

GPC Item # 170314
October 26, 2017



Gainesville's Electric System Undergrounding

GPC Meeting
October 26th, 2017

Current Status

- **GRU Electric T&D is an overhead utility like most US utilities.**
- **From Electric Light and Power 02/01/2013, “Restrictions enforced by regulatory agencies try to ensure utility customers are not unduly burdened with system improvements that benefit a limited number of customers. In addition, nearly all regulatory agencies base their standard power delivery models using overhead line construction”.**
- **The City of Gainesville Ordinances are specifically written keeping this in mind.**

Electric Distribution System

GRU_2017

- **1,226 linear miles of Overhead (48.7%)**
- **1,289 linear miles of Underground (51.3%)**
- **Nationwide: The Edison Electric Institute reported in 2015 that underground construction typically accounted for 18% of electric utility distribution infrastructure.**

Electric Distribution System

- **Estimated conversion costs of existing OH Distribution to UG**
 - **Circuit Mainlines (Backbone)** **\$227,686,390**
 - **Circuit Fused Laterals (small wire)** **\$61,170,760**
- **Maintenance Cost: Underground maintenance costs are 2-3 times the cost of maintaining overhead.**
- **Rate pressure (Tallahassee study stated at a minimum 20% rate increase for 50 years to underground system)**

Life Expectancy

- **Underground - 30 to 35 years**
- **Wood Poles - 50 to 60 years**
- **Concrete poles - 100 years**
- **Suppose we woke up tomorrow and everything was underground except one mile of wooden poles.**
- **In the next 50 to 60 years we would have replaced underground two times while the one mile of wooden poles would still be standing.**

UG Comparisons

- **There are two types of UG systems, radial and network. GRU has a radial system.**
- **A network system, while more reliable, is not economically justified until load concentration is 60 MW per sq. mile.**
- **Downtown Gainesville load concentration today is 19.1 MW per sq. mile.**
- **GRU's infrastructure in total is 2.26 MW per sq. mile.**

Undergrounding Practices

Key elements:

1. Objectives
2. Definition of Issues
3. Costs and Benefits
4. Application

Underground Practice

Objectives:

- **Assure a safe electrical distribution system for the public and our employees**
- **Economic design and construction of a reliable underground distribution system.**

Definition of Issues:

- **Cost considerations**
- **Follow City ordinances**
- **Integrity / Reliability of our distribution system**

Underground Practice

Costs and Benefits:

- Those who benefit should bear the cost
- When a project is of limited benefit to the entire community the property owners who benefit most should bear the cost which follows the City ordinances

Application:

- New Developments
- Arterial and Major Roadways
- Request to relocate, modify or remove (Including overhead to underground Conversions)

Underground Practice

New developments:

- **All new residential, commercial and industrial developments are to be served underground.**
 - (City Ordinance Section 30-345)
- **Developers and property owners to bear the cost of the required civil infrastructure.**
 - (City Ordinance Sec. 27-34, 27-35 and 27-36)

Arterial and Major Collector Roadways:

- **Follow the Florida Department Of Transportation (FDOT) Utility Accommodations Manual (UAM) and Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (Commonly known as the “Florida Green Book”).**

Underground Practice

Customer Request to Relocate, Modify or Remove Existing OH

- All costs to be borne exclusively by such customer (Ordinance Sec. 27-33).

Underground Challenges

- **There are several challenges to UG besides costs.**
- **While underground lines experience fewer outages than overhead, it is more difficult to find faults and takes longer to repair.**
- **Not valued by all customer's - Equity**
- **Number of other affected utilities/entities**
- **Easements and ROW for UG equipment.**

Underground Challenges

Estimated Cost Comparison per Mile (high level) :

- **New mainline distribution line construction**

Overhead: \$150,000

Underground: \$1,000,000 to \$1,800,000*

- **New residential distribution line construction**

Overhead: \$95,000

Underground: \$300,000 to \$500,000*

**Note: Civil infrastructure cost is the greatest variable due to limited right-of-way and physical constraints.*

Underground Challenges

Conversion Factors:

- Easements and ROW
- Civil Infrastructure costs
- Restoration costs
- Electrical Infrastructure costs
- Streetlighting costs
- Companion costs for other utilities/entities
- Conversion costs on private property

Underground Challenges

A large number of Utilities/Entities will be involved in any conversion effort. All have similar incremental costs to deal with.

- **Water/Wastewater**
- **Storm Water**
- **Electric**
- **Gas**
- **Fiber Optic & Cable TV**
- **Telephone**
- **Traffic Engineering**

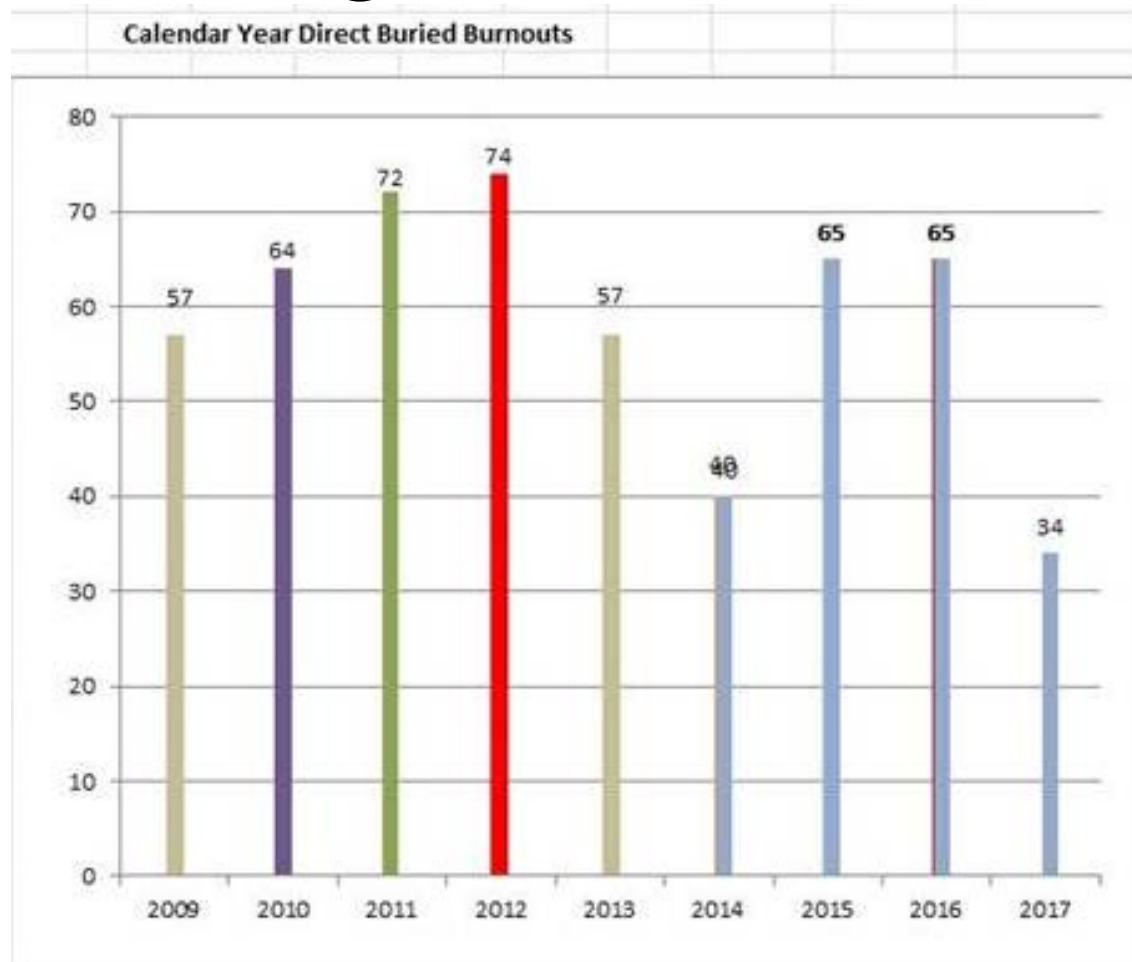
Underground Successes

- **Butler Plaza**
 - Relocation 100% Contribution in aid of Construction (CIAC) and New Customer contribution of civil work to pay for difference between OH and UG.
- **Celebration Point**
 - New Customer contribution of civil work and CIAC to convert OH to UG on Archer Rd.
- **Millhopper Rd**
 - Underground 540' section with help from FEMA Mitigation
- **The Standard**
 - New Customer contribution of civil work and CIAC to convert OH to UG on SW 14 St

Underground Reliability Programs

- **Cable Injection Project – 90% complete**
- **Subsurface Switch Gear Replacement (100% complete – May 2017)**
- **Direct buried rejected cable replacement (cannot be injected) - 72% complete**
- **Infra red inspections of switch gears and three phase transformers**
- **Secondary pedestal upgrade**
- **Maintenance/Inspection program – single phase transformers.**

Underground Failures



Opportunities

- **Continue utility proven underground preventative maintenance programs.**
- **Benchmark programs other utilities are employing to see if they can be applied at GRU.**
- **Follow successful results from fellow utilities. Larger utilities use R&D departments to experiment and find proven methods and materials. We can avoid costly research and time by utilizing their results.**



Undergrounding Gainesville!

Questions?