

**Technical Specification 035.01****ELECTRONIC MARKER BALLS FOR  
WATER AND SEWER FORCE MAINS****1.0 General**

- a) It is the intent of this specification to provide technical guidance on the proper installation of electronic marker balls for water and sewer mains sewer mains installed in the service area of the Brunswick County Public Utilities Department.
- b) The standard utility line locator material is a #12 AWG, high strength, copper clad steel conductor (HS – CC) tracer wire such as Copperhead SuperFlex, or approved equal.
- c) Electronic marker balls are also required for:
  - 1) Non-ferrous water mains and sewer force mains eight (8) inches in diameter and larger,
  - 2) Ferrous water mains and sewer force mains greater than twelve (12) inches in diameter.
- d) Contact Brunswick County for additional information and questions concerning the proper installation and required usage of electronic marker balls.

**2.0 Materials**

- a) Electronic marker balls shall be:
  - 1) Water: 3M Scotchmark Electronic Marker, model # 1403-XR, 4 – inch diameter, colored blue
  - 2) Sewer: 3M Scotchmark Electronic Marker, model # 1404-XR, 4 – inch diameter, colored green
  - 3) Reclaimed Water: 3M Scotchmark Electronic marker, model #1408-XR, 4 - inch diameter, colored purple
- b) The markers consist of a sealed shell containing a passive antenna with a low frequency resonance circuit tuned to a certain frequency depending upon the associated utility. For water and sewer systems the frequencies are:
  - 1) Water: 145.7 kHz
  - 2) Sewer: 121.6 kHz
  - 3) Reclaimed Water: 66.3 kHz
- c) The locator sends a signal to the marker, which energizes the marker, and the marker reflects the signal back to the locator. The markers are installed during new construction or repairs to system mains as specified herein.

### 3.0 Requirements for Electronic Marker Placement

- a) Electronic marker balls shall be placed at:

Tees	Bends	Repair points
Crosses	Utility crossings	Service laterals
Casing ends	Water crossings	Service stubs
Arcs	Rail crossings	

and at all changes in pipe diameter.

- b) Refer to the Brunswick County *Electronic Marker Ball Placement* Standard Detail.

### 4.0 Electronic Marker Installation, Spacing, and Depth

- a) Minimum depth of burial: 18 inches
- b) Nominal depth of burial: 24 inches
- c) Maximum depth of burial: 48 inches
- d) Minimum height above the main: 6 inches
- e) Minimum distance between markers: 3.5 feet
- f) Nominal distance between markers: 100 feet
- g) Maximum distance between markers: 200 feet
- h) On bends and lateral pipe deflections place one marker ball every (25) feet
- i) Markers to be installed above any installed main marking tape
- j) Refer to the Brunswick County *Electronic Marker Ball Placement* Standard Detail.