Development of a framework for controlled building destruction of tall buildings using a numerical technique (OLP-2219)

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Abstract

The planning of the safe demolition of tall buildings is governed by several factors such as planning of the intended collapse mechanism as per the structural systems and in-situ conditions, deciding fall direction within the different constraints (controlled through horizontal and vertical kinematic control of the building fall under the gravity), mitigating site-specific potential risks and hazards, minimizing the debris footprint, minimizing the falling debris, controlling ground vibration, etc. However, some parameters that cannot be simulated are safe air overpressure (AOP), vibration generated due to blasting, etc. Further, based on the above control requirements/parameters, the collapse mechanism needs to be assessed and finalized for the given structural system of the building. Therefore, the current project aims at simulating the column removal scenario to achieve the intended control of the fall.

Objectives

The overall objective of the proposal is to develop a computational-based framework for the analysis and design of an implosion plan for the safe demolition of high-rise buildings through the following objectives:

- Virtual simulation of the real demolition scenario through the removal of structural elements with time delay based on computational methods

- Prediction of accurate behavior of planned collapse mechanism, debris footprint, profile, generated ground vibration, etc.

Develop a guideline for structural failure sequence and design the initiation time and sequence of the blasting with a time delay to obtain the optimum output.