

Commentary K

Application of NBC Part 4 for the Structural Evaluation and Upgrading of Existing Buildings

Introduction

1. This Commentary concerns the structural evaluation and upgrading of an existing building to achieve a level of performance which is appropriate, based on the intent of the current National Building Code requirements. Buildings which satisfy the guidelines provided here should generally be considered acceptable. More stringent criteria may be appropriate for buildings used for post-disaster services.

2. This Commentary does not apply to new additions to an existing building structure or to a review of newly constructed work which was required to be in conformance with the current codes and standards. In both of these applications, NBC Part 4 applies without any of the relaxations described in this Commentary. New additions, however, may increase loads on the existing building structure.

3. Part 4 of the National Building Code and the structural standards referenced by Part 4 are written primarily for the design of new buildings (or new additions), not for the evaluation and upgrading of existing buildings. As a consequence, difficulties have arisen:

- Many current requirements specify quantities and arrangements of materials (such as reinforcing details in masonry and concrete structures) which are economical and practical to implement during initial construction but impractical after a structure is completed. In such cases, alternative solutions are needed
- Many older buildings consist of structural systems, components or materials which are not addressed by the structural design standards referenced by Part 4. When properly connected, however, these old systems can be made to work effectively. Information on the structural properties of such systems is lacking, making evaluation and upgrading difficult. This is especially important for heritage buildings
- Despite their lack of compliance with some aspects of current codes, many old buildings have performed satisfactorily over the years without distress or failure. In addition, some structural parameters, such as dead load and material properties, can be ascertained by measurement or test. Such information is not taken

into account in the structural criteria of Part 4 and referenced structural design standards.

4. To help overcome these difficulties, this Commentary provides guidance on the application of the requirements of Part 4 to existing buildings, including relaxations where appropriate, and alternatives where available (usually by reference to other documents). NBC Subsection 2.5.2. allows structural alternatives which are equivalent to Part 4 but, except for load testing, they are directed primarily to new construction. Except as recommended in this Commentary, structural equivalence should comply with the requirements of NBC Subsection 2.5.2 and Appendix note A-2.5.2.

5. Earthquake requirements provide the greatest difficulty in the application to existing buildings of Part 4 and referenced structural design standards. More specific guidelines to address the seismic evaluation and upgrading of existing buildings have been developed separately from this Commentary, as discussed in Paragraphs 38-42.

6. This Commentary does not specify the circumstances which would require a structural evaluation of an existing building. Typical situations where structural evaluation becomes necessary include change of use of the building, damage or deterioration, and where the safety of the building is a concern because of known or potential defects.

7. After the evaluation and before any upgrading, any life-safety implications of the conclusions of the evaluation should be discussed with the owner and authority having jurisdiction to establish the timetable for the work to be done. Each case must be dealt with taking into account its specific circumstances and the degree of urgency in the requirements for upgrading. Actions to be taken may range from immediate evacuation of the building, to a phased repair program, to monitoring or further evaluation, or to acceptance of the building "as is."

Basic Considerations

8. Structural requirements in Part 4 and referenced structural design standards include general performance requirements and design criteria. These requirements are based on the following fundamental considerations: