laid at a depth of 2 meter is estimated to be 2.5 Kg/Cm² (approximately 2.5 tons/ sq. ft).

3.12.4 If the nature of loading and settlement requirements are such that shallow foundations are not feasible then pile foundation may be adopted. The recommended allowable bearing capacity of 406 mm diameter cast-in-situ concrete pile having a depth of 8 meter below the soffit of pile cap is 50 tons. The load carrying capacity of the piles should be confirmed by load testing upto twice the design load.

3.12.5 The results of chemical tests have indicated that the sulphate content in the top soil and sub-surface materials is not significantly high, and the use of sulphate resisting cement will not be necessary for foundation work.

4.0 SELECTING TYPE OF FOUNDATION FOR TUBINES

4.1 The recommended bearing capacity was of 2 Kg. per Cm² (approximately 2 tons per sq.ft) at a depth of 1.5 meter, 2.5 Kg per Cm² (approximately 2.5 tons per sq. ft) at a depth of 2 meter as per para 3.12.2 of investigations. These bearing capacities were determined without considering the possibility of rain water seeping into the soil or entering into the fissures/faults/cracks in the weathered limestone as during heavy rains lot of water enters in this area. It was later determined that the bearing capacity under such conditions will be 0.5 Kg per Cm² (approximately 0.5 ton per sq.ft). The foundations for Turbines was to be designed both for

static load and the effect of vibrations. The required bearing capacity according to the turbine loads was 1.0 Kg/Cm² (approximately 1.0 ton per sq.ft.). It was decided that the safe bearing capacity should not be taken more than 0.5 Kg per Cm² (approximately 0.5 ton per sq.ft) for shallow foundations.

4.2 The Contractor initially proposed shallow foundations at 1.1 meter below the ground level having 150 mm lean concrete and 1.35 meter deep reinforced cement concrete having compressive strength of 4,000 psi. This proposal was rejected by the Author because the soil could not take the turbine loads under wet conditions. The Contractor then suggested pile foundations (Fig-8 to 10) consisting of 560 mm diameter (22 inches diameter) cast in situ upto a depth of 3.9 meter. The number of piles for each turbine foundation was twelve. The pile foundations were not included in the contract as given in para 2.6 of Scope of Civil Work. This proposal was not accepted as this would have involved additional cost to Wapda and more time for execution of the work. The Author suggested a practically feasible proposal by excavating weathered rock approximately 1.5 meter below the reinforced concrete foundation and re-filling with compacted Bholari Sand. Ultimately it was decided that 1.35 meter compacted sand fill mixed with 1 to 2% cement by weight to avoid liquefaction should be provided after removing the existing weathered limestone. The Bholari sand has very good grading as given in the grain size analysis curve in Fig.11. The filling will be done in 150 mm thick layers and each layer will be compacted with vibratory compactor to achieve minimum 85% relative density.

4.3 The cost comparison of 3 possible type of fill materials for foundations i.e. pile foundations, 1:3:6 cement concrete and compacted sand mixed with cement are as follows:

i) Cost of pile for 2 turbines = Rs.282,000
ii) Cost of 1:3:6 cement concrete for 2 turbines. = Rs.235,000
iii) Compacted sand and mixed with 2% cement for 2 turbines. = Rs. 34,000

The Pile foundations is the costliest and sand is the cheapest type of fill material. The 1:3:6 concrete fill would have added more weight on the foundation soil than the sand fill.

5.0 CEMENT MIXED SAND FILLING OPERATION

5.1 Trial test for cement sand fill

Three pits of 3 ft. x 3 ft. and 2 ft. depth were excavated close to the site of work and approved sand mixed with 1%, 1.5% and 2% cement by weight having maximum slump of 1½ inches was filled in layers. The mixing of cement and sand was done in a concrete mixer and water was also controlled in order to find out the optimum moisture content. This fill material mixed with different quantity of cement was placed in 6 inches (150 mm) thick layers in 3 different pits and compacted with vibratory plate compactor. The density results (Fig.12) achieved after compaction in these pits are as follows:

%age cement	Moisture content	Wet density gm/cc	Dry density gm/cc
1%	7.8%	1.86	1.70
1.5%	8.3%	1.86	1.71
2.0%	7.4%	1.87	1.74

Therefore the cement sand mix having 2% cement by weight was approved for filling on the basis of maximum dry density of 1.74 gm/cc achieved in the trial test and to avoid any chances of liquefaction.

5.2 2% Cement Sand Mixed Fill

The 1.35 meter depth was excavated below the reinforced cement concrete foundation of the turbine and then filled with approved sand mixed with 2% cement by weight with maximum slump of 1½ inches (Fig.17). The cement sand was mixed in the Standard Concrete mixer. This mix was placed in the excavated foundation in a layer of 150 mm thick and compacted with vibratory plate compactor to achieve a minimum Relative Density of 85% according to the United States Bureau of Reclamation (USBR) Relative Density Test. A vibratory plate compactor can be seen in Photo No.1 of this paper. The cement mixed sand filling operation was done continuously round the clock in 3 shifts and density tests were carried out by the Field Laboratory on each layer after compaction. The vibratory compactor started compaction from the outer ends of the excavated foundation and then moving towards the centre giving overlaps so that no area is left without compaction. The moisture content was controlled continuously with a speedy moixture testing equipment and density was also tested by the Field Laboratory Staff. The relative density achieved in each layer was from 87% to 100% and the results of field tests of each layer of 150 mm thick are given in Fig.13 for Unit No.5 foundation.

5.3 USBR Relative Density Formula

The United States Bureau of Reclamation Relative Density (RD) formula used for the calculations is given below:

$$RD = \frac{\gamma d.max.\ (\gamma d. - \gamma d.min)}{\gamma d.\ (\gamma d.max - \gamma d.min)} \times 100$$

The Bholari Sand was tested in the Laboratory and following results were obtained:

$\gamma d.max$ = Max Dry Density at 6.5% of moisture content = 1.93 gm/cc

$\gamma d.min$ = Minimum Dry Density = 1.60/gm/cc

γd = Field Density determined at site.

5.4 Details of Field Test for Density

The results of one of the field density test (Sand cone method) are detailed below for study and reference:

Wt. of Wet soil - W1	= 2796 gms
Wt. of Wet soil + Pan	= 69.00 gms
Wt. of dry soil + Pan	= 66.35 gms
Wt. of Pan	= 25.74 gms
Wt. of dry soil	= 38.61 gms
Water content	= w% = 6.8%
Unit wt. of sand, γ sand	= 1.410 gm/cc
Wt. of Jug+Cone with sand	= 5000 gms
Wt. of Jug+ Cone	= 1207 gms
Wt. of sand used (hole+cone)	= 3793 gms
Wt. of calibrated sand in cone	= 1865 gms
Wt. of sand in hole, W	= 1928 gms
Volume of hole Vh = W/γ sand	= $\frac{1928}{1.410}$ = 1367 cc

Density of Soil

Wet Density - γ wet = W1/Vh = $\frac{2796}{1367}$ = 2.05 gm/cc

Dry Density - $\gamma d = \frac{\gamma wet}{(1+w)} = \frac{2.05}{(1+.068)}$ = 1.91 gm/cc

According to USBR Formula, relative density is calculated as follows:

$$R.D = \frac{\gamma d.\ max\ (\gamma d - \gamma d.min)}{\gamma d.\ (\gamma d.max. - \gamma d.min)} \times 100$$

Where $\gamma d.max$ = 1.93 gm/cc (determined in Lab)

$\gamma d.min$ = 1.60 gm/cc (determined in Lab)

γd = 1.91 gm/cc (determined in field)

Relative Density = 94.92%.

6.0 LOAD TEST

6.1 In order to confirm the bearing capacity of the cement mixed sand fill, plate load test was carried out as explained below:

A 30 inches diameter and 1 inch thick steel plate having an area of 706.5 sq. in (4558 sq.cm) was placed under a Hydraulic Jack which was loaded with sand filled gunny bags over steel girders and wooden sleepers (Fig.14). Two very precise and sensitive Manometers were fixed one each on either side of the steel plate. Gradually load was applied to the plate through the hydraulic Jack starting with 2.5 ton and inducing 5.59 ton/sq. meter on the plate and the Manometer was watched for 1 minute for every addition of load.

The compacted sand showed no settlement upto a load of 17.86 ton i.e. 39.18 ton/sq. meter and proved to be exceptionally very well compacted. The settlement in sand initiated when the load was further increased and a maximum deflection of .0325 mm was recorded at a load of 25.52 ton i.e. 55.98 ton/sq. meter on plate.

The deflection of 0.0325 mm is very low and can be considered as negligible. Settlement therefore

expected under actual foundation load comparable to the Test Loads will also be negligible.

6.2 The details with regard to loading arrangement, readings of load and deflection, load settlement curve and sketch showing the set up for conducting plate load test are given in Fig.14 to 16.

7.0 CONCLUSIONS

The plate load test has confirmed that the bearing capacity of the soil was increased from 0.5 ton per sq. ft to 5 ton per sq. ft by using sand fill mixed with 2% cement by weight. It was found the most economical method for improving the bearing capacity of foundation of Gas Turbines Extension Project Units 5 & 6. If pile foundations were adopted then the additional cost to WAPDA would have been Rs.282,000. Therefore, the Author saved additional cost by adopting cement sand fill for the foundations. The cement sand mix was at the cost of the Contractor and no additional payment was made for this fill. The foundation was stabilized and bearing capacity was improved which will last more than the life of the Gast Turbines.

BIBLIOGRAPHY

1. Soil Investigation Report by Soil Mechanics Ltd.

2. Contract Documents of Kotri Gas Turbines Units 5 & 6.

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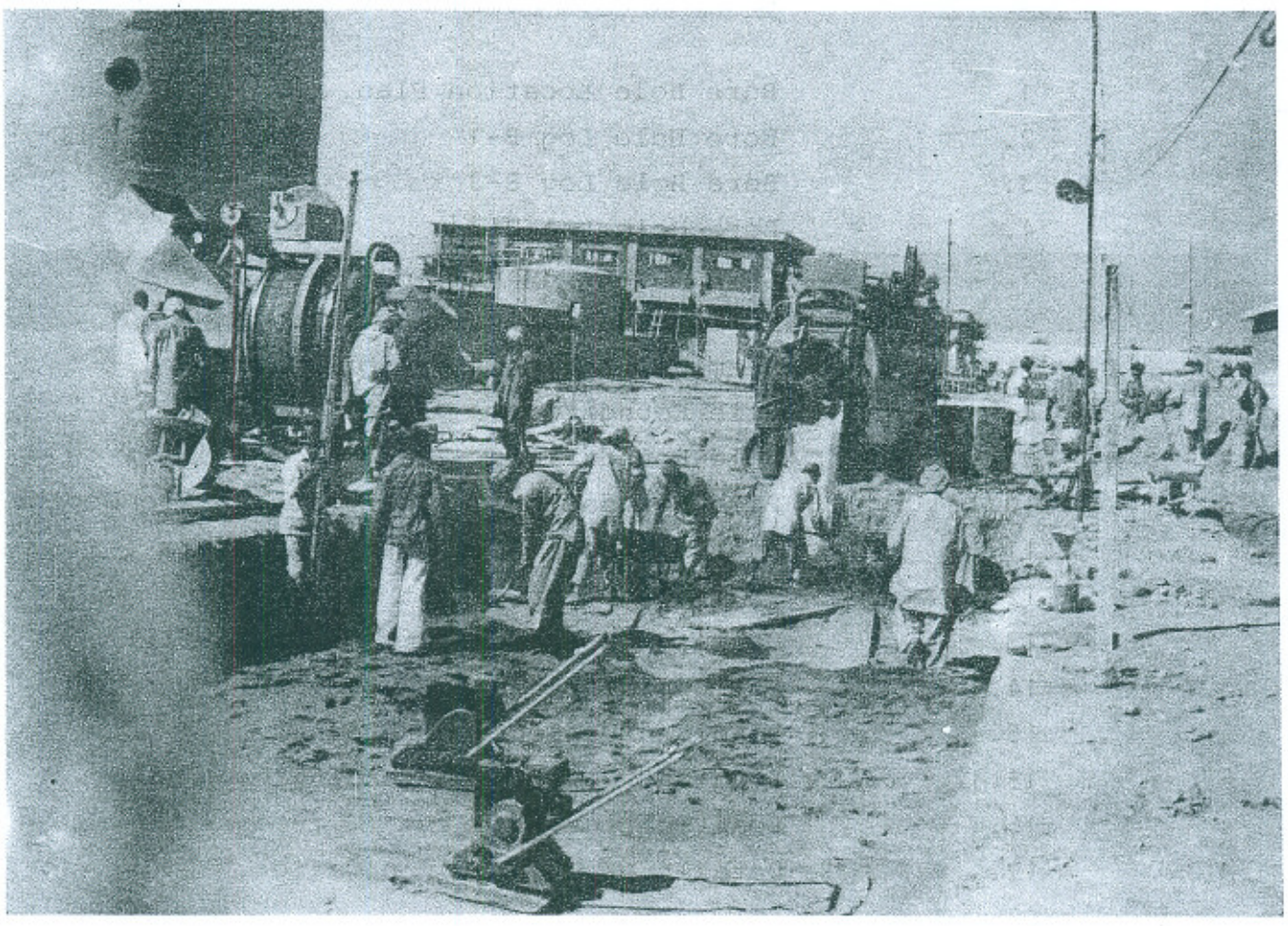


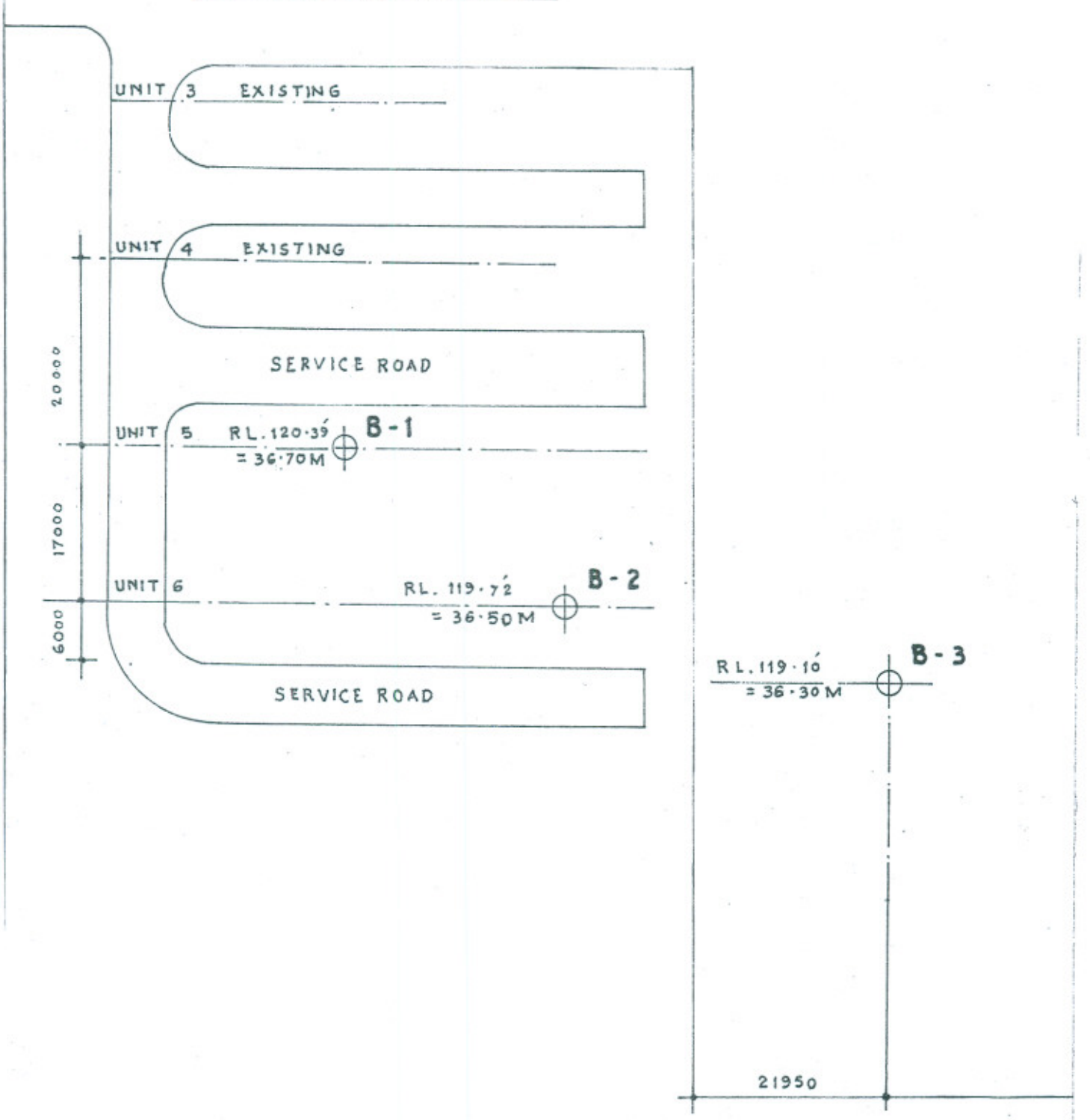
PHOTO 1

SAND MIXED WITH 2% CEMENT BEING PLACED IN TURBINE FOUNDATION PIT. TWO VIBRATORY COMPACTORS ARE ALSO IN USE.

FIG: I

KOTRI GAS TURBINES EXTENSION PROJECT UNITS 5 AND 6.

BORE HOLE LOCATION PLAN



SCALE = 1 : 300

FIG: 2

KOTRI GAS TURBINE EXTENSION PROJECT UNITS 5 AND 6.

BORE LOG OF HOLE NO. **B-1**

RL. 120·39 = 36·70 M

REDUCED LEVELS	DEPTH IN METRES	THICKNESS OF LAYERS	STRATA ENCOUNTERED	SOIL SYMBOL	DIAMETER OF BORING	PENETRATION TEST BLOWS (63·5 Kg HAMMER FALL 0·76 METRE) 10 30 50 70 90	REMARKS
	0·70 M	0·70 M	BROWN CLAYEY SILT WITH TRACES OF VERY FINE SAND.			48 1·00	BORE HOLE DRY.
	3·00 M	2·30 M	BROWN WEATHERED CHALKY LIMESTONE WITH LENSES OF SAND.			50/5·05 CM 2·00 80/15·00 CM 3·00	
	4·50 M	1·50 M	BROWN WEATHERED CHALKY LIMESTONE WITH LENSES OF SILT.		4·00	70/10·15 C M 4·00 BY ROLLER BIT: 4·50	
	6·00 M	1·50 M	BROWN CHALKY LIME-STONE.		NX-SIZE CORE	53·37 % 6·00	
	6·90 M	0·90 M	BROWN LIMESTONE.			66·66 % 6·90	
	7·50 M	0·60 M	BROWN SHALE.			25 % 7·50	
	15·00 M	7·50 M	BROWN CHALKY LIMESTONE			73·33 % 9·00 73·33 % 10·50 60 % 11·25 48 % 12·50 50 % 14·00 50 % 15·00	

NOTE:- 12·00M TO 15·00M 100% WATER LOSS.

FIG: 3

KOTRI GAS TURBINE EXTENSION PROJECT UNITS 5 AND 6.

BORE LOG OF HOLE NO B-2

RL = 119.72 = 36.50 M

REDUCED LEVELS	DEPTH IN METRES	THICKNESS OF LAYERS	STRATA ENCOUNTERED	SOIL SYMBOLS	DIAMETER OF BORING	PENETRATION TEST BLOWS 63.5 KG HAMMER FALL 0.76 METRE 10 . 30 . 50 . 70 . 90	REMARKS
	1.00 M	1.00 M	DARK BROWN HARD CLAYEY SILT WITH TRACES OF VERY FINE SAND			74/17.75 CM 1.00	BORE HOLE DRY
	2.00 M	1.00 M	BROWN WEATHERED LIMESTONE WITH LENSES OF LIGHT BROWN SILT			80/12.50 CM 2.00	
	3.00 M	1.00 M	BROWN WEATHERED LIMESTONE WITH LENSES OF LIGHT GREY SILT			60/7.50 CM 3.00	
	5.00 M	2.00 M	BROWN WEATHERED CHALKY LIMESTONE		5.00	60/2.50 CM 4.00 60/2.00 CM 5.00	
		10.00 M	LIGHT BROWN CHALKY LIMESTONE		BY ROLLER BIT CORE NX-SIZE	60/2.50 CM 6.00 100/12.50 CM 7.00 70/20.50 CM 8.00 60/2.50 CM 9.00 90 % 10.50 66.57 % 11.60 71.05 % 13.50 73.33 % 15.00	
	15.00 M						

NOTE:- 12.00 M TO 15.00 M 100 % WATER LOSS

FIG: 4

KOTRI GAS TURBINE EXTENSION PROJECT - UNITS 5 & 6

BORE LOG OF HOLE No. B-3

REDUCED LEVELS	DEPTH IN METRES	THICKNESS OF LAYERS	STRATA ENCOUNTERED	SOIL SYMBOLS	DIAMETER OF BORING	PENERATION TEST BLOWS (63.5 kg HAMMER FALL 0.76 METRE) 10 30 50 70 90	REMARKS
RL. 119.10' = 36.30 M	1.00 M	1.00M	BROWN WEATHERED CHALKY LIMESTONE		BY ROLLER BIT	49 — 1.00	BORE HOLE DRY
	2.00 M	1.00M	BROWN WEATHERED CHALKY LIMESTONE WITH LENSES OF SILT & TRACES OF GRAVEL			80/10·15 CM — 2.00	
	3.00 M	1.00M	BROWN CHALK WITH LANSES OF SILT & TRACES OF GRAVEL			90/10·15 CM — 3.00	
	10.50 M	7.50M	BROWN CHALKY LIMESTONE		4.00 NX - SIZE CORE	80/12·50 CM — 4.00; 53.33% — 5.00; 80% — 7.00; 73.33% — 8.50; 50% — 10.50	
	12·00	1.50 M	BROWN CHALK			23.33% — 12.00	
	15.00 M	3.00 M	BROWN CHALKY LIMESTONE			60% — 13.00; 100% — 15.00	

NOTE :- 12.00 M TO 15.00 M 100% WATER LOSS

FIG : 5

KOTRI GAS TURBINE EXTENSION PROJECT UNITS 5 & 6

CRUSHING STRENGTH RESULTS

Sr. No:	B.H. No:	Core NX Size:	Unit Wt. Grams/cc:	Crushing Strength Kg/Cm^2
1.	1	5.00M - 5.10M	2.71	9.0
2.	1	6.40M - 6.50M	2.30	2.0
3.	1	7.82M - 7.92M	2.18	0.9 (MINIMUM)
4.	1	9.50M - 9.60M	2.13	0.9
5.	1	10.70M - 11.80M	2.41	2.0
6.	1	11.60M - 11.70M	2.69	5.5
7.	1	13.00M - 13.10M	2.62	3.5
8.	1	14.50M - 14.60M	2.65	4.0
9.	2	10.00M - 10.10M	2.21	0.9
10.	2	11.10M - 11.20M	2.28	1.5
11.	2	12.60M - 12.70M	2.35	2.0
12.	2	14.50M - 14.60M	2.97	18.0
13.	3	4.50M - 4.60M	2.75	9.0
14.	3	6.60M - 6.70M	2.59	4.8
15.	3	8.40M - 8.50M	2.55	1.0
16.	3	9.30M - 9.40M	2.51	1.5
17.	3	12.62M - 12.72M	2.64	4.9
18.	3	14.70M - 14.80M	2.65	2.5

KOTRI GAS TURBINE EXTENSION PROJECT UNITS 5 & 6.

TEST RESULTS OF GRAIN SIZE ANALYSIS

Sr. No.	B.H. No.	Depth in Metres:	GRAIN SIZE ANALYSIS U.S. STANDARD SIEVES (% Passing by Wt)							
			3/8"	#4	#8	#16	#30	#50	#100	#200
1.	1.	0.00 to 0.70	100.00	98.10	82.0	59.40	47.20	36.10	27.30	9.30
2.	2.	0.00 to 1.00	100.00	97.50	71.5	49.20	36.40	25.20	17.60	5.70

FIG:7

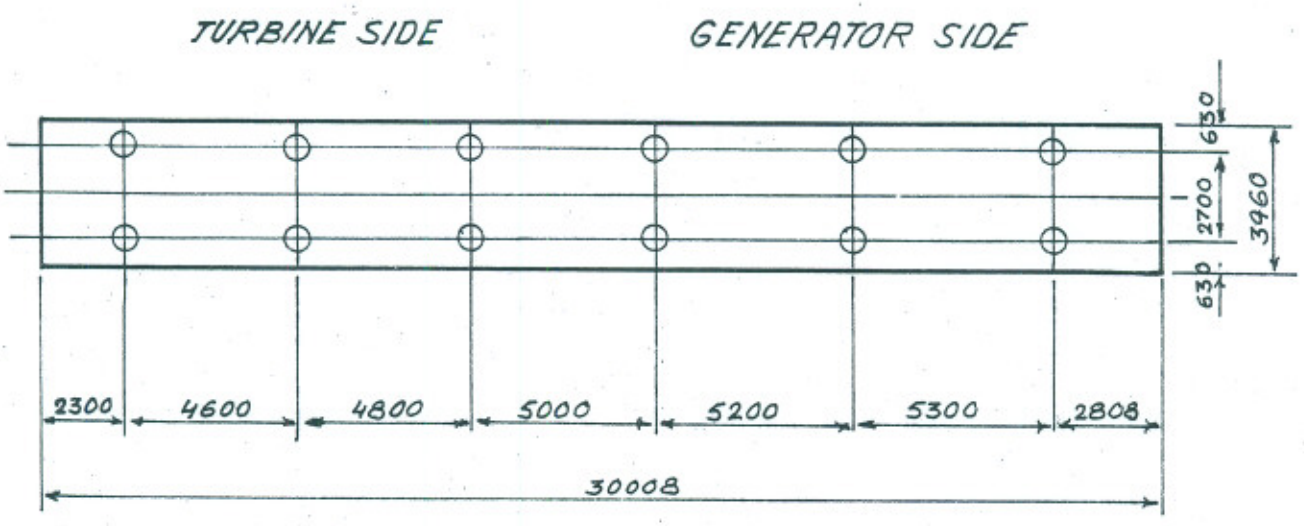
KOTRI GAS TURBINE EXTENSION PROJECT UNITS 5 & 6

CHEMICAL ANALYSIS OF SOIL SAMPLES

Sr: No.	Identification:	Sulphate SO_4	Calcium Oxide CaO	Magnesium Oxide MgO
1.	B.H. No. 3 SPT No. 1 Depth 1.0 to 1.46 M	0.03 %	0.07 %	0.03 %
2.	B.H. No. 1 SPT No. 1 Depth 1.0 to 1.46M	0.03 %	0.04 %	0.02 %
3.	B.H. No. 1 SPT No. 3 Depth 3.0 to 3.15 M	0.15 %	0.16 %	0.03 %
4.	B.H. No. 2 SPT No. 1 Depth 1.0 to 1.32 M	0.04 %	0.05 %	0.02 %
5.	B.H. No. 2 SPT No 3 Depth 3.0 to 3.08M	0.03 %	0.05 %	0.02 %
6.	B.H No. 3 SPT No. 3 Depth 3.0 to 3.46M	0.03 %	0.03 %	0.01 %

FIG:8

KOTRI GAS TURBINE EXTENSION PROJECT UNITS 5 & 6.



PILES PLAN

CONCRETE c.s. = 210 Kg /Cm² = 3000 PSI

ALLOWABLE UNIT COMPRESSION STRENGTH = 70 Kg/Cm² = 1000 PSI

REINFORCING BAR YEILD POINT (TORSTEEL) 4250 Kg/Cm² = 60714 PSI

ALLOWABLE UNIT TENSION STRENGTH = 1800 Kg/Cm² = 25710 PSI

FIG: 9

KOTRI GAS TURBINE EXTENSION PROJECT UNITS 5 & 6.

DETAIL OF PILES

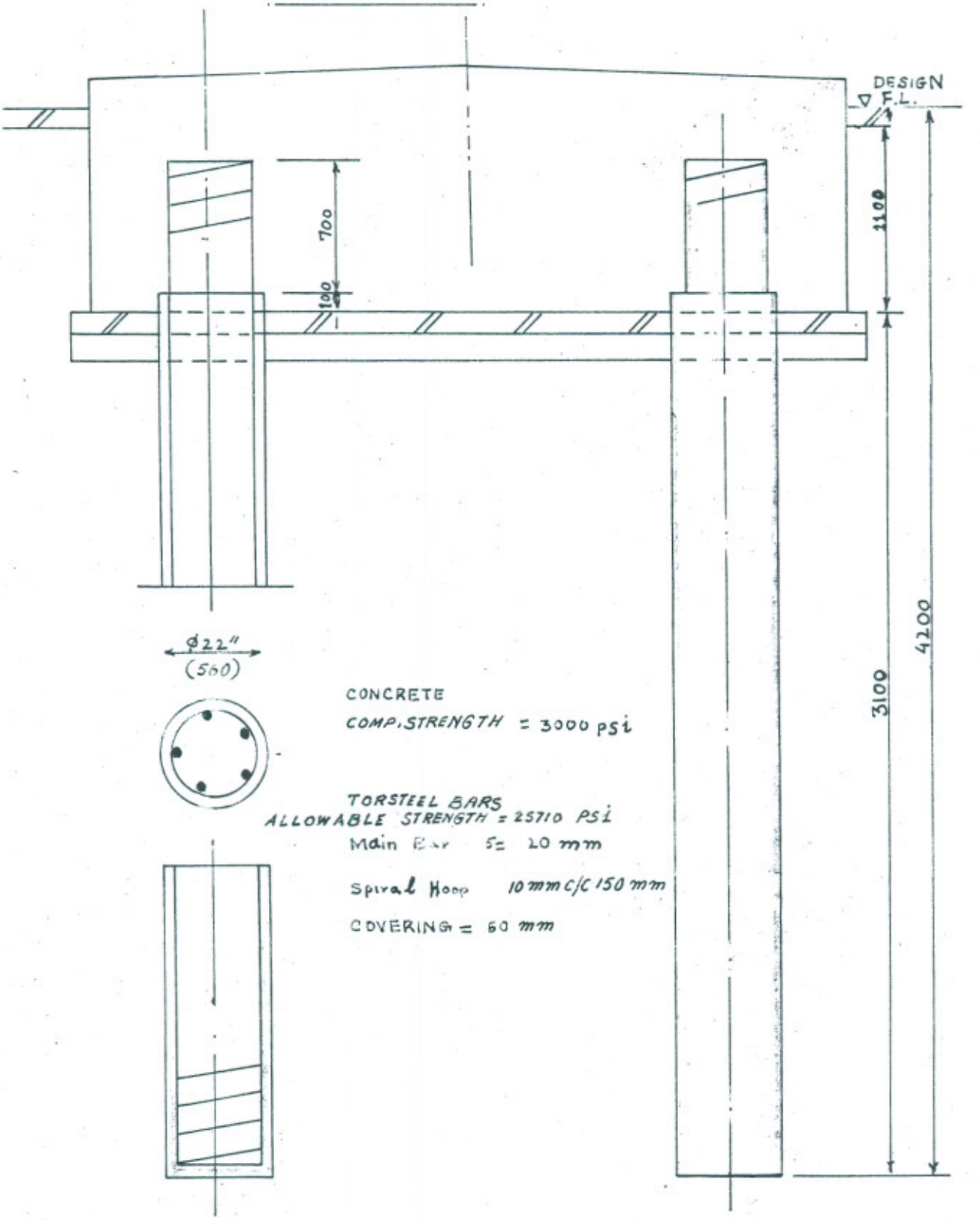
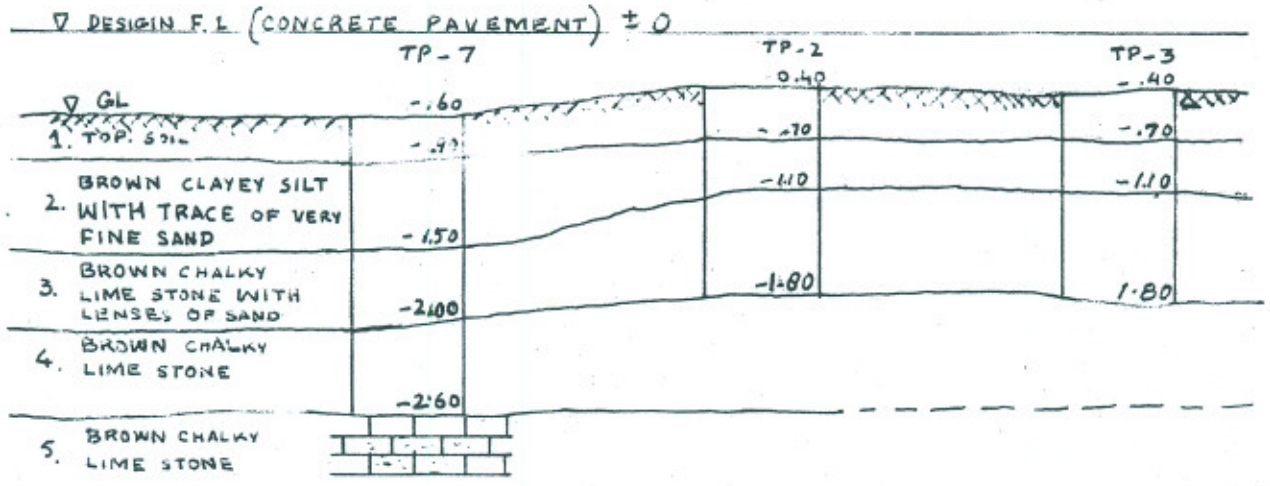


FIG:10

KOTRI GAS TURBINE EXTENSION PROJECT UNITS 5 & 6

TEST PIT AND PILE DEPTH



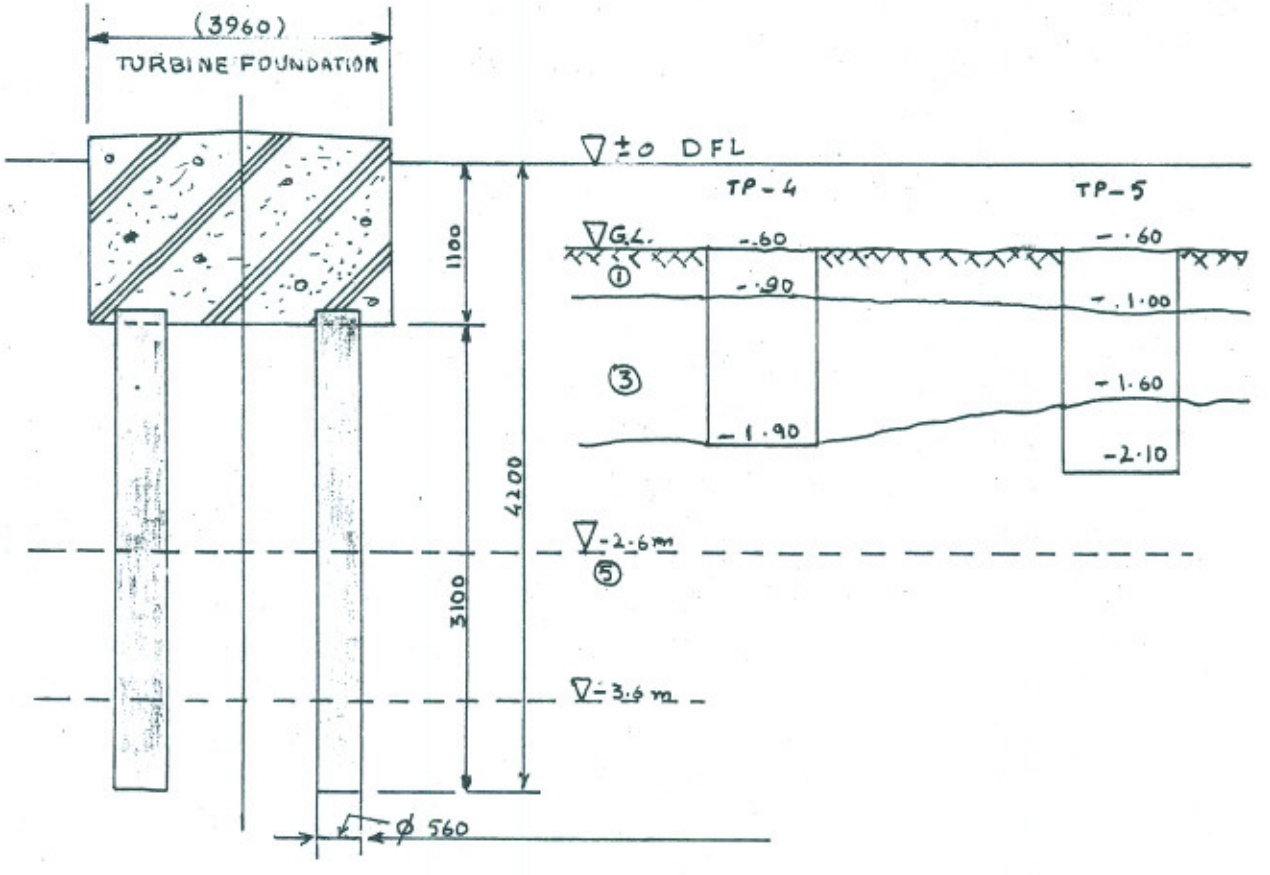
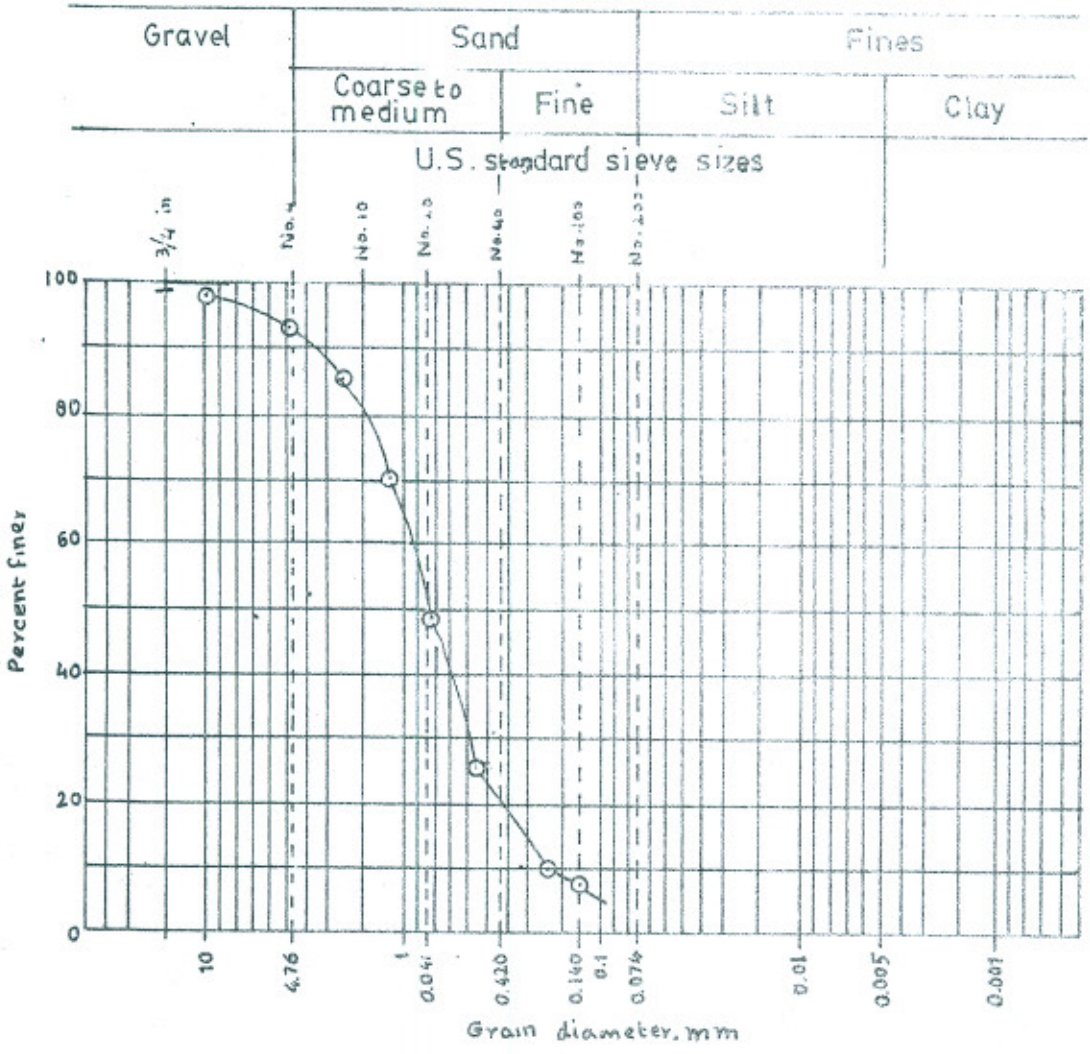


FIG : II

KOTRI GAS TURBINE EXTENSION PROJECT UNITS 5 & 6

BHOLARI SAND - GRAIN SIZE ANALYSIS



FINENESS MODULUS = 3·2

KOTRI GAS TURBINE EXTENSION PROJECT UNITS 5 & 6.

TRIAL DENSITY TEST RESULTS OF SAMPLS

S.NO.	CEMENT BY WT.	MOISTURE CONTENT	WET DENSITY Gms/cc.	DRY DENSITY Gms/c.c.
1.	1·0 %	7·8 %	1·86	1·70
2.	1·5 %	8·3 %	1·86	1·71
3.	2·0 %	7·4 %	1·87	1·74

REMARKS: -THERE IS NO CHANGE IN THE DRY UNIT WEIGHTS IF THE AVERAGE M.C. 7·8% IS TAKEN IN THE COMPUTATIONS INDICATING THAT THE PERCENTAGE OF CEMENT DO NOT EFFECT THE DENSITY MUCH WITHIN 1% TO 2% RANGE.

-TO PREVENT LIQUEFACTION CEMENT WILL BE USEFUL AND THUS SELECTING 2% CEMENT BY WEIGHT WILL BE MORE SAFE.

-THE WATER CONTENT, MAY RANGE FROM 5 TO 7 PERCENT.

Paper No. 460 FIG: 12

KOTRI GAS TURBINE EXTENSION PROJECT UNITS 5 & 6

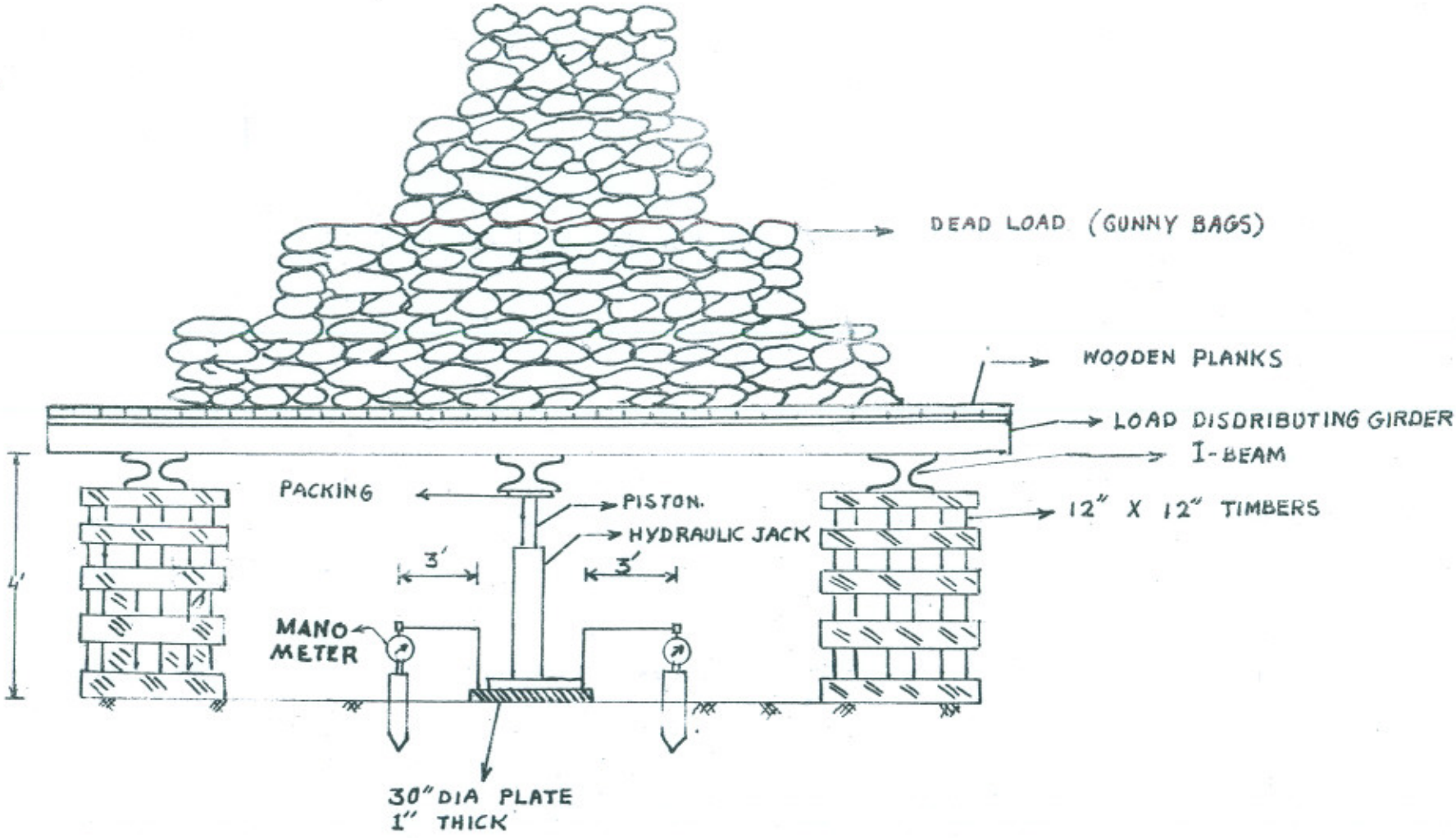
DENSITY TESTS FOR COMPACTED SAND FILL

S.No.	LOCATION	MOISTURE CONTENT	DRY DENSITY Gms/c.c.	LABORATORY MAX: DRY DENSITY Gm/c.c.	LABORATORY MIN: DRY DENSITY Gms/c.c	RELATIVE DENSITY
1.	1ST. - LAYER UNIT NO.: 5	4·0%	1·91	1·93	1·60	95·0 %
2.	1ST. - LAYER UNIT NO : 5	4·5%	1·92	1·93	1·60	97·5 %
3.	2Nd. - LAYER UNIT NO : 5	4·4 %	1·95	1·93	1·60	100·0 %
4.	2Nd. - LAYER UNIT NO 5	4·3 %	1·88	1·93	1·60	87·1 %
5.	3Yd. - LAYER UNIT NO : 5	4·2 %	1·95	1·93	1·60	100·0 %
6.	3Yd. - LAYER UNIT NO : 5	4·2 %	1·92	1·93	1·60	97·5 %
7.	4th. - LAYER UNIT NO : 5	4·0 %	1·88	1·93	1·60	87·1 %
8.	4th. - LAYER UNIT NO : 5	4·7 %	1·89	1·93	1·60	89·7 %
9.	5th. - LAYER UNIT NO : 5	4·4 %	1·88	1·93	1·60	87·1 %
10.	5th. - LAYER UNIT NO : 5	4·9 %	1·90	1·93	1·60	92·3 %
11.	5th. - LAYER UNIT NO : 5	4·9%	1·91	1·93	1·60	94·9 %

Paper no. 460

FIG:

KOTRI GAS TURBINE EXTENSION PROJECT UNITS 5&6.



SKETCH SHOWING THE SETUP
FOR CONDUCTING PLATE LOAD TEST

FIG: 14

KOTRI GAS TURBINE EXTENSION PROJECT UNIT 5 & 6.

Paper No.460

FIG:15

RESULT PLATE LOADING TEST No. 1

Date	Time	MANOMETER lb/in²	LOAD ON PLATE/INTONS	LOAD ON PLATE in t/sq.m	M_1 1/100	M_2 1/100	M_3 1/100	M_4 1/100	M AVER.	REMARKS
23.11.80.	0230	100	2.55	5.59	00	00	-	-	00	
	0231	200	5.10	11.18	00	00	-	-	00	
	0232	300	7.65	16.58	00	00	-	-	00	
	0233	400	10.20	22.37	00	00	-	-	00	
	0234	500	12.76	27.99	00	00	-	-	00	
	0235	600	15.31	33.17	00	00	-	-	00	
	0236	700	17.86	39.18	00	00	-	-	00	
	0240	700			00	00	-	-	00	
	0245	700			00	00	-	-	00	
	0246	800	20.41	44.75	0.005	0.005	-	-	0.005	
	0247	800			0.01	0.005	-	-	0.0075	
	0248	800			0.01	0.005	-	-	0.0075	
	0249	800			0.01	0.005	-	-	0.0075	
	0250	800			0.01	0.0075	-	-	0.0087	
	0255	800			0.01	0.0075	-	-	0.0087	
	0300	800			0.0125	0.0075	-	-	0.01	
	0305	800			0.0125	0.01	-	-	0.0112	
	0308	825	21.00	46.00	0.02	0.01	-	-	0.015	
	0313	825			0.02	0.01	-	-	0.015	
	0318	825			0.02	0.01	-	-	0.015	
	0323	900	22.97	50.39	0.0225	0.01	-	-	0.0162	
	0324	900			0.0225	0.01	-	-	0.0162	
	0329	900			0.0225	0.01	-	-	0.0162	

SIZE OF PIT. 31.2 X 5.16 M.

SIZE OF PLATE 30" Ø

AREA OF PLATE 706.5 sq" or 4558 sq.cm

DIAMETER OF JACK PISTON 4" & AREAL 12.565 sq INCH

BOTTOM LEVEL OF PLATE FROM G.L. 35 INCHES

G.W.T NOT STRUCK.

TEST LOAD ACTUAL LOAD GIVEN 22.97 TONS

TEST STARTED ON 23/11/80 at 0230 HRS.

TEST COMPLETED on 23/11/80 AT. 0607 HRS.

CONT:

KOTRI GAS TURBINE EXTENSION PROJECT UNIT 5 & 6.

RESULT PLATE LOADING TEST No.:

DATE	TIME	MANOMETER Lbs / in^2	LOAD ON PLATE IN TONS	LOAD ON PLATE in t/sq.m	M_1 1/100	M_2 1/100	M_3 1/100	M_4 1/100	M AVER.	REMARKS
23.11 30	0334	900			0.0225	0.01	-	-	0.0162	
	0339	900.			0.0225	0.01	-	-	0.0162	
	0343	1000	25-52	55.98	0.0250	0.02	-	-	0.0225	
	0348	1000			0.0250	0.02	-	-	0.0225	
	0353	1000			0.0250	0.02	-	-	0.0225	
	0358	1000			0.0250	0.02	-	-	0.0225	
	0403	1000			0.0250	0.02	-	-	0.0225	
	0408	1000			0.0250	0.02	-	-	0.0225	
	0515	1000			0.0325	0.02	-	-	0.0262	
		LOAD	RELEASED							
	0516	550	14.00	30.7	0.06	0.02	-	-	0.04	
	0531				0.06	0.02	-	-	0.04	
	0532	350	8.93	19.59	0.06	0.0050	-	-	0.0325	
	0537									
	0542									
	0547									
	0552	100	2.55	5.59	0.06	0.0050	-	-	0.0325	
	0557				0.06	0.0050	-	-	0.0325	
	0602				0.06	0.0050	-	-	0.0325	
	0607				0.06	0.0050	-	-	0.0325	
				TEST COMPLETED						

SIZE OF PIT 31·2 M X 5·16 M

SIZE OF PLATE 30" Ø

AREA OF PLATE 706.5 in^2 OR 4558 Sq CM

DIAMETER OF JACK PISTON 4" OR AREA =12.56 Sq INCHES.

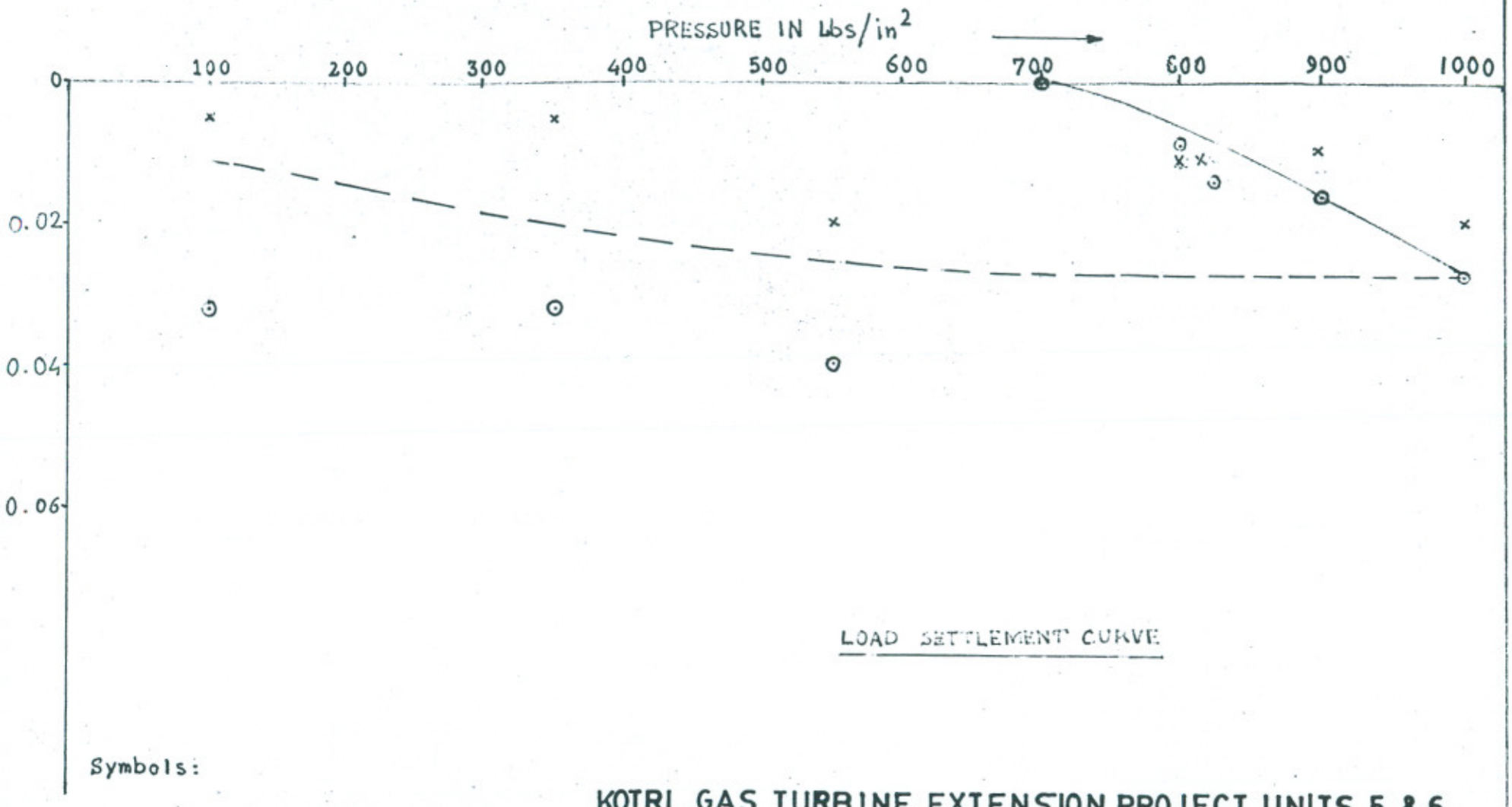
BOTTOM LEVEL OF PLATE FROM G.L=35 INCHES

G.W.T. NOT STRUCK.

TEST LOAD ACTUAL LOAD GIVEN 25.52 t/sq.m

TEST STARTED ON 23/11/80 AT 2.0 HRS.

TEST COMPLETED ON 23/11/80 AT 2.07 Hrs.



LOAD SETTLEMENT CURVE

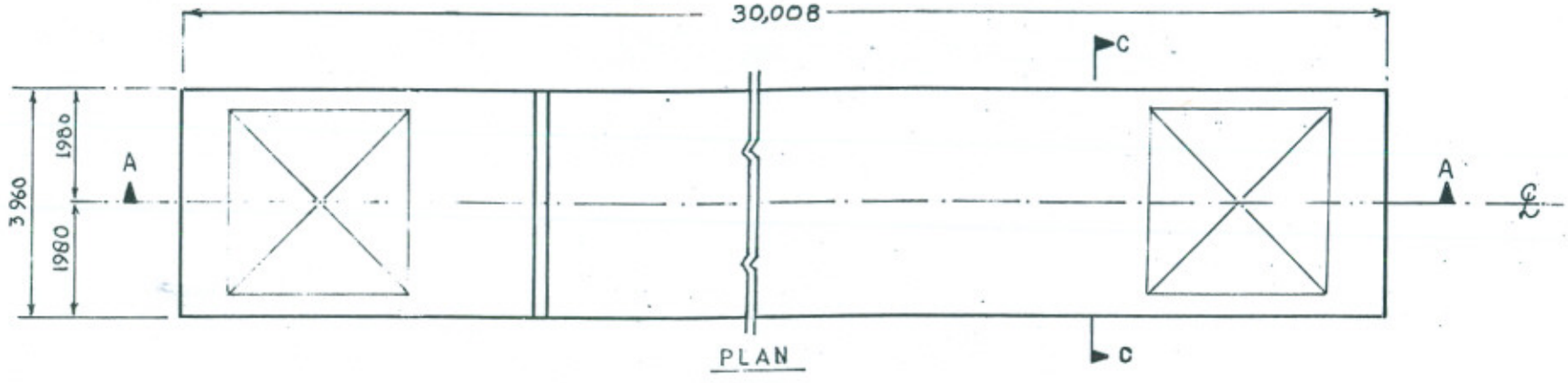
Symbols:

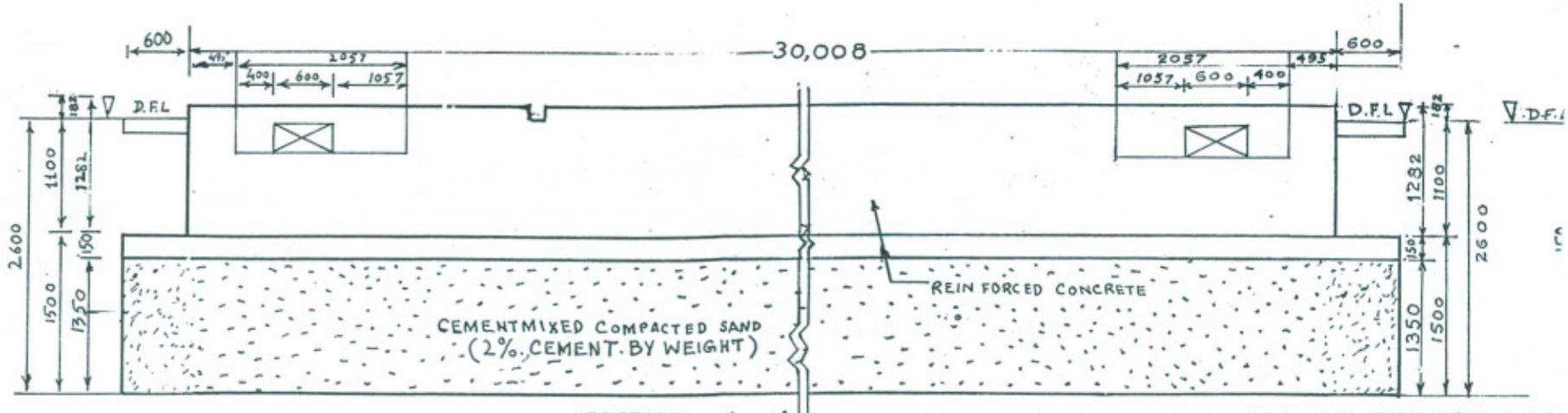
X = M_2 reading

O = Average reading

KOTRI GAS TURBINE EXTENSION PROJECT UNITS 5 & 6

KOTRI GAS TURBINES EXTENSION PROJECT UNITS 5 & 6

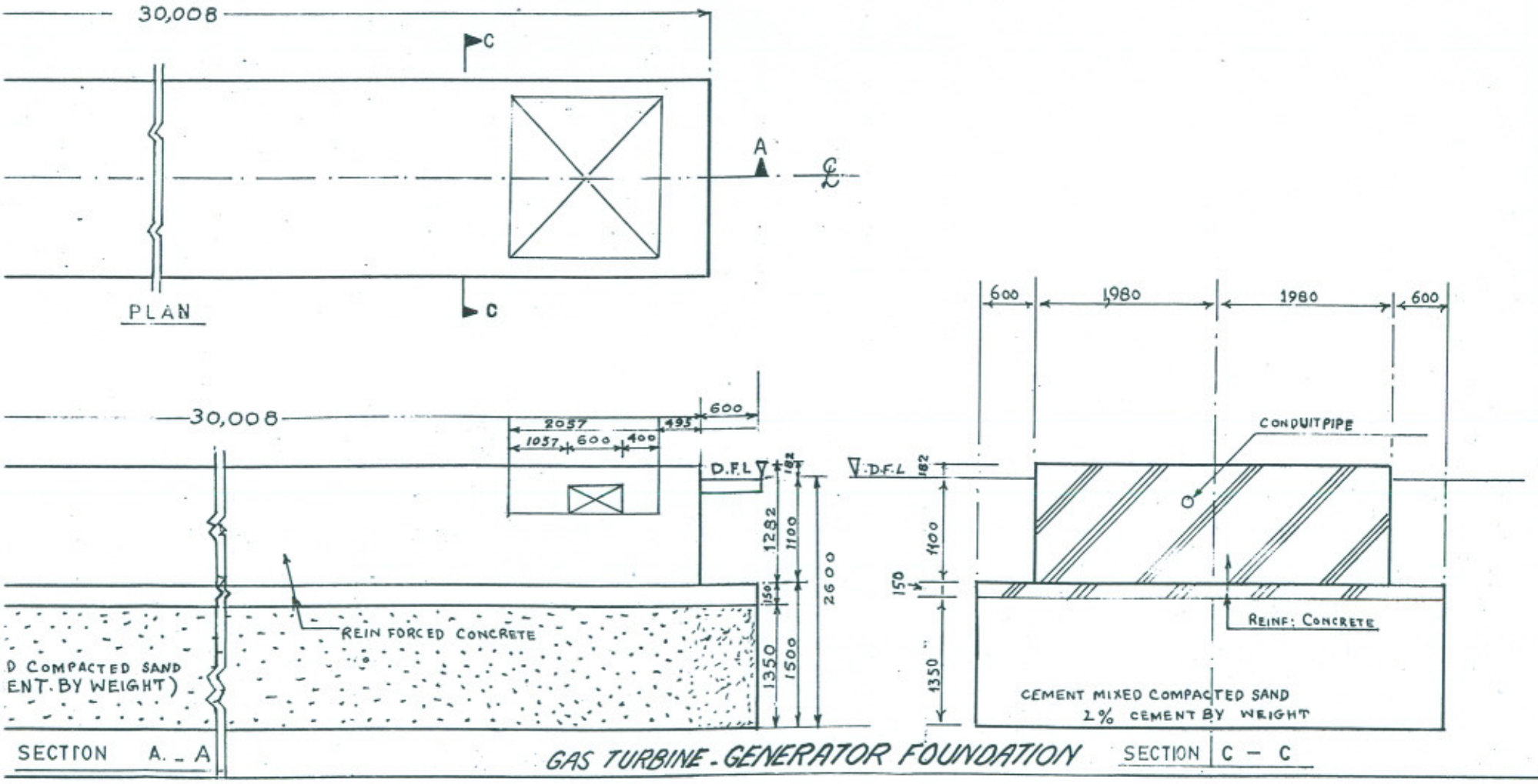




SECTION A. _ A

GAS TURBINE - GENERATOR

KOTRI GAS TURBINES EXTENSION PROJECT UNITS 5 & 6



GAS TURBINE - GENERATOR FOUNDATION