AXIS DEVELOPMENT

STAGE 1A, 6 AUSTRALIA AVE
&
STAGE 2, 2 HERB ELLIOT AVE
SYDNEY OLYMPIC PARK

DESIGN BRIEF – POST TENSIONED FLOOR SLAB

DESIGN BRIEF: – 2944 PTDB

PREPARED BY:-

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ISSUE: B

REVISION	DATE	ORIGINATOR	CHECKED	APPROVED	REMARKS
A	MARCH 2013	JR	JR		
B	APRIL 2013	JR	JR		

1. DESIGN CRITERIA

1.1 The prestressed concrete floors are to be designed for the loads as specified in AS1170, as shown on the drawings and in the structural design brief.

1.2 All floor slabs and beams are to be designed for strength and serviceability in accordance with the requirements of AS 3600 – Concrete Structures.

1.3 All frame analysis shall use 100% of the equivalent column stiffness for design checks of all slabs/beams for punching shear to AS 3600. All floors carrying masonry walls are to be designed to comply with the deflection and vibration criteria in AS 3600 and as noted on the drawings.

2.0 CRACK CONTROL AND WATER TIGHTNESS

2.1 Sufficient post-tensioning and reinforcement shall be provided in both directions so as to satisfy crack control provisions for moderate degree of cracking as per AS 3600 Clause 9.4.3.4.

If post-tensioning alone is to provide crack control, a minimum level of 1.4 MPa after final losses shall be maintained.

2.2 In areas horizontally restrained by piers, core walls and other stiff vertical elements, the restraints are likely to reduce the level of prestress below the minimum level. In all such areas adequate reinforcement is to be provided to properly control shrinkage cracking in the slabs and bands.

2.3 All roof slabs, terraces and balconies are to be designed for a moderate degree of crack control, with a layer of top mesh to minimise early age shrinkage cracking. Waterproof membranes are then to be applied to the slabs in accordance with the architectural specifications.

3.0 CONCRETE STRENGTH

Project assessment is required for all concrete placed.

All concrete is to have a characteristic compressive strength F'c=32 MPa at 28 days, and f'cm = 22 MPa at 5 days.

Concrete in all post-tensioned slabs and beams to have a maximum drying shrinkage of 600 microstrain at 56 days.

Initial (25%) prestress is to be applied when the concrete compressive strength reaches 9 MPa.

Final (100%) prestress is to be applied after a minimum of 5 days, when the concrete has reached a compressive strength of at least 22 MPa.

4.0 POST TENSION SPECIFICATION

4.1 Workmanship, materials and stressing shall comply with the Australian Standard AS 3600 – Concrete Structures.

4.2 The prestressing subcontractor shall prepare shop drawings showing the cable layout, all cable profiles, jacking loads and theorectical extensions and details of all required anchorages and couplers, including all antiburst anchorage reinforcement required additional to the flexural reinforcement shown on the drawings. The shop drawings and theoretical extensions are to be submitted to the Engineer for approval at least 10 working days prior to installation of cables on site.

4.3 Design Assumptions are:

a) Minimum level of prestress in concrete slabs and slab bands after final losses shall be sufficient to satisfy Part 2.0.

b) Fire rating of floors – Refer to architects drawings.

c) All strands shall be 12.7 or 15.2 diameter 7 wire-super-grade, stress relieved, low relaxation strands to AS 1311 with a minimum breaking load of 184 kN. Maximum tendon force prior to transfer (behind anchorage) – 156 kN per strand. For calculation of extensions:

Co-efficient of friction in duct u=0.2
Estimated angular deviation B=.024 RAD / M
Anchorage draw-in 6 mm assumed

d) All concrete outlines have been based on 100% column stiffness. Final Post Tensioning Design shall use 100% column stiffness.

4.4 Tension ducts shall be fitted to smooth curves between positions shown. Ducts shall be semi-rigid steel sheeting (galvanised). The design assumes that 4 & 5 strand tendons are contained with 70 x 19 flat ducts. Duct profiles are measured from the soffit of the concrete slab or band to the underside of the duct, except at the anchorages where dimensions are to the centreline of the anchor.

4.5 All ducts to be fully grouted within 5 days of stressing and after approval of extensions by the engineer.

4.6 Anchorages and splices shall be capable of developing the ultimate strength of tendons without excessive deformation. When required, satisfactory test data confirming the adequacy of the proposed devices shall be submitted.

4.7 Ducts, tendons and anchorages shall be firmly supported to prevent displacement during subsequent operations. They shall be placed with a tolerance of plus or minus 3 mm in concrete dimensions of 200 mm or less, plus or minus 5 mm in concrete dimensions between 200 mm and 600 mm, and plus or minus 15 mm in concrete dimensions over 600 mm.

5.0 STRESSING

5.1 Calibrate stressing jacks to an accuracy of 2%. Pressure gauge readings shall be based on instruments having a calibrated accuracy of $\pm$ 0.5%. Calibration curves for the equipment to be used shall be made available to the engineer prior to stressing. The initial cable load between jack and anchorage shall not exceed 85% of the specified minimum ultimate cable load.

5.2 Stressing Sequence

Initial Stress: Jack each strand to 40 kN when concrete compressive strength reaches 9 MPa.

Final Stress: Apply full jacking load of 156 kN after a minimum of 5 days, when concrete has reached a compressive strength of at least 22 MPa.

5.3 All test cylinders used for early age strength determination are to be site cured under similar temperature and exposure conditions to the concrete floor slabs. Keep complete stressing record for each stressing operation for each cable as follows:

i) Identification particulars of tendons.

ii) Initial force or pressure when tendons are marked for measurement of elongation.

iii) Final force or pressures before anchoring tendons.

iv) Elongation at final force.

v) Elongation remaining after anchoring tendon and release jacks.

Submit these records to the engineer for acceptance within 48 hours of completing each stressing operation.

6.0 Grouting

6.1 Grout shall consist of a mixture of cement and water.

Fly ash conforming to AS 1129 and 1130, for use in concrete may be used. Fly ash shall not exceed 14 kg per bag of cement.

6.2 Aluminium powder of the proper fines and quantity or other approved materials may be added to obtain a maximum of 10% expansion of the grout when measured unconfined.

6.3 Mix grout in a high-speed mechanical mixer and pass through a strainer into pumping equipment, which has provision for recirculation. Pumping of grout shall begin as soon as possible after mixing and may be continued as long as the grout retains the proper consistency.