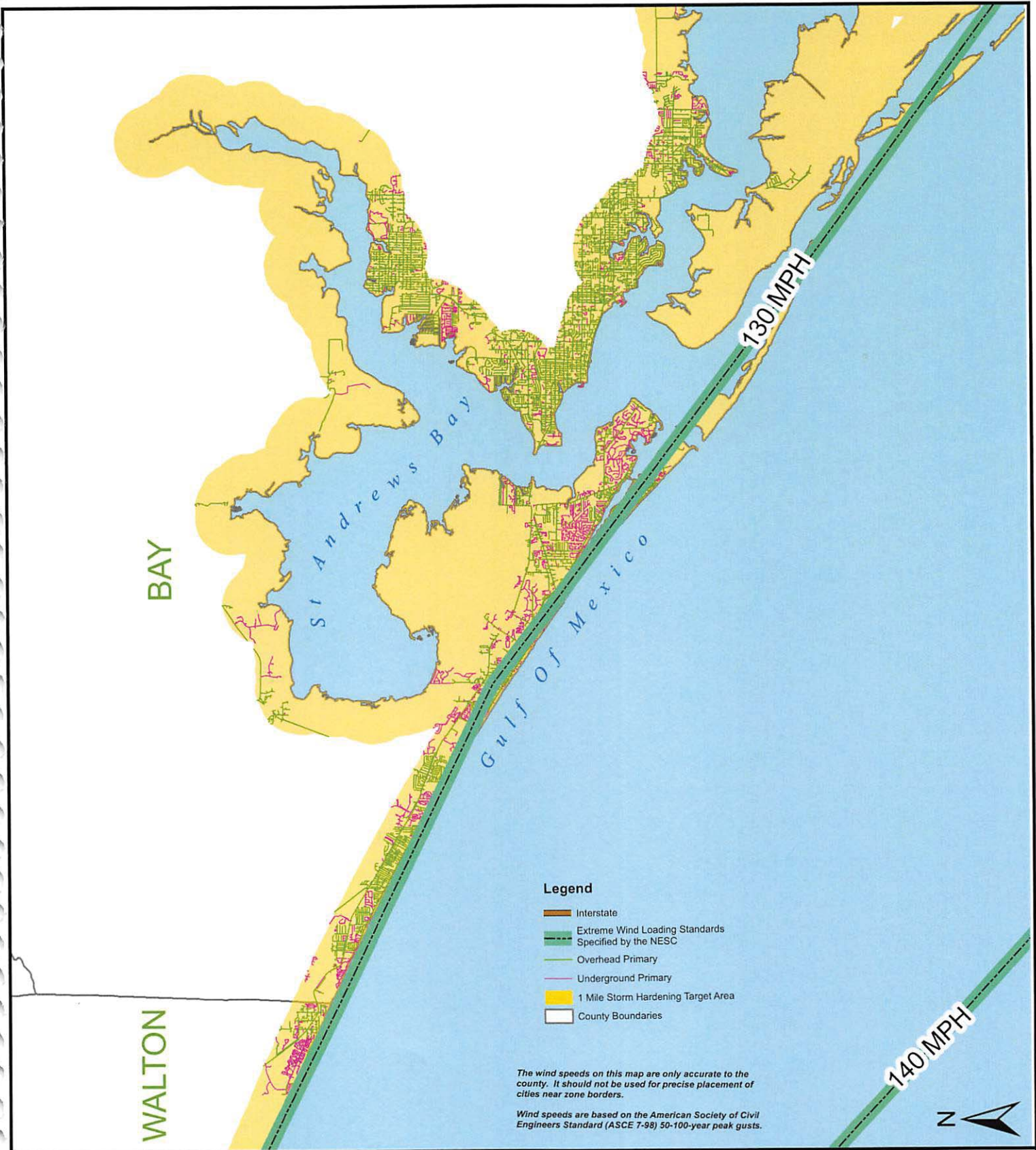
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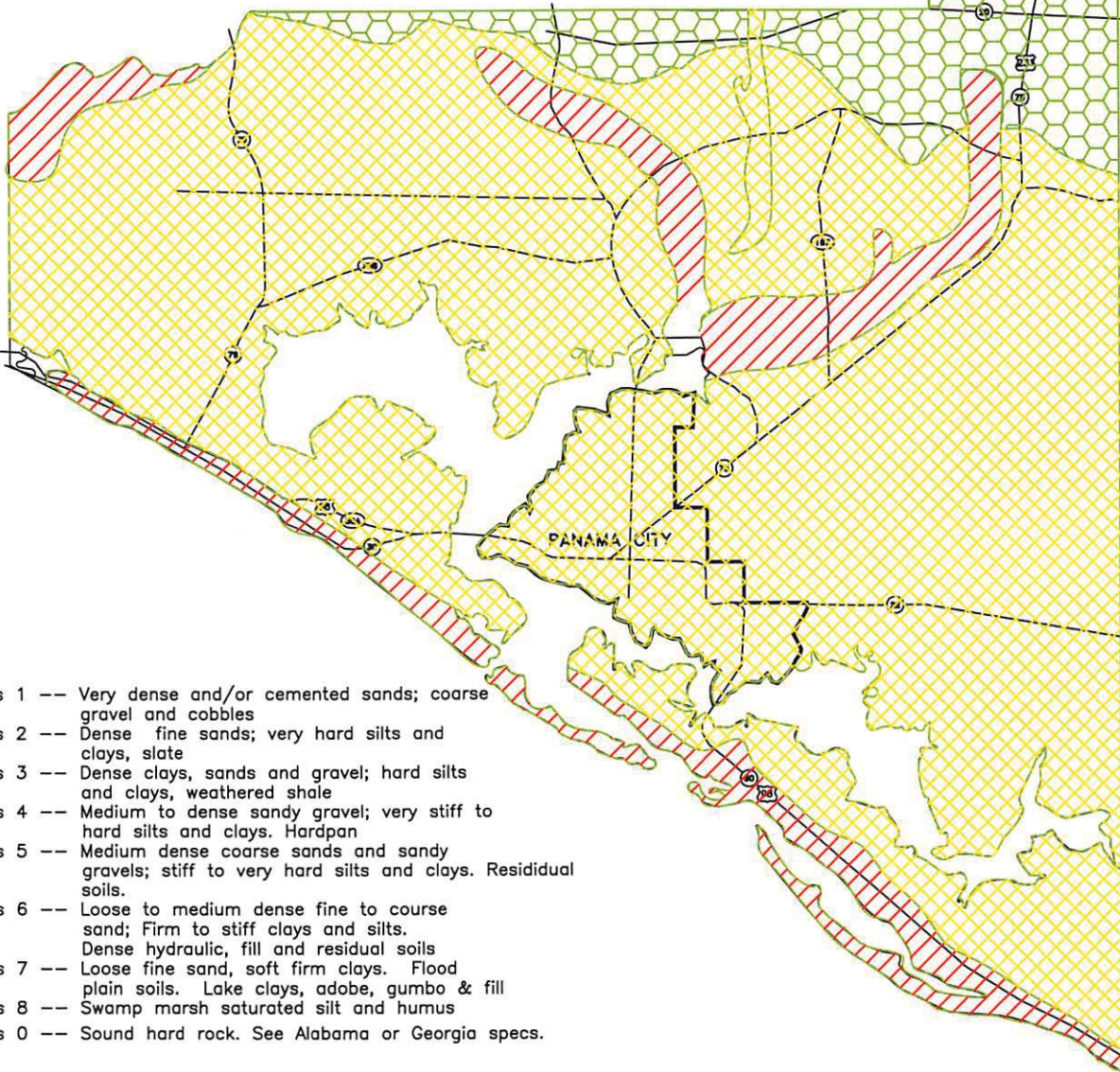
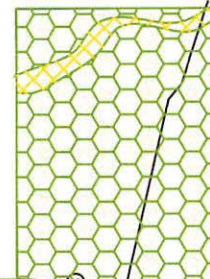
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# Legend

BAY COUNTY



|  |              |  |              |
|--|--------------|--|--------------|
|  | Class 8 soil |  | Class 4 soil |
|  | Class 7 soil |  | Class 3 soil |
|  | Class 6 soil |  | Class 2 soil |
|  | Class 5 soil |  | Class 1 soil |



- Key:**
- Class 1 -- Very dense and/or cemented sands; coarse gravel and cobbles
  - Class 2 -- Dense fine sands; very hard silts and clays, slate
  - Class 3 -- Dense clays, sands and gravel; hard silts and clays, weathered shale
  - Class 4 -- Medium to dense sandy gravel; very stiff to hard silts and clays. Hardpan
  - Class 5 -- Medium dense coarse sands and sandy gravels; stiff to very hard silts and clays. Residual soils.
  - Class 6 -- Loose to medium dense fine to coarse sand; Firm to stiff clays and silts. Dense hydraulic, fill and residual soils
  - Class 7 -- Loose fine sand, soft firm clays. Flood plain soils. Lake clays, adobe, gumbo & fill
  - Class 8 -- Swamp marsh saturated silt and humus
  - \*Class 0 -- Sound hard rock. See Alabama or Georgia specs.

\*Class 0 soil is not typically in the Gulf Power service area. If encountered, refer to Georgia Power or Alabama Power specifications.

Note: This is a guide. Individual site conditions may vary.

SUBJECT OVERHEAD DISTRIBUTION

DETAIL SOIL CLASS ACCORDING TO HOLDING STRENGTH. DATA OBTAINED FROM THE FLORIDA GEOLOGICAL SURVEY.

|                      |                                |                                   |   |           |
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**ESCAMBIA COUNTY**



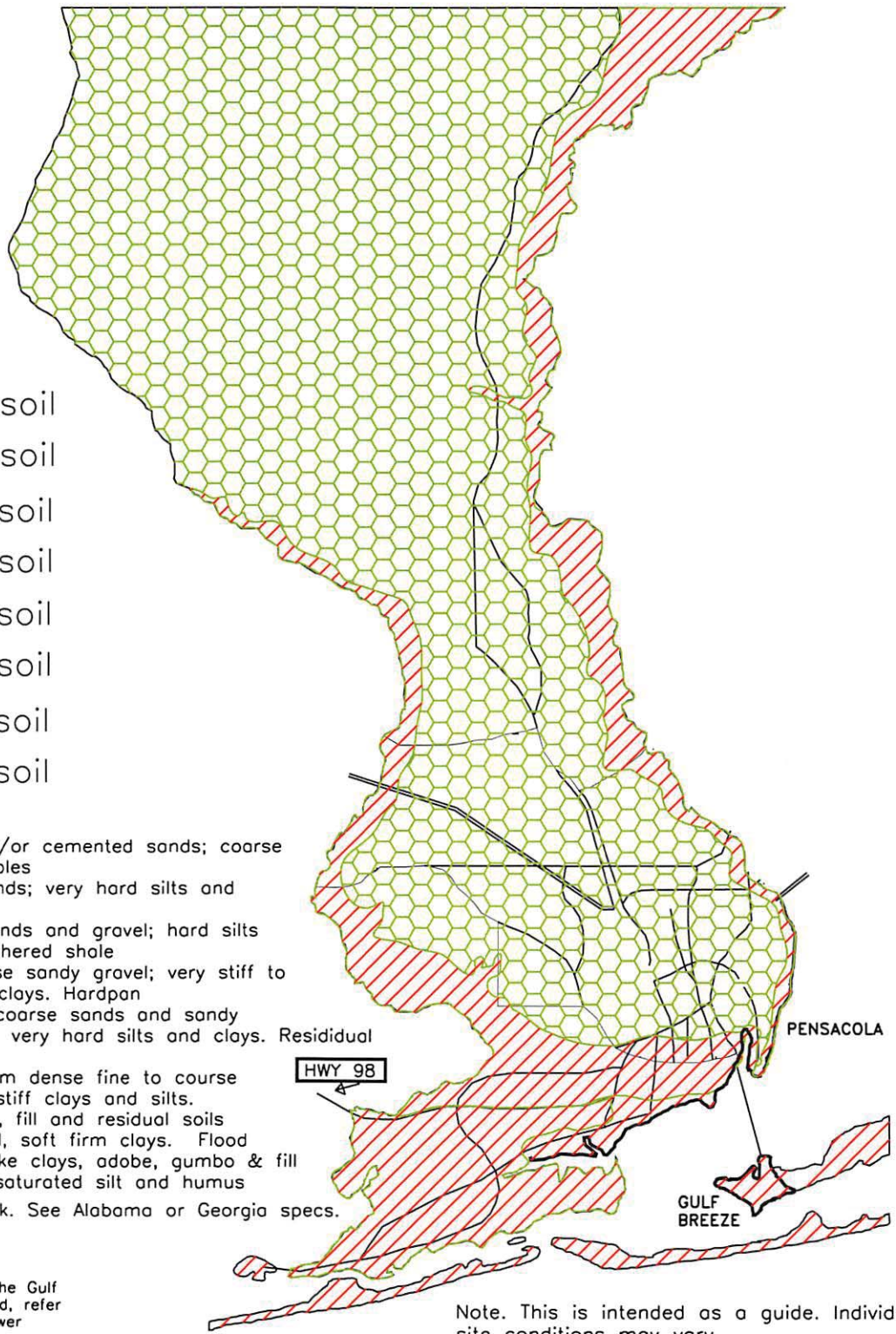
Legend

-  Class 8 soil
-  Class 7 soil
-  Class 6 soil
-  Class 5 soil
-  Class 4 soil
-  Class 3 soil
-  Class 2 soil
-  Class 1 soil

Key:

- Class 1 -- Very dense and/or cemented sands; coarse gravel and cobbles
- Class 2 -- Dense fine sands; very hard silts and clays, slate
- Class 3 -- Dense clays, sands and gravel; hard silts and clays, weathered shale
- Class 4 -- Medium to dense sandy gravel; very stiff to hard silts and clays. Hardpan
- Class 5 -- Medium dense coarse sands and sandy gravels; stiff to very hard silts and clays. Residual soils.
- Class 6 -- Loose to medium dense fine to coarse sand; Firm to stiff clays and silts.
- Class 7 -- Dense hydraulic, fill and residual soils
- Class 8 -- Loose fine sand, soft firm clays. Flood plain soils. Lake clays, adobe, gumbo & fill
- \*Class 0 -- Swamp marsh saturated silt and humus
- \*Class 0 -- Sound hard rock. See Alabama or Georgia specs.

\*Class 0 soil is not typically in the Gulf Power service area. If encountered, refer to Georgia Power or Alabama Power specifications.



Note. This is intended as a guide. Individual site conditions may vary.

SUBJECT OVERHEAD DISTRIBUTION

DETAIL SOIL CLASS ACCORDING TO HOLDING STRENGTH. DATA OBTAINED FROM THE FLORIDA GEOLOGICAL SURVEY.

Date 10/19/2007

SUPERSEDES

DATE

10/19/2007

SHEET 1 OF 1 SHEETS

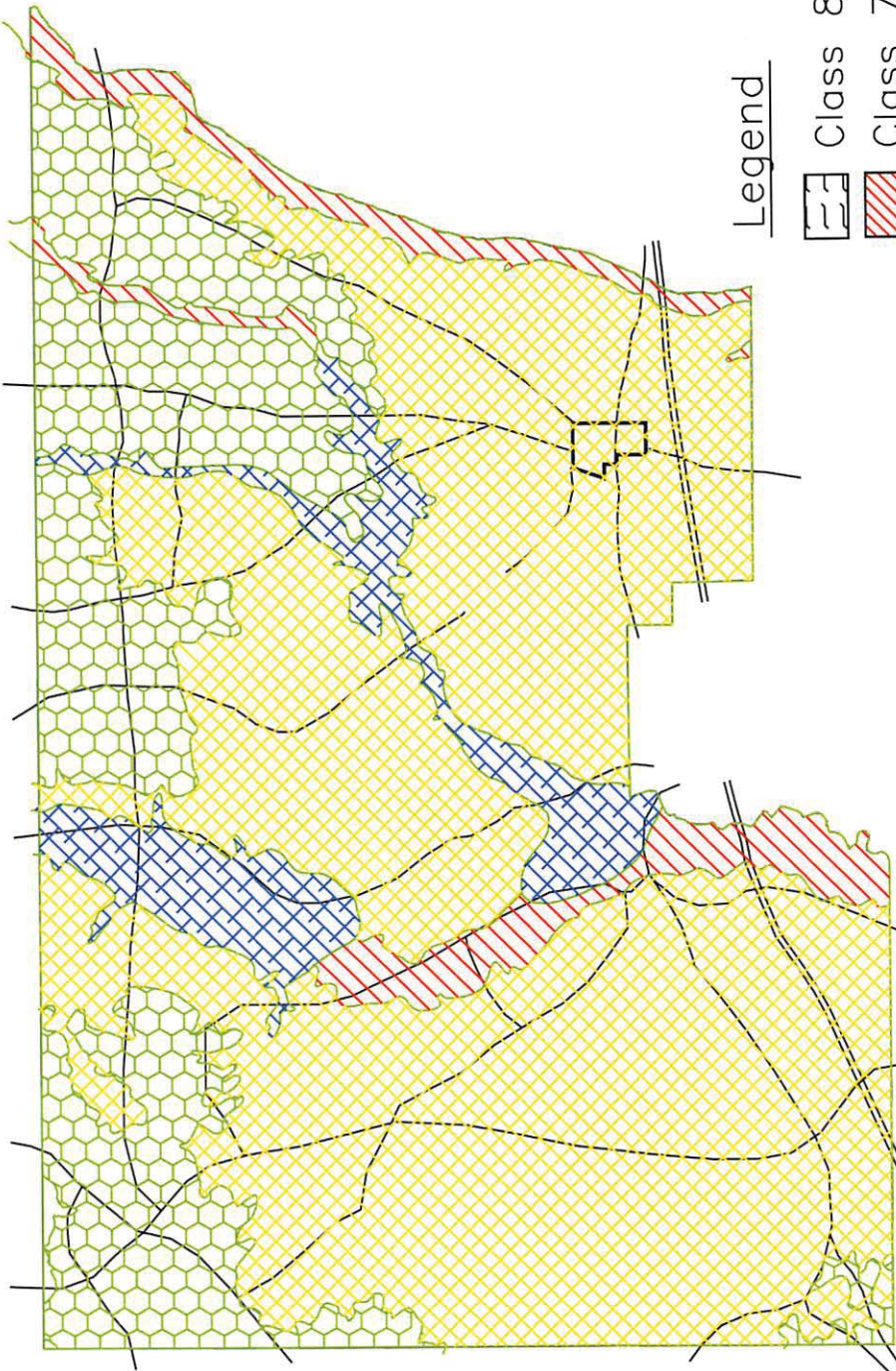


A- OZZ-II

OZZ-11

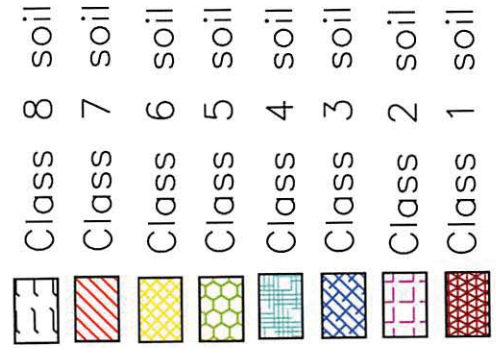


HOLMES COUNTY



Note. This is intended as a guide. Individual site conditions may vary.

Legend



- Key:**
- Class 1 --- Very dense and/or cemented sands; coarse gravel and cobbles
  - Class 2 --- Dense fine sands; very hard silts and clays, slate
  - Class 3 --- Dense clays, sands and gravel; hard silts and clays, weathered shale
  - Class 4 --- Medium to dense sandy gravel; very stiff to hard silts and clays. Hardpan
  - Class 5 --- Medium dense coarse sands and sandy gravels; stiff to very hard silts and clays. Residual soils.
  - Class 6 --- Loose to medium dense fine to coarse sand; Firm to stiff clays and silts.
  - Class 7 --- Dense hydraulic, fill and residual soils. Loose fine sand, soft firm clays. Flood plain soils. Lake clays, adobe, gumbo & fill
  - Class 8 --- Swamp marsh saturated silt and humus
  - \*Class 0 --- Sound hard rock. See Alabama or Georgia specs.

\*Class 0 soil is not typically in the Gulf Power service area. If encountered, refer to Georgia Power or Alabama Power specifications.

SUBJECT OVERHEAD DISTRIBUTION

DETAIL SOIL CLASS ACCORDING TO HOLDING STRENGTH. DATA OBTAINED FROM THE FLORIDA GEOLOGICAL SURVEY.

Date 11-27-2007

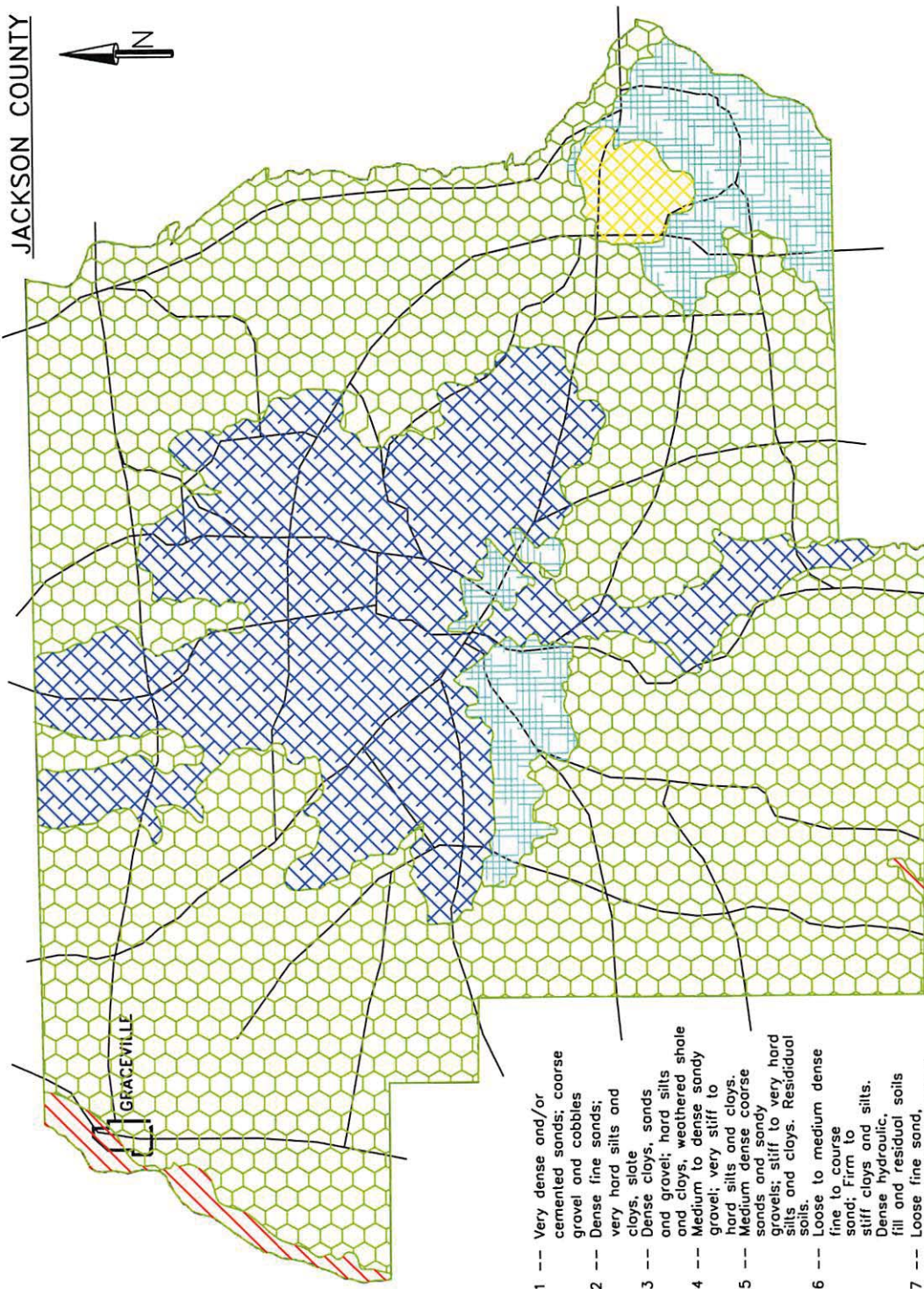
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DATE \_\_\_\_\_

SHEET 1 OF 1 SHEETS













A- OZZ-12

OZZ-12



**Legend**

-  Class 1 soil
-  Class 7 soil
-  Class 4 soil
-  Class 8 soil
-  Class 2 soil
-  Class 3 soil
-  Class 5 soil
-  Class 6 soil
-  Class 8 soil
-  Class 1 soil

- Key:**
- Class 1 -- Very dense and/or cemented sands; coarse gravel and cobbles
  - Class 2 -- Dense fine sands; very hard silts and clays, slate
  - Class 3 -- Dense clays, sands and gravel; hard silts and clays, weathered shale
  - Class 4 -- Medium to dense sandy gravel; very stiff to hard silts and clays.
  - Class 5 -- Medium dense coarse sands and sandy gravels; stiff to very hard silts and clays. Residual soils.
  - Class 6 -- Loose to medium dense fine to coarse sand; Firm to stiff clays and silts. Dense hydraulic, fill and residual soils
  - Class 7 -- Loose fine sand, soft firm clays. Flood plain soils. Lake clays, adobe, gumbo & fill
  - Class 8 -- Swamp marsh saturated silt and humus
  - \*Class 0 -- Sound hard rock. See Alabama or Georgia specs.

\*Class 0 soil is not typically in the Gulf Power service area, if encountered, refer to Georgia Power or Alabama Power specifications.

Note. This is intended as a guide. Individual site conditions may vary.

SUBJECT OVERHEAD DISTRIBUTION

DETAIL SOIL CLASS ACCORDING TO HOLDING STRENGTH. DATA OBTAINED FROM THE FLORIDA GEOLOGICAL SURVEY.

Date 11-16-2007

SUPERSEDES \_\_\_\_\_  
DATE \_\_\_\_\_

SHEET 1 OF 1 SHEETS









A- OZZ-13

**OKALOOSA COUNTY**

**Legend**



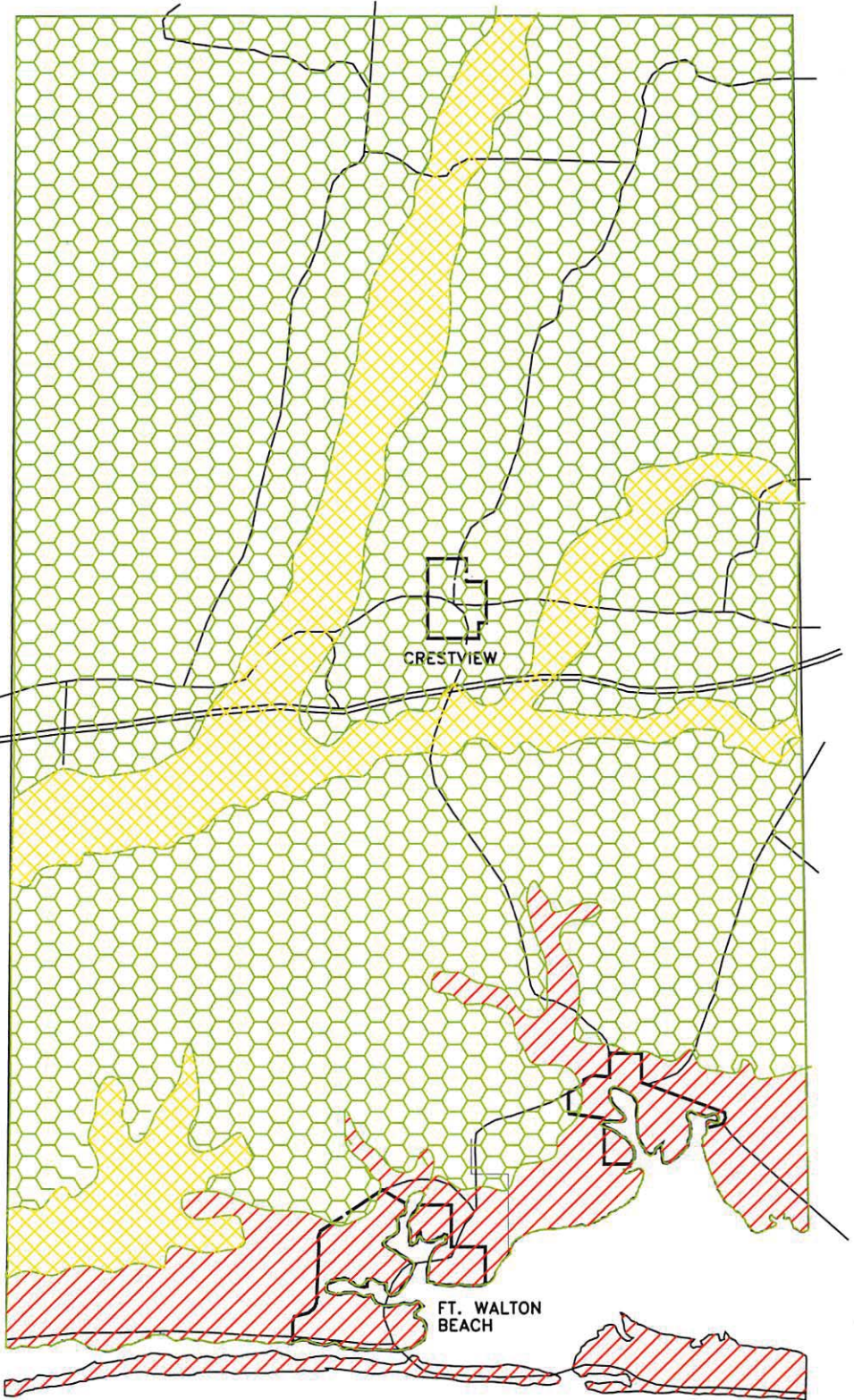
-  Class 8 soil
-  Class 7 soil
-  Class 6 soil
-  Class 5 soil
-  Class 4 soil
-  Class 3 soil
-  Class 2 soil
-  Class 1 soil

**Key:**

- Class 1 -- Very dense and/or cemented sands; coarse gravel and cobbles
- Class 2 -- Dense fine sands; very hard silts and clays, slate
- Class 3 -- Dense clays, sands and gravel; hard silts and clays, weathered shale
- Class 4 -- Medium to dense sandy gravel; very stiff to hard silts and clays.
- Class 5 -- Medium dense coarse sands and sandy gravels; stiff to very hard silts and clays. Residual soils.
- Class 6 -- Loose to medium dense fine to coarse sand; Firm to stiff clays and silts. Dense hydraulic, fill and residual soils
- Class 7 -- Loose fine sand, soft firm clays. Flood plain soils. Lake clays, adobe, gumbo & fill
- Class 8 -- Swamp marsh saturated silt and humus
- \*Class 0 -- Sound hard rock. See Alabama or Georgia specs.


\*Class 0 soil is not typically in the Gulf Power service area. If encountered, refer to Georgia Power or Alabama Power specifications.

Note. This is intended as a guide. Individual site conditions may vary.



SUBJECT OVERHEAD DISTRIBUTION

DETAIL SOIL CLASS ACCORDING TO HOLDING STRENGTH. DATA OBTAINED FROM THE FLORIDA GEOLOGICAL SURVEY.

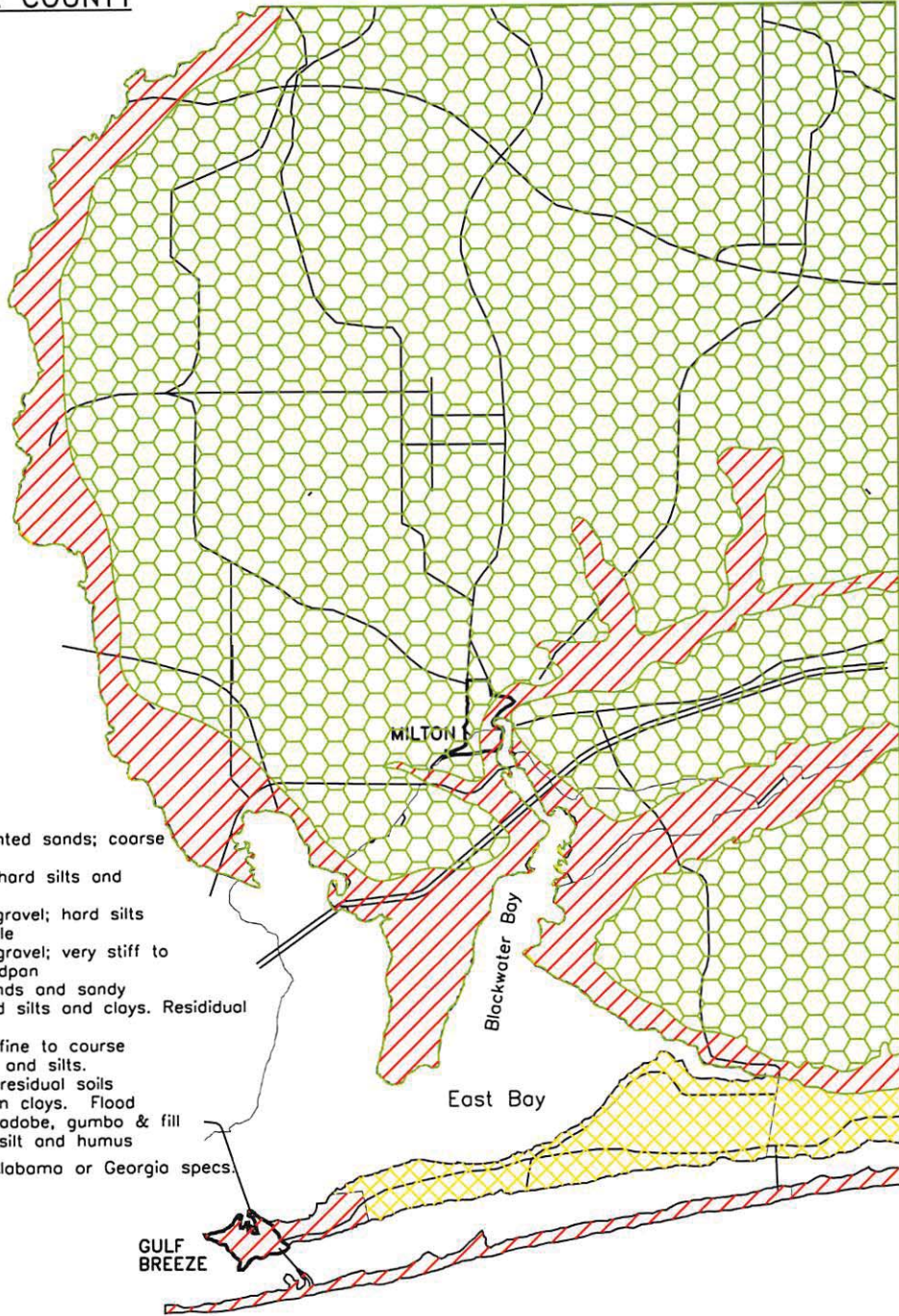
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|----------------------|------------------------------------|-----------------------------------|---|-----------|
| Date <u>10-30-07</u> | SUPERSEDES<br>DATE <u>10-30-07</u> | SHEET <u>1</u> OF <u>1</u> SHEETS | <br><b>Gulf Power</b><br><small>A SOUTHERN COMPANY</small> | A- OZZ-14 |
|----------------------|------------------------------------|-----------------------------------|---|-----------|



**SANTA ROSA COUNTY**

**Legend**

- Class 8 soil
- Class 7 soil
- Class 6 soil
- Class 5 soil
- Class 4 soil
- Class 3 soil
- Class 2 soil
- Class 1 soil



**Key:**

- Class 1 -- Very dense and/or cemented sands; coarse gravel and cobbles
- Class 2 -- Dense fine sands; very hard silts and clays, slate
- Class 3 -- Dense clays, sands and gravel; hard silts and clays, weathered shale
- Class 4 -- Medium to dense sandy gravel; very stiff to hard silts and clays. Hardpan
- Class 5 -- Medium dense coarse sands and sandy gravels; stiff to very hard silts and clays. Residual soils.
- Class 6 -- Loose to medium dense fine to coarse sand; Firm to stiff clays and silts. Dense hydraulic, fill and residual soils
- Class 7 -- Loose fine sand, soft firm clays. Flood plain soils. Lake clays, adobe, gumbo & fill
- Class 8 -- Swamp marsh saturated silt and humus
- \*Class 0 -- Sound hard rock. See Alabama or Georgia specs.

\*Class 0 soil is not typically in the Gulf Power service area. If encountered, refer to Georgia Power or Alabama Power specifications.

Note. This is intended as a guide. Individual site conditions may vary.

SUBJECT OVERHEAD DISTRIBUTION

DETAIL SOIL CLASS ACCORDING TO HOLDING STRENGTH. DATA OBTAINED FROM THE FLORIDA GEOLOGICAL SURVEY.

Date 10-26-07

SUPERSEDES \_\_\_\_\_  
DATE \_\_\_\_\_

SHEET 1 OF 1 SHEETS



A- OZZ-15



**WALTON COUNTY**

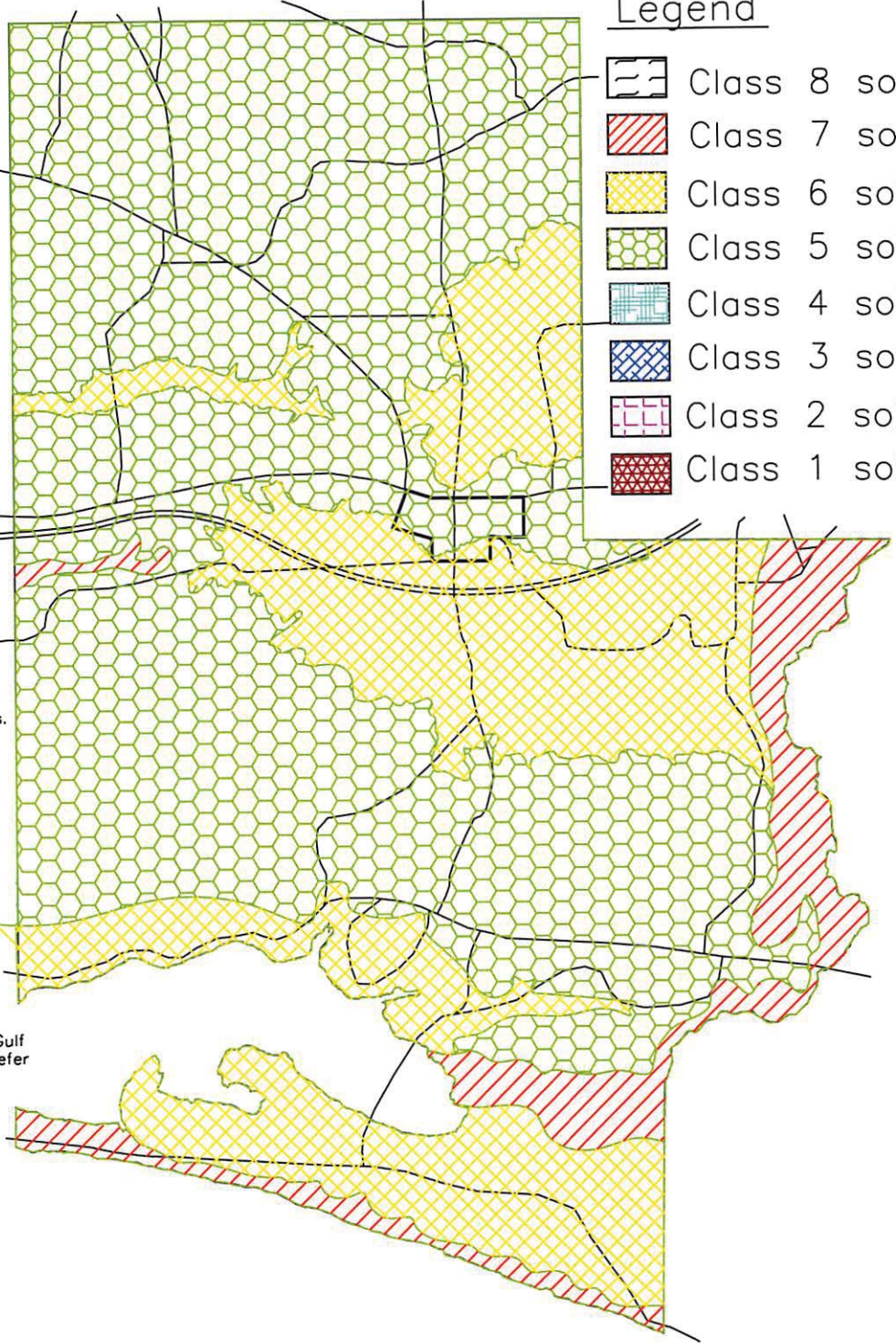


**Key:**

- Class 1 -- Very dense and/or cemented sands; coarse gravel and cobbles
- Class 2 -- Dense fine sands; very hard silts and clays, slate
- Class 3 -- Dense clays, sands and gravel; hard silts and clays, weathered shale
- Class 4 -- Medium to dense sandy gravel; very stiff to hard silts and clays.
- Class 5 -- Medium dense coarse sands and sandy gravels; stiff to very hard silts and clays. Residual soils.
- Class 6 -- Loose to medium dense fine to coarse sand; Firm to stiff clays and silts. Dense hydraulic, fill and residual soils
- Class 7 -- Loose fine sand, soft firm clays. Flood plain soils. Lake clays, adobe, gumbo & fill
- Class 8 -- Swamp marsh saturated silt and humus
- \*Class 0 -- Sound hard rock. See Alabama or Georgia specs.

**Legend**

-  Class 8 soil
-  Class 7 soil
-  Class 6 soil
-  Class 5 soil
-  Class 4 soil
-  Class 3 soil
-  Class 2 soil
-  Class 1 soil



\*Class 0 soil is not typically in the Gulf Power service area. If encountered, refer to Georgia Power or Alabama Power specifications.

Note. This is intended as a guide. Individual site conditions may vary.

SUBJECT OVERHEAD DISTRIBUTION

DETAIL SOIL CLASS ACCORDING TO HOLDING STRENGTH. DATA OBTAINED FROM THE FLORIDA GEOLOGICAL SURVEY.

Date 11-02-2007

SUPERSEDES \_\_\_\_\_  
DATE \_\_\_\_\_

SHEET 1 OF 1 SHEETS











A- OZZ-16

WASHINGTON COUNTY

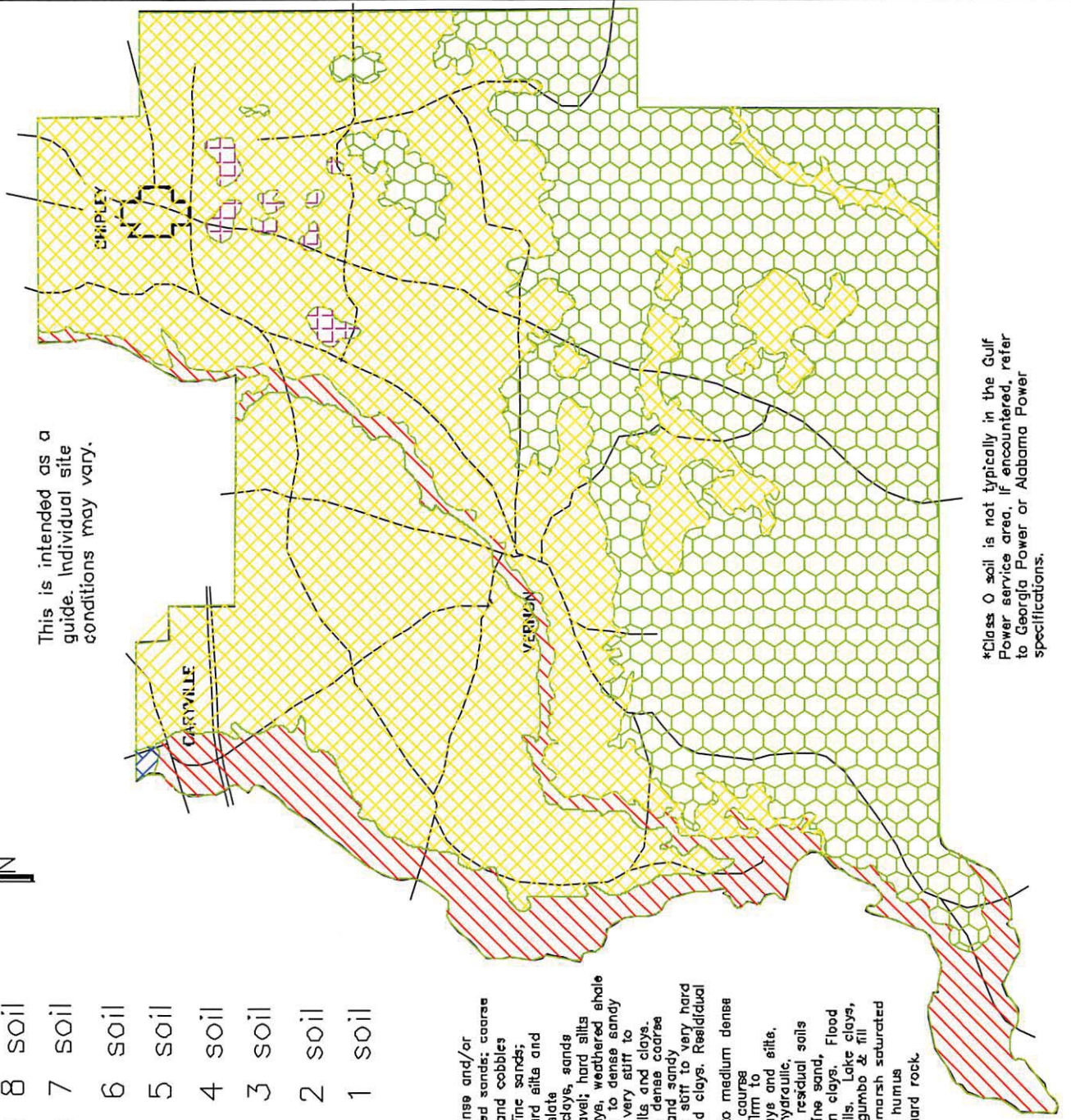
This is intended as a guide. Individual site conditions may vary.



Legend

-  Class 8 soil
-  Class 7 soil
-  Class 6 soil
-  Class 5 soil
-  Class 4 soil
-  Class 3 soil
-  Class 2 soil
-  Class 1 soil

- Key:
- Class 1 --- Very dense and/or cemented sands; coarse gravel and cobbles
  - Class 2 --- Dense fine sands; very hard silts and clays, slate
  - Class 3 --- Dense clays, sands and gravel; hard silts and clays; weathered shale
  - Class 4 --- Medium to dense sandy gravel; very stiff to hard silts and clays
  - Class 5 --- Medium dense coarse sands and sandy gravels; soft to very hard silts and clays. Residual soils.
  - Class 6 --- Loose to medium dense fine to coarse sand; Firm to stiff clays and silts.
  - Class 7 --- Dense hydraulic, fill and residual soils
  - Class 8 --- Loose fine sand, soft firm clays, Flood plain soils, Lake clays, adobe, gumbo & fill
  - Class 0 --- Swamp marsh saturated silt and humus
  - \*Class 0 --- Sound hard rock.



\*Class 0 soil is not typically in the Gulf Power service area. If encountered, refer to Georgia Power or Alabama Power specifications.

SUBJECT OVERHEAD DISTRIBUTION

DETAIL SOIL CLASS ACCORDING TO HOLDING STRENGTH. DATA OBTAINED FROM THE FLORIDA GEOLOGICAL SURVEY.

Date 11-20-2007

SUPERSEDES  
DATE \_\_\_\_\_

SHEET 1 OF 1 SHEETS



A- OZZ-17

**OZZ-17**

# APPENDIX 3

# Underground Storm Hardening

Gulf Power's Underground Distribution Facilities shall, where practical, be storm hardened to the extent practical using the methods described in this section if they are to be installed within One Mile of the Gulf of Mexico or any other large body of salt water (Pensacola Bay, Escambia Bay, Intercoastal Waterway, Choctawhatchee Bay, St Andrew Bay, etc). See Plates UZZ-2, UZZ-3, UZZ-4, and UZZ-5.

Underground circuits and feeders shall, where practical, be designed and built in the road right-of-way. In a flood/storm surge prone area, customers must install meters and metering equipment above the expected maximum flood level. Where this results in meters or metering equipment being above the standard specified heights above the ground, the customer will need to build permanent platforms and stairs to allow reading and servicing of the meters and equipment, unless the location of the equipment coincides with existing porches or platforms with ready access by Gulf Power employees. The platform must extend at least three feet out from the wall and at least 18" to either side of the metering equipment. Refer the customer to the local building inspector for other requirements for the platform and stairs.

Under normal circumstances, rear lot line construction shall be avoided and metering equipment shall not be placed on the rear of buildings.

Padmounted equipment that utilize (primary) live front connections and/or air break switches shall not be used in areas prone to flooding.

Consideration should be given to anchoring below grade boxes or vaults with pilings. See Plate UZZ-8.


Consideration should also be given to using transformer box pad in sandy or in storm surge areas. See Plate UZZ-9.

Underground feeders, especially those with large conductors (600 amp or 900 amp systems), utilizing a duct system, should be concrete encased and should be installed as far as practical from seacoasts, lakes, rivers, bays and other low lying areas to protect them from washouts and flooding. If possible the feeder should be built several blocks from these areas and the use of laterals, from the main feeder, should be used to serve the seacoast.

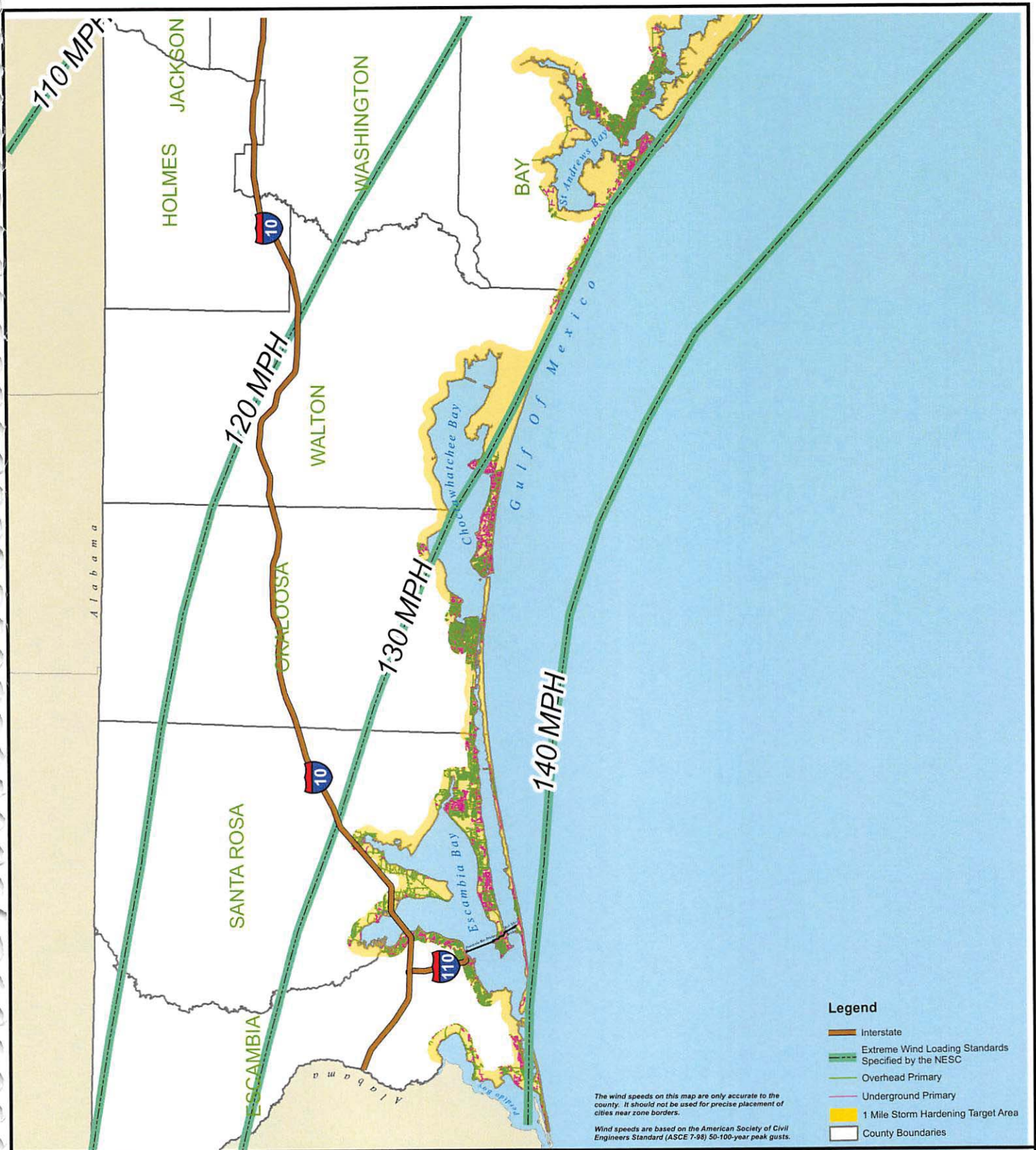
Padmounted equipment (such as transformers, pedestals, feed-thru cabinets, etc) should be located in places that naturally provide storm surge protection. Examples include: behind buildings, behind trees, high areas, etc.

3Ø transformers serving Gulf Front condo's, motels, restaurants, etc., shall, where practical, be installed on the opposite side of the building to the Gulf and as close to the center of the building as practical. The transformer should never be installed between two buildings, due to the extreme erosion of sand during a storm surge.

Where practical, underground circuits should be looped.

|  |  |                                   |   |
|--|--|-----------------------------------|---|
| SUBJECT <u>UNDERGROUND STORM HARDENING</u> |  |                                   |   |
| DETAIL <u>GENERAL STATEMENTS</u>           |  |                                   |   |
| Date <u>12-16-08</u>                       | SUPERSEDES <u>03-14-07</u><br>DATE _____ | SHEET <u>1</u> OF <u>1</u> SHEETS | <br>A- UZZ-1 |





SUBJECT UNDERGROUND DISTRIBUTION

DETAIL STORM HARDENING AREAS

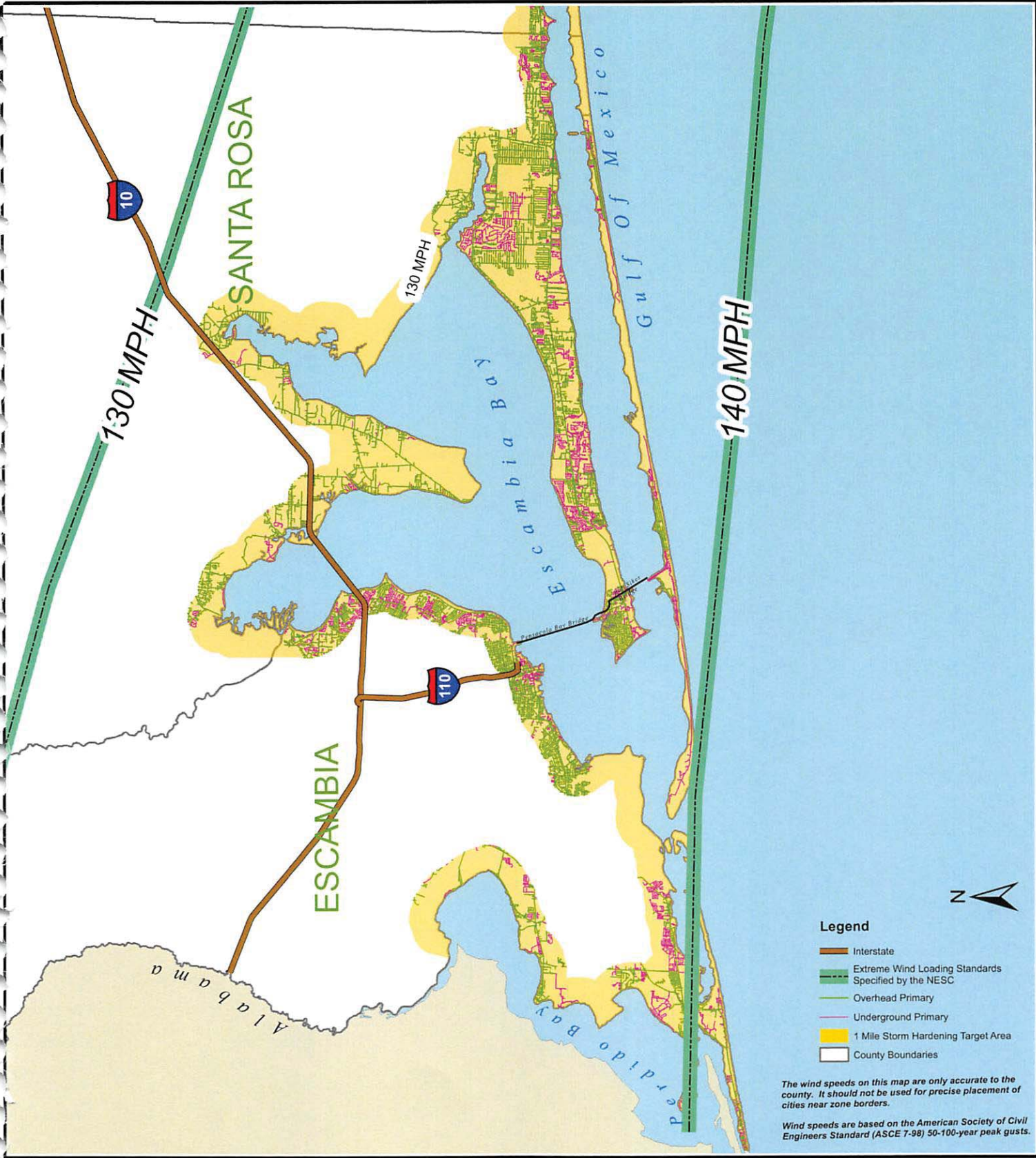
Date 3/23/07

SUPERSEDES  
DATE

SHEET 1 OF 1 SHEETS



A- UZZ-2



- Legend**
- Interstate
  - Extreme Wind Loading Standards Specified by the NESC
  - Overhead Primary
  - Underground Primary
  - 1 Mile Storm Hardening Target Area
  - County Boundaries

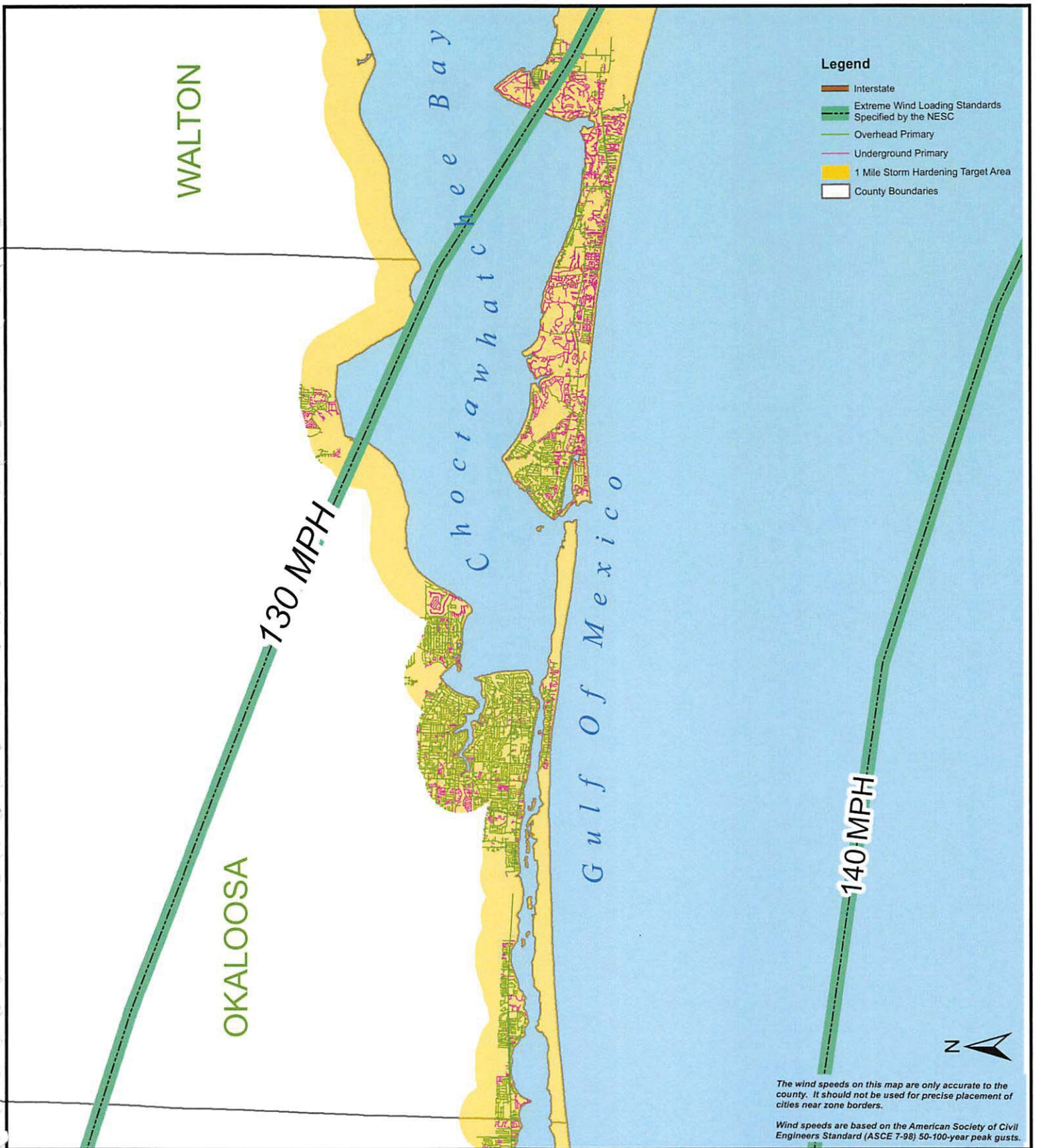
*The wind speeds on this map are only accurate to the county. It should not be used for precise placement of cities near zone borders.*

*Wind speeds are based on the American Society of Civil Engineers Standard (ASCE 7-98) 50-100-year peak gusts.*

SUBJECT UNDERGROUND DISTRIBUTION

DETAIL WESTERN STORM HARDENING AREAS

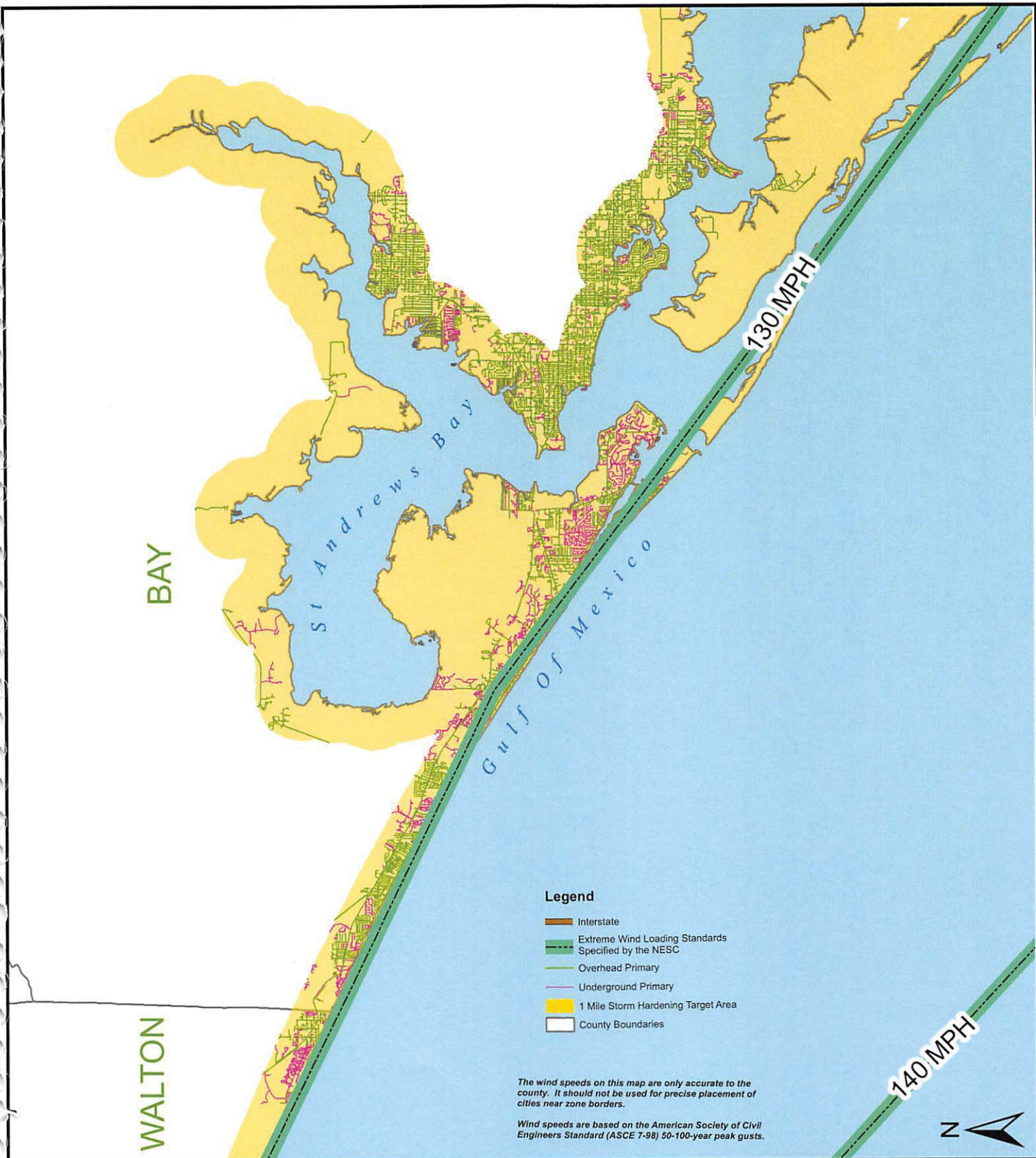
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| Date <u>3/23/07</u> | SUPERSEDES<br>DATE _____ | SHEET <u>1</u> OF <u>1</u> SHEETS | <br><b>Gulf Power</b><br><small>A SOUTHERN COMPANY</small> | A- <u>UZZ-3</u> |
|---------------------|--------------------------|-----------------------------------|---|-----------------|



SUBJECT UNDERGROUND DISTRIBUTION

DETAIL CENTRAL STORM HARDENING AREAS

|                     |                                |                                   |  |          |
|---------------------|--------------------------------|-----------------------------------|--|----------|
| Date <u>3/23/07</u> | SUPERSEDES _____<br>DATE _____ | SHEET <u>1</u> OF <u>1</u> SHEETS | <br><b>Gulf Power</b><br>A SOUTHERN COMPANY | A- UZZ-4 |
|---------------------|--------------------------------|-----------------------------------|--|----------|



SUBJECT UNDERGROUND DISTRIBUTION

DETAIL EASTERN STORM HARDENING AREAS

|                     |                                |                                   |   |          |
|---------------------|--------------------------------|-----------------------------------|---|----------|
| Date <u>3/23/07</u> | SUPERSEDES _____<br>DATE _____ | SHEET <u>1</u> OF <u>1</u> SHEETS | <b>Gulf Power</b><br>A SOUTHERN COMPANY | A- UZZ-5 |
|---------------------|--------------------------------|-----------------------------------|---|----------|

# Concrete Duct Banks



600/900 amp circuits shall be designed with concrete encased duct banks to protect against dig-ins and storm surges.

The concrete used should be 1:3:5 mix with 1/2 inch or smaller gravel or crushed stone aggregate. This mix should have a nominal compressive strength of 3000 psi. All concrete should be poured within 1-1/2 hours of mixing.

When placing concrete around the conduit adjust the delivery chute so that the fall of the concrete into the trench is as short as possible. Use a splash board to divert the flow of the concrete away from the trench sides to avoid dislodging soil.

(Con't on next sheet)

SUBJECT UNDERGROUND STORM HARDENING

DETAIL CONCRETE DUCT BANKS

Date 11-18-2015

SUPERSEDES 03-14-2007  
DATE

SHEET 1 OF 2 SHEETS



A- UZZ-6  
A

# Concrete Duct Banks (con't)

Use a vibrator (one inch maximum), slicing bar or equivalent to work the concrete down the sides of the conduit bank and between the conduits. It should be possible to see the concrete flowing along the **bottom** of the trench just ahead of the point where the concrete falls from the chute.

The trench can be back filled any time after the **concrete** has been poured and leveled. The concrete should be covered with a minimum of four inches of selected backfill. Spoils from the trench can be used for the remaining backfill.

On warm sunny days, if the concrete can not be covered immediately after leveling, one or two inches of fine soil or sand should be placed over the concrete. This cover prevents rapid evaporation of water from the surface of the concrete.

When necessary to stop construction, plastic plugs should be used to temporarily seal the conduit end against mud, dirt, and debris. If conduit is to be left uncovered over night, tie down only at one end.

Duct banks should be inspected by a **Gulf Power** representative before being covered with backfill or encased in concrete.

SUBJECT UNDERGROUND STORM HARDENING

DETAIL CONCRETE DUCT BANKS

Date 11-18-2015

SUPERSEDES 03-14-07

DATE

SHEET 2 OF 2 SHEETS



A- UZZ-7

# Anchoring Vaults



Consideration should be given to anchoring vaults/boxes with two 10' pilings.

These pilings should be installed on the front left and back right corners of the vault/box.

Pilings shall be 10' long and can be made out of 10" conduit filled with concrete or any preformed circular or square concrete at least 10" in diameter or square. After piling has been installed the area around the piling shall be filled with concrete to unitize the structure and vault/box.

SUBJECT UNDERGROUND STORM HARDENING

DETAIL ANCHORING VAULTS/BOXES

date 03-14-07

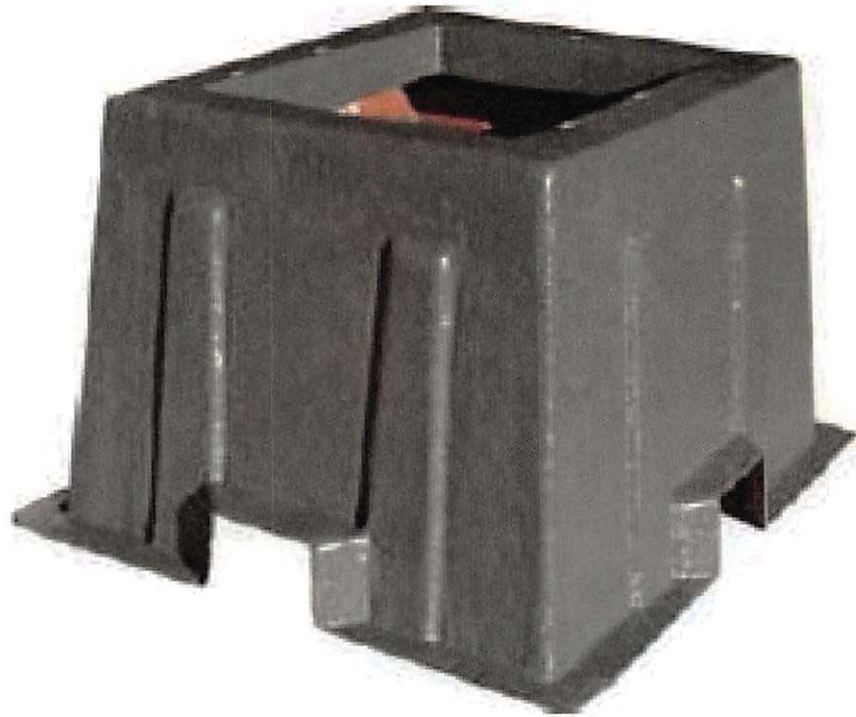
SUPERSEDES \_\_\_\_\_  
DATE \_\_\_\_\_

SHEET 1 OF 1 SHEETS



A- UZZ-8

# 1Ø Transformer Box Pad



The use of a transformer box pad instead of the traditional transformer pad should be considered in loose sandy soils that are subject to storm surges or flooding.

The use of these in subdivisions automatically makes the subdivision a 'Non-Typical Subdivision' and an Overhead to Underground Differential must be calculated.

SUBJECT UNDERGROUND STORM HARDENING

DETAIL 1Ø TRANSFORMER BOX PAD

Date 12-08-08

SUPERSEDES \_\_\_\_\_  
DATE \_\_\_\_\_

SHEET 1 OF 1 SHEETS

**Gulf Power**  
A SOUTHERN COMPANY

A- UZZ-9

UZZ-9



# APPENDIX 4

