

The Ministry of Tourism and Antiquities
The Ministry of Planning

Detailed Design for Tourism Sector Development Project in the Hashemite Kingdom of Jordan

Final Report

**Supporting Report
Volume 5SR-(1)**

Dead Sea Panoramic Complex Sub-project

August 2000

The JICA D/D Study Team
Joint Venture:
Pacific Consultants International, Tokyo
Yamashita Sekkei Inc

DEAD SEA PANORAMIC COMPLEX SUB-PROJECT

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A. DESIGN CALCULATION SHEETS

**THE Ministry of Tourism and Antiquities
The Ministry of Planning**

**Detailed Design
For
Tourism Sector Development Project
In
The hashemite Kingdom of Jordan
Dead Sea Complex**

Structural Calculation Sheets

March ,2000

THE JICA DETAILED DESIGN STUDY TEAM

Joint Venture :

Pacific Consultants International, Tokyo

Yamashita Sekkei Inc.

Local Consultant :

Consolidated Consultants (CC)

Consolidated Consultants		Job No.		Sheet	of
Project		Made by:		Date	
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CODE OF PRACTICE
Design, detailing and workmanship shall be according to the Jordan Code for Reinforced Concrete.

DIMENSIONS

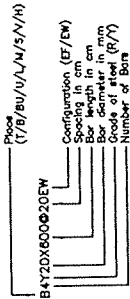
All dimensions are in Centimeters.

DRAWINGS

- Structural drawings shall be read in conjunction with Architectural, Mechanical and Electrical drawings.
- Where there are discrepancies between drawings, one shall refer to the Structural drawings. For required openings refer to Architectural, Mechanical and Electrical drawings.
- Contractors working drawings and bar bending schedules for reinforcement, in a format agreed with the engineer, shall be made.
- Structural Drawings, Reference should be made to Architectural drawings for floor concrete are not shown on Architectural drawings for such purpose.

NOTATION

- B - Bottom Bars
- BOF - Bottom Level of Footing
- BU - Bent Up Bars
- EW - End Wall
- H - Horizontal
- LB - Lower Bars
- L - Lower Bars at side faces
- MS - Mild Steel Bars
- S - Slab on Ground
- SOB - Slab on Beam
- T - Top Bars
- TOB - Top Level of Footing
- TS - Top Level of Structural Slab
- U - U-shaped Bars
- Y - High Yield Bars



MARKING SYSTEM

An alphanumeric marking system is employed for structural members. A member mark or detail mark is made up of one or two alphabetic characters followed by one or two numeric digits. The alphabetic characters define a series of structural members. Members which fall in a series usually are identified by the same letter. The character designation employed for member series is as follows:

- Beams - B, D, E, K, L, M, N, O, U, V
- Columns - C
- Coiling Beams - G
- Corbeles - J
- Robbed Slabs - J&R
- Solid Slabs - S
- Stair Footings - F
- Stair Slabs - T
- Wall Beams - W
- Sections - A, B, Z

REINFORCEMENT

- All reinforcing bars of a diameter larger than 8 millimeters shall be deformed, high strength steel bars of Characteristics (Y)=20 MPa.
- Bars of 8 and 6 millimeters diameter shall be of mild steel of Characteristics (Y)=20 MPa equal to:
- Reinforcement shall comply with BS4449 - BS4461 or BS4433
- Reinforcement shall be placed as shown on the drawings. Where bar length is not specified, longest practicable bar length shall be employed with staggered lap splices. Lap length shall be 25 times bar diameter.
- For crank shall not exceed 1:12.

REINFORCED CONCRETE

The following two types of reinforced concrete shall be employed:

- C25 - Grade 25 for all reinforced concrete members except columns.
- C30 - Grade 30 for all reinforced concrete Columns. Characteristic Strength as defined by a 150 mm cube of age of 28 days shall be:
- C25 - 25 MPa
- C30 - 30 MPa
- Minimum cement content, per cubic metre, shall be:
- C25 - 300 kilograms
- C30 - 320 kilograms
- Minimum water-cement ratio shall be:
- C25 - 0.40
- C30 - 0.35

PLAIN CONCRETE

The following two types of plain concrete shall be employed:

- C15 - Grade 15 for all plain concrete bedding under foundations.
- C20 - Grade 20 for all plain concrete bedding for stone walls.
- Characteristic Strength as defined by a 150 mm cube of age of 28 days shall be:
- C15 - 15 MPa
- C20 - 20 MPa
- Minimum cement content, per cubic metre, shall be:
- C15 - 200 kilograms
- C20 - 220 kilograms
- Minimum water-cement ratio shall be:
- C15 - 0.70
- C20 - 0.65

COVER

Clear concrete cover to reinforcement shall be:
50 mm for concrete above grade,
25 mm for interior walls above grade,
30 mm for exposed fair faced concrete surfaces.

AGGREGATES

Maximum aggregate size shall be 20 mm.

FOUNDATIONS

- Binding layer of footings is positioned at (1m) beneath natural ground level.
- The foundations are designed for an allowable bearing capacity equal to 400.00 kPa at an approximate depth equal to the finished level of ground. For a maximum depth of 1.5m below the finished level of ground, the bearing capacity of the structure, and 250 kPa at depth more than 1.5m.
- The foundations are designed to hold load from 1 storey and a basement in restraint. The Contractor to ensure that it is the responsibility of the contractor to ensure that the character designation employed for member series is the location of footing.
- Backfill behind basement walls is not allowed before probing of slab to walls.

PLACEMENT RULES FOR BEAM REINFORCEMENT



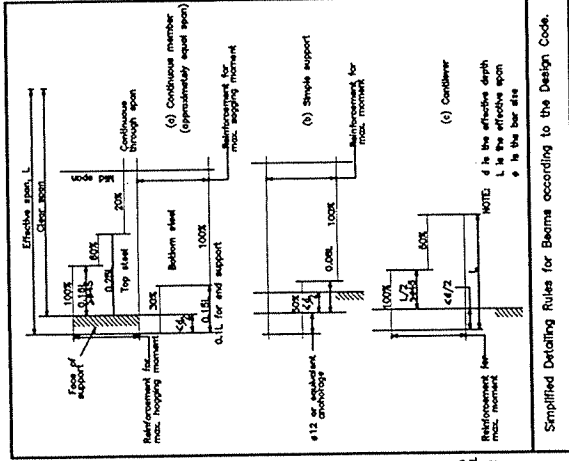
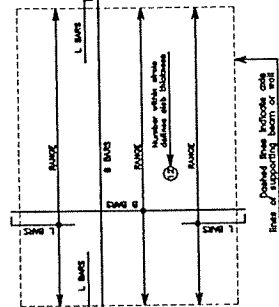
- Placement of bars shall be as follows, unless indicated otherwise:
- Top bars of higher grade shall be placed vertically on the support side for approximately equal span.
- Top bars in spans shall be placed to the equal lengths with support top bars at both left and right.
- Bottom bars in interior spans shall be placed to the same length as top bars beyond support centerline at both left and right.
- Bottom bars in exterior spans shall be placed such that the length is equal to 12 times bar size beyond the centerline of the exterior support. This length may include a 90 degree bend if sufficient room does not exist.
- L bars as top reinforcement of exterior supports shall extend 25 times the bar size beyond the beam.

PROTECTION OF SUBSTRUCTURE

Bituminous Waterproofing Membrane shall be employed to protect and seal all reinforced concrete below grade or in contact with soil, including:
- bottom, side faces and top of footings,
- bottom, side faces and top of wall below grade,
- bottom of reinforced slab on grade.

Notation Employed for Solid Slab Panels

Use the following notation for Slab Panels in the floor plan.



Simplified Detailing Rules for Beams according to the Design Code.

Project	Jordan Sector Development Project in the Hashemite Kingdom of Jordan
Contracting Agency	The Ministry of Tourism and Antiquities The Ministry of Planning
SEA-PROJECT	Dead Sea Potomonic Complex
Note	This detailed design has been prepared by the contractor in accordance with the agreement between JICA and JICA Study Team. The copyright of this drawing rests with JICA.

Designed by
Japan International Cooperation Agency (JICA)
JICA Study Team
Johji Watanabe
Pacific Consultants International and Yamahata Saitoh Inc.
Subcontracted Local Consultant
Consultant International
JICA Study Team

Drawing Title
STRUCTURAL NOTES
Scale
Drawing No. JICA-001

Project: Yaman Sator Development Project in the Hokuriku Region of Japan


Executing Agency: The Ministry of Land and Infrastructure, The Ministry of Planning

Sub-Project: Dead Sea Parametric Complex

Note: This detailed design has been executed by means of computer as shown below in cooperation with the Japanese Architectural Association (JAA) and JICA Study Team. The copyright of this drawing rests with JICA.

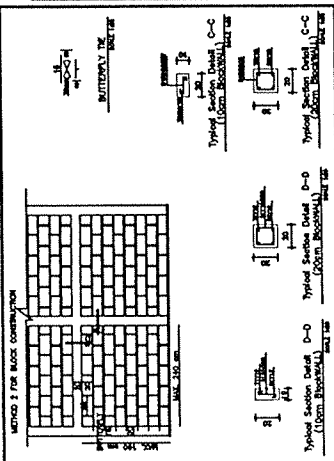
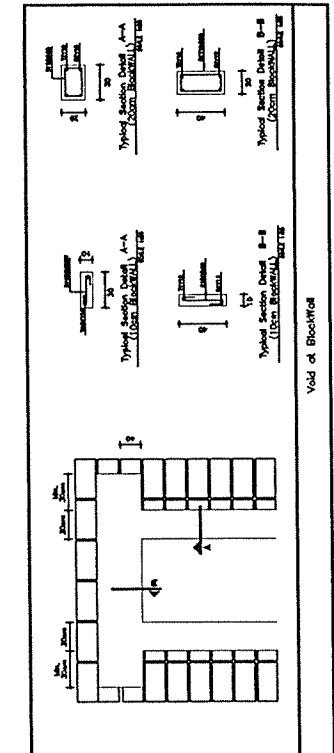
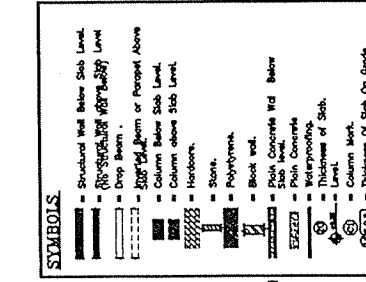
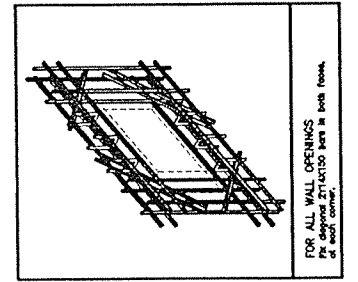
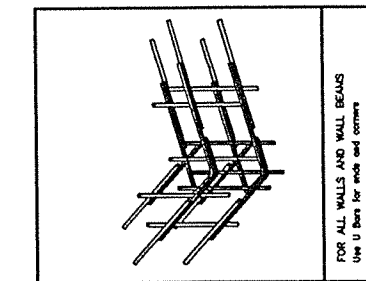
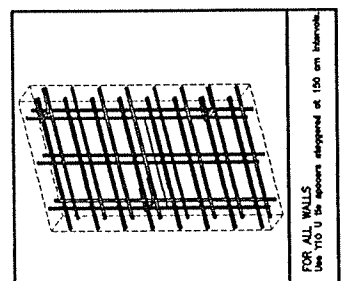
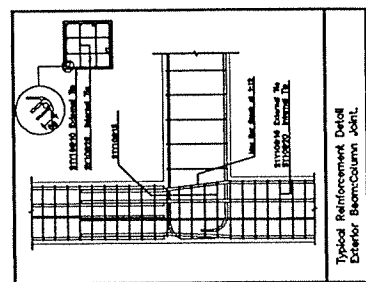
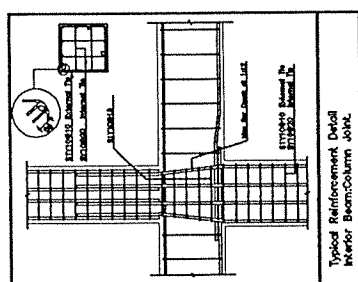
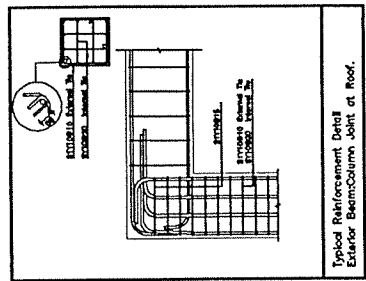
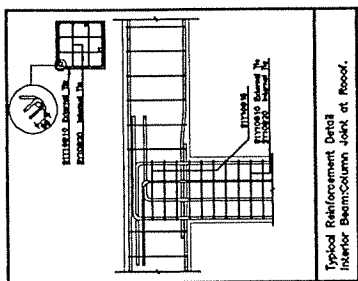
Designed by: Japan International Cooperation Agency (JICA)

JICA Study Team: Joint Venture of Pacific Consultants International and Tamaishi Seiki Inc.

Subcontracted Load Consultant:  **certified consultant** No. 10297 - for the field - since 1/11/11

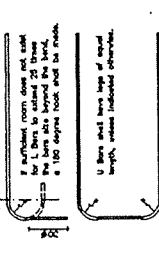
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Scale: Drawing No. **SP-5-002**

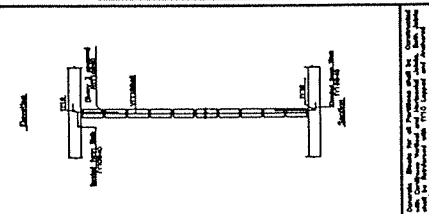
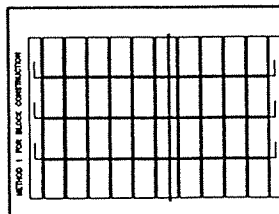


RADIUS OF BENDING

Minimum Radius of Bend for L Bars and U Bars shall be as follows. For other bars, minimum radius of bend shall be 100 mm. For 110 U Bars and 110 U Bars use 100 mm.



BAR DIAMETER (mm)	MINIMUM RADIUS (mm)
10	200
12	250
14	300
16	350
18	400
20	450
22	500
25	550
28	600
32	650



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1. Materials properties

Concrete:

Concrete compressive strength for reinforced concrete (f_{cu} in N/mm²)

For foundation and walls 20 (25) 30 35

For columns 20 25 (30) 35

For slabs and beams 20 (25) 30 35

For water reservoir 15 20 25 (30)

Concrete compressive strength for plain concrete (f_{cu} in N/mm²)

For blinding (15) 20 25

Steel reinforcement :

Deformed steel bars yield strength (F_y) =414 N/mm²

Smooth steel bars yield strength (F_y) =300 N/mm²

Soil:

Allowable bearing capacity of soil250-400...kN/m² according to soil report.

Unit weight of soil20.... kN/m³ according to soil report.

Internal angle of friction ...35-42... according to soil report.

Cohesion 0.0

Coefficient of Friction at base 0.81

Subgrade Modulus 50 – 100 kg/cm³

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Design Codes :

JCRC : Jordanian code for Reinforced concrete design.

BS 8110 : Structural use of concrete part1:code of practice for design and construction .

BS 8007 : Design of concrete structures for retaining aqueous liquids.

JCLF : Jordanian code for loads and forces .

ACI - 318 (Ch 21) : Special provisions for seismic design.

3. Computer programs:

SPANS : Computer program for the analysis and design of continuous beams.

STAAD3 : Structural analysis and design package.

PCACOL : Design of reinforced concrete columns

ENERCALC : Structural analysis library program for concrete and seismic .

PROKON : Analysis for concrete structures.

4. Idealization of structure and load cases :

The structure is simplified as continuous beam attached to columns below, which

Are assumed to be fixed at their upper and lower ends , or simply beams with hinged ends. Load cases as proposed in the JRC. Are

$$1.4*DL + 1.6 * LL$$

For lateral forces use the factors of (ACI Chapter 21) for seismic provisions .

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5. Loading (excluding self-weight of structure)

The loads includes live and Dead load

Dead load includes :

- 1- Own weight
- 2-Mechanical installations
- 3-Plastering
- 4-weight of False Ceiling
- 5- Screed over slab

LIVE LOAD :

Roof	- Imposed (k N/m ²)	...2.0.....
Stairs	- Imposed (k N/m ²)	...4.0.....

WIND LOAD :

Design wind speed of (35m/s) is used for analysis.

Seismic load :

The Jordanian code for loads is used in design of complex. The intensity factor is 0.75 For zone A and its 0.5 for zone B. of Mercalli scale.

A horizontal peak ground acceleration of 0.15 g is adopted in design of retaining walls .