



Tubed Mega Frame Structural Systems for Tall Buildings

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Abstract

The Tubed Mega Frame is a new structure concept for high-rise buildings which is developed by Tyréns in Sweden. The original design of the Tubed Mega Frame consists of mega columns in the periphery of the building and connecting perimeter walls. Hence, the stabilising central core in traditional high-rise structures has been omitted. Due to the tube action, this creates an efficient structural system and also increases the floor area utilization ratios when compared to traditional structures. In a previous series of structural studies, the global response of the system, the detailed design as well as the construction process was investigated. In an on-going study, the structural system is further developed by replacing the mega columns with façade frames and perimeter walls with internal crossing walls. The central core is still omitted in the modified systems. Various Tubed Mega Frame systems are compared with a traditional structure of a slender 425 m high-rise building recently constructed. The conclusions from the present study show that both the original Tubed Mega Frame and other Tubed Mega Frame systems are potentially feasible structural systems with high-efficiency for high-rise buildings.

Keywords: High-rise buildings, Towers, Structural building systems, case study, Tubed Mega Frame.

1 Introduction

1.1 Background

High-rise buildings and skyscrapers have become a magnificent element in the modern urban cities during the last century and they are considered as a solution to the land shortage problem in large and dense cities. They are an efficient way to provide residential, office, hotel and commercial spaces. High-rise buildings tend to get taller and taller, approaching and passing the 1 km barrier. This calls for increasing demands for new and innovative structural systems as well as for the need for new and innovative vertical

transportation system. Tyréns has proposed a new concept called Articulated Funiculator to solve the vertical transportation problem in high-rise buildings, especially in ultra-high buildings. In the meantime, a structural system concept called the Tubed Mega Frame has also been proposed by Tyréns in correspondence to the Articulated Funiculator transportation system. Both innovations were first presented in [1].

1.2 The Articulated Funiculator

The Articulated Funiculator is a series of trains separated by some distance along the vertical direction of the building, each series of trains will be responsible for the vertical transportation of