

ICONIC STRUCTURES: CASE STUDY OF A HISTORIC MUSEUM WITH NOTABLE SPANS DESIGNED IN CONCRETE

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The emergence of iconic structures around the world increased tourism and economic status of the of host cities. Iconic structures stand out and attract the attention of the general public due to their daring structural limits and aesthetic forms. Hence, the design idea of an iconic historic museum is conceptualized in this research. This paper models an art center, analyses and designs the critical elements according to BS 8110, trying to determine the feasibility of a large-cantilevering structure with numerous curves being achieved. The activities carried out in this research involved a systematic modeling of the structure with Building Information Modeling (BIM) tools, analysis and design in reinforced concrete with particular emphasis on the cantilevered wing of about 37.5m. Numerous load combinations were applied, and various member section properties were experimented. The results obtained from the analysis of the designed reinforced concrete model identified the structural efficiency of certain critical members in the west wing of the building and how they were made to adhere to structural limits in the code of practice by ensuring deflections of critical cantilevered members did not exceed the limit. A unique arrangement of structural systems has been combined to solve the problem of deflection of the seemingly impossible cantilever of 37.5m.

Keywords: Design and analysis, Deflection, Structural limit, Long cantilever, Reinforced concrete, BIM.

1 INTRODUCTION

Various regions and countries have astonishing structures, but a handful have become instantly recognizable and easily symbolize a destination or an epoch in time and a location as they develop the skyline of such areas. Such structures can be classified as iconic structures.

An iconic structure is an architectural masterpiece that stands out and is captivating (Ede 2014a, Ede and Udoh 2015a, 2015b). Numerous structures around the world belong to this category of eye-catching structures. Examples are the Sydney Opera House, Tower of Pisa, Eiffel Tower, the Burj Al Arab, CCTV Headquarters, the Millennium Dome, Pyramids of Egypt, British Airways London Eye and Malaysia's Petronas Towers. These structures are easily recognizable and have come to symbolize their host cities. Their presence has been immensely beneficial to their host cities and nations as they boast the value of tourism and therefore, inspires the design of more outstanding eye-catching structures.