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Tall building design and ultra-high strength concrete core wall behavior from the constructability perspectives

The use of concrete in high-rise buildings has increased significantly in the past 20 years mainly owing to improvement in all the technologies associated with these materials and methods related to prepare, supply and pour the concrete. Cementations materials, admixtures, aggregates, pumping techniques, transportations and elevation methods, etc. all these enchased possibilities are illustrated by taking 200 story high rise structural model; analyzed and designed by using the software ETABS-2013, to withstand the gravity loads and also the lateral loads considering Wind 100 mph, Exposure-Seismic Zone-I, soil profile type SD, Occupancy category 1.0 and Ductility factor, R=5.5. The type of ultra-high strength concrete cylindrical strength has been considered as 107 MPa at 28 days to bear the high load and straining action at lower portion of the core wall, steel sections and plates are conforming to ASTM-A992-Gr:70Ksi are considered for built-up column sections and floor beams. In addition shear studs conforming to ASTM-A106-Gr:1020 with composite metal deck have also been considered to be have as rigid diaphragm to act as monolithic unit against the heavy lateral loads. This paper clearly show that the design and constructability considerations, serviceability requirements and international codes compliances such as ACI-318, ASCE-7, IBC-2011, UBC-1997, further, it proves that the combination of R.C. concrete and steel composite sections could be the best solution for such tall skyscrapers.

Biography

M Manikandan is the Senior Structural Engineer at Gulf Consult, Kuwait with responsibility for designing and construction consultation of the tall buildings, colleges, shopping complexes, multi-story car parks, hospitals, bridges and deep underground structures by considering the structural requirements and adequate constructible systems to complete the projects within allocated budget and time schedule. Prior to joining Gulf Consult, Kuwait, he has worked as a Structural Engineer at several companies, including RECAFCO, Kuwait, Saeed Hadi Aldoosary EST, Saudi Arabia, where he has completed many precast structures and treatment plants including the deep underground structures with heavy equipment. Notable, he is in the construction industry since past 15 years and has completed many land mark projects in Kuwait as well in Saudi Arabia. He has received his PhD in Risk Management in International Construction Projects as an External Part-time Researcher with Vels University, Chennai, India. He has received Civil Engineering degree from Kamraj University Madurai in 2000 and MBA in Project Management from Sikkim Manipal University, India in 2012. His professional interests focus on construction/project management, structural management and risk management in the construction projects. He has published 50 papers in international and national journals.

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