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# THE KENYA POWER AND LIGHTING CO. LTD.

## SPECIFICATION *for* CONCRETE PRODUCTS

### REVISION RECORD

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## SPECIFICATION FOR CONCRETE PRODUCTS

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## SPECIFICATION FOR CONCRETE PRODUCTS

### FOREWORD

This specification has been prepared by the Research and Development Department of KPLC and it lays down requirements for Concrete Products used on Power Lines.

The specification is intended for procurement of materials.

### INTRODUCTION

This specification was prepared to establish and promote uniform requirements for Concrete Products. The specification lays down the minimum requirements for materials acceptable for evaluation.

### 1. SCOPE

1.1 This specification is for concrete products for use on power lines.

1.2 The specification covers the following concrete products:

- a) Hatari slab, LV
- b) Hatari slab, HT
- c) Stay block, 3/4" (19mm)
- d) Stay block, 1" (25mm)

### 2. REFERENCES

The following documents were referred to during the preparation of this specification; in case of conflict, the requirements of this specification take precedence.

ESI 43 - 91: 1981-	Stay Strands and Stay Fittings for Overhead Lines
IS 5820: 1970-	Indian Standard Specification for Precast Concrete Cable Covers.
BS 2484: 1985-	British Standard Specification for Straight Concrete and Clayware Cable Covers.
BS 4483: 1998-	Steel Fabric for the Reinforcement of Concrete.
KS 02-95-	Kenya Standard Specification for Natural Aggregates for Concrete.
KS 1725-	Kenya Standard Specification for Cement Part I: Composition, Specifications and Conformity Criteria for Common Cement.

### 3. DEFINITIONS

The definitions given in the reference standards apply.

### 4. REQUIREMENTS

#### 4.1 Operating Conditions

- 4.1.1 The concrete products shall be suitable for use in tropical conditions at altitudes of upto 2200m above sea level, temperatures of  $-1^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  and humidities of 95%.

The stay block shall be buried at depths of upto 1.8m in soils of various types to act as an anchor for stay wire on overhead lines.

The cable covers shall be laid above power cables buried underground in soils of various types. High voltage cables are buried at depths of upto 1.6m while low voltage cables are buried at depths of 0.5m.

- 4.1.2 The concrete stay blocks designated 3/4" shall be used with stay rod size 8ft x 3/4" of 64kN minimum failing load while those designated 1" shall be used with stay rod size 9ft x 1" of 131.6kN minimum failing load.

The cable covers designated LV shall be used to cover cables operating at 240/415V (low voltage) while those designated HT shall be used to cover cables operating at higher voltages upto 66kV.

#### 4.2 Design and Construction

##### 4.2.1 General

- 4.2.1.1 The products shall be made using Portland cement conforming to KS1725, coarse aggregates not exceeding 10mm nominal size and conforming to KS02-95, clean river sand and drinking quality water free from any visual contamination.

The products shall not contain additional admixtures and pigments. The composition of cement, sand and coarse aggregates shall be such as to satisfy the requirement for transverse strength and ultimate failing load.

The concrete stay blocks shall be reinforced while the cable covers shall contain no steel reinforcement.

- 4.2.1.2 Steel moulds shall be used in the manufacture of the products so as to ensure a smooth texture externally. The mould shall be accurately made to produce units of the dimensions, profiles and shapes shown in the drawings.

The product shall be vibrated while on mould to ensure a dense mass free from honeycombs or segregation and fill the forms and spaces between reinforcement (*for concrete stay blocks*) compactly and without voids. The vibrator used shall have a frequency of not less than 5000 cycles/minute and shall not be attached to or allowed to touch reinforcement during compacting.

Lettering shown on the drawings (*for cable covers*) shall be formed using accurately placed formers securely fixed in position. Cutting either uncured or hardened concrete shall not be permitted.

- 4.2.1.3 Freshly placed concrete shall be suitably protected and shall be kept constantly damp for a period of at least four days after concreting. The concrete shall be allowed to dry slowly over a period of at least three days after wet curing is completed.
- 4.2.1.4 Steel reinforcement rods shall be welded at all points of crossing and all dimensions shall be as per the drawings. Alternatively, a welded reinforcing fabric of No. 5 SWG x 75mm square with the wires symmetrically placed about the centre would be accepted.
- 4.2.1.4 The underside of the cable cover and stay block shall be flat while the upper sides shall be peaked as shown on drawings.

The concrete cable cover shall have one end concave, the other convex (as shown in drawings) to provide a concave/convex joint resisting lateral displacement.

#### 4.2.2 Dimensions

- 4.2.2.1 The cable covers are required in two sizes with dimensions as shown in table 1 and figures 1 and 2 attached. Tolerances on length (L), width (W) and thickness at outer edges (H) shall be  $\pm 3\text{mm}$  and  $\pm 2\text{mm}$  respectively.

When tested in accordance with IS5820: 1970 (clause 8.3) the concrete cable covers shall withstand, without breaking, the loads given in table 1 below.

**Table 1: Cable Cover Sizes and Transverse Strength**

Category	Dimensions(LxWxH) mm	Average Breaking Load (kg)
HT	610 x 230 x 50	750
LV	305 x 150 x 40	300

- 4.2.2.2 The concrete stay blocks are required in two sizes with dimensions as shown in table 2 and figures 3 & 4 attached. Tolerances on length (L),

width (W) and thickness at outer edges (H) shall be  $\pm 3\text{mm}$  and  $\pm 2\text{mm}$  respectively.

When tested in accordance with ESI 43 - 91 the concrete stay blocks shall withstand, for a period of 1 minute, the ultimate failing loads given in table 2 below.

**Table 2: Concrete Stay Blocks- Sizes and Ultimate Failing Load.**

Category	Dimensions(LxWxH) mm	Ultimate failing load (kN)
3/4" (19mm)	500 x 380 x 50	65
1" (25mm)	660 x 480 x 60	80

### 4.3 Marking

4.3.1 The upper side of each cable cover shall be marked longitudinally by means of impression with the words "HATARI KPLC" in accordance with fig 1 and 2.

The word 'HATARI' shall be impressed on one inclined face and the name KPLC on the other. The lettering shall be symmetrically spaced, 4mm deep and 20mm minimum height for LV cable covers and 40mm minimum height for HT cable covers.

Each cable cover and stay block shall carry an impression or embossment of the manufacturer's name or identifying mark.

4.3.2 The following information shall be marked on the manufacturer's certificate supplied with the cable covers and stay blocks.

- Name, trademark of manufacturer
- The number and date of standard to which the concrete product complies
- Type of binder constituent (s) used
- Dimensions of the product
- Instructions  
(all in English Language)

## 5. TESTS

5.1 Tests for the concrete stay blocks shall be in accordance with ESI 43-91 while cable covers shall be tested in accordance with IS 5820

5.2 Copies of previous type and routine test certificates certified by the relevant National Testing Authority of the country of manufacturer shall be submitted for Tender Evaluation.

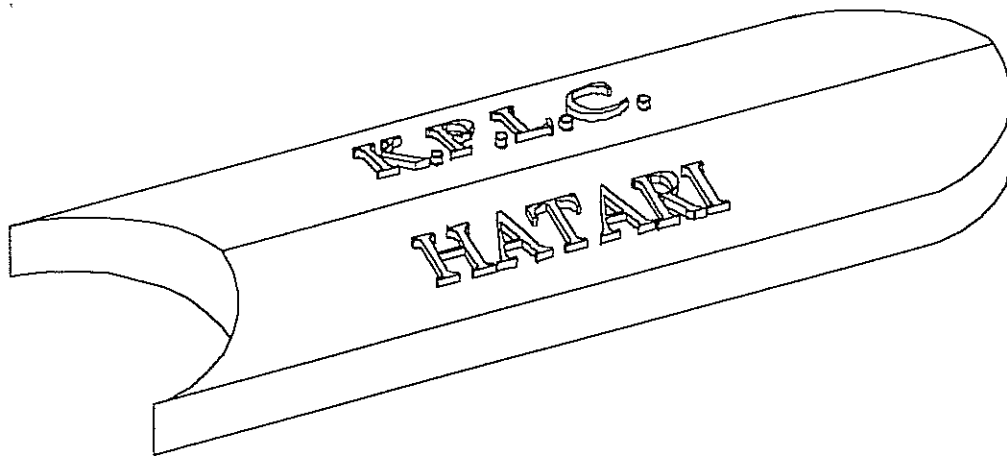
In the case of tender award certified test reports for the concrete products to be supplied shall be sent to KPLC for approval before shipment/delivery of the

goods. The test reports shall be certified by the relevant National Testing Authority of the country of manufacture.

- 5.3 The Tenderer shall submit a clause by clause statement of compliance with these specifications. Relevant technical details including the transverse strength, and ultimate failing load shall be submitted in support and shall be clearly marked to indicate the item and type reference numbers of the product offered.
- 5.4 The manufacturer's declaration of conformity to reference standards, quality assurance certification and list of previous customers (utilities) shall also be submitted.

## 6. INFORMATION (*In case of Tender Award*)

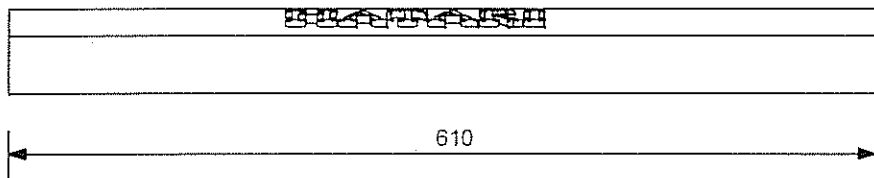
Drawings and technical details shall be submitted to KPLC for approval before manufacture of the concrete products commences. KPLC undertakes to submit their comments or approval for the drawings within three weeks of receiving the draft copies.



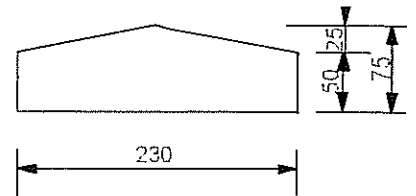
ISOMETRIC VIEW

**NOTES**

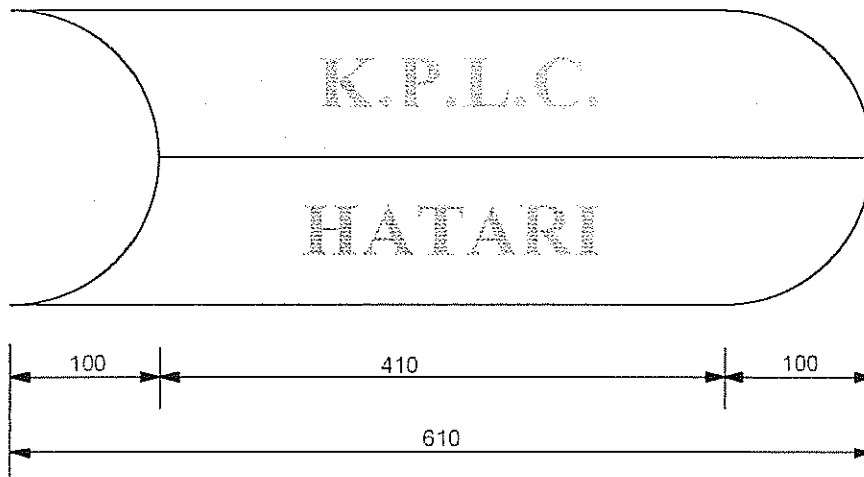
- TSP.01/008
1. ALL DIMENSIONS ARE IN MM.
  2. WHEN MANUFACTURING THE MOULDS ARE TO BE ACCURATELY MADE TO PRODUCE UNITS OF THE DIMENSIONS PROFILES AND SHAPE SHOWN ON THE DRAWINGS
  3. LETTERING SHOWN ON THE DRAWING MUST BE FORMED USING ACCURATELY PLACED FORMERS SECURELY FIXED IN POSITION. CUTTING EITHER UNCURED OR HARDENED CONCRETE WILL NOT BE PERMITTED.



SIDE VIEW



END VIEW

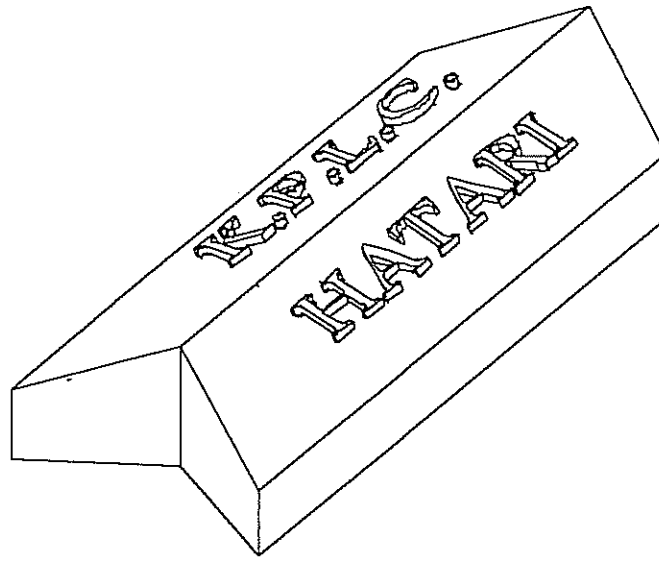


PLAN

**FIG :1 CONCRETE HATARI SLAB TO COVER H.T. CABLES**

	DATE	SIGN	ISSUE	DESCRIPTION	DATE	SIGN	<b>K. P. &amp; L. Co LTD</b>  <b>SK. NO. 08424 / 1</b>
APPROVED							
CHECKED	26 /03/ 02	S.K.K.					
DRAWN	17 /11/ 01	J.M.K.					
SCALE							

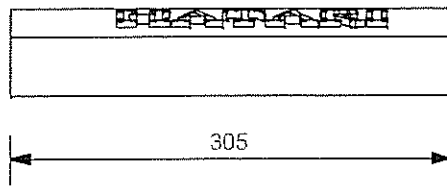




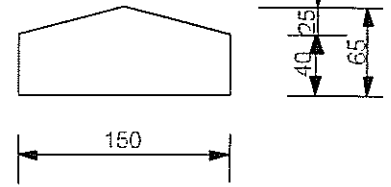
ISOMETRIC VIEW

**NOTES**

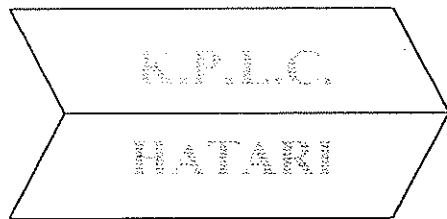
1. ALL DIMENSIONS ARE IN mm.
2. WHEN MANUFACTURING, THE MOULDS ARE TO BE ACCURATELY MADE TO PRODUCE UNITS OF THE DIMENSIONS PROFILES AND SHAPE SHOWN ON THE DRAWINGS.
3. LETTERING SHOWN ON THE DRAWING MUST BE FORMED USING ACCURATELY PLACED FORMERS SECURELY FIXED IN POSITION CUTTING EITHER UNCURED OR HARDENED CONCRETE WILL NOT BE PERMITTED.



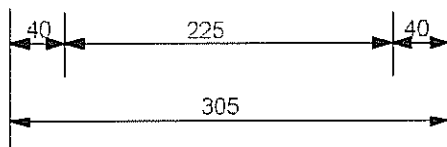
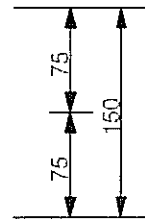
SIDE VIEW



END VIEW



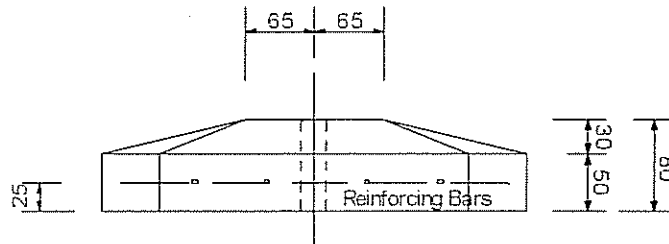
PLAN



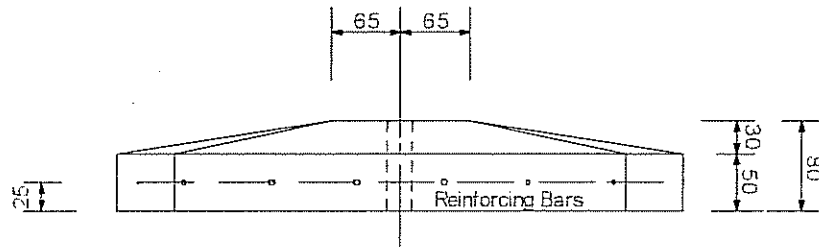
**FIG: 2 CONCRETE HATARI SLAB TO COVER L.V. CABLES**

	DATE	SIGN	ISSUE	DESCRIPTION	DATE	SIGN	<b>K. P. &amp; L. Co LTD</b>  <b>SK. NO. 08424 / 2</b>
APPROVED							
CHECKED	26 /03/ 02	S.K.K.					
DRAWN	16 /11/ 01	J.M.K.					
SCALE							

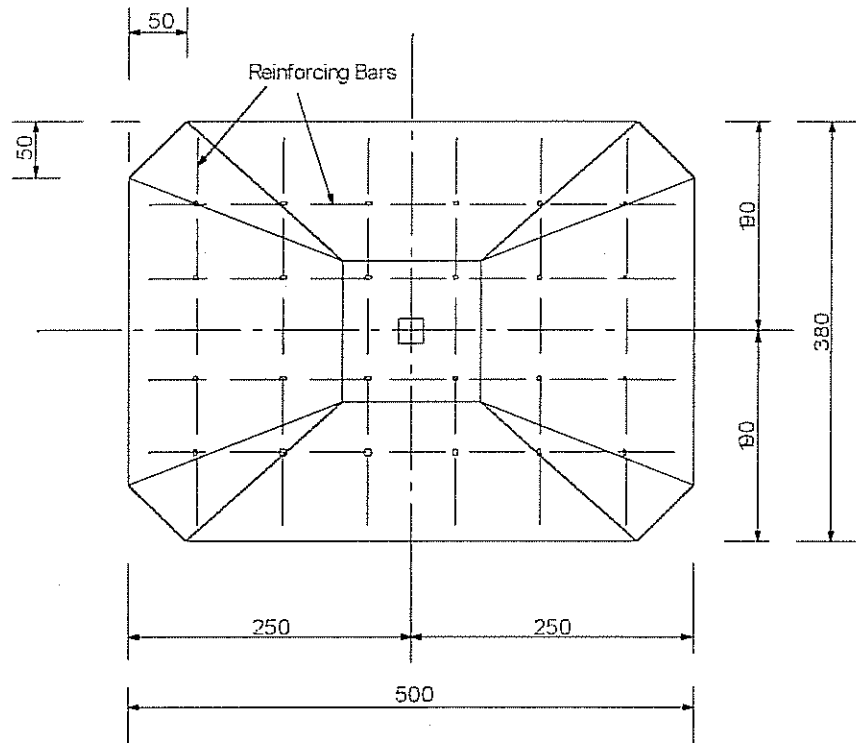
## REINFORCED CONCRETE STAY BLOCK FOR M.V. O/H LINE



**SIDE ELEVATION**



**FRONT ELEVATION**



**PLAN VIEW**

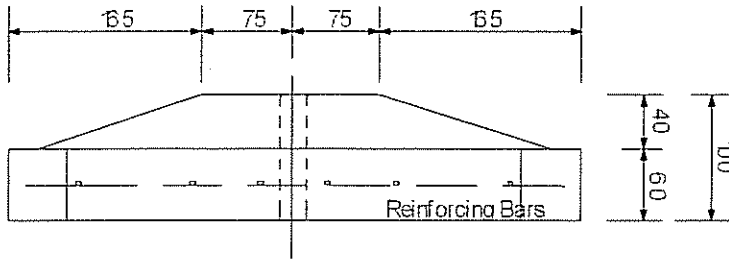
**Notes**

- 1 All dimensions are in mm
- 2 Reinforcement rods should be welded at all points of points of crossing. Alternatively a welded reinforcing fabric of No. 5 gauge x 3" square would be accepted.
- 3 Concrete to be vibrated during manufacture

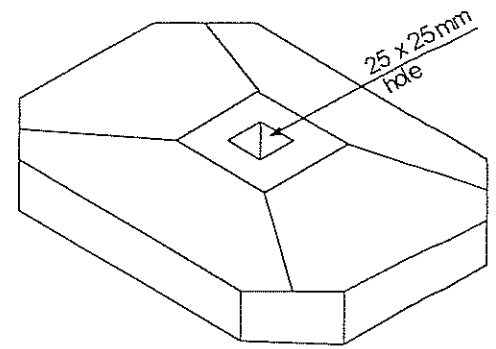
SCALE : 1:5

Drg. No. 3			MANUFACTURING FAILING LOAD
REINFORCEMENT			
NUMBER			
LENGTH	ACROSS		
1/4"	4	6	65 KN TO

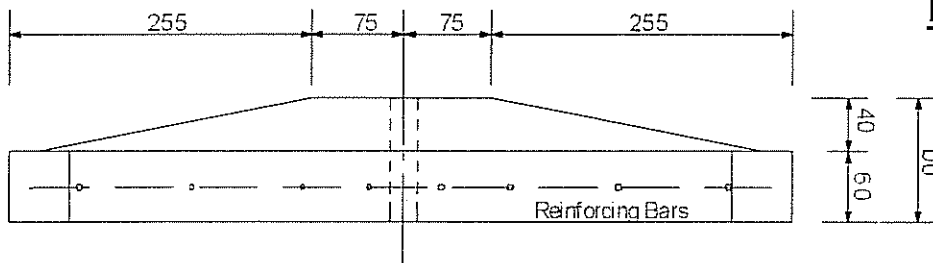
**REINFORCED CONCRETE STAY BLOCK FOR H.T. LINE**



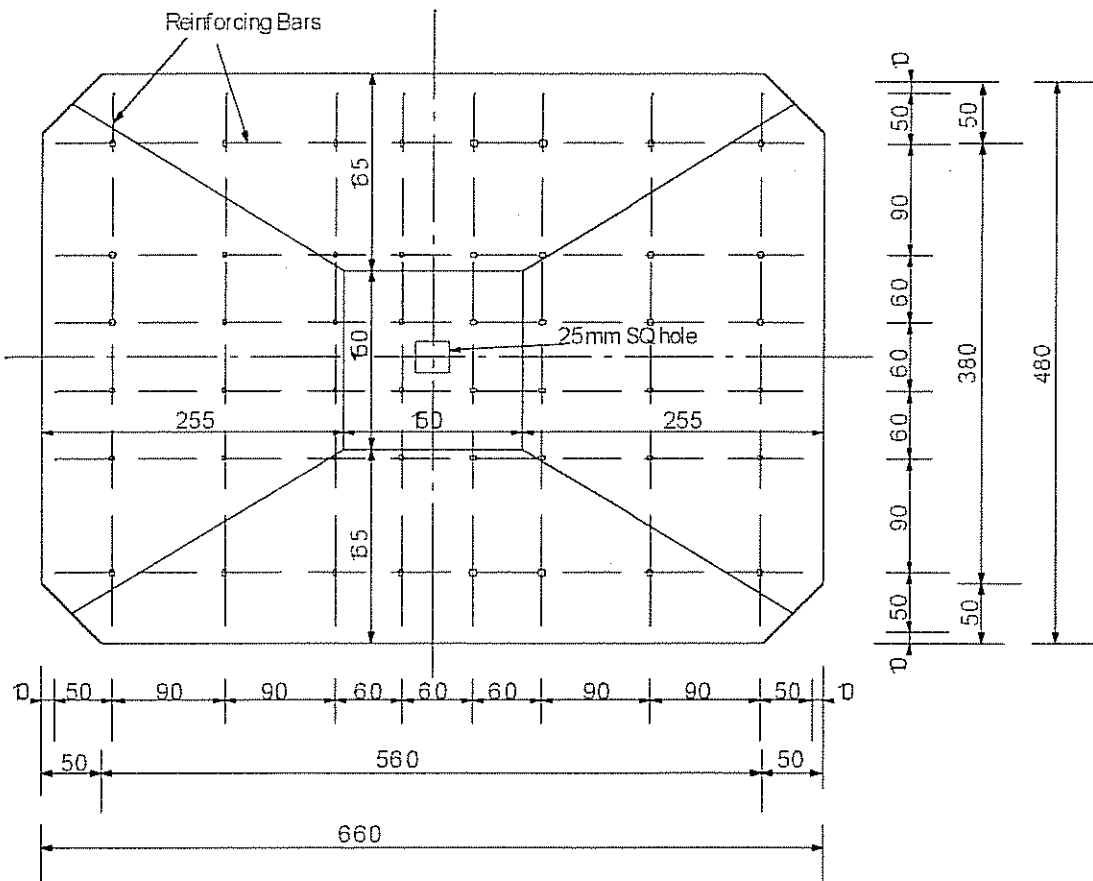
**SIDE ELEVATION**



**PERSPECTIVE VIEW**



**FRONT ELEVATION**



**PLAN VIEW**

**Notes**

1. All dimensions are in mm.
2. Reinforcement rods should be welded at all points of points of crossing. Alternatively a welded reinforcing fabric of No. 5 gauge x 3" square would be accepted.
3. Concrete to be vibrated during manufacture.

SCALE : 1 : 5

<b>Drg. No. 4</b>		
<b>REINFORCEMENT</b>		
	NUMBER A	
	LENGTH	ACRCS
1/4"	6	6

