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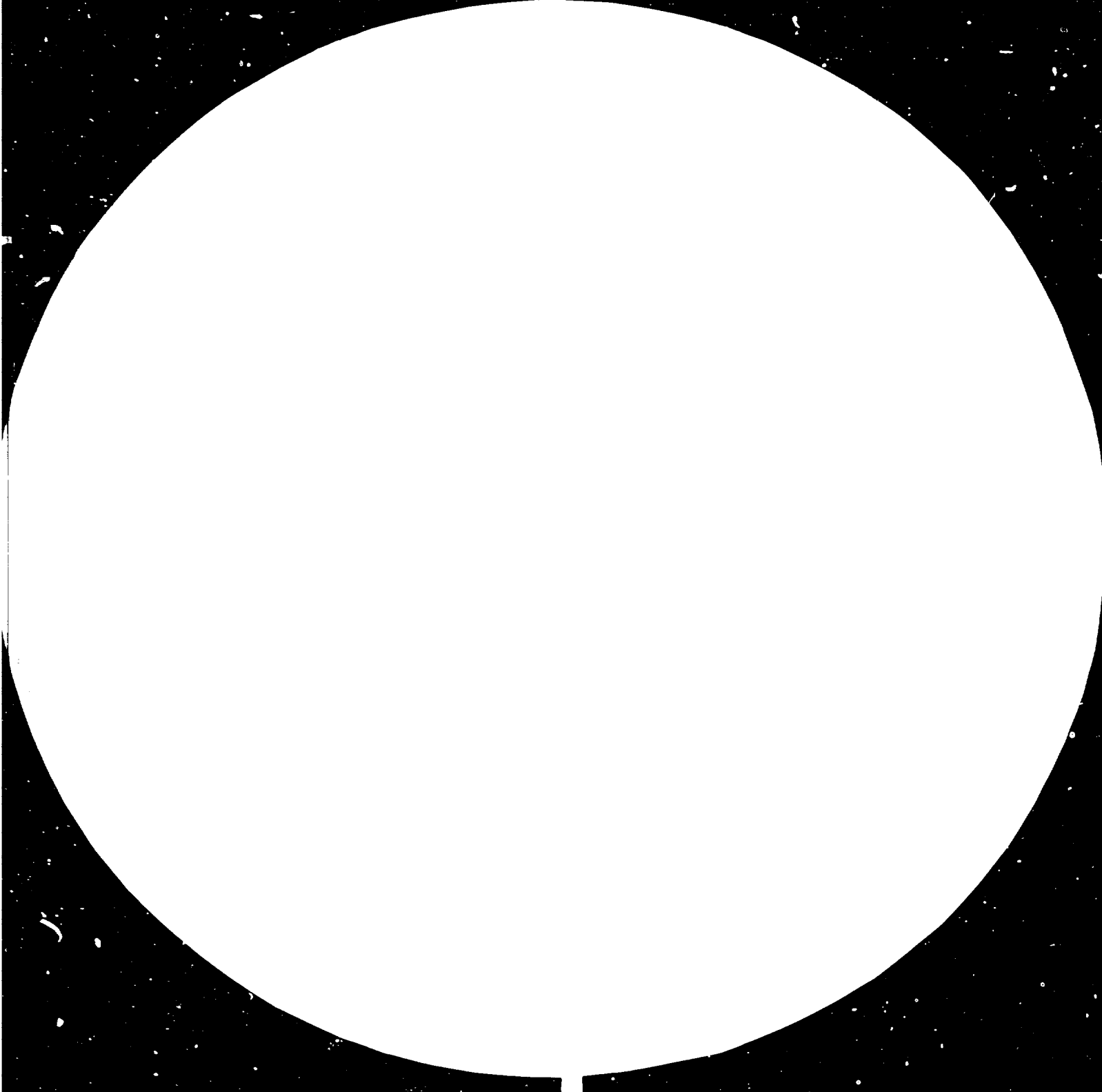
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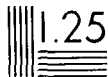
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Resolution Test Chart



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Workshop on Cement and Concrete Products
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COUNTRY MONOGRAPH - NEPAL*

by

C.D. Rajbhandari

980 58

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1. EXISTING CONCRETE PRODUCTS MANUFACTURING FACILITIES:

There are at present some fifteen regular cement and concrete industries operating in Nepal as registered in the Department of Industry and Department of Cottage Industry. Most of them manufacture huge pipes of different sizes. Some of them also manufacture concrete hollow blocks, cement floor tiles with terrazzo finish, low tension electric poles etc. besides concrete pipes. These products are usually manufactured against firm orders. One factory at capital city Kathmandu manufacture asbestos pipes and fittings; the daily production capacity being 200 pipes of 1.80 meter long and 7, 10 and 15mm diameter. The total huge pipe manufacturing capacity of above industries are in order of 450,000 meters per year in one shift operation, the diameter of the pipe ranging from 100mm to 1200mm. Larger portion of huge pipes are however made in the construction sites by the construction projects themselves or by construction contractors. Some 35,000 meters of huge pipes was consumed in the Sewerage Development Project of Kathmandu valley - larger portion of the pipes being fabricated by the projects contractors. About 10,000 running meters of pipes of ϕ 300 - ϕ 1000mm diameter was fabricated and fitted by a single contractor within two years in the Sewerage Project of Kathmandu city. There are several construction contractors equipped with the pipe making facilities. Concrete pipes are fabricated here using spinning moulds as well as wet casting into single stationary moulds and vibrating, there are several other small cottage industries scattered in the urban areas of the country producing small diameter pipes (ϕ 100 - 150mm) urinals, handbasins, bath with terrazzo finish etc.

Since pre-cast concrete products are bulky, these can hardly be supplied economically beyond certain distance because of high transport cost. Due to the lack of good transportation system in Nepal, a centrally located plant even with higher complexity of technology cannot compete with locally produced products. Hence decentralised production technology is preferred for the concrete products industry. The choice of decentralised production naturally implies the application of labour intensive simpler technology.

The demand of a concrete product in any year is dependent on the fund availability with the concerned construction project/department, a fact which can change the demand overnight. This has made the investment on that product risky, which is one of the reasons of slow growth of pre-cast concrete industry in the country. Construction projects have to fabricate their required products by themselves in situ. The tight supply situation of cement in recent years in on hand and its steep price escalation after 1973 on the other hand has retarded the boost of pre-cast concrete industry in the country. Nepal has to meet larger portion of her cement requirement through import from other countries. Reinforcing steel also has to be imported from other countries.

2. PRESENT & FUTURE DEMAND SITUATION OF CONCRETE PRODUCTS:

a) Concrete pipes:

The demand of pre-cast concrete pipes depend upon the construction activities in the public sector in the field of irrigation, sewerage, roads construction etc. But there exist a minimum demand of certain quantity of hume pipes every year for routine construction works and maintenance works. The minimum requirement is estimated to be 150,000 meters per year—an estimate based on the production statistics of pipe manufacturing industries in the country. Huge sewerage projects, roads projects, irrigation project have been

undertaken by the government in cooperation with international organizations and friendly countries. Hence, there should exist a future demand of huge quantity of concrete pipes. Irrigation projects may require semicircular pre - cast sections for irrigation channels in addition to the huge pipes of diameter ϕ 150-900 mm size, if there are sources of supply of such products.

b) Cable covers:

These are used to protect buried electrical wires and are fabricated by project themselves or contractors. These will be in demand if there are sources of supply.

c) Electricity poles:

Electricity Department/Corporation needs concrete poles for low tension power distribution in the urban areas. Such products demand high quality concrete and well placed reinforcement. These are manufactured by factories or contractors against firm order. At present metallic poles are being used in greater quantity because of their easy transportation and handling.

d) Paving slabs:

Generally two kinds of paving slabs 45mm x 60mm size and 60mm x 60 mm size are used here for covering pedestrian walkways alongside roads pathways, in public parks and gardens. These are manufactured in factories against firm order or cast in-situ. There is however a threat of competition from stone paving slabs.

e) Concrete blocks:

There are a few concrete hollow block making industries in the country their production being 800-1000 blocks per day against firm order. Use of hollow blocks, pierced blocks, split blocks etc. is not so popular in this country, because of lack of sales drive to educate to consumer in the use of these things. There exists a

total demand of about 382 million units of building blocks in terms of bricks in the country for the fiscal year 1980/81. Part of this demand will be fulfilled by existing brick manufacturing sources (127.6 million units bricks). The use of bricks in the rural housing is negligible-only 3.19% according to the survey by National Planning Commission. Stone as appears is the most abundant mineral resource in Nepal. Stone is the low energy consuming material for production. Stone finds extensive application in rural construction in the hilly and mountainous regions. The current survey of National Planning Commission shows that 40.26% of rural houses have used stone as the main construction material. But building blocks requirement in the Terai urban areas will have to be met with bricks or concrete blocks since stone cannot be economically transported from the hilly regions. Keeping in view of different product sizes of construction blocks in the country and existing source of supply the net additional requirement of 15 million bricks has been estimated for the year 1980/81. A Short fall of 44 million units of bricks is projected by the year 1985/86. There is thus an obvious opening for market of concrete blocks. But these products require efforts to market.

f) Precast elements used in structural frames:

Manufacturing of precast beams, columns, slabs etc. under factory conditions does not so far exist in the country. National Construction company of Nepal (NCCN) a government enterprises however fabricates pre-cast beams and slabs to meet its construction requirements. Some residential as well as non-residential buildings both under public and private sector have been built with such precast elements. Such pre-fabricated elements will be used in quite a large number of residential and nonresidential buildings now under construction planning.

The growth rate of urban population at present is 4.5% p.a. Housing need due to overcrowding and replacement has been critical at some urban areas e.g. Kathmandu valley. Government is currently undertaking staff housing projects in such areas. There will be sufficient size of structures to justify the establishment of small scale precast elements manufacturing units in urban areas like Kathmandu valley. The availability of trained personnel and technical

know-how in this field pose no difficulty, but availability of good transportation system and heavy duty vehicles, heavy lifting cranes required for the development of such industry may pose some difficulties.

g) Asbestos Cement Products:

The import proportion of pipes sheets and other products here from India are respectively 16.81 and 3 percent as revealed by Foreign Trade statistics of India. The average import from 1971 to 1975/76 comes to 1927 MT/year, the maximum volume of import being 3,512 metric tonnes in 1972/73. The import is declining in the later years. Their use at present is generally limited to godowns, workshops, construction of military barracks and industrial buildings etc. Due to high cost of products as well as frequent maintenance need, their uses in private residential buildings are generally rare. The market growth rate of 3% p.a for asbestos - cement products is estimated. Accordingly the demand of 2400 MT/year of asbestos cement products (Sheets 80% pipes & fillings 15% others 5%) is projected by the year 1985/86. Limited market demand and unavailability of indigenous asbestos resources are the difficulties for the development of this section of industry.

3. RAW MATERIAL SITUATION:

a) Cement:

The increasing requirement of portland cement in the country was being met only through import till the first cement plant-Himal Cement Company started its production in 1974. This plant meets about 15% of the current national demand of 250000 tonnes of cement. Rest of cement requirement has still to be fulfilled through import. The present sales price of cement in the country is around NRS 1,500-2000 (US 125-170) per metric tonnes; the lower figure being for domestic product. The domestic production capacity of portland cement will be 800,000 tonnes per year by the end of 1985/86 when two cement plants now under construction and construction planning start production.

Then the supply situation of cement in the country will be improved. This will help to boost cement and concrete products industry in the country.

b) Coarse aggregates:

Stone deposits occur all over Nepal in the form of bed rock deposits, gravel deposits or sediments except for part of southern Terai region of the country. The main raw materials for coarse aggregates are limestone, dolomite, quartz stone, etc. The gravel deposit of the Terai region could also be exploited for crushing aggregates. Two types of aggregates are sold here - manually crushed and machine crushed graded aggregates. Manually crushed aggregates are however being gradually replaced by graded aggregates. Limestone, dolomite, quartzite aggregates sold here generally pass the standard acceptance tests. They are hard, strong, non-porous, free from deleterious materials within specified limit. They show negative to alkali activity reaction.

c) Fine aggregates:

There are ample deposits of quartzite sand in the river beds of different parts of the country. Besides sand occurs as terrace deposits, pit deposits in many places. River bed sand in most places pass grading analysis for fine aggregates. They are free from clay, loam organic matters, etc. within specified limit. But sand from some localities contain excess quantities of mica (5-10%). Some work should have to be done to find the inexpensive methods to remove mica from sand.

d) Reinforcing steel:

Reinforcing steel is imported from India and overseas countries. Part of reinforcing steel rods are met from rolling mills where imported billets and bars are processed.

'Concrete aggregate' Thumke hill' Adeswar

1. Sp. gravity	2.5	2.68	2.66	
2. Water absorption in 24 hours	11%	0.42%	0.032%	
3. Alkali activity reaction	Appendix	Negative	negative	Thumke hill. Qty. of dissolved silica So=13.66 million/liter Reduction in alkalinity Rs.=112mi/li.
4. Content of deleterious system	Specification	not detected	appreciably	Adeswar:1) Se=9.435 million/liter. 2) Rs.=112million/liter
5. Hardness	3-4 mohs	3-5 mohs	4mohs	
1. Toughness.	should be touch	tough	touch	
ii. compactness	compact	crystalline	compact	in freshly broken surface uniform colour shows good durability uniformity of texture
6. Colour of freshly broken face	colour uniform	uniform bright face	uniform bright face	
7. Cementation properties		good	very good	
8. Surface texture	hard crys.	crystalline rough	crystalline hard	

APP - 1

Concrete mixture (H.V.G.)

Coarse Aggregate:- Coarse aggregate shall consist of crushed stone gravel or other approved inert materials of similar characteristics, or combinations thereof, free from adherent coatings and conforming to the following requirements.

- a) The amount of deleterious substances shall not exceed the following limits:

	Maximum Permissible limits % by weight -----
Soft fragments	2
Clay Lumps	0.25
Material passing the No 200 sieve.	0
Thin or elongated pieces (Length greater than 5 times average thickness	15
Cladium sulfate expressed as SO_3	0.25

- b) The coarse aggregate when subjected to the Los Angeles Abrasion Test shall have a percentage of wear of not more than forty (40) percent.

c) When the coarse aggregate is subjected to five (5) alternations of the magnesium sulfate soundness test, the weighted loss shall not exceed ten (10) percent.

d) The coarse aggregate shall be well graded, between the limits specified, and the size or sizes specified shall conform to the following requirements:

Percentage by weight passing
Laboratory sieves
having square opening.

	3/4 inch. 19.05 mm Aggregate	1 1/2 inch 38./ mm Aggregate	2 1/2 inch 63.5 mm Aggregate
75.2 mm 3 inch sieve	-	-	100
63.5 mm 2 1/2 " " "	-	100	10-100
38./ mm 1 1/2 " " "	100	95-100	60-100
19.05 mm 3/4 " " "	95-100	35-70	25-55
9.53 mm 3/8 " " "	20-55	10-30	10-25
No 8	0.10	0-5	0-5



