## **Master Thesis**

Assessment of Mixed Traffic Operation in Underutilized Rail Lines in Mexico: The Case Study of the Mixed Traffic Tram-Train Located in Xalapa, Veracruz, Mexico

An important feature that influences the quality of life in cities is the supply of mobility. Many cities face population growth and expansion which, if not accompanied by good mobility and regional planning, tend to increase travel times through the city and are often accompanied by different forms of pollution, thus directly affecting the quality of life.

This thesis analyses the operational feasibility of an alternative to mobility problems in medium-sized Mexican cities, which consists in the implementation of local and/or regional passenger rail systems on existing underutilised tracks, sharing the infrastructure with the existing freight rail system. This analysis is carried out in a deterministic way with simulation methods, using the simulation tool RailSys and taking as a case study the city of Xalapa, Veracruz, Mexico.

The second main objective, besides determining the viability of this alternative, is to establish a methodology that can be the basis for capacity studies in cities that are susceptible to the development of railway projects such as this one.

The results show that requiring some additional infrastructure to ensure proper functioning and safety, this alternative is operationally viable and could be attractive for the development of cities.



Photo : Mauricio Villarreal Muñoz





Integration of Freigth (blue) and passenger services (green) under variant 4 during Morning off-peak.

Proposed stations for Xalapa's tram-train project. Own work based on ARTF



Complete cycle of passenger trains during peak hours (10 min headway)

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