CIVIL AND ENVIRONMENTAL ENGINEERING

DM 630/TECNE - Analysis of the behavior of masonry tunnel linings and renovation using innovative materials

Funded By	TECNE GRUPPO AUTOSTRADE PER L'ITALIA S.P.A. [P.iva/CF:15783681008] MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584]
Supervisor	LENTICCHIA ERICA - erica.lenticchia@polito.it
Contact	CHIAIA BERNARDINO - bernardino.chiaia@polito.it Manlio Culotta, manlio.culotta@tecneautostrade.it LENTICCHIA ERICA - erica.lenticchia@polito.it
Context of the research activity	The research topic concerns the analysis of the behavior of masonry tunnel linings to identify critical issues and implement the necessary rehabilitation interventions; in particular, through the study of structural renovation interventions with innovative materials and construction techniques. Progetto finanziato dal PNRR a valere sul DM 630/2024 - CUP E14D24002410004
Objectives	Before the introduction of reinforced concrete, masonry linings were commonly used in rail, metro and road tunnels and, therefore, represent a heritage extended throughout the Italian peninsula; a heritage that having been in service for more than a century is beginning to show signs of degradation that may reduce its strength. The research topic concerns the analysis of the behavior of masonry tunnel linings to identify criticalities and implement the necessary rehabilitation interventions; in particular, through the study of structural renovation interventions with innovative materials and construction techniques. Specifically, in this project, intervention techniques that apply decarbonized cementitious materials and concretes (e.g., geopolymer binders, LC3, etc.) will be studied. These materials are in the early stages of application in the civil field. They have high mechanical performance, durability, and fire resistance and would enable the creation of reinforcing elements that can increase the service life of tunnels. The research activities, consistent with the objectives of the PNRR, will hinge on the principles of the Green Transition of the national infrastructure network, making it both more sustainable and, above all, more robust and resilient against collapse and other risks. The research will be conducted together with the engineering company TECNE, industrial partner of the project. The

	methodologies will be validated, with an interdisciplinary approach, with laboratory tests and on actual and relevant case studies oriented to meet the needs of the industrial partner.

Skills and competencies for the development of the activity	The position is open to candidates with a degree in Civil Engineering, Environmental Engineering or related fields. We are looking for a candidate with (i) a good background in structural engineering and structural analysis (ii) knowledge in the field of tunneling and diagnosis of existing structures; (iii) with experience in laboratory work and experimental tests;