



# Construction Guidelines

for Providing Communications Services



# TABLE OF CONTENTS

## Residential

Home Wiring.....	Page 3
Pre-Construction Checklist.....	Page 4
Line Extensions.....	Page 4

## Mobile Home Parks

Basic Requirements.....	Page 5
-------------------------	--------

## Subdivisions/Parcel Divisions

Basic Requirements.....	Page 6
-------------------------	--------

## Trenching

Basic Requirements.....	Page 7
-------------------------	--------

## Examples of How Citizens Handles Buried Telecommunication

### Drop Applications

Example A.....	Page 8
Example B.....	Page 8

## Customer Responsibilities for Communication Facilities on Drop Applications

Multi-Residential and Commercial Service Requirements.....	Page 9
Inside/Outside Telephone Transition Boxes.....	Page 10
Multi-Residential and Commercial Inside Protection.....	Page 10

## Glossary of Common Telecommunication Terms.....Page 12

## Call Before You Dig.....Page 14



Citizens Telephone Cooperative is pleased to provide this guide as a tool to help you plan for communications services. The information contained in this guide is intended to supplement the requirements of the National Electrical Code, the National Electrical Safety Code and all other applicable Federal, State or Municipal laws, codes, regulations or ordinances in place at the time of construction.

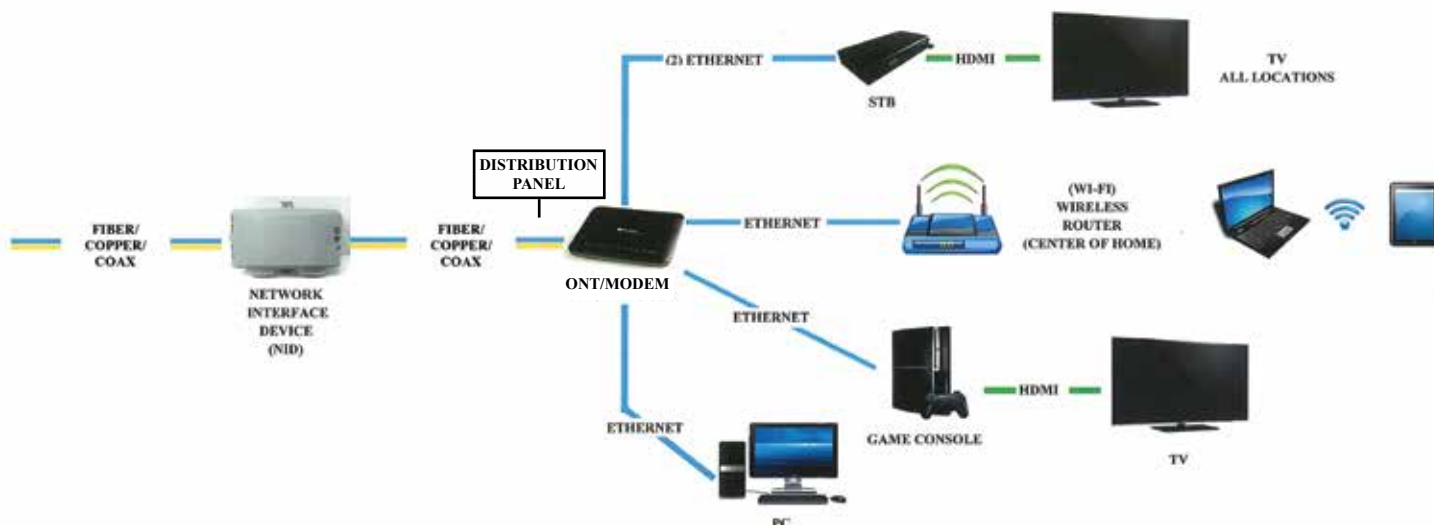
If we can answer any questions for you as you plan your communications construction project, please call us at 540-745-2111.

**Citizens Business Office**  
540-745-2111 | 276-637-6485 | 800-941-0426

**Citizens Engineering Department**  
Russell Janney, Bob Miller and Eddie Bower  
540-745-2111

# Home Wiring

The communications industry is changing rapidly and new technologies are constantly being implemented. Citizens want to ensure that your communications needs are met during the construction of your next home or development. It often happens that homeowners become frustrated when they find out that the home they have just purchased or built was not wired with enough facilities to meet their needs. Retrofits can become costly.



**Smart Wiring** is a term that implies wiring a premise for not only today's needs, but also planning for future requirements and can consist of copper wiring, fiber optics or a combination of both.

**Smart Wiring** is a two-stage process. The first stage is the delivery of the service to the home and the second stage is how the home itself should be wired.

1. **Delivering service to the home** - Citizens will provide a direct buried cable from our pedestal on the roadway to the house either by coordinating to use a joint trench with other utilities or independently placing a cable to a location near the power meter on the home. We will mount the NID (Network Interface Device) or a fiber transition box outside the home near the electrical meter to allow for proper grounding for the integrity of the network.

The distribution panel lies at one end of the wiring run and the wall jack lies at the other end. We recommend that multi-port jacks are installed to allow independent modules for voice, data and video. Use a separate cable pull (CAT5E/6 wiring) for each jack, even in a multi-port jack.

2. **Routing within the home** - From the distribution panel, independent Cat5 E/6 wires should be run to each jack throughout the home. Independent wiring runs are important because they allow for data, voice and video to be separated if needed and provide the infrastructure for home networking. **Home Networking is important; daisy chained wiring will not support data, or video applications.** Approximately 80% of homes in the U.S. use computers and wireless devices, and they are used in multiple rooms throughout the home. This wiring scheme will allow multiple devices to be online at the same time.

If you wish to further future proof the home, then either install conduit in the walls for future cable pulls or install fiber (single mode). Most devices today will not be able to connect directly to fiber; however, that is not far off.

We would be happy to assist you with the planning of the wiring scheme in your home. Please give our Engineering team a call at 540-745-2111.



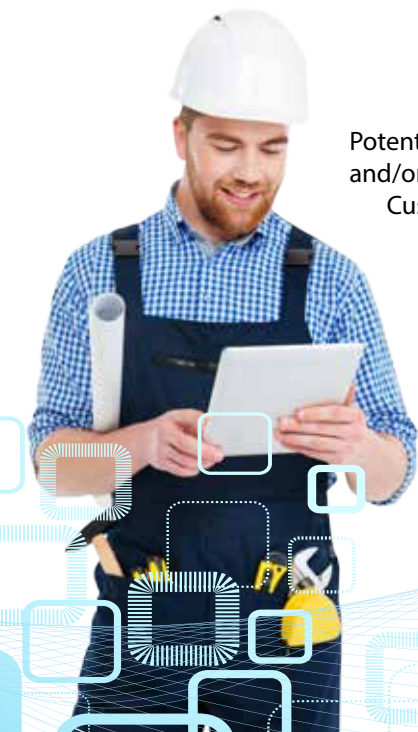
## Pre-Construction Checklist

**Here is a basic checklist to help in your planning and construction. If you need help or further information, we will gladly meet with you to review your project details.**

1. Notify Citizens as soon as your home is ready to have a wire drop placed. Citizens requires four to six weeks advance notification.
2. Apply for your Citizens services as soon as possible so that we can work to accommodate your construction schedule.
3. Please advise us in advance of any proposed open trenches so we may attempt to coordinate, if feasible, our service drop placement. The customer is responsible for maintaining an "Accessible Driveway" with enough clearance for Citizens' service vehicles. "Accessible Driveway" means accessible by car, truck, van or utility vehicle; clear of debris, gullies, standing water or other hazards.
4. Upon request, Citizens will provide a cost estimate for the installation of necessary infrastructure for communications services. The homeowner is required to mark and identify private buried utilities including, but not limited to water, sewer, gas, electric and sprinkler systems.
5. In order to ensure proper bonding requirements, per the NATIONAL ELECTRICAL CODE, we ask that the service location for the Network Interface Device (NID) coincide with the power meter location or the MGN location.
6. If you have requirements for multiple services, please notify us at the time of your application to be sure that our Engineering staff plans your facilities appropriately.
7. If you plan to install sidewalks or driveways through the proposed communications equipment route, the placement of the proper size of conduit will help assure fast and easy replacement in case of problems.
8. We require separation from other services in trenches as well as a minimum depth. All trenches should provide a minimum of 12" (cover to final grade) for drop applications.
9. Category 5 (CAT5) wiring should be used as a standard to ensure acceptable data transmission levels.
10. Please attempt to identify future requirements as what is acceptable today may not be adequate tomorrow.

## Line Extensions

Potential customers requesting services beyond Citizens' physical cable may be required to contribute to and/or pay the actual cost of extending the facilities necessary to provide service. Please contact Citizens Customer Care at 540-745-2111 with questions.



## Basic Requirements



1. Any rearrangement of spaces or expansion of the Mobile Home Park requiring additional communications facilities should be coordinated with Citizens' Engineering Department. A copy of the drawing or plat that shows the rearrangement or expansion should be made available to the Engineer.
2. Citizens tries to avoid performing any excavation within a mobile home park so as not to incur any liability for damage to the complex structure of underground utilities.
3. Park owner will be required to locate and identify private utilities located within the park.

Citizens reserves the right to refuse service if it is determined that conditions exist which pose a threat to its employees' safety.

## Basic Requirements



1. A subdivision is a parcel of land that is being divided into four (4) or more lots and developed for individual use.
2. Land developers and private landowners who are considering development or subdivision of a parcel of land should contact Citizens to schedule a meeting with an Engineer.
3. The developer will provide Citizens with a plat map and a development schedule as early as possible in the project. The developer will also provide Citizens the proposed layouts from other utilities as they become available.
4. It is the responsibility of the developer to provide the required utility easements.
5. All of the final elevation grades, property corners, lot lines, curbs and street lines must be clearly established prior to trenching to confirm utility placement location.



## Basic Requirements



1. The trench should be at least 12" inches in width and be in stable condition. The trench will also be a minimum of 30" inches deep for main cable applications.
2. All trenches will be opened at one time so the utilities can be placed in one trip. If additional trips are required due to unavailable trenches, they will be at the developer's expense.
3. All trenches will be clean and ready for utility placement. If the power company will be using the same trench, an 18" inch separation will be required.
4. The developer will have personnel on site during the installation to help maintain a clean trench and provide additional digging if required for placement of communications cabling.
5. If any lot line adjustment or conflicts arise that require Citizens to relocate our facilities, the developer shall be responsible for all costs unless they are offset by other considerations.

## Customer Responsibilities for Communication Facilities on Private Property

The owners of all business complexes and apartment buildings (4-plex and larger) are required to provide a supporting infrastructure. Citizens engineers will perform an on-site survey to determine the location of the infrastructure from the property line to the building. The size of the conduit used will be based upon current and future anticipated line requirements. Conduit type will be Schedule 40 PVC (or equivalent) with a 2 inch minimum diameter. The minimum radius for conduit sweeps should be 24 inches and there should be no more than three (3) 90° bends through the total run of the conduit. Conduits over 300 ft with more than 3 sweeps will require a utility box (min. 17"x 30") to aid in facility placement. A ¼ inch pull rope must be installed end-to-end inside the length of the conduit. Citizens requires a 30 inch cover over the supporting infrastructure with a 6 inch shading of fine material (free of rocks) at the bottom of the trench. The trench must be backfilled and compacted. Please contact the Citizens business office to schedule a visit from an Engineer.

### Examples of How Citizens Handles Buried Telecommunication Drop Applications



#### EXAMPLE A

*This is an example of a customer owned and maintained extension. A new buried extension is desired for another structure on the same property for the same telephone number.*

Citizens will place the extension on a Time and Material basis from the existing N.I.D. to the second structure. After installment, customer is responsible for maintenance of extension cable.

#### EXAMPLE B

*A temporary construction trailer is placed by a contractor. The contractor wants a telephone number that is different from that of the permanent resident.*

A buried drop is placed to the temporary structure on a Time and Material basis. Charges will include **both installation and removal costs.**

If the resident moves from a temporary dwelling to a permanent structure on the same property, Citizens will place a buried drop to the permanent location once a support structure is in place.

**Note:** If drop (distance) exceeds 1,000 feet and Citizens' average drop distance, aid in construction may be charged. Contact Citizens for full details and custom quote.



# Customer Responsibilities for Communication Facilities on Drop Applications

## MULTI-RESIDENTIAL AND COMMERCIAL SERVICE REQUIREMENTS

### CHECKLIST

#### Network from Street Access Point to Main Building

1. Schedule 40 PVC (or equivalent conduit min. 2" diameter).
2. Conduit placed from property line to location outside or inside building with access to power company ground (MGN).

### CHECKLIST

#### Customer's Network Inside Buildings and Between Buildings

1. Schedule 40 PVC (or equivalent) conduit sized per building requirements.
2. A multi-unit business complex will require conduit from each unit back to a central equipment room location.
3.  $\frac{3}{4}$ " AC plywood backboard installed. (Backboard dimensions to be determined by Citizens' Engineer at time of on-site visit after customer's requirements have been determined.)
4. #6 ground wire to be provided by building owner from power company ground (MGN) to the backboard.



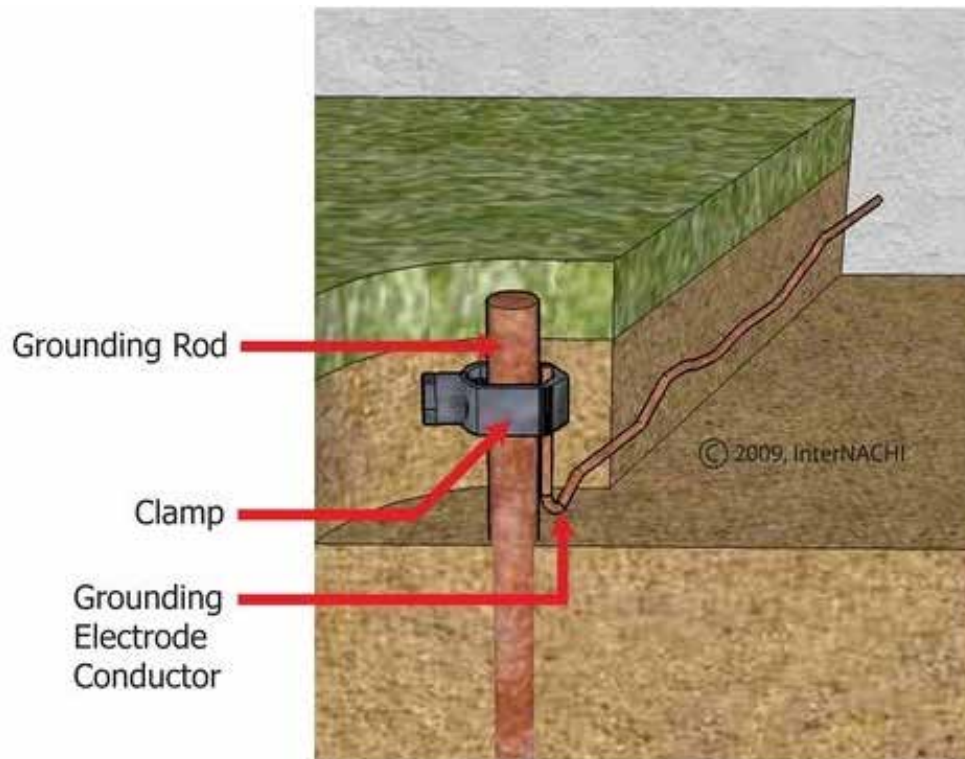
### **INSIDE/OUTSIDE TELEPHONE TRANSITION BOXES**

The service entrance location must be approved by the Engineering Department at Citizens. The location should be as close as possible to the electrical service entry point (power meter base) to accomplish bonding to the power ground electrode.

### **MULTI-RESIDENTIAL AND COMMERCIAL INSIDE PROTECTION**

The location of the service entrance must be approved by Citizens' Engineering Department. To insure quality of service, we would prefer that the location be accessible 24 hours per day. For service entrances located inside, the owner will provide a #6 copper ground wire from the power company ground electrode to the Communications Interface Backboard to allow for proper bonding of Citizens equipment. If the N.I.D. or Transition Box is located on the outside, it should be near the electrical service entrance and the power company ground electrode must be easily accessible from the outside to allow for proper bonding of Citizens equipment.

## Citizens Grounding Requirements



Citizens requires all customers to provide access to the power ground or grounding system of the structure where service is terminated. This location is typically beside the power meter base. Citizens will attach a ground / bonding conductor to existing ground rod, ground bar or provided bonding jumper / conductor, we will not attach to or inside of any power boxes or cabinets. It is required by the NEC (National Electric Code) that all Communications Circuits (telephone), Community Antenna Television (Cable TV) and Network-Powered Broadband Communications Systems (DSL and IP TV) to be bonded to the grounding system of every structure. These requirements and many more can be found in Articles 800,820 and 830 of the National Electric Code. If you have questions or concerns about what we are requiring, please contact your electrician, building official or schedule a Citizens technician/engineer to look at your specific location. The purpose of this requirement is to minimize the chances of potential damage to people, property and equipment.



# Glossary of Common Telecommunication Terms

## Backboard

$\frac{3}{4}$ " thick AC plywood board used by the telephone company for configuring the building terminal and Inside Wire at the customer's site. The size of the C.P.E. backboard depends upon the requirements of the customer. A Citizens Engineer will make this determination at the time of the site visit.

## Conduit

A supporting structure that is used to connect communications cabling from one location to another. A C.P.E. conduit is installed from the property line (at a location closest to Citizens' buried cable pedestal or pole) to the customer's building. During construction of a new building or installation of upgrades to the present telephone service (to provide greater capacity), the customer will place the conduit.

## C.P.E. (Customer Premise Equipment)

Conduits, ground wire, backboards, telephones, facsimile machines, computers with modems, inside wiring, etc.

## Demarcation (DEMARC)

The point that marks the separation of responsibilities between the telephone company and the customer. This point is generally defined as the telephone company's N.I.D. (network interface device).

## IW (Inside Wire)

C.P.E. materials that are placed between the N.I.D. and the RJ11 jack where the telephone equipment is connected. Inside Wire (IW) is available in many sizes and may be purchased from Citizens or an electrical supply store. Citizens' standard is Category 5 (CAT5) wiring.

## MGN (Multi Grounded Neutral)

The common ground point which is established by an electrician at the entry point of the electrical service to the building (power meter base).

## N.I.D. (Network Interface Device)

A device installed by the telephone company that is accessible 24/7 and provides grounding protection and access for testing by the customer and the telephone company.

## Electrical Service Entry Point (Power Meter)

A location where the local power utility provides metering for electrical service to the premises. Citizens chooses this location over others to bond their equipment to the power company's multi-grounded neutral.

## Pull Rope

A C.P.E. line,  $\frac{1}{4}$ " in diameter used to pull the communications cabling through the C.P.E. conduit.

**RJ11 Jack**

The most commonly used type of connectors in the communications business. Most single line telephones plug into this type of jack.

**Service Drop**

The buried or aerial facility between the main cable and service location.

**Support Structure**

A customer-provided access on private property (conduit, trench) used for providing communications facilities.

**Telephone Pedestal**

The housing used by the telephone company as a connection point between the main buried cable and the service drops. Pedestals are usually green in color.

**T & M (Time and Materials)**

Service provided that includes charges for materials and labor.

**Warning Tags**

Labels that are attached to the ground wire at the N.I.D. and at the power company's ground locations (generally at the power meter).

**Line Extension Charges**

When it is necessary to extend existing facilities to serve a new customer or customers, the first 1,000 feet of the extension will be made under normal service connection charges quoted within our existing tariff. The customer may pay the total cost of the distance beyond 1,000 feet and supply the poles and/or trenching and associated labor. Citizens will provide the cable and/or conduit at no cost to the customer.

We strongly advise the builder/developer to have a section on the blueprints dedicated to telecommunications infrastructure, separate from the electrical blueprints. For MDUs (multi dwelling units) we encourage the developer/builder to contact us before construction is started to discuss best ways to ensure that your tenants have quality telecommunication services.

# Call Before You Dig

Virginia law holds the customer responsible for damage to underground cable (electric and telephone) if they have not contacted **VA811** to mark the location of their underground lines before digging.

**1-800-552-7001 or Dial 811**

