

HISTORIC HOMES—BACK TO THE FUTURE

By John Whitcraft, PE, CLD, LEED AP BD+C,
President of [Whitcraft Engineering Solutions, Inc.](#)

If there were a crystal ball to foretell the safety issues of today, historic homes may have been built differently. No one can resist the historic charm of Atlanta's century-old homes. They are impressive, but as a solutions-oriented electrical engineer, I know the intricacies involved in restoration. Replacing or repairing components often includes the electric meter panel, sub-panels, household wiring, electrical boxes, receptacles (outlets), switches, appliances, lights, and power equipment. Still, major repairs are absolutely worth the time and investment. My most rewarding project was designing and updating the electrical system for the [Warrior Foundation Freedom Station II](#) in San Diego, CA. Affectionately known as The Home of the Brave, this remodeled group of circa-1920 cottages supports the mission to help United States wounded soldiers successfully transition from military service to civilian life.

As with many historic buildings, these cottages were transformed to serve a new type of resident. It was an honor to ensure a safe, adaptive-living environment for our veterans.

Restoring Instead of Buying New Houses

With homeowners, though, the motives to restore old houses can vary. One reason could be financial, with prospective buyers believing that it may be easier to secure a loan for a remodel than for a new dwelling in today's ever-challenging real estate market. Another strong motivation is the appearance and character of the structure, according to a recent [blog by Home Hunters Realty](#):

No doubt owning an older home can be a satisfying source of pride in the workmanship and architecture of a bygone era. Many older homes offer unique features that just aren't prevalent in today's residences. Some homeowners inherit properties that once belonged to their parents or other relatives. In some parts of the U.S. maintaining the "old homestead" is almost a duty that comes with being part of their family heritage.

The Historic Eight

According to the [Atlanta Journal Constitution](#), "[An] historic house is defined as being at least 50 years old, has architecturally important designs and was the site where an historic event may have occurred or is associated with a famous person." Such memorable houses could be part of a designated historic district in a city or municipality. Atlanta, which was founded almost 200 years ago, contains eight popular historic districts and described by blogs at [simpleshowing.com](#) and [ntcic.com](#).

1. **Grant Park** was founded before the Civil War. This district is named for Lemuel Pratt Grant, an engineer and businessman who helped bring the railroad to Atlanta.
2. **Inman Park** is comprised of many houses constructed in the late 19th and early 20th centuries. This residential development is considered Atlanta's first suburb.
3. **Castleberry Hill**, situated southwest of downtown Atlanta, became a federally-recognized historic district in 1985 and a "City of Atlanta Landmark District" back in 2006.
4. **Old Fourth Ward** became the home of Dr. Martin Luther King Jr. back in 1929. Currently, many dwellers reside in the area's modernized condos.
5. **Virginia-Highland's** origins began in 1920. Now this historic site contains a wide variety of large houses that can be quite costly.
6. **West End**—with its lovely townhouses— is popular with young professionals because of its proximity to businesses and cultural events.
7. **Tuxedo Park** has the distinction of being listed on the National Register of Historic Places (NRHP), as well as offering mansion-sized rooms on acres of lush lawns near the Georgian woods.
8. **Academy Lofts at Adair Park** is a preservation and adaptive reuse project in an historic elementary school near the Atlanta Beltline offering 35 residential micro-units, as well as office, event, and commercial spaces.

Despite the obvious attraction and allure of living in an historic district, buying in such an area entails rules and regulations about the way a house may be refurbished or rebuilt in the event of damage or loss: "While new construction materials may be used in the reconstruction or repair, the materials may have to conform to certain historical standards and appearances," states the [Home Hunters Realty blog](#).

Electrical Problems in Old Houses

As an electrical engineer, I'm probably more aware of electrical challenges than most professionals. The challenges include the risk of life-threatening injuries—such as severe shock, electrocution, and fires—when amateurs attempt to renovate old houses. The dangers are daunting compared to other types of construction and remodeling. For this reason, it is vital to hire an electrical engineer and/or an electrical contractor when restoring a venerable yet vulnerable aging property.

Old houses are especially likely to have such complications because they are typically underpowered, depending upon 60-amp or 100-amp service instead of the 200-amp utility in today's homes. Other routine issues include ungrounded circuits, wiring with deteriorated or missing insulation, and circuits controlled by old-fashioned fuses rather than modern circuit breakers.

The lifespan of electrical wiring itself is limited by the lifespan of the wire's insulation. According to a [Money Crashers January 2022 blog](#) by Brian Martucci:

Wiring installed before 1960 lasts roughly 70 years, while newer wiring is estimated to last at least 100 years. Once the insulation deteriorates to the point that the actual wire is exposed, the risk of electrical fire, shocks, short circuits, and localized (single- or multi-room) power failures increase dramatically.

Electrical service panels and circuit breakers are also prone to deterioration. Service panels last 60 or 70 years, while breakers last 30 or 40. Failing panels and breakers can cause shock, power failure, fire, and other dangers.

"The good news is that modern electrical components are designed, tested, and certified for safe, reliable, long-lasting performance," explains a recent [blog on This Old House](#). "Building inspectors throughout the country rely on the same strict, detailed standards for electrical work in new construction and remodeling projects—provided by the [National Electrical Code](#)." The NEC is a standard created and regularly updated by the National Fire Protection Association (NFPA).

Residential Electric Code Requirements

Electrical code requirements stipulate where different types of breakers are used. For example, the receptacle circuits in bathrooms, kitchens, garages, basements, and other wet (or potentially wet) areas need Ground-Fault Circuit Interrupters (GFCI) protection. In addition, building codes in many areas now require Arc Fault Circuit Interrupter (AFCI) breakers for other household circuits because they protect against fires and electrical flashes caused by arcing faults, which often occur in damaged or deteriorated wires and cords. Test GFCI outlets monthly by pressing the button on the outlet marked "Test". Since GFCI breakers are expensive, your home may have been wired using a single GFCI outlet and down-stream outlets chained on the same circuit. One ground fault opens the entire circuit. Circuit breakers that feed receptacles will be rated at 15 or 20 amps, which means they will automatically trip if electrical current exceeds these ratings. Lighting circuits are controlled by 15 or 20-amp breakers. The house's service panel will also contain a limited number of larger "double-pole" breakers that have higher amp ratings for big appliances such as air conditioners, stoves, and clothes dryers.

Lighting Upgrades

Remodeling an old house requires replacing incandescent light fixtures and fluorescent lighting with LED (light-emitting diode) fixtures. Research shows that LED lighting sources emit light up to 90% more efficiently than incandescent light bulbs. How do they function? As an electrical current passes through a microchip, the chip converts electricity into visible light. When installing new recessed lighting (also known as can lights) in a ceiling beneath attic space, make sure to tell your electrical engineer or electrician to use fixtures with an IC (insulation contact) rating, so that attic insulation can be installed in direct contact with the fixture. The [DMF lighting "One Frame System"](#) is an example of a recessed "Insulation Contact Rated" fixture.

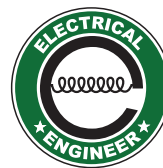
In addition, ask your electrical engineer or electrical contractor to air-seal around fixtures in the attic to help prevent loss of warm air from the house's living space in wintertime. Ask him/her to include dimmer switches in the renovation lighting plan. "Being able to moderate the degree of light (especially in ceiling-mounted lights) is an easy and

effective way to alter the ambiance of living space," states a recent [This Old House blog](#). The DMF "One Frame System" is also ASTM E283 Certified Air Tight.

As an electrical engineering expert, LEDs fascinate me. For that reason, I've provided some interesting facts with comments from Scott Caron, an electrical contractor, in another [This Old House blog](#):

- Light-emitting diodes (LEDs) are commonly used in flashlights and Christmas tree lights.
- LEDs are long-lasting, super-bright, and energy efficient. Although the LED costs more, they will probably never be replaced. LEDs have no filament to fail as incandescent lamps do.
- A standard Christmas tree light consumes seven watts of electricity per bulb. An entire string of LED lights uses only three watts.
- Replace old incandescent bulbs with retrofit LEDs, which screw into standard lamp sockets.
- Reflective-style LEDs come with various bases and often easily plug into the socket.
- Recessed LEDs combine the light bulb and trim kit into one compact unit.
- Flush-mounted LEDs can be connected to an existing recessed fixture or hardwired to a ceiling-mounted electrical box.
- Color-changing LED rope lighting can be installed inside or along the tops of cabinets and wall units.
- New LEDs can be controlled wirelessly through a smartphone or tablet, allowing for adjustments with the intensity (brightness) or color of the light.
- Illuminate kitchen counters with slim LED fixtures that are designed for under-cabinet installation.
- Exterior-rated LED lights are available for installation outdoors above a patio, driveway, or deck.
- Almost all commercially available light fixtures now are based on LED technology.

As homeowners continue to remodel old houses, either for financial or nostalgic reasons, they will need the services of a licensed professional electrical engineer.



**WHITCRAFT
ENGINEERING
SOLUTIONS INC**



If you need more information or an assessment of your next project, please email me at: john@whitcraftengineering.com, or call/text (858) 229-8722.