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1. Q. What is undergrounding?

- A. Undergrounding is the act of replacing a system of overhead wires with an equivalent system of underground cables that are pulled through buried plastic pipes. As part of AmerenUE's initiative called Project Power On, we are investing \$300 million to underground those lines that have proven most susceptible to outages, particularly during storms.

The photos show examples of spans of AmerenUE overhead wires. Generally two to six wires are supported by a pole. The "high voltage" wires are those highest on the pole, while the "low voltage" wires are situated below them.

Overhead wires like these represent some of the greatest threats to electric service reliability, especially in heavily treed areas. If a tree or limb makes contact with or damages any of these wires in any location along their route, customers by the dozens (or hundreds) could lose their electric service. For this reason, the spans of wire from pole to pole are the primary focus of AmerenUE's Power On undergrounding efforts. And because electricity travels a great distance to reach your house, undergrounding projects that are blocks or even miles away from your home can still improve your service reliability.



2. Q. How does the undergrounding of overhead wires help improve reliability?

- A. Most of the power outages experienced during severe weather are due to trees or tree limbs falling onto the lines. This can cause the wires themselves to break or even cause nearby poles or equipment to fail. Undergrounding overhead electric lines drastically reduces the exposure of these wires and equipment to the effects of trees, wind, ice and other severe weather conditions, thus reducing the number of outage events. It is important to understand, however, that no level of undergrounding will completely eliminate outages.

3. Q. How does replacing existing underground cable in a subdivision help improve reliability?

- A. The type and vintage of underground cables, along with the physical conditions in which they exist and operate, are factors in how reliably they supply electricity to customers in residential subdivisions. Given the updated technology available with AmerenUE's new cables and improvements that have been made in how they are installed, the replacement of existing underground cables (especially those that have been repaired many times over) can help reduce the number of power outages due to cable failures.

4. Q. How does installing more cable in an already underground subdivision help improve reliability?

A. When AmerenUE serves a new underground subdivision in Missouri today, we do so with two separate lines that can be connected together and switched back and forth when one of them fails. However, some older underground subdivisions have only one line serving them. When outages occur in these locations, we are unable to switch to an alternate line, and power can't be restored until the actual damage is repaired. By having a second underground supply available in these subdivisions, the duration of outages can be significantly reduced by merely switching affected customers to it and repairing the damage later. With the Power On undergrounding, subdivisions without alternate underground supplies are being considered for the additional cabling necessary to provide alternate supplies.

5. Q. How does undergrounding an overhead line that is not in my neighborhood help reduce my power outages?

A. Electric power lines operate in a similar manner to the electrical wires in your house. The wires in your house are located in the different rooms in order to supply electricity to them, and they all come together at the "fuse" or "circuit breaker" box. When a problem occurs in one room of the house, the fuse or circuit breaker "trips," interrupting power to perhaps a number of different rooms, while allowing power to continue in the rest of the house. Similarly, AmerenUE's power lines come together at main lines that have their own fuses or circuit breakers. When an overhead line is damaged due to trees limbs falling onto it, this causes the fuse or circuit breaker to "trip," interrupting power to customers not only on that damaged section, but to all customers "downstream" of that fuse or circuit breaker. Undergrounding the overhead lines in a particular area will not only reduce the number of outages to the customers in the immediate vicinity, but also to all those customers "downstream" of the fuse or circuit breaker.

6. Q. Why must some of the equipment in an underground system remain above ground?

A. The installation of buried plastic pipe and underground cable is what makes the removal of poles and wires possible, and the new cable is not visible after it's been installed. Some undergrounding equipment, however, has to remain above ground so AmerenUE personnel can have access to critical components. For example, transformers and switch cabinets need to be accessible to crews at ground level for timely maintenance, outage repairs, re-routing power, and other tasks.

7. Q. What is UE's inspection program for underground electric facilities?

A. In 2008, the Missouri Public Service Commission issued reliability rules for investor-owned public utilities that require inspecting infrastructure, including underground facilities. As part of this program, UE is visiting the property of many of our customers to inspect our underground equipment. The most commonly inspected equipment will be pad-mounted transformers. UE is conducting two types of inspections—a patrol inspection completed every four years is a simple, visual inspection designed to identify obvious problems and hazards. A detailed inspection, completed once every eight years, will carefully examine individual pieces of equipment and structures, visually and through use of routine diagnostic testing. Equipment will be opened and its condition rated and recorded. Here are the [guidelines](#) for this program.

8. Q. What does an underground system look like?

- A. The most common components of an underground system that are above ground and visible to the eye are **padmount transformers, service pedestals** and **terminal poles**.

Transformers are devices that take the high voltages on AmerenUE's spans of overhead wire and reduce them to the safer, more usable levels that are seen inside homes and places of business.

An **overhead transformer** (right photo) is a gray cylindrical-shaped metal "tank" that is fastened to the pole and has several overhead wires connected to it. During a Power On undergrounding project, the overhead transformers will be removed along with the spans of wire from pole to pole.

The underground equivalent of this is the **padmount transformer** (photo below), a "forest green" colored box. In residential areas, the transformer's dimensions are roughly 32" tall x 34" wide x 34" deep. All cables come into the transformer from below ground, and all the connections are made inside and kept out of view.



The locations of padmount transformers need to be close enough to streets, parking lots or other "improved" surfaces so that installation and maintenance can be performed using trucks sitting on those surfaces. In residential areas, this places the transformer in front, roughly 15 to 20 feet from the street. It is usually installed along the property line between adjacent lots. This location will help prevent damage to private property by heavy equipment.

The photo at right shows how a set of low voltage **overhead connections** appears on a pole. These connections are necessary to distribute the low voltage lines from a single overhead transformer to each home and business that it serves.

The underground equivalent of this is the **service pedestal** (photo below). The service pedestal is a heavy plastic "forest green" colored column roughly 18" in diameter and buried a foot into the ground. With the protective cover attached on top, the pedestal stands about 18" tall. All cables come into the pedestal from below ground, and all the connections are made inside and kept out of view.

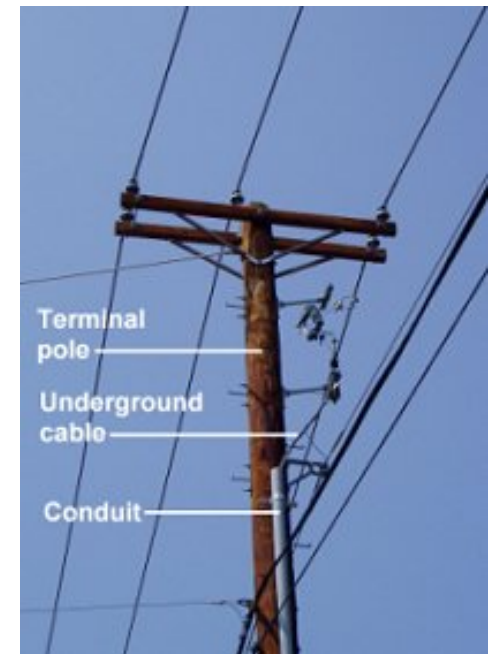


Because of their small size and weight, service pedestals do not have to be located close to streets or "improved" surfaces as padmount transformers do. Generally, a service pedestal needs to be located within 5 to 10 feet of the pole that has the overhead connections being undergrounded.

In many residential areas, the overhead wires are located in the rear of lots. When these wires are undergrounded, the service pedestal is placed in this area as well. Service pedestals are often located along property lines between adjacent lots.

With underground installations, there is usually a location where a physical transition is made from the overhead lines to the new underground cables. This transition is made on a **terminal pole** (photo at right). Notice the cable is connected to one of the overhead wires and heads down into a heavy gray plastic pipe or **conduit**. The conduit runs the length of the pole and straight into the ground.

Terminal poles will be standard additions in most Power On undergrounding projects and will be seen at or near the construction project boundaries.



9. Q. Why is AmerenUE installing its new underground systems in front lots? Why not place them in the back yard where the overhead poles were?

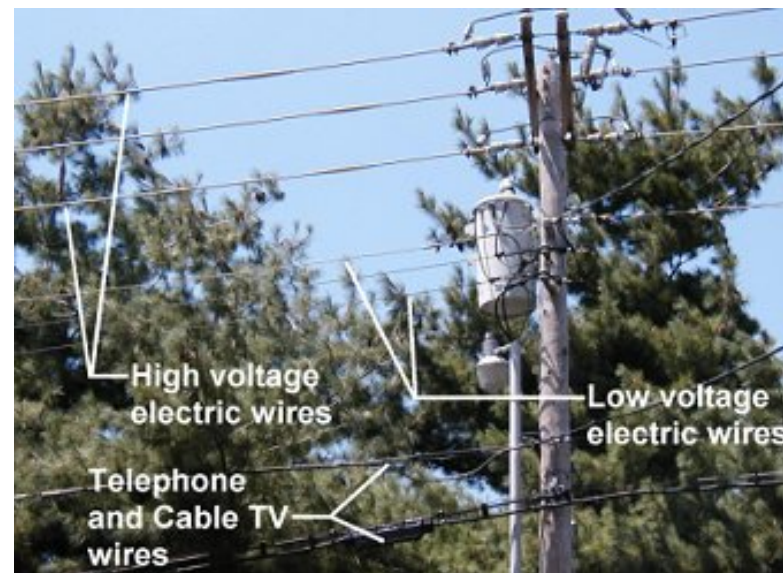
- A. Accessing the rear of customers' properties with large construction equipment is extremely difficult in mature, well-established yards. Swimming pools, detached garages, locked gates, dogs and landscaping are just some of the obstacles that can be encountered. Placing the new underground facilities in the front eliminates these issues and gives AmerenUE crews better truck access to equipment, which means less damage to private property and faster restoration times in the event of an outage. Installations in brand new developments all over Missouri are built this way for precisely these reasons.

10. Q. What happens to the telephone and cable TV wires on the poles?

- A. Most of the poles in Missouri with AmerenUE wires and equipment on them are owned by AmerenUE. The remaining poles are owned by telephone and cable TV companies. Regardless of the pole ownership, **overhead telephone and cable TV wires** are always attached at the pole's lowest point (right photo).

While AmerenUE will proceed to remove and underground its overhead spans of wire, we cannot force the other utilities to do the same—even if AmerenUE owns the pole.

When AmerenUE finds other utility wires on the poles we intend to vacate, we will contact the other utilities and invite them to underground their lines at the same time. If they elect not to underground with us, then the tops of those poles that no longer carry our power lines will be cut off so that they stand only as tall as needed for the other utilities. The maintenance of these pole "stubs" will become the responsibility of these other companies.



11. Q. Why would some poles have to remain after an overhead line is placed underground?

- A. There are several reasons why poles may have to remain after the power lines on them are placed underground:
- Some customers are paying for Dusk-to-Dawn lights that they want to retain for the benefits they provide, so those poles would have to stay.
 - Some customers with overhead service wires to their homes will choose not to have those wires converted to underground even though AmerenUE is undergrounding its spans of wire from pole to pole. The individual poles that these overhead service wires are connected to will have to remain for those customers making this choice.
 - There are many poles in Missouri supporting not only electric lines but also telephone and cable TV lines. AmerenUE will always offer telephone and cable companies the option of undergrounding their lines at the same time we do, but if they choose not to do so, the poles will remain to support their lines.
 - AmerenUE has some equipment that must be located on poles because they have no underground "equivalent." So there may be some poles that remain even after the wires are placed underground.

12. Q. What are some examples of instances where proposed overhead to underground conversions would not end up being feasible?

- A. There are several reasons a proposed overhead to underground conversion might not be feasible:

- Private property owners are not willing to provide the easements necessary for AmerenUE to construct and operate the new underground system.
- Locations exist where the necessary safety standards and operational requirements cannot be met, e.g. extremely congested areas where pad mounted transformers and switch cabinets cannot be installed with sufficient operating clearances.
- The intended construction area is prone to flooding. Though this is not expected to be a problem in most areas of Missouri, excessive flooding can and does short out transformers, which then cannot be safely restored until the flood waters recede.

13. Q. If an undergrounding project is taking place in my neighborhood, will the service wires to my house automatically be placed underground too?

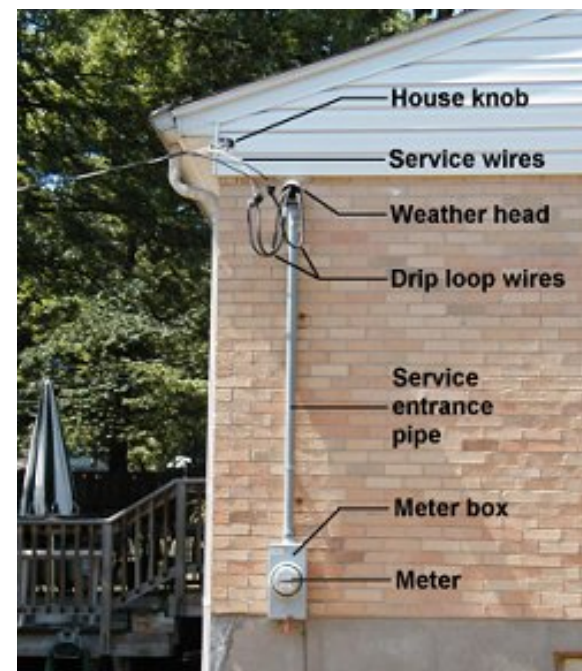
- A. No. The overhead wires AmerenUE is removing in Power On undergrounding projects are those from pole to pole, not from pole to house. We cannot elect “on our own” to underground the service wires connected to individual houses and buildings because there are private costs to the customer involved in doing this. AmerenUE cannot force its customers to make that investment. However, AmerenUE is offering a rebate to eligible residential customers who participate themselves in the undergrounding of these wires to their house at the same time we are removing our pole-to-pole spans of wire.

14. Q. What is involved in having the service wires to my house placed underground? What would I have to do myself?

- A. During a Power On undergrounding project, AmerenUE will contact affected residential customers and invite them to participate themselves in undergrounding the service wires to their homes at the same time AmerenUE is removing the pole-to-pole spans of wire.

This photo (right) shows a typical **overhead service entrance** for a residential customer. Of the items shown, AmerenUE owns the **service wires, house knob** and **meter**—the customer owns everything else.

In order for service wires like these to be placed underground, the customer is responsible for installing (1) a new **meter box** that accepts “bottom-fed” cables and (2) a new **buried service conduit** on the property to the underside of the new meter box. This is the plastic pipe that houses AmerenUE’s underground service cable. The customer is also responsible for removing the **weather head, drip loop wires, service entrance pipe** and old **meter box**.



For those **eligible residential customers** choosing to participate, AmerenUE will (1) install and connect new underground service cables to their homes in their new buried service conduits free of charge and then (2) issue individual \$750 rebate checks to those customers for the installation of the buried service conduit on their properties.

For those **eligible residential customers** choosing not to participate, AmerenUE will make the necessary provisions to keep their overhead service wires undisturbed—meaning the poles those service wires are connected to will remain. It is important to note that all customers, regardless of these individual decisions, will benefit equally from the removal of AmerenUE’s spans of overhead wire.

15. Q. Can you be more specific about some of the costs in converting my individual overhead service wires to underground?

- A. The costs can vary widely and will depend on variables such as:
- Whether your local electrical inspection authority requires your electrical installation or wiring to be upgraded as part of your conversion;
 - Whether an electrician (or other tradesperson) needs to dig and backfill an open trench or perform "directional boring" in order to install the conduit from the easement to the house;
 - The length of underground service line required for the conversion;
 - Whether or not your existing weather head extends through the roof of your house, in which case you would incur the cost of roof repair after the weather head is removed.

16. Q. If an undergrounding project is not taking place in my neighborhood, can I ask to have the service wires to my house undergrounded anyway?

- A. Yes. Customers who are not part of a Power On undergrounding project may request to have their overhead service wires placed underground at any time. For those residential customers who choose to do so and perform the required work, AmerenUE will install and connect new underground service cables to their homes and connect both ends free of charge. However they are not eligible for the rebate.