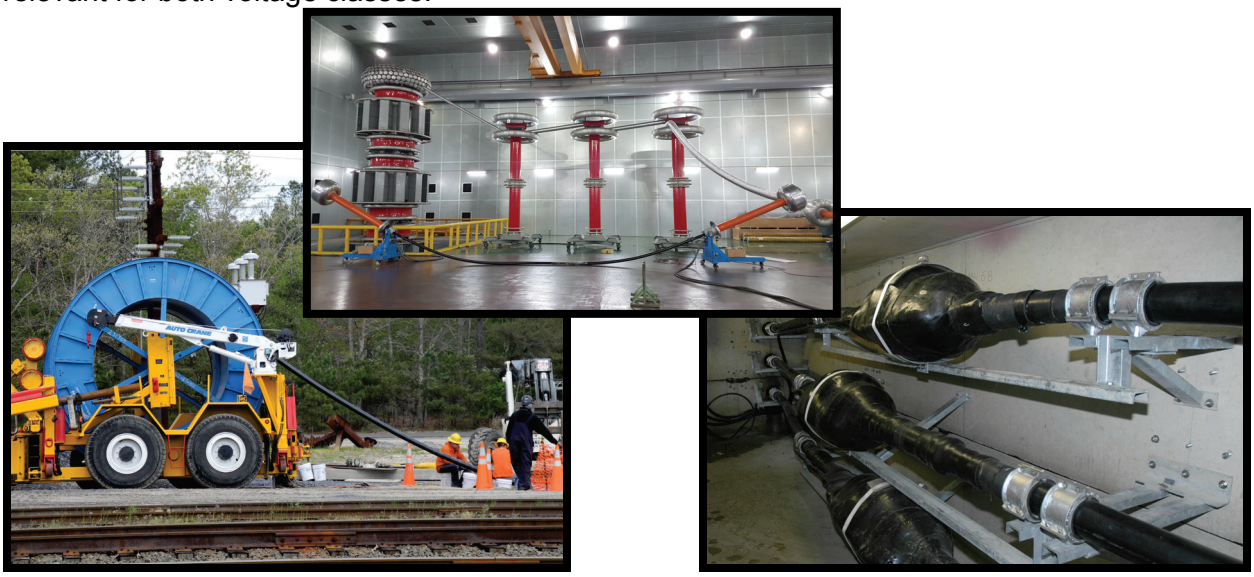
ELECTRICAL CONSULTING ENGINEERS, P.C.

Aspects of Underground Power Cable Systems Course

Description

Electrical Consulting Engineers, P.C. is offering a comprehensive course on underground transmission and distribution cable systems. Utilities, architect-engineers, developers and industrials are often faced with considering an underground cable option either as a portion of an otherwise overhead line, to connect nearby substations, as entry to an already congested substation, or in urban setting where underground transmission or distribution is the only alternative. The student attending this course will gain an overall understanding of the major cable system types including extruded, pipe-type and self-contained fluid-filled, as well as an understanding about elements of design, manufacturing, installation and operation of underground transmission and distribution cables. More often, transmission cable systems are engineered on a case-by-case basis, so much of the 2-day course focuses on transmission with relevant references to distribution voltage cables. The instructor will discuss topics that are relevant for both voltage classes.



Attendees

This course will be of interest to those wanting to gain an understanding about underground cable systems, components and applications. A student taking this course should be generally familiar with power systems; a background in electrical, mechanical or civil engineering will be helpful in understanding some concepts.

Presentation Format and Continuing Education

This 12-14 hour course will be presented over two days in a classroom setting using lectures, in-class discussions and illustrative problems. Questions and interaction among students are encouraged. Concepts are presented using theoretical background along with practical experience. Each student will receive a notebook containing copies of the instructor's presentation material along with additional material deemed relevant. Students may wish to bring portable computers or hand calculators to class, but these are not required. Students taking this course will receive a course certificate and professional development hours (PDH).

Detailed Course Agenda

Day 1

- Introductions, Summary of Course Goals
- System Types and Historical Perspective
- Transmission vs. Distribution
- Cable System Planning, Selection and Characteristics
- Cable Project Types
- Cable System Components
    - Cable Construction
    - Terminations
    - Splices/Joints
    - Other Accessories (Link Boxes, Bonding Cables, Pressurization Plants)
- General Design Considerations
    - Underground vs. Overhead
    - Power Transfer Requirements and Rating Criteria
    - Route Selection & Rights-of-Way

Day 2

- Summary of Design Calculations
    - Ampacity & Soil Effects
    - Pulling Tension
    - Impedances
    - Induced Voltages and Currents
    - Magnetic Fields
- Manufacturing Considerations
    - Laminate Cables (Pipe-Type, Self-Contained)
    - Extruded Dielectric (XLPE, EPR)
- Installation and Civil Design Considerations
    - Open Trench
    - Trenchless Technology
    - Transitions to Other Equipment
- Testing, Standards & Specifications
    - Prequalification Tests, Factory Acceptance Tests (Routine, Sample), Commissioning Tests, Fault Location Tests, Standards and Specifications
- Operation, Maintenance, Repair

Instructor

This course will be presented by Earle C. (Rusty) Bascom, III, Principal Engineer with Electrical Consulting Engineers, P.C. Mr. Bascom has over 27 years of experience focusing on the analysis, design, research and education related to underground transmission and distribution cable systems. His expertise has been applied to the construction of new underground cable circuits as well as advancing the continued successful operation of existing underground systems. He co-authored the underground cable system section in the last four editions of the McGraw-Hill *Standard Handbook for Electrical Engineers*, and reviewed the 1992 edition and was the principal author for Chapter 11, Ampacity, in the 2006 edition of the EPRI *Underground Transmission Systems Reference Book*. He is active in the IEEE, Power & Energy Society, Standards Association, and is an officer of the Insulated Conductors Committee where he also contributes to several working groups and discussion groups, and with CIGRÉ. Mr. Bascom holds an A.S. degree in Engineering Science from Hudson Valley Community College in Troy, New York, a B.S. and M.E. degrees in Electric Power Engineering from Rensselaer Polytechnic Institute in Troy, New York, and an M.B.A. degree from the State University of New York in Albany. Mr. Bascom is a licensed professional engineer in the states of NY, FL, TX, MD, DE, AZ and the District of Columbia, has authored 60 technical papers or publications and holds one patent.

Expected Learning Outcomes

After taking this course, the student should be able to do the following:

- Identify and characterize the major cable system types and components
- List the major design calculations required for a new cable system
- Describe the types of tests that are required in the manufacture and installation of a cable system

On-Site Locations and Course Hours

For utility on-site presentations of this course, ECE expects that the host will organize a meeting room suitable for the number of attendees configured in a “classroom” style with tables, adequate lighting, an projection screen and computer projector (or large monitors), and a white board or drawing pad with suitable markers. Coffee breaks and lunches are provided by the host organization.

Course instruction generally will start between 8am and 8:30am, with a mid-morning and mid-afternoon break, 30-60 minute lunch break and daily dismissal at between 4-5pm. Actual class time varies depending on questions, extent of classroom discussions and specific interests of participants.