

**Forest Service Manual
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**Forest Service Manual 7600 – Electrical Engineering
Chapter 7610 - Electrical Systems**

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Responsible Staff:

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Digest: Following is an explanation of the changes throughout the directive by section.

7610.43: Changes caption from “Forest Supervisors” to “Forest Supervisors and National Technology & Development Program Director” and updates direction.

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7610.1 - Authority

(FSM 2330, FSM 7310, and FSH 7309.11).

7610.2 - Objective

To provide safe, functionally efficient, and cost-effective electrical systems for buildings and related facilities that are owned, leased, operated, occupied, or authorized for use by the Forest Service and that are required to conduct activities authorized by the Forest Service.

7610.3 - Policy

1. Ensure that the design and construction of electrical systems comply with applicable requirements of the latest industry, State and local codes, and agency standards (FSM 7610.6, 7611.1-7611.3).
2. Prepare plans, specifications, and cost estimates prior to beginning construction or renovation of electrical systems.
3. Ensure that electrical systems meet the requirements of the needs and functions they are to serve.
4. Ensure that the design, construction, operation, and maintenance of electrical systems authorized under special-use permits support activities authorized by the permit, meet quality standards for physical improvements, and protect the public welfare and safety.

7610.4 - Responsibility

7610.41 - Washington Office

7610.41a - Director of Engineering

The Director of Engineering has overall responsibility for development, design, construction, operation, maintenance, and management of all electrical systems for buildings and related facilities owned, leased, occupied, or permitted by the Forest Service. This responsibility includes providing Service-wide standards to ensure safe, cost-effective, and efficient electrical systems for Forest Service activities.

7610.42 - Field Units

7610.42a - Regional Foresters, Station Directors, Area Director, and Institute Director

It is the responsibility of each Regional Forester, Station Director, Area Director, and Institute Director to:

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1. Provide for the construction, alteration, and repair of electrical systems for buildings and related facilities within their respective areas of responsibility.
2. Review and approve electrical plans, designs, and construction proposals for all electrical systems owned, leased, or authorized by the Forest Service. This responsibility may be delegated as provided in FSM 7611.04.
3. Provide needed electrical engineering support skills, as requested, to Forest Supervisors in formulating project proposals, preparing designs, working drawings, specifications, and cost estimates, and providing construction administration. Regional Foresters, Station Directors, Area Director, and Institute Director may collaborate to provide similar services for Station, Area, and Institute facilities.
4. Make available training to ensure that Forest Service personnel involved with electrical systems management meet the skill requirements as provided in FSM 7611.1-7611.3.

7610.43 - Forest Supervisors and the National Technology & Development Program Director

It is the responsibility of each Forest Supervisor and National Technology & Development Program Director to:

1. Provide planning and program information for electrical systems and related facilities to support the unit's mission consistent with Forest plans.
2. Conduct preliminary needs analysis on all electrical systems to be acquired.
3. Provide construction administration and engineering management for all Forest Service-owned and leased electrical systems and related facilities used by the unit.
4. Administer all special-use facilities authorized on the unit (FSM 7611.4).

7610.5 - Definitions

Electrical Energy Transmission Systems. Those portions of electrical systems operated at voltages exceeding 600 volts between any phase or phase to ground.

Electrical Systems. Facility systems including electrical power generation facilities and systems, electrical energy transmission systems, and premises wiring systems.

Maintenance Work. Troubleshooting and identical electrical component replacement of items such as, light fixtures and lamps, switches, receptacles, relays, fuses, and so forth of minor complexity not required to be performed by a licensed electrician.

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Power Generation Facilities and Systems. Facilities and systems that convert mechanical or solar energy or chemical reactions into electrical power for distribution and use.

Premises Wiring Systems. Interior and exterior wiring located on Forest Service-owned, leased, occupied, or permitted facilities. This includes power, lighting, control and signal circuit wiring together with all of its associated hardware, fittings, and wiring devices, both permanently and temporarily installed, that extend from the service point, or source of a separately derived system, to the outlet(s) as defined in Article 100 of the National Electrical Code (FSM 7610.6). In addition, these systems include special purpose systems.

Repair Work. Work, other than construction, done to electrical systems that is more complex than that defined as maintenance work which is required to be performed by a licensed electrician.

Special Purpose Systems. These systems include but are not limited to:

1. Emergency systems such as fire, security, uninterrupted power, shutdown, warning, emergency generator, and so forth.
2. Building Automation systems such as elevators, heating, ventilating, air conditioning, energy management, and so forth.

7610.6 - References

National Electrical Code, NEPA No. 70 - National Fire Protection Agency,
Battery-march Park, Quincy, MA 02269.

Lightning Protection Code, NEPA No. 78 - National Fire Protection Agency,
Battery-march Park, Quincy, MA 02269.

7611 - Development of Electrical Systems

Development is a means to construct, alter, or repair electrical systems through contract, Forest Service employee activities, cooperative agreements, memorandums of understanding, and so forth, that apply.

7611.03 - Policy

Ensure that only qualified electrical designers accomplish or direct all planning, design, construction, alteration, or repair of Forest Service electrical systems (FSM 7611.1-7611.3).

7611.04 - Responsibility

7611.04a - Regional Foresters, Station Directors, Northeastern Area, and International Institute of Tropical Forestry

(FSM 7610.42a). It is the responsibility of each Regional Forester and Station Director to:

1. Make available professional electrical consultation and design service to the Forests, Research Station Laboratories, Northeastern Area, and International Institute of Tropical Forestry as requested.
2. Use qualified personnel as provided in FSM 7611.1-7611.3.
3. Ensure that drawings, specifications, and cost estimates are prepared for all electrical systems for projects where the Regional Forester or Station Director has not delegated authority to field units.
4. Provide review and approval for designs where the Regional Forester or Station Director has not delegated authority to field units.
5. Notify involved field units of those projects where design and/or approval authority are being retained by the unit. Notice shall include defining the role and responsibility of the unit in accomplishing each project.
6. Ensure the monitoring of design, construction, alteration, and repair of systems throughout the Region, Station, Northeastern Area, or International Institute of Tropical Forestry as requested.
7. Evaluate the need for and make available technical electrical engineering training.

7611.04b - Forest Supervisors

It is the responsibility of each Forest Supervisor to:

1. Ensure that drawings, specifications, and cost estimates are prepared for the construction, alteration, or repair of electrical systems, where design authority has been delegated by the Regional Forester as provided in FSM 7611.04a.
2. Provide design review and approval where that authority has been delegated by the Regional Forester as provided in FSM 7611.04a.
3. Use qualified personnel as provided in FSM 7611.1-7611.3.

7611.1 - Design

All systems, regardless of how acquired or constructed, must meet the following design standards:

1. All construction, alteration, or repair work shall have an approved design.
2. All design for systems of 600 volts or less must be prepared by qualified personnel meeting at least one of the following requirements:
 - a. Current registration as a Professional Engineer with appropriate education and experience in the work being performed.
 - b. A Forest Service employee who has a valid current State or local license as an electrician or electrical inspector, and who is approved in writing by the Regional Staff Director for engineering activities or other person responsible for engineering at the Region or Research Station level (FSM 7610.42a).
 - c. A Forest Service employee with all of the following qualifications and who is approved in writing by the Regional Staff Director for engineering activities or other person responsible for engineering at the Region or Research Station level:
 - (1) Employed as a Facilities Engineer at the GS-9 or higher level.
 - (2) Successfully completed a minimum of 15 quarter hours of electrical theory and design from a nationally-accredited electrical engineering program. This course work should cover the fundamentals of electric and magnetic circuits, power conversion (motors, generators, and transformers), electronics, control systems, lightning protection, and building electrical systems. At least 5-quarter hours should be in design.
 - (3) Successfully completed 15 additional quarter hours of course work in related areas such as mechanical design, building construction, instrumentation, communications, and alternative energy systems.
 - (4) Successfully completed a minimum of 1 year working in the area of electrical design under the direction of an individual with the qualifications listed in paragraph a or b.
 - d. A Forest Service employee deemed qualified by and approved in writing by the Regional Staff Director for engineering activities or other person responsible for engineering at the Region or Research Station level.
3. All design of systems above 600 volts shall be prepared by a registered Professional Engineer with appropriate education and experience in the work being performed.

7611.2 - Design Review and Approval

All systems, regardless of how acquired or constructed, must have a design review and approval as provided in FSM 7611.04a and 7611.04b.

7611.3 - Construction of Forest Service-Owned Systems

Construction requirements are as follows:

1. Construction, alteration, or repair work performed by Forest Service employees shall be accomplished by employees with valid current State or local licenses as electricians and written approval of the Regional Staff Director for engineering activities or other person responsible for engineering at the Region or Research Station level.
2. Construction, alteration, or repair work performed by contract or through cooperative agreements, memorandums of understanding, and so forth, shall be accomplished by State or local licensed electricians.
3. Forest Service Contracting Officer's Representatives and inspectors shall be certified in Buildings and Contract Administration in accordance with FSM 7115. Inspection is required regardless of whether volunteers, Forest Service employees, cooperators, Job Corps personnel, or contractors perform the work.

7611.4 - Operation, Maintenance, and Repair

1. Use qualified personnel to perform condition surveys (FSM 7115, or FSM 7611.1).
2. Use qualified personnel to assist in special-use permit administration (FSM 7611.1).
3. Operate and maintain electrical systems in accordance with their operation and maintenance instructions, including routine calibration, adjustments, and so forth. Assign only personnel with specific electrical system training. Maintenance work such as, troubleshooting and identical electrical component replacement of items such as light fixtures and lamps, switches, receptacles, relays, fuses, and so forth does not require a licensed electrician.
4. Use licensed electricians for repair work for electrical systems that is more complex than that defined as maintenance work.