

ELECTRICAL DESIGN REVIEW CHECKLIST

PROJECT TITLE: _____

PROJECT LOCATION: _____

DESIGNER/REVIEWER: _____

DESIGN PHASE: _____ DATE: _____

Completed/Coordinated
Yes No N/A

I. GENERAL REQUIREMENTS:

- | | | | | |
|-----|---|-----|-----|-----|
| 1. | Are the drawings, including both lettering and symbology, suitable for either half-size reduction or metric sheet scale? | [] | [] | [] |
| 2. | Are ANSI standard voltages used? | [] | [] | [] |
| 3. | Are NEMA standard voltages and frame sizes specified for motors? | [] | [] | [] |
| 4. | Are suitable NEMA equipment enclosures specified? | [] | [] | [] |
| 5. | Provide separate electrical legends for exterior and interior work. Legends shall be complete and coordinated with drawings. | [] | [] | [] |
| 6. | On projects involving existing facilities, indicate which items are new and which are existing. Provide demolition plans if necessary. | [] | [] | [] |
| 7. | Provide clearance around electrical equipment for operation and maintenance as required by the National Electrical Code or National Electrical Safety Code. | [] | [] | [] |
| 8. | Adequate space should be provided for at least 3 typical manufacturers of large items such as motor generators, unit substations, main switchgear, freestanding panelboards, motor control centers, dry-type transformers, UPS, etc. Space consideration should also include operation, maintenance, and removal. | [] | [] | [] |
| 9. | Are space and connections provided for government furnished equipment? | [] | [] | [] |
| 10. | Show or note boundaries (in all three dimensions) of hazardous areas on drawings. Show class and division identification numbers and group identification letter for hazardous locations as required by the NEC. Indicate maximum temperature for lighting fixtures when applicable. | [] | [] | [] |
| 11. | Has short circuit analysis and coordination study been performed for large or complex systems? Study should be computerized. | [] | [] | [] |

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| | | <u>Yes</u> | <u>No</u> | <u>N/A</u> |
| 12. | Are relay settings for feeder overcurrent and/or ground fault protection equipment indicated? | [] | [] | [] |
| 13. | For complex projects, has a phasing plan been provided on either the drawings or in the specifications? | [] | [] | [] |
| 14. | In seismic zones, insure that required bracing and reinforcing is detailed and/or included in the applicable specifications. | [] | [] | [] |
| 15. | Are all additives and options clearly delineated on the drawings and in the specifications? | [] | [] | [] |

II. EXTERIOR ELECTRICAL:

A. Overhead:

- | | | | | |
|----|--|-----|-----|-----|
| 1. | Feeder circuits shall coincide with installation utility drawings for size and location. Show correct voltage, phase, and conductor size and material for existing primary being tapped. | [] | [] | [] |
| 2. | When extending aerial primary lines for short distances, the line configurations and materials shall be same as existing. Provide proper fusing when smaller tap conductors are used. | [] | [] | [] |
| 3. | Provide adequate lightning/surge protection at risers, deadends, switches, transformers, etc. Arresters must be of proper ratings and installed with as short of leads as possible. | [] | [] | [] |
| 4. | Special design conditions such as large conductors (typically 4/0 copper and larger), long spans, or heavy loading zones may require larger-than-normal crossarms, special deadends, and high strength guys. | [] | [] | [] |
| 5. | On cluster-mounted transformers, do not put fuse cutouts on same side of pole as the middle transformer. | [] | [] | [] |
| 6. | Taps to primary for transformers should show hot line clamps attached to stirrups (bail). | [] | [] | [] |
| 7. | Is height and class shown for all poles? Provide profiling for aerial lines in special circumstances such as waterway crossings, hilly terrain, etc. | [] | [] | [] |

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8.	Provide details for congested poles, deadends, risers, transformer banks, etc.	[]	[]	[]
9.	Is adequate clearances maintained for aerial lines and service drops? Check clearances between other circuits, equipment, and ground.	[]	[]	[]
10.	Adequate clearance must be provided between overhead primary and facilities for POL (petroleum, oils and lubricants) facilities.	[]	[]	[]
B. Underground:				
1.	Liquid-insulated transformers must be installed at proper distances from structures. Reference MIL-HDBK 1008B and AEIM.	[]	[]	[]
2.	Provide spare stub-up at pad-mounted transformers and unit substations.	[]	[]	[]
3.	Provide bollards or traffic barriers around pad-mounted transformers or other equipment in heavy traffic areas.	[]	[]	[]
4.	On loop feed systems, has loop functionality been maintained with sufficient cable ampacity, sectionalizing capability, and properly rated equipment?	[]	[]	[]
5.	Show and detail grounding of fences and gates. Coordinate drawings with Site Development design.	[]	[]	[]
6.	Insure that fence heights around electrical equipment meet NEC and NESC requirements.	[]	[]	[]
7.	Outside branch circuits (e.g. pumps, parking area lighting, etc.) shall include a separate equipment grounding conductor.	[]	[]	[]
8.	Cable ampacities in multiple-run ductbanks may be required to be derated IAW the NEC dependent upon number of ducts, configuration of ductbank, burial depth, and other factors.	[]	[]	[]
9.	Have profiles of manholes and ductbank system been provided to insure proper drainage and clearances? Short extensions may not require profiling. Coordinate with Site Development Section.	[]	[]	[]
10.	Have all features of the design been adequately detailed on the drawings?	[]	[]	[]

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III. INTERIOR ELECTRICAL:

A. Lighting and Power:

- | | | | | |
|-----|---|-----|-----|-----|
| 1. | Lighting fixture schedule shall be complete, including fixture voltages, and coordinated with plans. Standard drawing No. 40-06-04 should be used for design to the maximum practical extent. | [] | [] | [] |
| 2. | Electrical lighting fixtures, switches, and miscellaneous equipment mounting heights must be shown on the plans or in the legend. | [] | [] | [] |
| 3. | Coordinate locations of lighting fixtures and HVAC outlets with each other and also with Architectural reflected ceiling plans. | [] | [] | [] |
| 4. | Are explosion-proof fixtures provided in areas subject to flammable vapors? | [] | [] | [] |
| 5. | Vaporproof fixtures shall be provided in rooms and areas containing moisture; e.g., dishwashing rooms, showers, canopies, etc. | [] | [] | [] |
| 6. | Supply battery-operated emergency lights from light circuit serving room where emergency light is located. | [] | [] | [] |
| 7. | Provide emergency lighting in stairwells of multistory buildings such as barracks and BOQ's. | [] | [] | [] |
| 8. | Have provisions for relamping and maintenance been considered, especially for high-bay fixtures? | [] | [] | [] |
| 9. | Is the switching and/or control of all lighting fixtures clearly indicated? In larger areas, multi-level and sectionalized switching should be used. | [] | [] | [] |
| 10. | Has use of bus duct been considered instead of cabling for circuits of 600 amps or greater? | [] | [] | [] |
| 11. | Show and size grounding electrode conductor for building service and any separately derived systems. | [] | [] | [] |
| 12. | Insure ground fault protection is on feeders and service entrance equipment where required. The NEC requires ground fault protection on grounded wye services of 150 volts or more to ground and 1000 amps or more. | [] | [] | [] |

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13.	Show personnel groundfault protection on all duplex receptacles as required by the NEC or other design criteria.	[]	[]	[]
14.	Has dedicated electrical space been shown and dimensioned on the drawings? This space shall be closely coordinated with all other disciplines. Coordinate with mechanical designer to have the same exact space shown on the mechanical plans.	[]	[]	[]
15.	Have all safety switches and special-purpose outlets been adequately described, e.g., volts, amps, poles, kw (hp rating), NEMA types, etc? Fusible switches shall include fuse size and class.	[]	[]	[]
16.	Sizes of conduit larger than 16 mm and wire larger than #12 should be shown on the floor plans.	[]	[]	[]
17.	For Air Force and Fort Hood projects, a separate equipment grounding conductor shall be provided for branch circuits and feeders. Connect to the service entrance ground.	[]	[]	[]
18.	Do not allow back-to-back or thru-wall boxes in walls where sound transmission is objectionable.	[]	[]	[]
19.	Are there excessive outlet openings in fire rated walls? See UBC requirements.	[]	[]	[]
20.	Do not show conductor insulation type letters on drawings.	[]	[]	[]
21.	Are conductors derated IAW the NEC for either fill (more than three current-carrying conductors in a raceway) and/or ambient temperature conditions?	[]	[]	[]
22.	Are conduit seals for hazardous areas specifically noted or shown? Seals must be accessible.	[]	[]	[]
23.	Rooms for storing and charging batteries are not considered hazardous areas as defined by the NEC. However, insure adequate ventilation with an interlock between fans and charging equipment.	[]	[]	[]
24.	Are electrical panel schedules provided? Panel load summaries should be totaled and breaker AIC ratings shown.	[]	[]	[]
25.	Are adequate spares provided for circuit breaker and fusible panelboards? 15-25% minimum required.	[]	[]	[]

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- | | | | | |
|-----|--|-----|-----|-----|
| 26. | Is interrupting rating of all circuit breakers and fuses adequate according to findings of the short circuit analysis? | [] | [] | [] |
| 27. | Kw size (horsepower) and voltage of mechanical equipment shall be the same as those shown on the mechanical plans and schedules. | [] | [] | [] |
| 28. | Has reduced voltage starting been provided or considered for larger motors (typically greater than 18.5 kw)? | [] | [] | [] |
| 29. | Is metering provided, including provisions for connection to the local EMCS/UMCS? | [] | [] | [] |
| 30. | Insure that the drawings have an accurate power riser diagram clearly depicting the overall electrical distribution system. All components and feeders shall be noted and sized. | [] | [] | [] |

B. Fire Alarm and Detection:

- | | | | | |
|----|--|-----|-----|-----|
| 1. | Provide a one-line riser diagram for the fire alarm system. Indicate correct conduit and wire sizes on plans or in the specifications. | [] | [] | [] |
| 2. | Are all typical I/O devices shown on the riser? Include pull stations, bells, audio/visual devices, detectors, water flow switches and valves, shutdown relays, etc. | [] | [] | [] |
| 3. | Projects with PIVs should provide empty conduit with pullwire from FACP to supervisory switch on PIV. Show on riser and exterior plan. | [] | [] | [] |
| 4. | Is system 4-wire or Style D (formerly Class A)? | [] | [] | [] |
| 5. | Plan location of general fire alarm bells and pull stations must be shown. When another system (eg. AFFF system) uses similar devices, coordinate and distinguish between systems. | [] | [] | [] |
| 6. | Verify that combination smoke/heat detectors used in sleeping quarters have the heat detector wired into the building's general alarm system. The smoke detector is for local annunciation only. | [] | [] | [] |
| 7. | Is proposed fire alarm equipment compatible with the existing base-wide system? | [] | [] | [] |

C. Communications:

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| | | <u>Yes</u> | <u>No</u> | <u>N/A</u> |
| 1. | Verify facility has dedicated room for communications equipment. EIA/TIA standards provide guidance for allowable floor space. | [] | [] | [] |
| 2. | Is communications space environmentally controlled? Minimum lighting required is 500 lux. | [] | [] | [] |
| 3. | Provide minimum 2 each receptacles on separate dedicated circuits, in addition to general purpose receptacles, in every communication room. | [] | [] | [] |

IV. SPECIFICATIONS:

- | | | | | |
|----|---|-----|-----|-----|
| 1. | Verify that all pertinent guide specification sections have been included and edited for the project specifications. | [] | [] | [] |
| 2. | Is all the information specified "as indicated on the drawings" actually shown on the drawings? | [] | [] | [] |
| 3. | Check the submittal requirements. All items marked "GA" require government review and approval, while "FIO" is for the government's information only. Use "GA" submittals prudently, i.e., coordination studies, cathodic protection designs, or other items critical to the functionality or performance of the system design. | [] | [] | [] |
| 4. | Except for paragraphs titled "Applicable Publications", delete non-applicable paragraphs and non-applicable portions of paragraphs in the specifications. | [] | [] | [] |
| 5. | Have all contractors' options permitted by the guide specifications been included? Deviations require justification and documentation IAW ER 1110-345-720. | [] | [] | [] |
| 6. | Are propriety or sole source items specified? If so, these require special waivers. | [] | [] | [] |
| 7. | Items and equipment not covered in the guide specifications must be covered by performance specifications and added to the project specifications. | [] | [] | [] |

V. DESIGN ANALYSIS:

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		Completed/coordinated		
		<u>Yes</u>	<u>No</u>	<u>N/A</u>
1.	Are complete design analysis and any required economic studies furnished as required by ER 1110-345-700?	[]	[]	[]
2.	Are illumination levels IAW Chapter 9 of MIL-HDBK-1190 or Chapter 12 of the AEI? These values, and others taken directly from the IES, shall be considered as maximum design levels.	[]	[]	[]
3.	Are calculations for electrical load determination submitted?	[]	[]	[]
4.	Are realistic demand and/or diversity factors applied to feeders and service?	[]	[]	[]
5.	Are voltage drop calculations included for the design of branch circuits, feeders, and service?	[]	[]	[]
6.	Verify that voltage dip analysis has been provided for projects with very large motor starting requirements.	[]	[]	[]
7.	Are cathodic protection calculations furnished?	[]	[]	[]
8.	Where appropriate, require other miscellaneous calculations such as cable pulling tension, pole and guy strengths, ruling span, conductor sag and tension, or others.	[]	[]	[]
9.	Neutral sizes and transformer ratings must be analyzed in situations where large non-linear loads are encountered.	[]	[]	[]
10.	Design analysis should include available short circuit current calculations for all services of 150 KVA and larger. Equipment suitable for available short circuit current shall be shown and described on the drawings.	[]	[]	[]