MONASH
ENGINEERING

MONASH University

Faculty of Engineering

Summer Research Program 2023-2024

Project Title: Sustainability of underground infrastructures: a BIM-based framework for design integration and optimisation

Supervisor(s): Qianbing Zhang

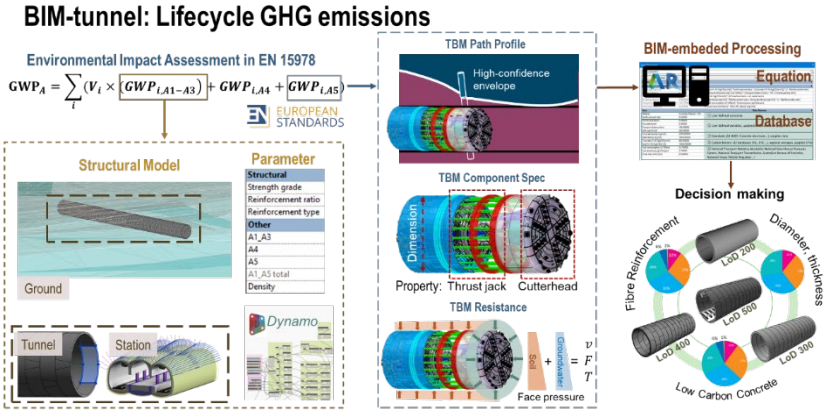
Department: Civil Engineering

Email: qianbing.zhang@monash.edu

Website profile of project supervisor:
https://www.monash.edu/engineering/qianbingzhang

Objective

Underground infrastructures have lacked progress towards decarbonization and faced difficulty from lack of initiatives, guidance, standards, and references due to its nature of large-scale, independency, and uncertainty. The objective is to explore the feasibility of potential innovative underground construction technologies for reducing embodied carbon emissions, and facilitating long-term structural stability for climate-adaptive resilience in large tunnels. A holistic, sustainable and intelligent framework incorporating digitalised platforms is to be developed to fundamentally transition the way we design, construction, and operate underground projects with information management in embodied carbon assessment, ground-structure interaction analysis, and construction simulation.



Project Details

Urban developments have imposed inevitable impacts on global environments causing climate change. As reported by Infrastructure Australia, 125 major transport projects (~$300 billion) will be delivered in the next 10 years representing 58% of total infrastructure projects; among them, 25% increase in tunnelling is forecasted in the next 5 years. The future of transport assets in Victoria, New South Wales, and Queensland heavily depends on tunnel developments, with an emphasis on metro (4838 ktCO2e), road (2599 ktCO2e), and rail (7695 ktCO2e) systems.

Prerequisites

Rhino or Revit software experience is highly recommended before the project.