1. This section provides guidelines for the installation of cables and equipment for the campus medium voltage distribution system.

2. Western Washington University is served by three 15 kV feeders connected in a combination loop and radial system from the Viking Electrical Substation. The substation is owned and operated by Puget Sound Energy (PSE). Each primary feeder serves several buildings. The University has one line diagrams, campus power plan, and 15 kV details of the primary system feeders available for review. Each consultant shall get copies and maintain them in their office files for reference.

3. The University distribution system is 12.47 kV [12,470 Volts], 3 phase. 3 wire, Delta system. The ground fault source capacity of the system is as follows:
   a. 3LG – 6,237.9A @ -56.5 deg. (A-phase), X/R = 16.1
   b. 1LG – 5335.5A @ -58.0 deg. (A-phase), X/R=28.3
   c. LL – 5402.0 @ -146.5 deg. (B-phase), X/R = 16.1

4. Every building must include electrical 15 kV design from an existing tunnel node or manhole to a new building. The consulting engineer shall determine which manhole/tunnel node to secure feed from and shall route the duct bank or tunnel section on power plans showing the exact routing. When manholes are used they shall be no more than 400 feet apart, shall be minimum 6' x 6' outside dimensions, and shall have oversized 36-inch diameter covers to facilitate wire pulling. A typical service for a new building shall consist of a 15 kV, medium voltage switchgear line up connected to a feeder in a loop configuration and located in the main electrical room. Two 12.47kV – 480V transformers shall be part of the double ended substation/main switchgear line up with tie breaker for continuity of service. Supply each transformer with a feeder coming from a fused switch connected to a bus between the loop switches. The service capacity of the transformers must be determined based on a load analysis of the connected building loads. The transformer shall have 50% spare capacity over calculated load. In each tunnel node/manhole there are connectable dead-break elbows as specified in this section.

5. Dead-break elbows shall contain a test point:
   a. 15kV class.
   b. BIL rating of 95kV impulse voltage, 1.2 x 50 microsecond wave.
   c. AC Withstand – 34kV, 60 Hz, for 1 minute.
   d. DC Withstand – 53kV, 15 Minutes.
   e. Corona Extinction Voltage – 11 kV.
   f. 200 amp Elbows - Short time current rating 10,000 amps, rms, sym, 1.3 max. asym factor – 0.17 sec.
   g. 600 amp Elbows - 25,000 amps, rms, sym for 10 cycles.
   h. Unused load break bushings shall have a 15kV rated pre-molded protective dead end cap with ground lead to insulate, electrically shield and mechanically seal the bushing.
   i. Manufacturer’s product shall be equivalent to Elastimold in quality.

6. Stress cones shall be a molded type with an equipment grounding conductor to match NEC tables.

7. Primary cables shall be provided with suitable cable identification tags at all terminations. Tag shall indicate the circuit and the phase of each cable and shall be large enough and be located properly so that each cable is readily identifiable from outside the vault or equipment.

8. Fireproofing: Fireproof all exposed primary cables in manholes
9. For new buildings, the placement within the loop shall be depicted on a partial 15kV single line drawing. Tunnel node/manhole splicing details shall be shown for every manhole that is impacted by the project. “Typical” splice details are not acceptable. Show the actual configuration, including modifications, that is required by the project. The actual configuration shall include physical location of all splice locations and cable locations. Both before and after configurations shall be shown. There shall be at least ¾ wrap by the cable between the splice and the point of cable exit from the manhole. Elevations of all duct banks including wire content of conduit must be shown where leaving manholes, loop switches, transformers, etc. Splice bodies shall be properly grounded in manholes.

10. One person from the consulting engineering firm shall be closely involved with every project from a 15kV standpoint. This person will formally review and check all drawings and specifications for compliance with university standards.

11. The 15kV cable shall have copper conductor, EPR - 133% level insulation, and a full size copper tape shield with an overall jacket. All new cable must be Hi-pot tested to the full level recommended by the manufacturer by an independent electrical testing company approved by the university electrical engineer. The reports shall be sent to the consulting engineer and Western within five (5) working days of the test. On all new buildings the electrical contractor shall use a 15kV cable splicer approved by the university electrical engineer to do all splicing. In tunnel system, there shall be 3 conductor type MV-105 shielded power cable with an aluminum sheath, copper ground wire, and a low temperature red PVC jacketed cable.

12. The 15kV high voltage cable shall be manufactured by Okonite, Southwire, Pirelli, Rome, or Cablec.

13. Exact routing of all duct banks must be shown in plan and all existing utilities in the area of the routing must be shown on this drawing.

14. Before cable is pulled in, duct shall be rodded, and a mandrel and swab shall be drawn through. All spare ducts must be left with a #10 insulated copper conductor, which can be used as a pull wire. Two feet of excess length shall be coiled inside the duct at each end. Spare duct shall be capped or plugged at each end.

15. Conduit elbows and bends shall be minimum 36" radius when containing 15kV cables.

End