INTRODUCTION

Assignment: PLATE

The Plate structure is the 2nd design study of this structural form making exercise. The plate is a beam-less short-span structural system. It is typically a reinforced concrete slab, slightly thicker than a slab with beams. As a monolithic slab it normally behaves as a two way structure, transmitting loads to columns through two way bending action. With columns placed in a regular square bay grid, neither direction is preferred. However, if columns are positioned in rectangular rows, the slab will tend to bend more in the longer spanning direction. When this occurs the two-way plate acts more like a one way spanning structure and loses its inherent structural advantages. Hence, columns tend to be arranged in a square configuration.

Another feature of the two way beam-less slab is the structural advantage obtained by a slight cantilever (up to 1/3 the span dimension) beyond the line of columns. Also the thicker beam-less slab does not require an edge beam. In fact problems occur when the edge of the slab is positioned right on the column line (without any cantilever). In this situation a stiffening beam along the column line may be required.

Without the presence of beams, the slab or plate has an uninterrupted and continuous surface. The architect Le Corbusier recognized this characteristic early in the development of R/C construction. He realized that the space trapped between the floor and ceiling had the potential for continuity and he enhanced this quality through the strategic configuration and placement of space defining elements and figuratively shaped service elements. Since the columns in a plate system are sufficient to transfer all gravity loads to the ground, the role of the walls or partitions is limited to enclosure or space definition. For Le Corbusier it became a polemical statement to detach the non-structural partitions from the structural, load bearing columns. In so doing he arrived at his famous "5 points": the free plan, the raised building on pilotis (columns), the reconstituted ground plane as a roof garden, the free façade, and the horizontal strip window.

PROJECT DESCRIPTION

Using the plate structural system type, explore the relationship of structure and spatial form. Refer to the description of ‘anti-space’ in the text by Steven Peterson. Concentrate on the attributes of the system type and explore the potential of plate structure within a generic program of spaces and a set of constraints outlined below.

Structure: Two way R/C (reinforced concrete) plate system with columns circular in cross section and 40 cm in diameter. Openings in the slabs must be positioned inside the column lines and with a minimum of 1m from the column centerline to the edge of the opening. Span lengths to be in the range of 5-7 meters. Again, the long-span double height atrium space is treated as an exception. The same roof conditions as in the previous studies apply.

Site & Program: Same as the Wall Part
REQUIREMENTS
• 1/100 Plans (each floor), 2 Sections and 2 Elevations
• 1/200 axonometric drawing showing Mass/Void relations in plate system
  Note: Drawings will be either digital or hand-drawn on transparent sheets mounted on the Wall Part drawings.

READING
• Peterson, Steven Kent. “Space and Anti-Space” in The Harvard Architecture Review, Number 1.

EVALUATION
• Ability to craft and clearly represent, and articulate your architectural ideas through drawings, models, and through verbal and written expression
• Comprehensiveness of design decisions, clarity, thoughtfulness, and level of detail shown in the representations
• Ability to identify and utilize the characteristics of structure to control and make space

SCHEDULE
• Plate Part begins .................. 10 March Tuesday
• Plate Part ends ................. 13 March Friday

Plate Examples