

West Hampstead Square

Project Brief

Project name: West Hampstead Square Redevelopment
Project Value: 40m pounds
Description: Construction of a mixed use development
Client: Ballymore/ Network Rail JV

Design Team

Architect: WCEC Architects
Structural & Civil: O'Connor Sutton Cronin
Mechanical & Electrical: Troup Bywaters & Anders

What material was used ?

- Main Structure
Reinforced concrete frame on reinforced concrete piled foundations
- Building Envelope
External wall with quality brick finish
- Floors
Reinforced concrete slab with appropriate floor finishes
- Walls
Party walls constructed from metal studwork finished on both sides with sound resistant plasterboard and acoustic insulation



Building under the construction, 2015



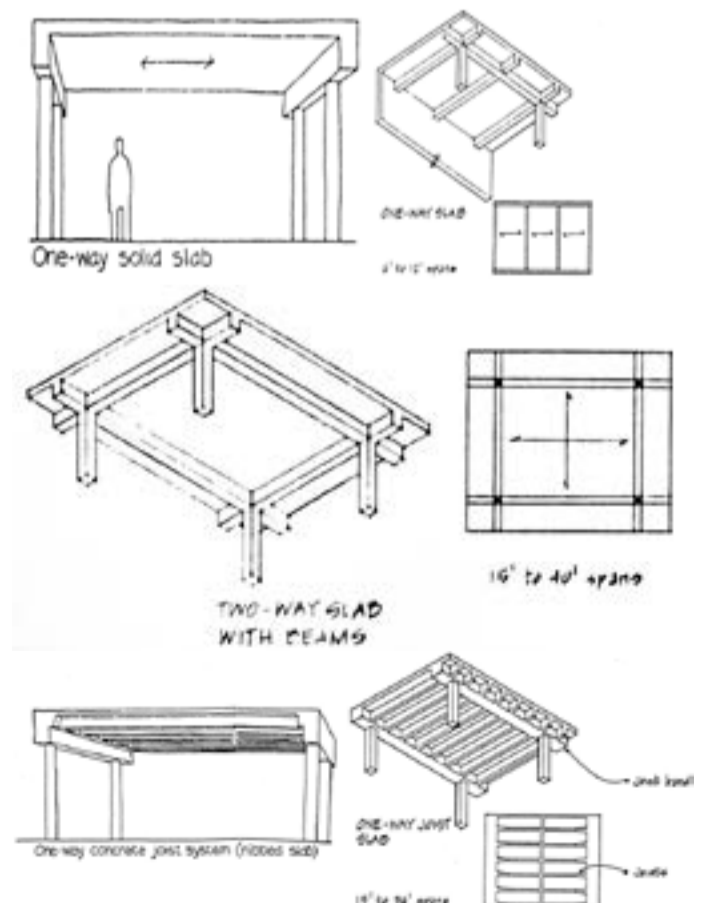
Building under the construction, 2015

Concrete slab

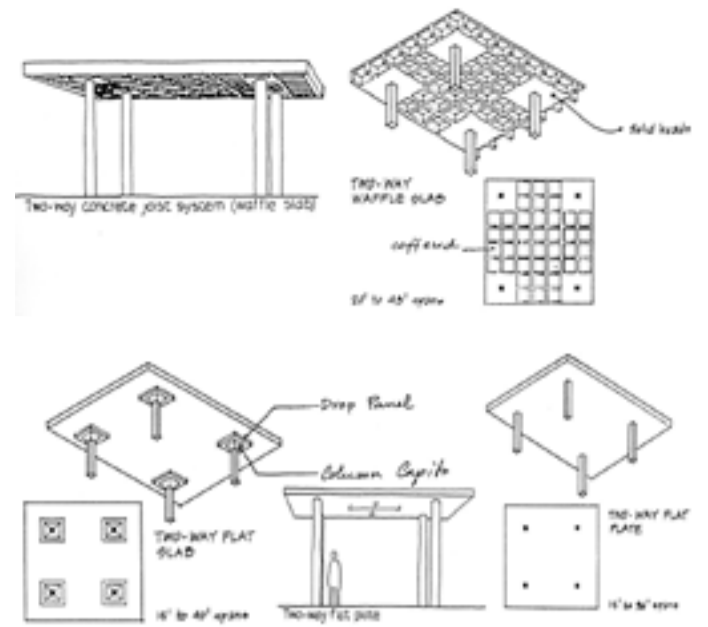
thickness/ span/ concrete grade (C24 up to C40)
Reinforced concrete floor is called 'SLAB'. Slab is generally constructed in two major types : slab on grade and slab on beam.
Reinforced concrete slabs are floors that are supported by walls, beams or columns. Other than the tolerance for the floor surfaces, these slabs are quite different than the slab-on-grade floors discussed earlier. Reinforced concrete slabs are structural elements that require great care in design, detailing, and installation.

Concrete slab can be classified by load transfer system

1. **One-way slab** transfers load from slab to a pair of beam or bearing wall . One-way slab is used with short span range from 1.80-3.60 m . Rectangular shaped slab ($w : L = 1 : 3$) also appropriate to use one-way slab system.
2. **Two-way slab** with beam transfers load to the four columns through two pairs of beam. Bay should be nearly as square as possible. Two-way slab is used with long span (4.5-12 m.) and heavy loads, or when high lateral force resistance is required.
3. **One-way concrete joist system (ribbed slab)**
Ribbed slab is used for longer spans (4.5-10.8 m.) and heavier load than one-way slab. Broader joists at beam (joist band) can resist greater shear.
4. **Two-way concrete joist system (waffle slab)**
Waffle slab is used for long spans (6.0-14.4 m.) heavy loads. Bays should be as square as possible.



5. **Two-way flat slab Flat slab** is supported by columns without beams for long span building (4.5-12.0 m.) . Drop panel , which min. width of 0.45 x span and min. depth is span/85 , and column capital are for increase shear strength and moment resisting capacity. Min. floor thickness equal to span/36 or 4 " . But typical floor thickness commonly used is 6 " -12 " .



6. **Two-way flat plate**

Flat plate is flat slab without drop panel and column capital for long span building (4.5-10.8 m.) . Min. floor thickness equal to span/33 or 5 " . But typical floor thickness commonly used is 14 " .

Concrete mix

sand/ gravel/ water ratios

Concrete slab can be classified by load transfer system

Mixture of concrete

Cement	Fine aggregate(sand)	Coarse aggregate(gravel, crush stone 10-20min)	Water
1	2	4	by volume
1	2	3	by volume
1	3	5	by volume

Water content in concrete mixture is about 60% of cement by weight. During concrete hardening period, heat due to hydration is given off as the cement combines chemically with water to form strong crystal that bind aggregates together. At the curing time, excess water content in the concrete should be slowly evaporate to produce a strong material. This can be done by covered it with wet cloth or plastic wrap. Concrete is commonly designed to be use at the strength it reaches after 28 days (4 weeks).

Additional mixture can be added in the concrete mixture. It is called admixture. Each admixture has it certain property.

Concrete sequence

formwork/ rebar fixing

Form work

Formwork is the term given to either temporary or permanent molds into which concrete or similar materials are poured. In the context of concrete construction, the falsework supports the shuttering moulds.

Formwork comes in several types: Traditional timber types/Engineered formwork system/ Re-usable plastic formwork/ Permanent insulated formwork/ Coffor(structural stay-in-place formwork system/ flexible formwork.

Rebar

Rebar (short for reinforcing bar), also known as reinforcing steel, reinforcement steel and colloquially in Australia as reo, is a steel bar or mesh of steel wires used as a tension device in reinforced concrete and reinforced masonry structures to strengthen and hold the concrete in tension. Rebar's surface is often patterned to form a better bond with the concrete.

Use in concrete

Concrete is a material that is very strong in compression, but relatively weak in tension. To compensate for this imbalance in concrete's behavior, rebar is cast into it to carry the tensile loads. Most steel reinforcement is divided into primary and secondary reinforcement.



Concrete damaged surface exposing iron rebar



Curve concrete formwork