

CABLE SYSTEMS IN MULTI PURPOSE OR SHARED STRUCTURES

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ABSTRACT

With the increase in demand and the challenges posed by the design and installation of high voltage (HV) and extra high voltage (EHV) cables in congested right of ways, structures such as tunnels and bridges for multipurpose use are becoming an attractive option. Cigre's working group B1.08 met in various parts of the world and developed engineering guidelines on Cable Systems in Multi Purpose or Shared Structures during 2006-9. This working group had electrical cable engineers from Australia, Austria, Canada, France, Italy, Japan, Korea, Netherlands, Singapore, Spain, Sweden, and the United Kingdom, and a civil engineer from the United States.

KEYWORDS

High voltage cables; Extra high voltage cables; Design; installation; Right of way; Multiuse; Shared; Sustainability; Environmentally friendly; Tunnels; Bridges

INTRODUCTION

With the increase in demand and the challenges posed by the design and installation of high voltage (HV) and extra high voltage (EHV) cables in dense urban and other congested right of ways, structures such as tunnels and bridges for multipurpose use are becoming an attractive option. They offer reduced overall costs, environmental advantages and less disruption to the community during installation, maintenance and replacement of cables and other services. In the Cigre' WG B1-08' technical brochure n°403, the reader can follow Sections 1 to 5 and review the examples described in Section 8 to decide if a shared structure is appropriate. If the decision is to use a shared structure, Sections 6 and 7 offer expert guidance on various technical and administrative issues, forming a wonderful reference document on the design and implementation of such a system. Section 8 indeed is a review of the international experience of HV cables in multipurpose or shared structures, offering prior established experience in this field. Future trends are summarized in Section 9. Section 10 offers a list of 60 references. A comprehensive appendix presents the results of TF B1-14, which surveyed through comprehensive questionnaires on the global use of cables and structures. The same issue for Gas Insulated Lines (GIL) has been reviewed by JWG B3/B1.09 in the TB 351 "Application of Long High Capacity Gas Insulated Lines in Structures."

Scope of Work

Due to the complexity of cabling in general, this study

group elected to mainly deal with cable systems of 50 kV and above in multipurpose and shared structures where it felt that future investments are most likely to be made. There is no limitation to applying these principles, however, to cables of lower voltages.

Some Definitions

The group adopted the definition of a shared structure as "Any continuous structure containing one or more utility services which permits the replacement, renewal, maintenance, repair or revision of the service without the necessity of making an excavation," from the American Public Works Association. This implies that the structure is traversable by people and in some cases by some sort of technology. In this report, multiple services by the same owner, multiple services by multiple owners or the same utility service by different owners have been taken into consideration as shown in Fig.1.

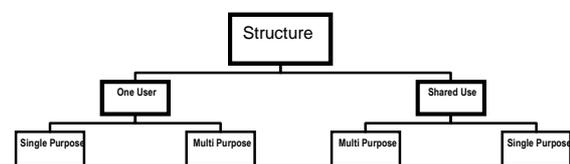


Fig. 1: Various Forms of Structures

The following structures have been considered:

- Single Purpose Structure;
- Multipurpose Structure;
- Shared Structure.

Single Purpose Structure

Any continuous structure containing one or more power cable systems which permits the installation, replacement, renewal, maintenance or repair of the services without the necessity of making either an excavation or disruption to any other services. This implies the structure is traversable by people and in some cases by some sort of technology.

Multipurpose Structure

Any continuous structure containing either a power cable system or systems and other services which permits the installation, replacement, renewal, maintenance or repair of the services, without the necessity of making either an excavation or disruption to any other services. This implies that the structure is traversable by people and in some cases by some sort of technology. It should be noted that a structure originally constructed for a single