

Taylor & Boyd

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TAYLOR+BOYD

Consulting Structural and Civil Engineers
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Over the 45 years of its existence, Taylor & Boyd have been involved in more than 14000 projects throughout Northern Ireland and abroad. With a total staff of 36, it is one of the largest structural engineering consultants in Northern Ireland. The practice strives to provide a quality service meeting client's requirements, as closely as possible and in order to maintain this level of service the practice became quality assured to BS EN ISO 9001 in December 1993.

Projects have ranged from small private schemes to large commercial sector developments. Some recent projects have been individually valued in excess of thirty million pounds. Projects include schools, hospitals, hotels and leisure, supermarkets, large commercial and industrial complexes, offices and residential accommodation.

Schemes have encompassed structural steelwork, reinforced concrete, masonry, timber and aluminium ranging from the simple to the highly sophisticated and innovative. Taylor & Boyd have also designed numerous civil engineering works, primarily in site development, roads, main drainage and sports fields and topographical surveys.

A wide variety of investigative work and reporting has also been undertaken, including damage claims,

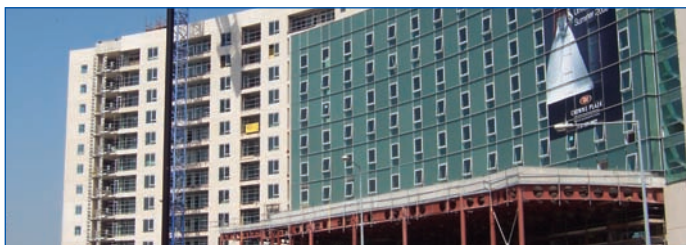
conditions of structures and providing advice for the refurbishment of old buildings.

Taylor & Boyd have consistently been involved with many large private sector developments, some of which have been on a design and build basis. The economical designs and efficient work methods of the practice were paramount in securing these projects against stiff competition from other Consultants.

The practice provides a full consultancy service in structural and civil engineering. It is custom of the practice to liaise with the client and architect from the earliest stage of scheme development, refining its engineering input to meet precisely with the constraints of the project concerned.

This close liaison with other members of the design team enables Taylor & Boyd to produce economical, practical and, when called for, innovative designs, constantly aligning resources to meet current project requirements.

The practice has several advanced computer systems, each backed by the latest engineering design software. The computer aided draughting facility links up with the design modules to form a full computer aided design and detailing system.



Crowne Plaza Hotel and Apartment complex

Short Description

This project comprises two adjoining buildings including a 10-storeyed Crowne Plaza Hotel and 13-storeyed Apartment Development. The hotel, situated beside the Blanchardstown shopping centre includes 188 bedrooms, as well as 12 meeting rooms, the largest having a room capacity of 450. The adjacent apartment building includes 96 apartments over 13 floors, with a double storey basement car park (295 spaces) serving both the hotel and apartments. This project is a Design & Build contract with McAleer & Rushe being the main contractor and Consarc Design, the architect. The client for the apartments is Green Property and Crowne Plaza is the client for the hotel development.

Project Information

Owner: Crowne Plaza & Green Property
Architect: Consarc Design Group
General Contractor: McAleer & Rushe Ltd
Engineering Office: Taylor & Boyd LLP

Construction Start: 11/2006
Construction End: 10/2008
Location: Blanchardstown, Dublin, Ireland



This project comprises two adjoining buildings including a 10 storey Crowne Plaza Hotel and 13 storey Apartment Development. The hotel, situated beside the Blanchardstown shopping centre includes 188 bedrooms, as well as 12 meeting rooms, the largest having a room capacity of 450. The adjacent apartment building includes 96 apartments over 13 floors, with a double storey basement car park (295 spaces) serving both the hotel and apartments. This project is a Design & Build contract with McAleer & Rushe being the main contractor and Consarc Design the architect. The client for the apartments is Green Property and Crowne Plaza is the client for the hotel development.

Both the hotel and apartments include a two storey basement with a total of 295 parking spaces. The basement car parking extends beyond the footprint of main buildings. The foundations comprise of a 1500 mm deep raft slab supporting the basement and main building, and a 750 mm deep raft slab supporting the areas of two storey basement only. The use of ESA-Prima Win was instrumental in determining the optimum slab depths, as well as modelling bearing pressures and deflections.

Reinforced concrete retaining walls enclose the basement. These walls are 250 mm thick and are typically 6 metres high, propped at mid-height by a floor slab. The Basement -1 slab is a 275 mm thick flat slab supported on RC columns and walls. The

ground floor slab is divided into two areas. The area of slab outside of the main footprint of the buildings had to be designed for construction traffic so it was therefore necessary to thicken the slab here. A steel frame is also supported on this 450 mm deep slab, so accurate analysis was required to model the transfer of loads into the car park columns below.

The apartment building is 13 storeys high and is of reinforced concrete flat slab construction. Floor slabs are typically 275 mm thick supported on RC columns and walls. The construction height between the first and second floor is 5.5 metres with all other floor to floor heights above being 3.0 metres. The higher space between ground and first floors was left to allow for a possible mezzanine floor. It was decided later in the contract to add the mezzanine floor over part of the building. As the main concrete frame had already been erected, the mezzanine floor was constructed using steel slimflor beams and a concrete T-beam and block floor system.

The columns supporting slabs were positioned within walls in the apartments above ground, and between car parking spaces in the basement. In order to achieve an efficient structure it was preferable to keep the column positions fixed throughout the entire height of the building. This was not possible in a few cases and RC transfer beams were required to transfer these column loads. These downstand beams are of maximum 1500 mm deep. The concrete

Used software: ESA-Prima Win

Crowne Plaza Hotel and Apartment complex

grade in the columns is C40/50 from foundation to second floor and then reduced to C28/35 from second floor to roof. Stability is achieved using RC shear walls with thicknesses of 400 mm and 250 mm, some of which are reduced in width further up the building.

The Crowne Plaza Hotel building is 10 storeys high and is constructed in both reinforced concrete and steelwork. The construction heights differ from the apartments due to the different requirements for occupancy. The construction height between ground and third floors are 4.6 m, 3.5 m and 3.5 m respectively. Floor to floor heights are then 3 metres from third floor to roof.

Slabs are again typically 275 mm thick, supported on RC columns and walls. Stability is achieved using RC shear walls of 400 mm and 250 mm in thickness, again some of which are reduced further up the height of the building. The concrete grade in the columns is C40/50 from foundation to first floor, which is then reduced to C28/35 above first floor.

There are RC downstand beams required in the slabs from first to third floor at the interface between the concrete and steel frames. A steel frame was required for three stories at the front of the building to form the entrance foyer and function rooms. The long clear spans required led to the use of cellular steel beams. The steel frame is supported on the RC podium slab at ground floor.

Slabs for both the apartment and hotel buildings were modelled using ESA-Prima Win. Loadings for each slab were selected from British Standard BS 6399, and all concrete elements have been designed to BS 8110. This software was useful at evaluating the ultimate and serviceability state design requirements as well as producing the reinforcement requirements. Due to the nature of this design and build contract, the design was continually developing during construction so the software was very easy to amend models with regards to, for example, additional slab openings or loadings.

Punching shear and moment transfer checks were carried out on all slabs by extracting the column loads and moments from the model and using both spreadsheets and hand calculations.

