

Applies to: All FOD Employees, Project Design and Installation Contractors  
Issued: January 2009

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## Statement

This policy defines the internal FOD review and inspection procedures necessary to manage the risk associated with Primary Electrical Service construction work. The goal of this policy is to ensure that new primary electrical service construction meets the safety and reliability requirements defined in the University Building Design Standards (BDS) and applicable state and national codes.

Compliance with this policy is a component of the mitigation strategy to the risks that improperly installed electrical systems pose; namely, injury or fatality to staff or contractors and electrical service interruptions to critical Medical Center, research, animal care, and other university operations.

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## Definitions

1. Laterals - Electrical distribution cable installed to distribute power from the Primary Circuit Feeder Pair to the incoming switches on the Primary Select Switch for each building.
2. Loadways - Electrical distribution cable installed to distribute power from the load side switches on the Primary Select Switch to the building transformers.
3. Primary Circuit Feeder Pair (Mains) - Reactor Limited 13.2 kV electrical distribution circuits installed in underground duct-banks to distribute power to multiple buildings from a central substation location.
4. Primary Disconnect Switch - The fused disconnect switch applied to the high voltage side of the Primary Transformer and used to isolate the primary transformer from the Loadway cable.
5. Primary Select Switch - The switch in the electrical distribution system used for Primary Circuit Feeder alignment and building isolation.
6. Primary Service (Connection) - The electrical connection to the university electrical distribution system. It covers from the Primary Circuit Feeder Pair to the Secondary Main Circuit breakers.
7. Primary Transformer - The 13.2 kV transformer provided to power the individual building loads at low voltage levels (480 or 208 VAC).

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8. Qualified Technical Personnel - A person with the training and experience to perform electrical testing as defined by the National Electric Testing Association (NETA).
9. Secondary Mains - The fault interrupting circuit breaker or fused disconnect device powering the building switchgear from the load side of the building Primary Transformer.

## Requirements

This policy applies to any facility supplied power from the main campus system. It does not address building emergency power requirements or provisions for standby electrical service.

Facilities supplied power from the university 13.2 kV distribution system shall be fed from one (preferred) circuit of a feeder pair through a Primary Select switch. This switch shall be equipped with an automatic transfer feature capable of detecting circuit failure and transferring facility loads over to the remaining (alternate) feeder circuit. Assignment of preferred and alternate feeder circuit and the decision to enable the automatic transfer feature are the province and responsibility of the University Utilities High Voltage Services (UTHVS). The decision to enable automatic transfer or provide alternate connections to the 13.2 kV distribution system shall be based on distribution system capacity, feeder capacity, and the intended use of the facility.

All portions of the Primary Service to any facility connected to and powered from the Ohio State Medium Voltage Distribution System (13.2 kV and 4160 V) shall conform to the University Building Design Standards (BDS) as stipulated in Division 33 of that document and further clarified or defined in documents referenced therein. Primary Service to such facilities is under the control and at the discretion of the UTHVS. The Design Authority (Project Architect/Engineer) shall consult on the design intent with UTHVS regarding the sizing and configuration of the primary service. UTHVS, in consultation with the facility Design Authority, shall establish the required Primary Selective switch configuration for each Primary Service during schematic design and before design development based upon a careful evaluation of building service requirements and what is appropriate for the campus power system.

All on-site sources of electrical generation (emergency, standby, photovoltaic, or other) shall be designed to avoid accidental back feeding into the 13.2 kV primary system. Switching, control, and protection of this generation shall be reviewed and approved by UTHVS.

**Primary Service Connections are subject to inspection and denial of services for any non-conforming or substandard installation in accordance with published requirements.**

UTHVS shall place the security of the Power System, safety, and continuity of service for the university as a whole over the preferences or operational concerns of any one facility or complex of facilities.

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## Responsibilities

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### A. University Utilities High Voltage Services (UTHVS)

1. UTHVS shall review and concur on relay protection and fuse coordination settings and the documentation of such. Protection and coordination settings shall meet BDS requirements before construction documents are approved.
2. UTHVS, as part of their installation compliance inspection process, shall inspect all vaults, manholes, duct banks, and conduit installation work before and during pouring of the encasing concrete.
3. UTHVS shall inspect the primary service before the new facility's connection to the university's medium voltage distribution system. The inspection shall include all portions of the medium voltage circuits, circuit connections, switching devices, and connected equipment, such as primary transformers, disconnect switches, fuses, bus work, high side metering, and surge arrestors. The inspection shall extend to the secondary main disconnect device(s), their controls, protective functions, settings, ratings, and application. Two Primary Service Connect Checklists (Construction, Permanent) are considered part of this policy and are available for download at [fod.osu.edu/resources](http://fod.osu.edu/resources).
4. UTHVS shall review the inspection results and authorize service if the installation meets the appropriate standards and no substandard practices, workmanship, or non-conforming conditions are discovered. The existence of an approved service authorization shall not relieve the equipment manufacturer or installation contractor of their warranty responsibilities, nor shall it relieve the Architect/Engineer of their design responsibilities to ensure that secondary connected loads do not exceed the primary system capacities and characteristics (e.g., cable ampacity, transformer impedance, relay coordination, etc.).
5. UTHVS shall perform all primary switching operations on the medium voltage system and equipment. This include all switching associated with primary service disconnect, commissioning, initial service connection, and post-commissioning facility operation.

### B. Design and Construction (FDC)

1. FDC shall communicate this policy and the requirements herein to the Design Authority and the Construction Contractors for FDC-managed projects.
2. FDC shall coordinate design requirements with the customer(s), Design Authority, and UTHVS.

### C. Design Authority (Project Architect/Engineer)

1. The Design Authority for a new or renovated facility shall provide medium voltage primary circuitry protection, dielectric and system test requirements, and switching capabilities acceptable to UTHVS. The operation of this circuitry shall be tested or

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otherwise demonstrated and commissioned by the project with the supervision and facilitation of UTHVS, so that UTHVS can substantiate their determination that the installation meets requirements and is acceptable before placing the primary service circuits into service.

2. The Design Authority for a new or refurbished facility shall provide secondary main-to-primary fuse coordination. Secondary side faults shall be detected and cleared by the secondary main breaker or a downstream device early enough to avoid primary transformer fuse operation or degradation.
3. The Design Authority for the facility shall be required to produce documentation, including fault current calculations, relay and fuse current-time characteristics, and equipment fault ratings to demonstrate to UTHVS that appropriate protection and switching/interrupting capability, selectivity, and coordination exist on the secondary side of the primary distribution transformers. Secondary main circuit breakers, switching, and protective devices shall have been installed, inspected, and tested in accordance with NETA requirements by qualified technical personnel. All protective device settings and equipment ratings shall have been reviewed and approved by a registered Professional Engineer accountable to the university.

#### D. Construction Contractors

1. The Contractor shall maintain and make available documentation, including equipment specifications, purchase requisitions, bills of lading, and manufacturers' drawings adequate to demonstrate to university representatives that all materials and supplies used on the 13.2 kV system installation meet BDS standards.
2. Contractor shall maintain and make available to university representatives the certifications and qualifications of all contractor personnel involved in performing medium voltage terminations and splices.
3. The Contractor shall provide a minimum 2-week advance notification of their intention to pour concrete duct bank, with confirming notification given to UTHVS and the Project Manager four hours before the pour. Pouring shall not proceed without a UTHVS representative present for inspection and approval. Documented notification shall be provided to the Project Manager and UTHVS via e-mail or fax.

## RESOURCES

For questions and consultation, contact the Senior Director of Utilities (614-292-4509), Utilities Technical Director (614-688-3196), or Manager of High Voltage (614-292-0219).