26 Electrical

GENERAL

Designers shall verify that all applicable portions of these standards are incorporated into the project's design, drawings, specifications and final construction. Variances from these standards are to be submitted for written approval, using the KU Standards Variance Request Form in Appendix A1.1.

RELATED DOCUMENTS & REQUIREMENTS

Refer to the following for requirements that also apply to work of this section.

- **Division 1 - General Requirements:** Refer to sections regarding construction testing and field quality control requirements.
  - Unless directed otherwise, the Owner shall separately contract for quality control testing during construction, not the Contractor. Verify with DCM for each project.
- **Division 2 –Sitework**: Contains information about site utility systems.
- **Division 15 - Mechanical:** Review all sections of Division 250000 and 230000 for related work and systems that must be coordinated with provisions of Division 260000.
  - Appendix A15.3, SOP - Commissioning: For projects involving a commissioning agent as part of the project team, the Designer shall coordinate with the commissioning agent for function test procedures for equipment and systems of Division 270000.
- **Division 26 - Electrical Standards of Practice:** The University has adopted specific electrical system construction practices that are referenced by the applicable AIA-Masterspec section and/or University Standards of Practice (SOP). The Designer shall use the following supplemental guidelines and standards of practice in development of project construction documents, in addition to these Division 260000 Standards.
  - Appendix A16.1, SOP - Emergency Lighting Systems
  - Appendix A16.2, SOP - Electrical Power Metering
  - Appendix A16.3, SOP - Campus Electrical Distribution System
  - Appendix A16.4, Outdoor Lighting Standards

METERING REQUIREMENTS

Electrical metering for projects that require new services to be fed from the University distribution system shall be in accordance with requirements of Appendix A16.2, Standard of Practice - Electrical Power Metering.

UTILITY SERVICE PROVIDER

Projects that require new services to be fed from the University distribution system shall be in accordance with requirements of Appendix A16.3, Standard of Practice - Campus Electrical Distribution System.

For projects that require the establishment of new electrical services, the Designer shall determine, by discussions with University personnel, whether the service would be from the campus distribution system or from a utility provider. The Designer will use this information to inform his editing of electrical specification sections references above.

COMMON WORK RESULTS FOR ELECTRICAL – 260500

Basic Minimum Raceway Requirements: In order to facilitate long-term cable management, wiring systems (including but not limited to DDC, fire alarm, telecommunications, security, and power) shall be installed in raceways.

Concealing new circuits: Electrical work in architecturally finished spaces shall be concealed. The Designer shall obtain University approval for design of new circuits that must be installed in surface raceway systems where concealment is not possible.

Firestopping: Identify and provide installation details for utilization of firestopping materials associated with the particular construction materials that will be encountered. Include details of firestop systems in plans and list specific UL or other approved test assembly numbers. Use removable pillows for cable tray penetration firestop.

Cathodic Protection: Cathodic protection is required for certain underground piping systems. The need for cathodic protection shall be reviewed with the university for each project.

Electrical Test Data: Specify the operational tests and test methods required for the following equipment and materials:

- ❑ Primary cable and equipment.
- ❑ Engine-generators and emergency power system.
- ❑ Auditorium sound systems
- ❑ Audio/Video systems
- ❑ Fire alarm systems
- ❑ Lightning protective systems
- ❑ Transformers
- ❑ Ground fault protective systems
- ❑ Secondary service conductors/bus duct
- ❑ Voice/Data systems

- ❑ Electrical grounding systems

MEDIUM-VOLTAGE CABLES – 260513

Voltage Classifications: The Designer shall use this specification section to specify electrical cables carrying power at phase-to-phase or phase-to-ground voltages of between 2001-volts and 35,000-volts. For projects on the main Lawrence campus, this would include any cables installed in the 12,470-volt circuits between the KPL substations and a building service entrance transformer.

- ❑ Refer to Appendix A16.3, SOP - Campus Electrical Distribution System for additional discussion.

Appropriate Cable Assemblies: In general, medium voltage power cables will be installed on the Lawrence main campus, in either underground ductbank systems or in cable tray systems within tunnels and equipment rooms.

- ❑ Cable installed in underground ductbanks shall be specified as shielded single conductor.
- ❑ Cable installed in cable tray systems shall be specified as shielded and armored multiconductor cable. Armoring shall be specified as interlocking galvanized steel or aluminum with a PVC or PE jacket.
- ❑ The Designer shall evaluate the project-specific installation requirements and specify, and clearly designate on drawings, the use of single or multiconductor cable assemblies as appropriate for the project.
- ❑ Refer to Appendix A16.3, SOP - Campus Electrical Distribution System for specification and installation details.

Submittals - Supplemental Text: Because of the expectations for an extended operating life for these power distribution cable systems, the University is concerned that prospective contractors possess, and be able to demonstrate, a high level of competency in the installation of the systems. The Designer shall include the following supplemental text in the specifications paragraphs related to Submittals:

> Prior to scheduling any outage for purposes of completing cable splices or terminations, the contractor shall complete, in the owner's presence, the preparation of a sample cable end suitable for installation of a splice or termination kit.

Quality Assurance - Supplemental Text: In addition to the above paragraph, the Designer shall include the following supplemental text in the specifications paragraphs related to Quality Assurance:

> Installer Qualifications: Engage an experienced and certified cable splicer to install, splice, and terminate medium-voltage cable. The installer shall submit, for the owner's review, a certificate verifying factory training in the use of the specific splice and termination kits provided for the project. KU Facilities Operations personnel shall inspect and approve each installer's qualifications information before final termination work is done.

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES – 260519

Prohibited Wires and Cables: Aluminum wire is prohibited.

Prohibited Underground Conductors: To facilitate future replacement of conductors and increase conductor life, do not provide direct-buried conductor systems for underground wiring.

- ❑ Conductors shall be THHN for 8 AWG and smaller, THW for 6 AWG and larger.
- ❑ Color coding per latest edition of the NEC.
- ❑ MC cable is only allowed for fixture whips and must carry a grounding conductor.

UNDERCARPET ELECTRICAL POWER CABLES – 260519.13 PROHIBITED

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS – 260526

Grounding And Bonding: The building electrical ground shall be exothermically welded to the building steel in the grade beam, the piers, and the columns in at least two different sides of the building in addition to the water pipe ground and any driven rod/counterpoise systems. This applies to all new buildings and additions, and where possible, to renovated buildings. Renovated buildings are usually possible to make at least one steel connection in one location when planned in the design phases.

- ❑ Refer to Appendix A16.3, SOP - Campus Electrical Distribution System for a description of the University campus electrical distribution system grounding grid and for details regarding required electrical design practices on the main Lawrence campus.
- ❑ Provide ground riser diagrams for power distribution and telecommunications systems in the contract documents.

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS – 260533

Limitations of Raceway Use: The Designer shall incorporate the following considerations in the construction documents.

- ❑ Nonmetallic raceways are prohibited for use inside of buildings, unless specifically permitted elsewhere in this standard.
- ❑ Thinwall indenter, pressure cast, or slip-on metallic fittings are prohibited.
- ❑ Compression conduit connections shall be utilized. Set screw fittings are acceptable.
- ❑ Conduits shall not be considered grounding systems. All conduits shall include a separate grounding conductor.
- ❑ Use of flexible conduit shall be limited to recessed lighting fixtures, motors, and equipment. These connections shall be of minimum length and a maximum of 6’-0”.
- ❑ Rigid Nonmetallic Conduit. Rigid non-metallic raceways may be used below grade, embedded in concrete, and for special service applications such as corrosive locations.
- ❑ Elbows in buried PVC conduit runs shall be PVC covered steel.

Bus Duct and Busway: Plug-in and feeder busses 225 amp and larger shall have built-in ground bus. Plug-in devices shall have an integral, built-in ground connection for attachment to bus ground.

Conduit Drainage: Where probability exists of moisture entering buried conduits, provide methods for drainage.

General Box Requirements:

- ❑ Due to safety hazards and maintenance problems, the use of flush mounted and surface mounted floor outlets is prohibited.
- ❑ Surface boxes used on or in exterior building surfaces, or on the site, shall be cast type.
- ❑ Installation: Provide title rings over outlet boxes in glazed tile walls and wood paneling.
- ❑ To reduce sound transmission, wall outlet boxes shall not be installed back-to-back in partitions.
- ❑ Where boxes are installed in concrete block walls, the box mounting height shall be at the block joint.

Floor Penetration Details: Specify concrete curbs and fire barriers where duct runs pass through concrete floor slabs and fire rated walls.

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS – 260548

Prohibited Support: Lead, fiber, or wood anchors are prohibited for support of raceways or equipment.

IDENTIFICATIONS FOR ELECTRICAL SYSTEMS – 260553

Identification: The Designer shall edit specification section 260553 to identify specific requirements for labeling and identifying electrical equipment and devices. All switching, protective devices, and metering on main distribution switchboards shall be identified with black-white-black laminated 1/8 inch thick plastic plates. Plastic plates shall be attached to the equipment with screws or rivets.

- ❑ Identification plates are required for all electrical distribution equipment from the service through branch circuit panelboards and motor control centers. Labels shall identify both the equipment designation and the source supplying the equipment.
- ❑ The Designer shall specify both numbering and wording of identification plates.
- ❑ Motor and associated equipment numbers shall be the same.
- ❑ Raceways shall be labeled where appropriate, i.e., red for fire alarm, RED/GREEN for emergency lighting, etc.

MEDIUM-VOLTAGE TRANSFORMERS – 261200

Building Service Entrance Transformers: Refer to Appendix A16.3, SOP - Campus Electrical Distribution System for a description of the specification requirements for campus distribution system transformers.

Design for non-resistive loads: The Designer shall specify transformers and all other components of the electrical distribution systems to be rated for the anticipated non-sinusoidal load currents of modern electrical/electronic equipment.

MEDIUM-VOLTAGE SWITCHGEAR – 261300

Sectionalizing Switches: Refer to Appendix A16.3, SOP - Campus Electrical Distribution System for a description of the specification requirements for campus distribution system sectionalizing switches.

LOW-VOLTAGE SWITCHGEAR – 262300 & SWITCHBOARDS – 262413

Overcurrent Protective Devices: The design engineer shall conduct short circuit and coordination studies to determine protective device ratings and requirements, and shall not assign the responsibility for this to the contractor.

Sizing of Secondary Service And Distribution (600 Volt And Below): The Designer shall specify new secondary service and distribution systems to be of adequate size to provide for load growth during the life of the building. The facility type and use shall be considered in determining capacity to be provided in excess of initial demand. Design criteria documents shall identify to the University the reserve capacity provided in the design.

Ground Fault System: A ground fault protection system, where required by Code, shall be designed to provide minimum possibility of power outage to critical building facilities. Designers, who are involved in switchgear or panelboard upgrades that serve existing feeders, shall consider a coordinated system on the feeders rather than a main service entrance type ground fault system to permit incremental settings thus providing reasonable continuity of electric service.

- ❑ Additional ground fault protection may be required at point-of-use receptacles to provide personnel protection. Exterior power outlets and interior uses at lavatories and service sinks shall be provided and shall be GFCI protected and corrosion resistant.
- ❑ Current pickup and time delay range shall be specified for all sensors. Construction documents shall state that ground fault sensors shall be set at "0" time delay and "minimum" ground current flow during construction period. When the project is turned over to the University the two settings shall be changed to values selected by the DESIGNER.
- ❑ Specifications shall require that the Contractor test the system ground fault performance when first installed and submit a written record of the test to the University. A copy shall be included in final project data submittals. Tripping curves and characteristics shall be

submitted to the University. Identify the method to be used to test ground fault protection in the field.

Power Factor Correction: The Designer shall review with the University whether any secondary voltage power factor correction is required. It may not be desired in most locations because medium voltage rated power factor correction is already in place at both main campus substations.

Design for Available Fault Current: The Designer is responsible for determining available fault current at the point of equipment installation and for specifying bracing to withstand the available short circuit current, asymmetrical, RMS at rated voltage. Values shall be specified.

Distribution Switchboards: The Designer shall include the following provisions in construction documents:

- ❑ Do not locate plumbing facilities above the vault and switchboard space.
- ❑ The phase arrangement on three-phase busses shall be "A-B-C," from left to right as viewed from the front of the switchboard.
- ❑ Specify provisions for future protective devices. Base provisions on need for possible future increases in electrical requirements. In order to increase flexibility provides spaces in lieu of spare devices.
- ❑ Include continuous ground bus, equipped with bolted pressure clamp type lugs, full length of switchboard.
- ❑ Busses shall be copper. Design shall include provisions for future extension of main bus.

PANELBOARDS – 262416

Panelboards and Cabinets: The Designer shall include the following provisions in construction documents:

- ❑ In order to accommodate future additional wiring; provide spare conduit stubs from flush panels into suspended ceiling spaces or other accessible spaces. The spare circuits and spaces available in panel shall determine the quantity.
- ❑ Each electrical panel shall be furnished with a clear, plastic covered, typed circuit schedule mounted in a metal cardholder. The schedule shall identify circuits by room number using final numbers furnished by the University. Verify room numbers with the University.
- ❑ Provide a number designation on each circuit protective device. Odd numbers shall be used in sequence down left side and even numbers in sequence down right side.
- ❑ Provide cross breaker connectors and bus for the spare circuit breakers indicated in panelboard schedules. Provide a minimum of 25% spare spaces with single pole 20A circuit breakers.
- ❑ Neutral bus shall be rated for 200%.

MOTOR-CONTROL CENTERS – 262419

Motor Control: The Designer shall review the following for guidance regarding designs and specifications for electrical motor operation and control.

- **Motor Control Centers** - In areas where there are eight or more three-phase motors, a motor control center shall be provided. MCC bus work shall be braced to withstand the available short circuit current, asymmetrical, RMS at rated voltage. Values shall be specified.
- **Motor Electrical Service** - With the exception of portable maintenance equipment, motors over 1/3-h.p. shall be three-phase.
- **Motor Starters** - Starters shall be full voltage with fusible disconnect except as follows: For 20 h.p. and larger motors on 120/208 volt systems, and for 40 h.p. and larger motors on 277/480 volt systems, starters shall be autotransformer or part winding type with fusible disconnect.

  Coordinate starter type selection for use with specific motor as identified in Division 23000.
- Control circuit voltage shall be 120 volt. Where transformers are needed, fuses shall be employed in both primary and secondary sides.
- Where two pumps are provided, with one intended as a standby, an alternator shall be incorporated which allows the stopping and automatic switching for restart through one BACS stop/start point.
- Magnetic starters shall incorporate a minimum of two auxiliary contacts and a HAND-OFF-AUTO switch.
- A motor control center schedule shall be included on the electrical drawings.
- **Electrical Interlocks:** A schematic wiring diagram of circuits involved in an interlocked system shall be included in the DESIGNER's drawings. Devices used shall be specified.
- Starters shall have fusible disconnects rather than circuit breakers or MCPs. Control circuit voltage shall be 120 volt or less. Specify push button start/stop control in lieu of hand/off/automatic control for fan motors controlled through BACS.

WIRING DEVICES – 262726

Ratings of Convenience Receptacles and Lighting Switches: General use receptacles and light switches shall be heavy-duty, 20 amp, grounding type for general service applications. Install power receptacles with the ground pins up.

Surge Suppression Receptacles: One receptacle per office may have surge protection and shall be equipped with both audible and light alarms. Review with DCM Project Manager.

Cover Plates: All cover plates shall be stainless steel, type 302, brushed satin finish meeting Federal Specification W-P-445a, unless aesthetic requirements call for a different type of finish.

Floor Maintenance Equipment Receptacles: For corridors, large assembly areas, and other areas where floor maintenance equipment is used, locate receptacles so that a 45-foot cord will reach any part of the floor. Provide at least one duplex receptacle in each room where floor maintenance equipment is needed and receptacles are not otherwise available in accordance with the NEC.

Devices in Wet Areas: Receptacles, switches, and plates in damp or corrosive areas shall be specifically designed for use in that environment. Exterior power receptacles and interior receptacles at lavatories and service sinks shall be GFCI protected and corrosion resistant.

VARIABLE-FREQUENCY MOTOR CONTROLLERS – 262923

Provide Danfoss brand. May be provided by Johnson Controls through State Contract. Review with DCM Project Manager.

ENGINE GENERATORS – 263213

Provide as appropriate for each project. Review specific criteria with DCM Project Manager.

EMERGENCY POWER SYSTEMS AND EMERGENCY/EGRESS LIGHTING – 263323

General: The Designer shall refer to Appendix A16.1, SOP - Emergency Lighting Systems for guidance regarding University preferences for design of emergency / egress and exit lighting systems.

Loads Requiring Emergency Power Supplies: In general, the University provides backup electrical power supply capability for the following loads:

- ❑ Emergency egress and exit sign lighting.
- ❑ Building sprinkler system fire pumps.
- ❑ Security systems, fire alarm systems.
- ❑ Selected ADA-compliant egress passenger elevators.
- ❑ Communications systems equipment, computer workstations, or servers only if required to maintain operation of life safety equipment.

Emergency Power Systems: For projects involving emergency power requirements, an emergency generator shall be utilized. The preferred fuel is # 2 diesel fuel. When diesel generators are used, the fuel shall be and the storage quantity shall be as small as possible and still meet code and maintenance requirements. Fuel storage shall be aboveground, typically in generator base. Standby generator installations shall comply with NFPA 110. Please specify the NFPA required on site load testing.

Inverter-based Emergency Lighting Systems: Do not use, Do not use, Do not use.

Self-Diagnostic Battery Packs: If a generator-based system is not affordable or desirable, self-diagnostic battery packs in dedicated emergency light fixtures shall be utilized. This requires approval from both DCM and the University Fire Marshal Authority. Do not use emergency ballasted type fixtures.

STATIC UNINTERRUPTIBLE POWER SUPPLY – 263353

Provide as appropriate for each project. Review specific criteria with DCM personnel.

INTERIOR LIGHTING – 265100

Fixture Mounting Locations: Fixture locations requiring special equipment or scaffolding to aid in maintenance or relamping increase ongoing operating costs and thus require written approval from the University. Such special equipment and provisions for its storage and access must be provided as part of the project.

Design of Exterior Lighting: The Designer shall refer to Appendix A16.4, SOP - Outdoor Lighting Standards for University requirements for lighting of walkways, parking lots, drives, and building entrances.

Lighting Criteria: The Designer shall coordinate with the University to establish and document design criteria for lighting levels during schematic design. Lighting design shall follow the recommended and accepted lighting standard levels consistent with energy conservation and visual performance.

- ❑ The number of foot-candles of illumination designed for particular functions of the building shall be in accordance with the latest edition of the Illuminating Engineering Society Handbook in accordance with Kansas Lighting Standards.
    - ❑ Furnish design calculations, either by hand or by computer output, to the Office of Design & Construction Management during the design review process to help evaluate compliance with the IES standard.
- ❑ Occupancy sensors shall be considered as a means of controlling lights and conserving energy in large rooms.
- ❑ Provide exterior emergency egress lighting at all exits to the public way (30').
- ❑ It is presumed that fluorescent lighting will be satisfactory throughout, although there is some concern with the noise (audible & EMI) level created by such lighting. This can be reduced to a satisfactory minimum for most applications by proper electrical design. This matter shall be discussed with the Building Committee whenever the situation so dictates.
- ❑ Fluorescent lighting shall be with highest-efficiency electronic ballast's available with a two-year or more good reliability record. Harmonics shall be less than 20% Total Harmonic Distortion.

Light Fixture Switching and Control: The Designer shall use the following guidelines in circuiting, switching, and controlling interior lighting systems.

- Three-way and four-way controls shall be provided in long corridors, gymnasiums, auditoriums, and other large spaces.
- Provide inboard/outboard switching or dimming of fluorescent fixtures in private offices, classrooms, laboratories, and conference rooms.
- Occupancy sensors shall be integrated in the control schemes of classrooms, restrooms, storerooms, and multiple occupant office areas. Use sensors with combined ultrasonic/infrared technology, provided with an integral manual over-ride switch and ambient light level sensor.
- The Designer shall review the feasibility of automatic light level control areas with prominent daylighting.

Dimming Systems Designs: For general use, provide IC dimming ballast's with wall controller/switches.

- Where specialty systems have been stipulated in a project program, a comprehensive design will be considered to consist of the following, at a minimum:
- Circuiting of fixtures to be dimmed.
- Location of controller modules.
- Location of programmable controllers.
- Locations of dimmer panels.
- Emergency lighting relay if required.
- A detailed written sequence of operation and control modes for the dimming system.

Lamps: Linear florescent lamps shall be T5 or T8 with a correlated color temperature of 3500K.

Lens: Provide parabolic lens' in ceiling fixtures in classrooms and offices to prevent reflected glare and provide enhanced appearance.

Ballasts and Accessories: Fluorescent ballasts shall be efficient solid-state electronic ballasts. Electronic ballasts shall have a "true" power factor of .90 or greater with 20 percent or less total harmonic distortion. Fluorescent ballasts for outside applications or in areas where ambient temperature is lower than 50 degrees F shall have a minimum starting temperature of -20 degrees F.

Removal and Disposal of PCB Ballasts: On remodeling projects, the Designer shall consult with the University Department of Environmental Health and Safety (DEHS) for requirements for handling and disposal of PCB ballasts. Removal and disposal of ballasts containing PCB material shall be accomplished per EPA requirements.

- ❑ The Designer shall note in the construction documents that the Contractor shall examine existing ballasts that are to be removed from service. If ballast is not clearly labeled to indicate that it does not contain PCB, it shall be assumed to contain PCB.
- ❑ The University's EHS department will provide a ballast collection container at or near the project site. PCB containing ballasts shall be placed in the ballast collection container as they are removed.
- ❑ The University will dispose of the container.

EXTERIOR LIGHTING – 265600

Design of Exterior Lighting: The Designer shall refer to Appendix A16.4, SOP - Outdoor Lighting Standards for University requirements for lighting of walkways, parking lots, drives, and building entrances.

Fixture Mounting Locations: Fixture locations requiring special equipment or scaffolding to aid in maintenance or relamping increase ongoing operating costs and thus require written approval from the University. Such special equipment and provisions for its storage and access must be provided as part of the project.

Ballasts and Accessories: Fluorescent ballasts shall be efficient solid-state electronic ballasts. Electronic ballasts shall have a "true" power factor of .90 or greater with 20 percent or less total harmonic distortion. Fluorescent ballasts for outside applications or in areas where ambient temperature is lower than 50 degrees F shall have a minimum starting temperature of -20 degrees F.

27 Communications

General: The Designer should be aware that the University organizational structure includes a Department of Networking and Telecommunications Services (NTS), which is responsible for installation and maintenance of all telecommunications and computer networking systems on campus.

- ❑ Refer to Division 270000 - Telecommunication Systems for detailed requirements for all University telephone systems.
- ❑ At the earliest possible stages of programming or design, the Building Committee should review with DCM and NTS the options available for each project regarding the provision of telephones and other telecommunication systems, and verify how that project's telecommunication systems shall be designed and constructed.

For projects that involve the addition or relocation of telephone and/or computer communications outlets, the Designer shall review and verify outlet locations with the space occupants. This review shall identify outlets that are needed for immediate program needs, as well as future outlet locations.

- ❑ The Designer shall include installation of all conduit, boxes, and mounting devices in the project construction documents.

Design of Communications Terminal Room: Refer to Division 270000 - Telecommunication Systems for specific requirements.

Provisions for Elevator Communications: The Designer shall review Appendix A14.1 - Elevator Telephones for specific requirements for specifications and design of passenger elevator telephone installation on campus.

MASTER ANTENNA TELEVISON SYSTEM – 274113

Requirements for these systems will be determined on a project-by-project basis. Where applicable, reference the University Media Committee standards and/or specific Audio/Video consultant.

- ❑ Cable and/or satellite television systems require written approval from University Provost prior to installation. University Dean, Department Chair or Building Committee Chair shall submit this request in writing to the Provost.

PUBLIC ADDRESS SYSTEMS – 275116

Requirements for this will be determined on a project-by-project basis.

- ❑ EPAS- Emergency Public Address System for Mass notification- Refer to fire alarm standards for installation requirements.

SOUND-MASKING EQUIPMENT – 275119

Requirements for this will be determined on a project-by-project basis.

INTERCOMMUNICATIONS AND PROGRAM SYSTEMS– 275123

Requirements for this will be determined on a project-by-project basis. Intercom service may be provided through the phone system.

EDUCATIONAL INTERCOMMUNCIATIONS AND PROGRAM SYSTEMS – 275123.50

Requirements for this will be determined on a project-by-project basis. Do not provide master clock system unless directed by Building Committee.

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