SFPE22
International Conference on Performance-Based Codes and Fire Safety Design Methods
Virtual
23-25 March

Case Study

Title: Extension of an existing office building

OVERVIEW

Introduction

SFPE is seeking expressions of interest to participate in a case study at the 14th International Conference on Performance-Based Codes and Fire Safety Design methods. Chapters are invited to form a team to represent the Chapter and potentially present the results of their analysis at the 2022 Virtual PBD Conference. Chapters are encouraged but not required to have at least one student participate as a team member. Also, SFPE student chapters are encouraged to submit a case study.

The case study is an opportunity to Fire Engineers to review, analyze, and assess a theoretical building for the purpose of applying performance-based design principles. It is encouraged that the Chapters utilize this opportunity to recognize some of the challenges within the modern built environment, including design approaches, mitigation measures, and risk analysis.

Objectives

The objectives of the case study are as follows:

1. To enable a global perspective of fire safety design to be captured and illustrated on a harmonized project.
2. To facilitate the sharing and dissemination of performance-based design applications and practice.
3. To encourage Chapters to expose Consultants / Engineers to performance-based design (PBD) where they may not have been aware of or had the opportunity to explore such project opportunities.

Brief

Each Chapter is to form a group of willing participants to undertake the case study review. The group is to review the building design within an undisclosed geographical location, i.e., it is intended that the case study is sufficiently generic such that each Chapter will base the prescriptive expectations on their own location.

The group will analyze the case study and provide a fire-engineered approach/solution to address the significant components/challenges of the design. Risk is to be assessed for the design with proportionate mitigation measures introduced as required.

The analysis is intended to be made on a general level and is anticipated to be qualitative in nature. It is recognized that time constraints will likely inhibit the possibility of advanced numerical modeling (i.e., evacuation, CFD) to be utilized. If a Chapter has sufficient time and resources to conduct numerical modeling, this may be presented with the case study however, this is not an expectation.

Deliverables

The deliverables will be as follows:

1. Expressions of interest from Chapters to be sent to Theona Salmon Ponder at tsalmonponder@sfpe.org by **December 17, 2021**.
2. A PowerPoint presentation (5 -10 mins in duration) to be sent to Theona Salmon Ponder at tsalmonponder@sfpe.org by **February 1, 2022**.

BUILDING DESCRIPTION

Existing Building:

An existing heritage office building (floor plate: 40m x 40m) with two stairs will undergo refurbishment and extension. The existing building is 9 stories (Ground plus 8) and approx. 27 m tall. The two existing stairs are each 1,000 mm in width (with 800 mm wide doors) and located on adjacent elevations. Owing to the heritage nature of the building, the stairs are unable to be widened, nor more stair cores added.

A condition assessment of the existing portions of the building has been conducted with mostly inconclusive findings. Combustible materials have been noted as forming parts of the structural skeleton of the building.

Proposed Extension:

The proposal is for the extension of another 4 floors (each approx. 3m in height) and introduce a new restaurant and retail spaces on ground floor, creating open voids between the ground and up to fourth-floor level. Three additional floors (Level 9, 10 and 11) will also be used for offices; Level 12 will be used as a restaurant with access to an external roof terrace for members of the public and viewing platform. The building is to be designed as fully accessible.

The Client desires to provide mass timber within the extension that is also to be exposed to the maximum extent permissible. The feasibility of this building redevelopment is largely underpinned by:

1. the revenue created by the new restaurant and external roof viewing platform, and
2. the maximum lettable footprint of the office floorplates

Subsequently, the key Client objectives are to:

1. Maximize the number of occupants,
2. Maximize the lettable floorplate of the office floor areas (i.e., minimize stair & elevator cores), and
3. Optimize the aesthetics of the building to attract tenants

Figure 1: Typical Plan (Existing)

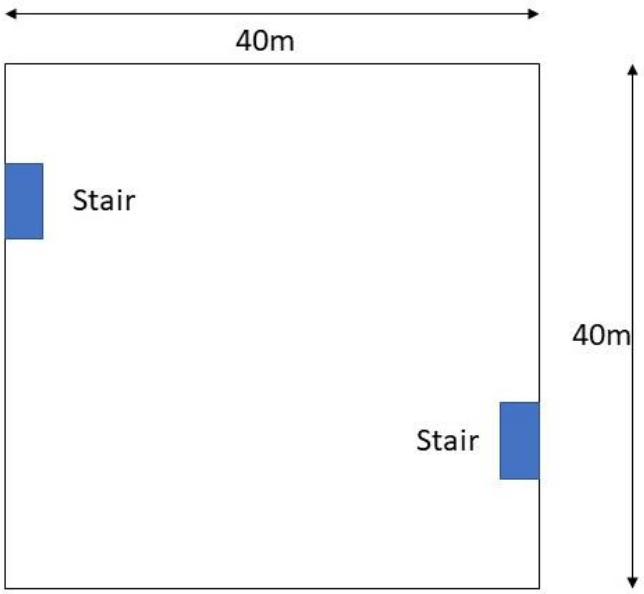


Figure 2: Typical Section (Existing)

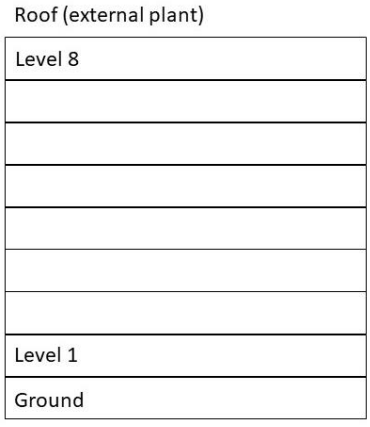
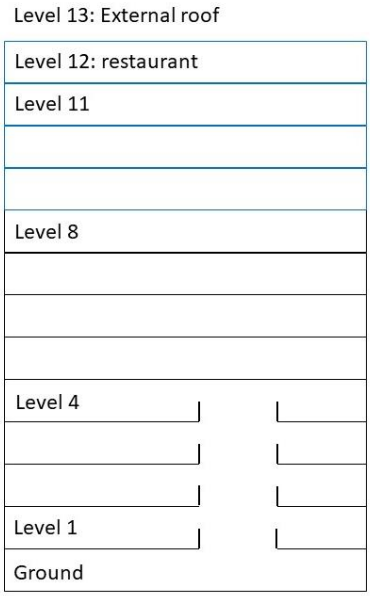


Figure 3: Typical Section (Proposed)



Tasks:

1. Describe the key principles of the fire safety strategy for the proposed scheme to be considered in your country.
2. Outline opportunities and challenges for application of performance-based design within a fire strategy.
3. Consider additional objectives/hazards and risks (i.e., WUI, terrorism, energy or sustainable related technologies, historical, etc.) as desired.

Items for Consideration:

1. What regulations need to be considered in your country, and what are their prescriptive limitations?
2. What would be the benchmark for tolerable risk?
3. How is the existing and the new building been considered/classified?
4. Are the planned mixed-use occupancies acceptable?
5. Is it possible to fit the building within the prescriptive code of your country or is PBD required to design the building as proposed?
6. Do you see areas and opportunities for application of PBD design? If yes, what PBD tools and approach would you consider suitable? If not, what are the barriers that would prevent PBD?
7. What approval process should be considered?
8. Any implications/differences if this scheme would be in an inner-city location compared to, less developed location? (i.e., fire brigade availability, water supply, regulatory enforcement, unique hazards such as seismic, wind, wildland proximity)
9. What active systems (e.g. sprinklers, risers, smoke ventilation, etc) would be required in the building? What passive elements would be addressed (fire proofing, fire resistance, flame spread)?
10. What do you think would be the major cost driving factors of the fire protection design in the building?