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GROUP REF. : B1
PREF. SUBJECT : 3
QUESTION N° : 3

One of the Effective Ways for Environmental Impact Mitigation in Cable Replacement

1. Duct system

In Japan, cable systems have been introduced for effective land use and so on. Especially, a duct system has a strong point on a cable replacement because the system allows the work without additional civil works such as excavation. This feature suggests that the duct system can be one of the effective solutions to mitigate the environmental impact as well as the social impact such as traffic congestion.

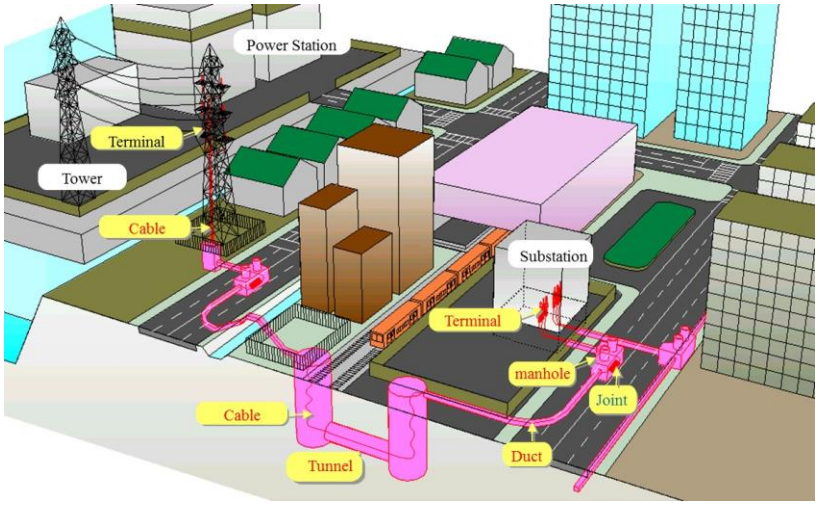

Fig.1 duct system

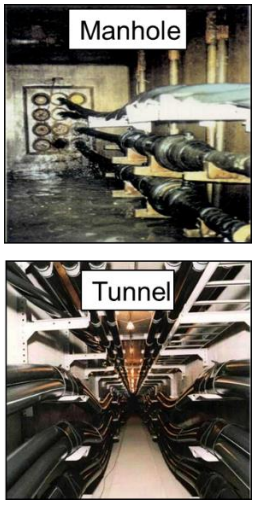

Fig.2 Manhole and Tunnel

2. Design concept of duct system

This section introduces a design concept of the duct system, with particular attention to spare ducts. Previously, a spare ducts is equipped not for cable replacement but for emergency response in case of cable fault and so on. Therefore a conventional procedure of a replacement is to remove existing cables and then install new cables into the same ducts. This method requires a long power outage period between stating from the existing cables removal work and completion of the new cables installation.

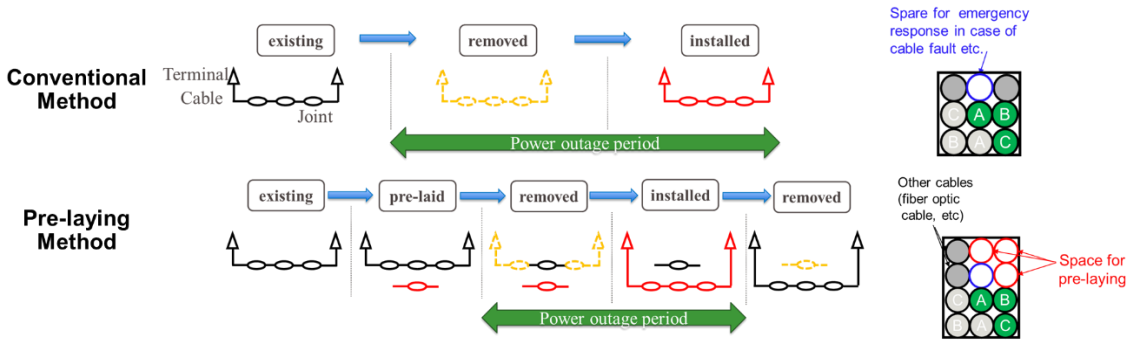

Fig.3 Comparison of Conventional and Pre-laying Methods and cross-section view of the ducts

As society continues to develop, electricity plays an ever-expanding role. Therefore, ensuring the reliability of the cable systems becomes more important than ever. For example, we effort to minimize the power outage period associated with cable replacement.

A new design concept has been introduced to minimize the power outage period and mitigate environment impact, in which the number of spare ducts are secured in advance. The spare ducts enable us to lay new cables in without power outage and extra civil works for additional ducts installation. We call this procedure as “Pre-laying method”. It can be said that the new design concept also take consideration with future retrofits in terms of use of existing facility at maximum.

3. Technological Development at the view point of Retrofitting

Technological development from a retrofit perspective is also important for environmental impact mitigation. For example, there are some cases where new XLPE cables cannot be fit into the existing duct system designed for existing SCFF cables. This is due to the differences in the extension characteristics of each cable type. With conventional technology, civil works to expand a manhole is required in order to secure the cable offset because an extension of XLPE cable is greater than that of SCFF. To avoid civil work, we have verified applicability of a newly developed compact joint. As a result, the XLPE cable was successfully installed in the existing manhole without the extension of the manhole.

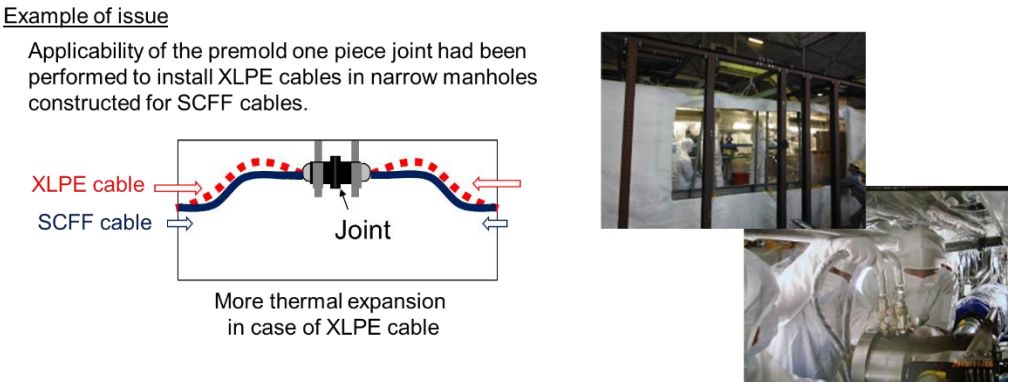

Fig.4 Overview of the verification of premold one piece joint in a narrow manhole

4. Conclusion

- Application of a duct system is one of the effective ways to contribute the environmental impact mitigation, because the system enables cable replacement work without excavations.
- To update the design concept is essential for responding to social demands including environmental impact mitigation. Pre-laying method is used to shorten the power outage period for retrofit or replacement.
- It is also important to develop technologies based on the concept of retrofit. Maximizing the use of existing facilities will minimize environmental impact.