Figure 5.4 Rhodes Waterside shopping centre.

5.3 Shopping Centres

Shopping centre structures often need to address a wide range of performance features that require design consideration. These include:

- Vibration control
- Waterproofing of top deck carparks
- Fire engineering
- Slab setdowns in back of house areas in supermarkets
- Large column-free areas required by certain tenants
- Future proofing
- Deflection control
- Large loading in areas such as storerooms, cool rooms
- Earthquake loading likely to govern bracing design
- Transfer beams

5.3.1 Vibration Control

The acceptable accelerations of retail floors are higher than for office floors so that a structure designed for load usually complies. Special consideration however should be given to areas such as the slab openings at travelators or beside atriums where the edge beams have minimal damping from lightweight balustrades. Murray et al (1997) recommends using an edge beam with a stiffness of at least 1.5 times that of the internal beams.

The interaction between car park and retail structure does require additional attention. The impact force of a car tyre hitting a speed bump or the start of a ramp is greater than people walking. The transference of these vibrations to adjacent occupancies is to be avoided. ***Vibration transfer from a car park area to a retail area can be reduced or avoided by some simple measures such as the following (common to concrete structure floors):***

1. Locate the two different occupancies on separate floor panels (i.e. do not have them on the same secondary beams).

2. Locate the car park boundary on a primary beam and change direction of the secondary beams in the adjoining retail floor.
3. Isolate the floor slabs by a butt construction joint.
4. Coordinate the building expansion / contraction joint with the change in occupancies.
5. Use a heavy dividing wall to provide increased damping and mass which reduces the floor panel acceleration and hence the perceived level of vibration.
6. Avoid the use of speed humps and ramps close to retail areas.

Figure 5.5 Rooftop car park over retail. Rhodes Waterside.

5.3.2 Waterproofing Top Deck Car Park Floors

For an open car park floor overlying a retail area, preventing water leakage and providing efficient runoff drainage is important. See Figure 5.5. ***This can be achieved by several options. Setting the carpark floor beams to fall and pouring the slab to a uniform thickness or pouring the concrete to sloping thickness on level beams and decking. Alternatively construct a level structure and pour a topping slab to the required fall. In any case the minimum recommended gradient is 1 in 100 and dependent on local rainfall data***.

Common to these options is the use of admixtures such as Xypex® and Radcon #7® which fill the voids within the concrete matrix producing an impermeable barrier in conjunction with a well designed contraction / expansion joint layout to prevent any unserviceable cracking.

Notwithstanding the above, providing a roof (light steel frame structure) over the car park (similar to that shown in Figure 5.11) provides several benefits worth considering:

1. Reduces the quantity of water contacting the floor.
2. Reduces thermal variations.
3. Provides shade to shoppers and vehicles.

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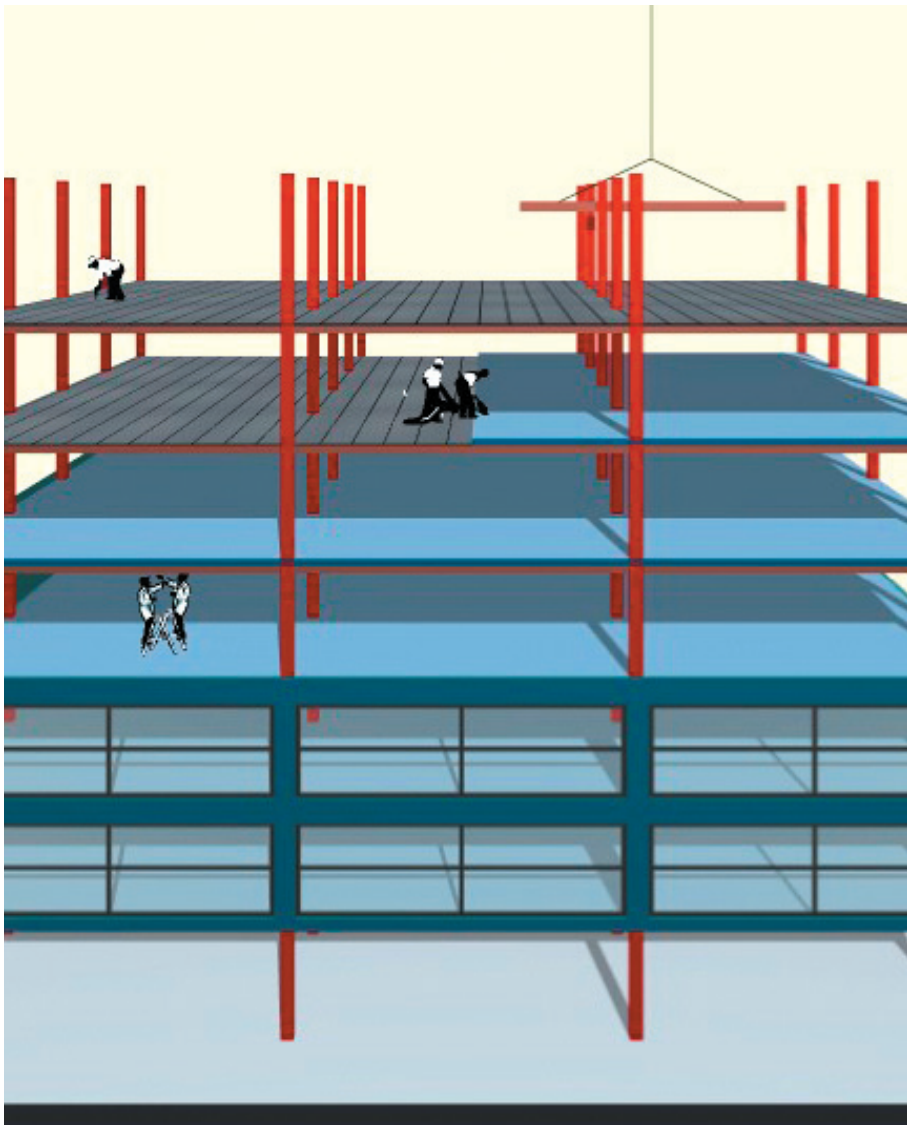

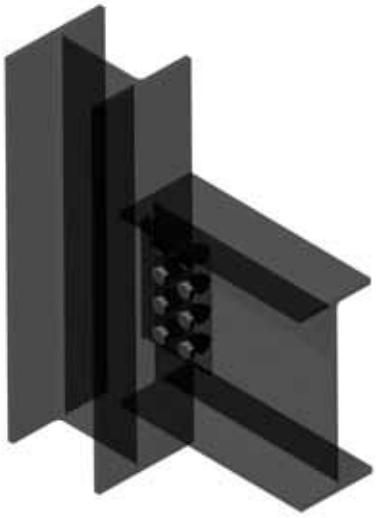

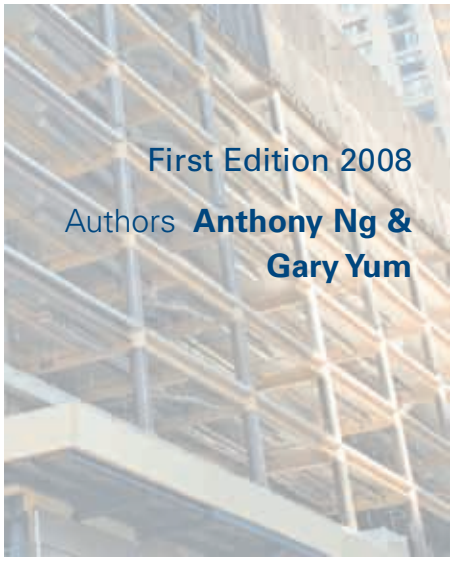

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Authors **Anthony Ng & Gary Yum**

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