



Division 26 Electrical

26 00 00 Electrical

For campus projects that require an electrical system shut down, a Power Outage Planning Form, found in Appendix – Division 26, must be completed and filed seven days prior to activity so it can be reviewed, approved, and coordinated with UW-Madison FP&M. If an electrical shutdown will affect a life safety system, UW-Madison Environmental, Health & Safety *Fire and Life Safety Impairment procedures* shall be followed.

26 05 00 Common Work Results for Electrical

26 05 05 General Requirements for Electrical

1. The electrical system design for all UW-Madison facilities shall comply with all of the provisions of the latest version of the Division of Facilities Development (DFD) Electrical System Standards & Design Guidelines, which is available from the DFD website.
2. References within the DFD Guidelines regarding the DFD Project Manager shall apply to the UW-Madison Project Manager on UW-Madison Managed Projects.
3. Project Specifications shall use as their basis all appropriate sections of the latest edition of the DFD Master Specifications.
4. Deviations from DFD's Minimum Design Guidelines or the DFD Master Specification sections shall be made only upon approval from the UW-Madison Project Manager. A qualified Electrical Expert should concur with any changes to the specifications.
5. The Guidelines for Planning and Design of UW-Madison Facilities shall take precedence over DFD Guidelines, but the A/E shall discuss all conflicts within the guidelines and specifications with the UW-Madison Project Manager.
6. The goals and guiding principles of the UW-Madison Campus Master Plan (latest edition) shall be considered and referenced as part of the planning, design, detailing, and material section for every project.
7. Record drawings shall be kept up to date on the job site and turned over to the A/E prior to final pay requests. The drawings shall be prepared by the A/E in AutoCAD or Revit format in accordance with *Section 01 13 00*. The campus shall receive two paper copies as well as a CD for record drawings.
8. When ground fault protection is required on the main breaker, fully adjustable LSIG circuit breakers with electronic trip units shall be provided for feeder circuit breaker frame sizes 200A and greater. This second level of ground fault protection will improve the ability to coordinate the feeder breakers with the main breaker. The consultant shall identify all electronic trip circuit breakers on the one-line diagram.
9. All thermostats shall be located directly above light switches in private offices and conference rooms. These shall be placed next to the latch side of the door or side light. Coordinate with both mechanical and furniture plans.



10. The DFD lamp recycling specification should be used on UW-Madison managed projects as well as DFD projects.

26 10 00 Medium-Voltage Electrical Distribution

All buildings larger than 20,000 square feet or over 250 kVA of load on campus shall be provided with a looped primary feed.

26 13 00 Medium-Voltage Electrical Switchgear

1. Electrical Switching Protocol: A UW-Madison Physical Plant electrical engineer shall be involved in all electrical switching activities. Only UW-Madison Physical Plant electricians shall operate medium voltage switches (4,160 volt and 13,800 volt). To arrange electrical switching activities, the contractor shall send a date-stamped request to UW-Madison Physical Plant Customer Service.
2. Indoor Metal Enclosed Air Interrupter Switch: All efforts shall be made to serve each building on campus with a looped primary feed to allow building to remain in service when an outage must take place.

26 30 00 Facility Electrical Power Generating and Storing Equipment

26 32 00 Packaged Generator Assemblies

26 32 13 Engine Generators

1. All emergency generator installations shall comply with local noise ordinances.
2. Provisions shall be made for year-round access to the fuel port by a standard truck and gravity-fill hose at a distance no greater than 100 feet.
3. When determining generator locations, the possibility of soot staining of nearby building surfaces and cross contamination to nearby air intakes shall be considered.
4. All emergency generators shall be located inside buildings whenever possible.
5. On the rare occasion when the project supplies the UPS systems, they shall be designed for the specific application of use on emergency generators. Frequency shift of emergency generators, when loads are placed “on” or “off” the system, shall be considered. UPS systems installed by the project shall be able to tolerate this frequency shift without short-cycling the UPS.
6. Large generators shall require synchronizing switches and their related shunt trip protection. Refer to *Division 26 36 00 – Transfer Switches*.
7. Contractors shall test emergency generators under full load (load bank.) Generator shall be refueled upon turn over to the University.
8. Generator fill pipes shall be located above grade and external to the building. No pressurized filling to the generator shall be permitted. Use gravity feed with remote fuel level monitoring when necessary.
9. Generator installations shall be designed and located to incorporate air transfer for makeup air without the need to be fan motor driven, i.e. use area wells or dampers without fans. Generator rooms shall also be designed to not freeze the sprinkler



protection system when the generator is running. Modulate return air dampers for generator radiator exhaust shall be used to maintain room temperature when outside ambient temperature is too low.

10. Makeup air dampers shall be sized to be 1.5 times the size of the radiator. This is the industry standard.
11. Generator controls shall be installed at no more than 6 feet above finished floor. Proprietary controls shall not be permitted.
12. An extra set of filters and belts shall be supplied. Oil and oil filters and fuel filters shall be changed at the end of the first year warranty period by the contractor.
13. Emissions and fuel consumption data over varying loads shall be provided.
14. Provide 2 hard copies of the complete O&M parts and service manuals. All wiring diagrams and as-built drawings shall be included.
15. Engine block heaters shall have isolation shut off valves installed at the block. Heaters shall be controlled not to exceed 105 degrees Fahrenheit.
16. Radiators on generators that exceed 350 kW shall have sight glasses or sight bubble installed.
17. Air dampers for intake and exhaust air shall follow UW-Madison DDC protocol for sequence and function.
18. All diesel fuel tanks shall have fuel gauges and a threaded port for manual tests of fuel levels.
19. Provide 2 year parts and labor warranty.
20. Rooms and fuels tanks shall be properly marked with correct NFPA 704 diamond.

26 36 00 Transfer Switches

1. It shall be preferred to have multiple transfer switches in place of single higher amperage transfer switches. Switches shall be maximum 400 amps whenever possible. This will reduce the liability when and if an equipment failure occurs.

26 37 00 Photovoltaic Systems

1. Photovoltaic systems shall comply with all provisions of the UW Madison – MGE memorandum of understanding document.
2. Photovoltaic systems shall comply with the latest published NEC article 690.
3. Photovoltaic systems shall not be installed on buildings which are a subfeed from another building (for instance Ramp 67 which is supplied from Meat Science).
4. Photovoltaic system interconnections shall connect to an overcurrent device on the load side of a buildings main switchboard breaker.
5. A lockable interconnection fused disconnect switch with a visual open shall be located as close as possible to the building's main switchboard. All photovoltaic inverters shall be consolidated onto a single feeder which terminates into this single switch.



6. A campus standard power quality and demand meter package shall be installed on the load side of the interconnection switch. The meter shall be connected to the campus Metasys system by the installing project.
7. The following shall not be used on the UW Madison campus:
 - 7.1. Single panel micro-inverters.
 - 7.2. PV equipment and manufacturers which have less than 5 years of proven reliable service.
 - 7.3. Equipment which is proprietary and has no equivalent from a second manufacture.
 - 7.4. Building integrated photovoltaics which combine a photovoltaic surface and structural elements such as roofing or glazing.
8. Inverters for building mounted PV systems shall be in a weather protected location which includes walls and a roof. For buildings with maintenance funded 100% by program revenue, this is only a guideline.
9. Solar array design shall take into consideration building maintenance: roofing and access to roof mounted mechanical equipment. PV systems shall not be installed on roofs which are approaching end of life.
10. Electrical and structural design documents and calculations shall be sealed by an engineer licensed in the State of Wisconsin.

26 40 00 Electrical and Cathodic Protection

26 41 00 Lightning Protection Systems

26 41 13. Lightning Protection for Structures

The project design team shall consult with the campus electrical engineer for input.

26 50 00 Lighting

26 51 00 Interior Lighting

Interior Lighting is to be specified using DFDM Master Specification Section 26 51 13.

26 55 00 Special Purpose Lighting

26 55 30 Emergency Wall Packs

1. Emergency wall packs to be Lithonia ELM2L M12 LED Emergency Lights, Exit signs to be red-only Lithonia EXRG EL M6 LED exit sign or red-only Lithonia ECRG RD M6 exit and emergency combination light, and exterior remote lamp heads for exterior emergency egress lighting shall be Exitronix MLED2-G-WP fixtures. For fixtures in locations with emergency power generators or other approved backup power systems exit sign fixtures shall be Lithonia LQM s W 3 R 120/277 M6 red only, A/C only.



26 55 60 Parking Structure Lighting

1. Floors inside parking structures shall be lit by an average of 5 foot candles using a 4:1 minimum/maximum ratio on the average lighting levels.
2. Roof top floors of structures shall be lit with a 2 foot candle standard on average. Use campus standard lights. See Division 26 56 00.
3. All perimeter lights shall be regulated by photo cell devices so they can be turned off during daytime hours.
4. Exterior perimeter lighting shall follow campus standards. See *Section 26 56 05 Exterior Lighting Fixtures*.

26 56 00 Exterior Lighting

26 56 05 Exterior Lighting Fixtures

1. Site Lighting is to be specified using DFD Master Specification Section 26 56 29.
2. Provisions for control of exterior lighting circuits shall be made through the campus building control system (Johnson Controls METASYS).
3. Exterior spaces shall be lit with a 0.5 foot candle standard on average.
4. All exterior lights shall be LED.
5. Exterior lighting fixtures shall be the campus standard Kim Archetype as identified below. These are a sole source item. No substitutions. DFD requires a Class 1 notice to be included in the specifications.
 - 5.1. The Archetype Model SAR LED on 14 foot poles and the Archetype Model AR LED on 25 foot poles are the campus standards.
 - 5.2. Lamps shall be LED 4100K. Use PicoPrism or PicoEmitter.
 - 5.3. The Kim standard arm to connect light fixture to pole shall be used with vertical slipfitter.
 - 5.4. The vertical slipfitter mount shall be round 2 3/8" x 4".
 - 5.5. Exterior lighting shall be controlled from Metasys VTG lighting contactor. Metasys to be hooked up by the UW-Madison Electric Shop.
 - 5.6. Color of the light fixtures, light poles, arms, vertical slipfitter mounts, and base covers shall be smooth black.
 - 5.7. Poles shall be aluminum, round, smooth (no flutes) and straight (non-tapered).
 - 5.8. The 14 feet tall, 4 inch diameter pole is the campus standard for pedestrian areas. Standard 20 foot and 25 foot poles are 5 inch diameter, and some 30' poles are 6 inch diameter. All poles with accessories added to them need to be designed/approved by the manufacturer.
 - 5.9. Base cover shall be the Kim Standard Base Cover (Round) and sit on a concrete base of 5 inch larger diameter.



6. The campus standard exterior “Historic” light fixtures are the Sternberg Main Street, Model MS805LED and MS605(A or B, with or without spikes, for both). Use of these fixtures shall be identified and approved by UW-Madison Campus Planning & Landscape Architecture (CPLA). These are a sole source item. No substitutions. DFDM requires a Class 1 notice to be included in the specifications.
 - 6.1. Lamps shall be LED 4100K.
 - 6.2. Fixture may have decorative spikes (A); consult with UW-Madison CPLA.
 - 6.3. Lens shall be clear seeded acrylic (CSA) unless there are glare concerns. Frosted acrylic may then be used. Any deviations shall be approved by UW-Madison CPLA.
 - 6.4. Post top (PT) mounted fixture shall be used.
 - 6.5. Color of light fixture, pole and all components shall be black, except on Bascom Mall, where concrete poles to match existing shall be used.
 - 6.6. Poles shall be 14 feet tall, 4 inch or 6 inch diameter
 - 6.6.1. The pole and base shall be one of the following with consultation and approval by UW-Madison CPLA. Selection will depend on location, scale of space, and existing adjacent light poles.
 - 6.6.1.1.1. Oxford Series 6200, tapered, fluted shaft
 - 6.6.1.1.2. Leesburg Series 3800, straight, fluted shaft
 - 6.7. Single fuse and holder (SF) shall be included.
7. Concrete pedestals/footings for light poles shall be 36 inches above grade in parking lots and 6 inches above grade in all other areas.
 - 7.1. The base shall have a 1 inch chamfer at a 45 degree angle and rubbed finish. The top of the base shall have a circular broom finish.
 - 7.1.1. Provide construction detail in 35% plan set.
 - 7.2. Diameter of concrete bases/footings shall be kept to a minimum but also provide required structural support and be larger than base cover (shroud) for the lamp base. The base cover shall not overhang the concrete pedestal/footing.
 - 7.3. The base cover shall sit flush on the concrete base without any gap.
 - 7.4. The concrete pedestals/footings of multiple light poles in proximity to one another, typically, shall have consistent heights. Light poles in proximity to one another, both existing and proposed, shall have the same pole diameters and same top of pole height (length of pole + height of concrete base).
8. Exterior lighting shall be limited to what is required for security and safety.



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9. Recessed wall lighting, step lights, handrail lights, and bollard lights (LED and non-LED) are strongly discouraged because of maintenance challenges. Do not use in-ground or in-concrete fixtures.
 10. Control of light pollution continues to be an important issue on the campus. Up-lighting and/or building accent lighting shall not be specified. All lights shall have sharp cut offs and be Dark Sky Compliant.
 11. Wall mounted light fixtures shall be avoided. Pole mounted lights are the campus preferred method of illumination and shall be used whenever possible.
 12. All exterior light fixtures within the project boundary shall be updated to meet current campus standards. Non-standard lights shall not be reinstalled.
 13. An exterior lighting plan with schedule that identifies location and type of all exterior lights including pole mounted and building mounted fixtures shall be provided.
 - 13.1. The light schedule for exterior lights shall be on the same sheet as the lighting layout plan.



Power Outage Planning Form

See the following attachment

Power Outage Planning

Completed form required for power outage on UW Madison Campus
UW Electric Shop - Approved (Yes , No)

Electrician Name
Company

Date
Contact Phone #

Building
Address

Number

1. Requested Outage Date

2. Time of Day

3. Reason for outage

*Include copies or photos of panel schedules for all the affected panels to your Supervisor and ok times and dates with the building manager.

4. Work order Number

5. Project #

Bldg Manager

Electric Shop Contacts

Todd Kiley 444-6590

Russ Whitehead 265-3904

Bruce McIntosh 444-4380

Adam Melka 235-1702

Electric Shop Senior Manager- Jeff Folk-----

D-265-3905 C-444-4928

Electrical Engineer- Dan Volk-----

C-577-3068

Contact (BEFORE and AFTER) shutdown!!!

Doit Platform-----

263-2648 email (ns-field-repair@doit.wisc.edu)
email (noc@doit.wisc.edu)

UW Police-----

262-2957
262-4524 Fax (262-9768)

UW Electric Shop
Physical Plant – Facilities Planning & Management