

Low-EMF, Circadian-Aligned Healthy Home

ELECTRICAL DESIGN BRIEF - Draft (for discussion)

Version 1.4 – Feb 5, 2026

Executive Summary

This home is being built for an immunocompromised occupant, with a strong focus on **mitochondrial, circadian, and nervous-system health**. The electrical design is therefore intentionally different from a typical modern house. It prioritizes low electromagnetic fields (EMFs), biologically friendly light, and simple, hard-wired controls over convenience gadgets and smart features.

Key goals are:

- Keep EMF levels in **bedrooms and main recovery spaces as low as reasonably achievable**, especially during sleep.
- Use **incandescent and halogen lighting only** (no LEDs, no dimmers) to avoid flicker, spectral distortion, and electronic noise that can disrupt circadian rhythms.
- Preserve robust, code-compliant safety and functionality while avoiding unnecessary wireless or “smart” systems that add RF exposure and electrical complexity.

We fully understand that this is a non-standard brief. The aim is not perfection but a practical, buildable design that significantly improves the electrical environment compared to typical construction, while fully respecting code and good trade practice. We value input on how best to implement these priorities in a safe, efficient, and inspection-friendly way.

1. Objectives

- Minimize EMF exposure, especially in bedroom "sanctuary" zones.
- No LEDs, no dimmers; incandescent/halogen only, with multi-bank switching for circadian support.
- Allow bedroom demand/cut-off switching of circuits at night to dramatically reduce electric fields during sleep. (such as <https://liveemfsafe.com/product-category/mitigate/>)

2. Panels, routing, and EMF basics

- Main and sub-panels, large junction boxes, EV charger, and other high-load gear to be located in garage/mechanical areas, not on bedroom walls.
- Use radial/star wiring; avoid large loops; route high-current feeders away from bedroom walls and ceilings.
- Keep circuits serving bedrooms separated from kitchen/garage/high-load areas where practical.

3. Bedroom "sanctuary" circuits & cut-off switches

- Master and Bedroom 2 to be treated as **sanctuary rooms**.
- For each of these bedrooms:
 - Place all standard bedroom receptacles and bedroom lighting on **dedicated circuits** that pass through an EMF cut-off/demand switch module at or near the panel (e.g., EMFSafe Neutral & Power Cut Off or equivalent).
 - Provide a **low-voltage control switch** in each bedroom (near entry and/or bedside) that shuts off those bedroom circuits at night.
 - Separate **life-safety and critical loads** (smoke/CO alarms, hard-wired Ethernet, possibly one "emergency" outlet) on non-cut-off circuits so they remain energized.
- Prefer models that interrupt **hot and neutral** to further reduce electric fields when circuits are off, subject to code approval.
- Allow adequate **panel space** and labeling for the cut-off modules and dedicated bedroom breakers.

4. Tri-bank circadian lighting (no dimmers, no LEDs)

- **No dimmer switches anywhere in the house.**
- **No LED or smart bulbs;** use only incandescent or halogen.
- For major rooms (great room, kitchen, dining, office, master, Bedroom 2, and ensuite):
 - Provide **three separately switched circuits**:
 - **Bank A (Daytime/General):** warm white incandescent/halogen ceiling or wall fixtures for full illumination and task lighting.
 - **Bank B (Night/or Red):** separate ceiling or wall fixtures with red or very low-lux incandescent lamps for evening/night use.
 - **Bank C (Lamp Receptacles):** one or more switched receptacles fed by a dedicated circuit, allowing owner to plug in table lamps or standing lamps with owner-supplied incandescent/red bulbs for flexible, low-level ambient light. (lamp receptacles not needed in ensuite bathroom)
 - At the wall, use **three simple mechanical on/off switches**, clearly labelled (e.g., "DAY / WHITE," "NIGHT / RED," "LAMPS"), not dimmers.
- In larger rooms, Bank A can be further split (front/back or center/perimeter) for additional light-level options without electronic dimming.
- In bedrooms, position Bank B fixtures and lamp receptacles for wayfinding and low-glare use (near doors, path to ensuite, bedside).

5. Outlets, grounding, and wiring details

- Robust, low-impedance grounding for panels, metal enclosures, and branch circuits; follow best practice and code to minimize stray currents.
- Route bedroom wiring away from head-of-bed locations; avoid running high-load circuits parallel to bed walls.
- Use dedicated 15 A or 20 A circuits for bedroom outlets, ceiling lights, and lamp receptacles (as above, routed through cut-off devices for sanctuary rooms).
- Lamp receptacles to be **standard grounded outlets** in locations approved by owner for lamp placement (e.g., bedside, corner of living room, alcove).

6. Wireless and controls

- No wireless switches, smart dimmers, RF thermostats, or smart lighting controls.
- All thermostats, fans, and controls to be **hard-wired**.
- Network to be hard-wired (Cat6/7); Wi-Fi, will be manually controlled by owner and should not be required for operation of any electrical or HVAC system.
- Hard-wired whole home music system with room control (like a [Russound](#) audio systems).

7. EV charger and high-load circuits

- EV charger on dedicated feeder in metal conduit, located in garage away from bedrooms.
- Other high-load circuits (kitchen range, dryer, water heater, HVAC) to use metal conduit or tightly bundled conductors, routed away from sanctuary rooms.

8. Standby Generator

- Permanently installed **standby** generator tied into the main panel via an automatic transfer switch that is located away from regularly occupied areas (especially bedrooms)
- Wiring layout to avoid running the generator feeder or critical-load feeders right under bedroom floors or directly behind headboards. And to keep high-current conductors grouped and away from spaces where you sit or sleep for long periods.

9. Commissioning and verification

- After completion, owner may have an EMF consultant perform measurements; cooperate as needed to adjust circuit usage or labeling.
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