# ENGINEERING

# 1.0 DESIGN CONSIDERATIONS

## 1.1. DESIGN CONSTRAINTS:

| Overhead | |
|---|---|
| Ambient Air Temperature | 90° F (32° C) |
| Crosswind Velocity | 2 Feet/Second |
| Emissivity Constant | 0.8 |
| Maximum Solar Heat Gain | June 21, 5:00 PM |
| Absorptivity Constant | 0.5 |
| Atmospheric Conditions | Clear |
| Altitude | 50 Feet |
| Conductor Azimuth | 0° N-S |
| Latitude | North 30° |
| **Underground** | |
| Earth Temperature | 68° F (20° C) |
| Thermal Resistivity | 90 RHO (°C-cm/W) |
| Load Factor | 75% |

**1.2. CONDUCTORS:** JEA standard design is to use 954 or 1590 ACSR conductor with a maximum final tension of 20%. Conductor data along with sag and tension data are given in the CONDUCTOR section.

**1.3. HARDWARE:** Bolt sizes are to accommodate the installation load which can be substantially higher than normal working load. Except for dead-ends and heavy angle circuits using 1590 conductor, which shall use 1" bolts, all others shall be $^{7}/_{8}$". Locknuts shall be used in all bolts on concrete and steel pole applications. Spring washers shall be used in place of locknuts on wood structures.

**1.4. INSULATORS:** All new construction shall use polymer (silicone only) insulators.

Note: INSDE002 is used only on new construction 230kV dead-ends.

INSDE003 and INSSU009 are sized to match a string of 15 porcelain insulators for maintenance of existing 230kV structures. INSDE003 is also used on new construction dead-ends for 138kV structures.

INSDE004 and INSSU008 are sized to match a string of 11 porcelain insulators for maintenance of existing 138kV structures. INSDE004 is also used on new construction dead-ends for 69kV structures.

INSDE010 and INSSU007 are sized to match a string of 7 porcelain insulators for maintenance of existing 69kV structures.

**1.5.POLES:** When possible, all new construction shall use spun concrete poles. Steel poles may be used when guying of concrete structures is not possible due to limited right of way. Class 1 wood poles may be used to replace existing wood structures when horizontal construction is necessary.

**1.6.SHIELDS:** 69kV and 138kV shall use bayonet shields while 230kV shall use Davit arms.

**1.7.MISCELLANEOUS:** Work stations shall be installed approximately 3½ feet below work areas such as insulators and shields. Consideration should be given to increasing minimum clearance to ground where future site work is possible and elevations may change such as road work.

# 2.0 POLE INFORMATION

**2.1. GENERAL:** JEA has standardized on spun concrete poles. The main reasons for this are good delivery, low cost, and high reliability. An example of reliability is Homestead Florida where hurricane Andrew hit. The only poles left standing were spun concrete – not a single one failed with over 100 installed. Furthermore, no damage was incurred by these poles which was verified when the manufacturer tested them following the hurricane and found that they tested to 150% of capacity. In some situations where right of way limitations or other factors such as weight require, JEA will continue to use wood or steel pole replacements.

**2.2. TRANSPORTATION ISSUES AND LEAD TIME:** Spun concrete poles used for transmission are very long and heavy. For this reason they have high transportation cost and can be only transported during daylight hours. Lead time from time to order is typically about 10 weeks. During emergencies they will require a minimum of 30 days due to the curing time required to insure adequate strength concrete. Because of transportation cost, manufacturers are limited to local suppliers. Current JEA suppliers are listed below.

Valmont/Newmark
Barlow, Fl.
Tommy Hanner
(727)804-9612

**APPROXIMATE POLE WEIGHTS BY LENGTH AND POLE TIP DIMENSIONS**

| | 11" tip | 13" tip | 15" tip | 17" tip | 20" tip | 22" tip |
|---|---|---|---|---|---|---|
| 80 ft | 17,000 | 19,000 | 22,000 | 26,000 | 28,000 | 31,000 |
| 85 ft | 18,000 | 21,000 | 24,000 | 28,000 | 31,000 | 34,000 |
| 90 ft | 20,000 | 23,000 | 27,000 | 31,000 | 34,000 | 37,000 |
| 95 ft | 22,000 | 25,000 | 29,000 | 34,000 | 37,000 | 40,000 |
| 100 ft | 24,000 | 27,000 | 31,000 | 36,000 | 40,000 | 44,000 |
| 105 ft | 26,000 | 29,000 | 34,000 | 39,000 | 43,000 | 48,000 |
| 110 ft | 28,000 | 32,000 | 37,000 | 42,000 | 46,000 | 52,000 |
| 115 ft | 31,000 | 34,000 | 40,000 | 45,000 | 49,000 | 56,000 |
| 120 ft | 33,000 | 37,000 | 42,000 | 49,000 | 55,000 | 60,000 |
| 125 ft | 36,000 | 39,000 | 46,000 | 52,000 | 59,000 | 64,000 |
| 130 ft | 38,000 | 42,000 | 49,000 | 56,000 | 63,000 | 68,000 |

**2.3. SIZE AND CLASSIFICATIONS:** Longer poles than listed above are available but not as single units. By splicing two units together it is possible to go up to 190 feet. Some poles have been made larger by having two splices. Based on JEA designs, poles should have a typical pole tip diameter of 17". These dimensions are larger than in the past because poles are now designed to handle the additional load of under-built distribution circuits. Some diameters such as dead-end applications may be smaller when guying is used. All spun concrete poles have a constant taper of 0.216 in/ft and are classified by strength.