BRANZ FACTS

MID-RISE BUILDINGS #1

What are they?

Mid-rise buildings are considered to be those that fall within a 10–25 m height range. With increasing densification of living within our major urban areas, the numbers of mid-rise residential or mixed-used commercial/residential buildings is likely to increase significantly to meet housing demand.

MID-RISE BUILDINGS are outside the scope of documents such as NZS 3604:2011 *Timber-framed buildings* and E2/AS1. This means there is a lack of available benchmark solutions that can be used to establish compliance with the Building Code, particularly clause E2 *External moisture*.

Buildings that fall within this grouping can include:

- apartment complexes
- hotels
- mixed-use office/residential, retail/residential
- offices
- shopping malls
- schools
- gymnasiums
- libraries and galleries
- warehousing and factories.

What's different for mid-rise buildings?

When designing mid-rise buildings, a number of factors influence the design that are likely to be more severe than those applying to a lower building.

Mid-rise buildings can be complex and are usually based on one-off specific designs. Their design and construction requires balancing many competing requirements and involving a number of consultants. Examples include:

- planning requirements
- requirements of design review panels
- greater wind loads need to be accommodated – wind loads increase with building height and wind can act in any direction
- inter-storey drift becomes a factor to accommodate – more detailed

consideration of the relationship between structural deflections and tolerances of cladding systems will be required
- building footprints are bigger – this places specific requirements on the design and construction of floor plates
- heavy rather than light construction – concrete, concrete masonry, structural steel or fabricated large-size timber are more likely to be used for the primary structure
- a mix of commercial, parking and residential activities within the one building and the integration of structural design that accommodates all uses
- safety and security solutions for occupants
- a move away from typical domestic-style window sections and cladding systems
- requirement for a return on investment
- consultants experienced in this type of project will need to be part of the design team – façade engineer, fire engineer and so on
- provision of vertical access when over 3 storeys
- availability of appropriate suppliers' information on the use of their materials or systems on taller buildings
- provision of access for maintenance
- requirement for fire engineering design, acoustic design of inter-tenancy walls/floors
- provision for on-site parking
- greater building weight – specific design of foundations
- shading of adjacent sites and public spaces
- vertical and horizontal circulation routes
- blocking of existing views
- greater demands for professional coordination and cooperation throughout the project
- level of detailing demanded by complexity – form, materials, junctions and so on
- initial cost versus long-term costs when considering material and component selection
- the Code-plus elements of the design
- water supply (and storage) to elevated levels
- fire risers and sprinklers
- centralised or individual tenant/occupant control of heating, air conditioning, water heating and so on.

Good design

According to the City of Toronto design guide,[1] design of commercial and residential mid-rise buildings should aim for:

- a good scale and relationship to the street
- a mix of uses
- minimal impact on sunlight admission to streets and public spaces
- an interface at the street that animates or enlivens the street
- a usable rooftop area
- incorporation of design elements to reduce the impact of the building – for example, inclined or stepped façades to upper floors
- a maximum building height that is in keeping with street width and a limit on height of walls on the street boundary
- high-quality materials and finishes
- the incorporation of sustainable construction principles
- an articulated façade to the street
- transparency at the ground floor level and multiple street-facing entrances
- landscaping used as a buffer to adjacent low-rise buildings
- mechanical areas and penthouses that complement the architecture of the building.

Areas of concern

The main areas of concern are schools, apartments and office buildings where construction components, methods and details typically associated with lower building heights are being applied.

Other considerations include the following:

- Availability of qualified people to undertake peer review such as the design of weathertightness systems.
- A current lack of a definitive guide to weathertightness design.
- A negative perception by the general population of mid-rise residential buildings (fearing they may be ghettos of the future).
- Structural and passive fire-related issues identified as a result of weathertightness issues in recently constructed mid-rise buildings.
- Continuing development of skills so that construction is not being undertaken by firms with little or no experience in mid-rise construction.
- Ensuring there is sufficient construction supervision.
- Incorporating and verifying performance of new construction options such as CLT, off-site construction of modular sleeping, service or living units, light timber-framed acoustic and fire separations and panellised cladding systems. Designers often do not acknowledge where design details come from, and there can be a willingness to alter manufacturers' details without getting the approval of the manufacturer.
- How to ensure work completed on lower floors is not impacted by work on upper floors or water migrating down through the building.
- What a design and construction quality assurance programme should look like.
- The benefits of base isolating a mid-rise building.
- Incorporation of green and LCA principles.
- Understanding fire protection requirements (including their relationship to access routes, smoke control and mechanical services).
- Acoustic privacy and separations.
- Consideration of the maintenance requirements and strategies for providing maintenance access to the exterior.
- Ensuring there is coordination between structural, fire and façade engineers.

[1] *www.toronto.ca/city-government/planning-development/official-plan-guidelines/design-guidelines/mid-rise-buildings/*