

**REPORT  
OF THE  
CENTRAL ADVISORY BOARD  
OF  
EDUCATION COMMITTEE  
ON  
SCHOOL BUILDINGS**



**GOVERNMENT OF INDIA  
MINISTRY OF EDUCATION AND SOCIAL WELFARE  
NEW DELHI.**

## Background

The Central Advisory Board of Education in its 35th meeting held on May 2-3, 1970 passed the following Resolution:

"The Board emphasises the urgent need to provide buildings to educational institutions, especially at the primary stage. In its opinion, this massive problem can be tackled only if local resources are harnessed and a scheme is devised under which it would be possible to make loans available to State and local Governments and voluntary organisations at minimal rates of interest. The possibility of the nationalised banks making some funds available for this programme should be explored and, as a long-term measure a Central Financing Corporation for educational buildings may be set up. Full use should be made of the work done at the Central Building Research Institute, Roorkee, to reduce constructional costs."

In order to examine the problem and to prepare concrete proposals for action, the Union Education Minister appointed a Committee as follows:

Union Education Minister

*Chairman*

Prof. A. K. Kisku  
Deputy Minister  
Ministry of Education & Y.S.

*Vice-Chairman*

Shri C. H. Mohamed Koya  
Minister for Education  
Government of Kerala  
Trivandrum.

*Member*

Shri Surjit Singh  
Minister for Education  
Government of Punjab  
Chandigarh.

*do.*

**Shri B. Patnaik**  
Minister for Education  
Government of Orissa  
Bhubaneswar.

*Member*

**Minister for Education**  
Government of Goa, Daman and Diu  
Panaji, Goa.

do.

**Shri S. D. Patil**  
Member Parliament (Lok Sabha)  
16 A, North Avenue  
New Delhi.

do.

**Shri A. C. Deva Gowda**  
Director of Public Instruction (Rtd.)  
74, Miller Road  
Bangalore-1.

do.

**Shri T. R. Jayaraman**  
Joint Secretary,  
Ministry of Education & Y.S.

*Member-Secretary*

### **Meetings**

3. The Committee held three meetings, one on 13th August 1970 in New Delhi, the second meeting on 5th December 1970 at the Central Building Research Institute, Roorkee and the final meeting on 5th January 1971 at New Delhi.

### **School Buildings Requirements**

4. In the first meeting, the Chairman desired that the Committee may collect Statewise information regarding the requirement of school buildings. Accordingly, the Member-Secretary addressed a letter to the Education Secretaries of all State Governments/Union Territories (Annexure I). The information collected (Annexure II) revealed the total estimated requirements of funds for primary school and secondary schools as follows:

	Estimated requirement of funds for clearing the backlog for 4th Plan	Estimated requirement of funds for the new schools envisaged to be opened during the 4th Plan.
Primary Schools	Rs. 17000 lakhs	Rs. 3800 lakhs
Secondary Schools	Rs. 8000 lakhs	Rs. 5200 lakhs
<b>TOTAL</b>	<b>Rs. 250 crores</b>	<b>Rs. 90 crores</b>

As against the above requirements, according to the information submitted by the State Governments, the total provision made by them for the Fourth Plan is as follows:

For Primary Schools . . . .	Rs. 1667 '00 lakhs
For Secondary Schools . . . .	Rs. 2974 '00 lakhs
	<u>Rs. 4641 '00 lakhs</u>

It will be seen from the figures given above that, to meet the demands for additional buildings for schools started during the 4th Plan both primary and secondary, Rs. 90 crores are required (roughly Rs. 18 crores per year). It may be assumed that 50 per cent of the amount will be available through popular contribution. Thus the actual amount required for the new schools from Government grants will be Rs. 9 crores per annum. It is seen from the information given by the State Governments that there is plan provision of approximately Rs. 9 crores per annum for school buildings. If out of this Rs. 9 crores, Rs. 6 crores are set apart for the new schools, the balance of Rs. 3 crores per annum can be considered to be available for meeting the backlog every year. As the total requirements to wipe off the backlog is Rs. 250 crores of which we may assume half will be available through popular contribution, Government's share will be roughly Rs. 125 crores. At the rate of Rs. 3 crores per annum, it will take about 42 years to wipe off the backlog. If, however, the Central assistance can be given at the rate of Rs. 10 crores per annum the entire deficit can be wiped off in the next about 10-11 years. This appears to be a practical proposition and in view of the national importance the Committee urge that the Government of India may set apart Rs. 10 crores per annum for the next 10 years as grants to the State Governments specifically for construction of school buildings. If necessary, half of this may even be given as loan and the rest as grant.

#### **Funds for Loans for the Construction of School Buildings**

5. In order to explore the possibility of the nationalised banks or the Life Insurance Corporation making some funds

available for this programme, letters were also addressed to the Ministry of Finance (Deptt. of Banking), and the Life Insurance Corporation of India. The Ministry of Finance as well as the Life Insurance Corporation of India both stated that it would be difficult to make any funds available from their resources for giving loans for the construction of school buildings (Annexure III and IV). The possibility of the Central Government for providing funds for giving loans to the State Governments for the construction of school buildings at minimal rates of interest was also taken up with the Planning Commission. However, the Planning Commission stated that the loans to States/Union Territories for school buildings could not be accepted as Central or Centrally Sponsored Scheme (Annexure V).

6. Another possibility of finding funds for the construction of school buildings was through the Rural Works Project. According to the Employment Commissioner, the Ministry of Food and Agriculture were likely to surrender a sum of Rs. 19 crores from the allocation made for the rural work projects in 1970-71. Since the construction of school buildings would create additional employment opportunities for educated unemployed who could be absorbed as teachers, as also engineers, overseers, carpenters, etc., a Revolving Fund of at least Rs. 10 crores could be set up from which loans could be given to the States for the construction of school buildings. A scheme for affording employment to the unemployed engineers and technicians through a programme of construction of school buildings prepared by the Central Building Research Institute, Roorkee, is enclosed (Annexure VI).

### **Setting up a Central Financing Corporation**

7. If the funds made available are large enough, it may be desirable to set up a Central Financing Corporation for Educational Buildings. An outlay of Rs. 14 crores provided for it over a period of 7 years at the rate of Rs. 2 crores per year would allow a Revolving Fund to be set up, based on a 20

years loan. No additional funds need to be provided after the 7th year.

### **Local Resources**

8. In order to mobilise local resources for school buildings, the following steps are recommended:

- (i) The Committee strongly recommends that the funds collected by the different States through lotteries may be utilised for educational purposes including the capital costs on buildings, equipment, etc., and this fact may be publicised during the sale of the lottery tickets.
- (ii) Local people may be asked to donate one or two rooms at the time of birth-days, marriages and such other occasions and if so desired, the name of the donor could be inscribed on the room/rooms donated by him/her.
- (iii) Public meetings may be arranged and an appeal could be made by a number of speakers for donations for the construction of school buildings.
- (iv) A drive should be made to get the religious institutions to donate some buildings as a part of their programme.
- (v) Other avenues like staging plays and organising exhibitions may also be explored for the purpose of raising funds for school buildings.
- (vi) Contributions in kind, e.g., surplus cement and surplus food for paying for the labour in kind may also be accepted.

### **Reduction in the Cost of Construction**

9. The Committee examined in detail the possibility of reducing the cost of construction of school buildings on the

basis of the work done by the Central Building Research Institute, Roorkee. A report on cost reduction in educational buildings submitted by the Central Building Research Institute, Roorkee is enclosed. (Annexure VII). The following conclusions in the report are worth noting:

The Institute has carried out a comprehensive study of use-efficiency of school spaces in several primary schools. The efficiency ranged between 50 to 76 per cent. The average use-efficiency of the school building having five class rooms was found to be 52 per cent. Verandah, headmaster's room had use-efficiency value as low as 25 per cent. *It was found that by judicious elimination of non-productive areas, the use-efficiency of the building could be increased to 63 per cent, thereby effecting a saving of about 25 per cent in the floor area.* To increase the use-efficiency of class rooms further, an adjustment of the time table was made in relation to the plan of building. It was found that a primary school building could do with only three class rooms and a sheltered space. This increased the use-efficiency of the school buildings to about 85 per cent, thereby economising nearly 40 per cent in the overall space for teaching purposes. The impact of three class rooms on the efficiency of teaching was studied in collaboration with the Education Department of the Uttar Pradesh Government in several schools. It has, therefore, been concluded that through use-efficiency technique 20 to 40 per cent economy in the cost of construction can be achieved depending upon the climatic region of the country.

A note on the feasibility of adjusting the vacations to the varying climatic conditions so as to reduce the quantum of school buildings to the minimum may be seen at Annexure VIII. As can be seen, the institute has concluded that there is little scope for reducing built-up space by utilising out-door teaching. A statement reviewing the progress made in the adoption of

the designs of school buildings developed by the Central Building Research Institute, Roorkee, in different States through the State Development Groups is at Annexure IX.

10. The Committee recommends that the programme of construction of school buildings may be planned in the following order of priorities:

- (i) Buildings for those schools where classes are held in the open; (Information received from States/Union Territories at Annexure X).
- (ii) Places where classes are conducted in tents;
- (iii) Schools having rented accommodation;
- (iv) Repairs, maintenance and improvements (additional rooms etc.) in existing schools.

The possibility of providing tents to schools where classes are being held in the open till buildings can be provided should also be explored.

11. A summary of the recommendations made by the Sub-Committee is given in the Annexure XI.

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## ANNEXURE I

T. R. Jayaraman  
Joint Secretary

Government of India,  
Ministry of Education,  
and  
Youth Services,

No. F. 15-5/70-Schools I

New Delhi.  
Dated the 29th July, 1970.

Dear,

In pursuance of the resolution passed in the 35th Meeting of the Central Advisory Board of Education held recently, a Committee has been set up under the Chairmanship of the Union Education Minister for devising ways and means to find funds for the construction of school buildings.

In order to enable the Committee to find out a practical solution to the problem, it is necessary to have some basic details about the requirements of the various States/Union Territories with regard to school buildings.

In particular, the following information in respect of your State/Union Territory is required.

### **Primary Schools**

- (i) Funds provided for the construction of school buildings in the annual plan, 1970-71;
- (ii) Provision for the Fourth Plan for school buildings;

- (iii) Physical targets in terms of classrooms/school buildings/area of construction to be achieved during 1970-71;
- (iv) The above physical targets for the Fourth Plan;
- (v) Estimated requirement of funds for clearing backlog for the Fourth Plan;
- (vi) Estimated requirement of funds for the new schools envisaged to be opened during the Fourth Plan.

### **Secondary Schools**

- (i) Funds provided for the construction of school buildings in the Annual Plan 1970-71;
- (ii) Provision for the Fourth Plan for school buildings;
- (iii) Physical targets in terms of classrooms/school buildings/area of construction to be achieved during 1970-71;
- (iv) The above physical targets for the Fourth Plan;
- (v) Estimated requirement of funds for clearing backlog for the Fourth Plan;
- (vi) Estimated requirement of funds for the new schools envisaged to be opened during the Fourth Plan.

I shall be grateful if the above-mentioned information in specific terms could be made available to me urgently and if it is not possible to send it earlier, you may kindly bring it with you when you come to attend the forthcoming conference of Education Secretaries/Directors of Education and Directors of Public Instruction to be held on 10th and 11th August, 1970 in New Delhi.

With kind regards,

Yours sincerely,

Sd/-

(T. R. Jayaraman)

**To**

**All Education Secretaries  
of States/Union Territories**

**Copy to Director of Public Instruction/Director of Education,  
All State Governments/Union Territories**

**Sd/**

**(T. R. Jayaraman)**

**Joint Secretary**



## ANNEXURE II

Summary of Replies received from Education Secretaries of States/Union Territories in reply to D.O. Letter No. F.15-5/70-Schools I dated 29-7-70 regarding requirement of various States/Union Territories with regard to School Buildings

### PRIMARY SCHOOLS

(Rs. in lakhs)

Sl. No.	Name of the Station/ Union Territory	Funds provided for construction of school buildings in Annual Plan 1970-71	Provision for 4th Plan for school buildings	Physical targets in terms of class rooms/ school buildings/area of construction to be achieved during 1970-71	Physical targets for the 4th Plan as mentioned in col. 5.	Estimated requirements of funds for clearing backlog for 4th Plan	Estimated requirements of funds for the new Schools envisaged to be opened during the 4th Plan	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
1	Andhra Pradesh							Information not received.
2	Assam							Information not received.
3	Bihar	25.00	130.00	2000 class rooms (construction and repair)	10,000 class rooms	2200.00	75.00	

## PRIMARY SCHOOLS—contd.

(Rs. in lakhs)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
4	Gujarat	36.48	120.00	(a) 1060 class rooms (proposed) (b) 31 quarters for female teachers (proposed)	(a) 4500 class rooms (b) 575 quarters for female teachers.	26.00	120.00
5	Haryana	Nil	Nil	Nil	Nil	Nil	Nil
6	Jammu & Kashmir						Information not received.
7	Kerala	64.46	127.00	2100 rooms of size 20' x 20'	10,000 rooms size 20' x 20'	800.00	135.00
8	Madhya Pradesh	1.75	105.00	Completion of incomplete work of 3rd Plan and new class rooms	Completion of incomplete work of 3rd Plan and construction of 3000 new class rooms.	4081.60	900.00
9	Maharashtra	25.59	150.00 (tentative)	846 class rooms	4000 class rooms	1866.00	342.67
10	Mysore	32.00	135.00	(i) 3000 class rooms (ii) 10 T.T.Is.	(i) 13,000 class rooms (ii) 25 T.T.Is.	400.00	40.00
11	Nagaland	25.74	182.01.7	24 school buildings 4 Hostels 5 Staff quarters 4 Office buildings	51 School buildings 5 Hostels 5 Staff quarters 6 Office buildings	67.92	..

## PRIMARY SCHOOLS —contd.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
12	Orissa	2.25	9.75	90 rooms	390 rooms	50.00	400.00
13	Punjab	16.00	28.10	40 buildings	57 buildings	2783.20	120.00
14	Rajasthan						Information not received.
15	Tamil Nadu	62.60	342.48	About 62 schools can be provided with buildings.	About 300 schools can be provided with buildings.	1100.00 Out of about 32,000 primary schools, about 11,000 schools are without buildings. About Rs. 11 crores will be required to clear the back log.	20.00 (for about 200 schools)
16	Uttar Pradesh	14.05	195.00	231 school buildings	2874 school buildings	222.48	139.38
17	West Bengal	10.00 (recommended by the working group in the 4th Plan but no provision has been made in the Annual Plan 1970-71 on this item until now)	50.00	500 additional class-rooms	250 additional class-rooms	30.00	20.00
18	A&N Islands	0.98	4.40	2 school buildings and extension of 2 school buildings.	16 new schools and extension of 9 school buildings	4.02	2.60



PRIMARY SCHOOLS—contd.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
19	Chandigarh	1.00	2.30	Not laid down	200 rooms	10.00	15.00
20	Dadra Nagar Haveli	0.45	2.80	5 class rooms	3 class rooms	2.80	.
21	Delhi	*0.30	*Nil.	*1000 sq. yards (for construction of 2 class rooms)	*Nil	*Nil	*Nil
22	Goa, Daman & Diu	6.00	16.00	About 160 rooms in- cluding completion of incomplete school buildings as spill over of 3rd Plan.	200 rooms in addi- tion to the comple- tion of school build- ings under the sch- eme in 3rd Plan.	104.00	3.00
23	Himachal Pra tesh	—	15.00	—	750 one room pri- mary school build- ings @ Rs. 2,000/- per school.	1500.00	600.00
24	Laccadives	0.10	0.34	3 class rooms	3 class rooms	..	..
25	Manipur	5.40	19.00	5 primary schools 5 M.E. school buildings.	50 primary schools 20 middle schools	70.00	..
26	N.E.P.A	10.70	51.28	Details not received	Details not received	219.00	152.58
27	Pondicherry	3.76	24.00	40 class rooms (19200 sq. ft.)	200 class rooms (96,000 sq. ft.)	4.88	32.00
28	Tripura	0.25	2.00	Targets not fixed.	Targets not fixed	No such assessment has been made.	

\*This information relates to schools under Cantonment Executive Officer, Delhi Cantt. Information about the schools under Delhi Municipal Corporation and N.D.M.C. is awaited.

**SUMMARY OF REPLIES RECEIVED FROM EDUCATION SECRETARIES OF STATES/UNION TERRITORIES  
IN REPLY TO D. O. LETTER No. F. 15-5/70 SCHOOLS DATED 29-7-70 REGARDING REQUIREMENTS OF  
VARIOUS STATES/UNION TERRITORIES WITH REGARD TO SCHOOL BUILDINGS.**

**SECONDARY SCHOOLS**

(Rs. in lakhs)

Sl. No.	Name of the State/ Union Territory	Funds provided for construction of school buildings in Annual Plan 1970-71	Provision for 4th Plan for school buildings	Physical targets in terms of class-rooms, school buildings, area of construction to be achieved during 1970-71	Physical targets for the 4th Plan as mentioned in col. 5	Estimated requirements of funds for clearing backlog for 4th Plan	Estimated requirements of funds for the new schools envisaged to be opened during the 4th Plan
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Andhra Pradesh						Information not received.
2	Assam						Information not received.
3	Bihar	9.15	40.00	Not fixed	Not fixed	20.00	5.00
4	Gujarat	Nil	Nil	Nil	Nil	Nil	Nil
5	Haryana	Nil	Nil	Nil	Nil	Nil	Nil
6	Jammu & Kashmir						Information not received.

## SECONDARY SCHOOLS—contd.

(Rs. in lakhs)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
7	Kerala	14.00	50.00	170 rooms 20' X 20'	860 rooms 20' X 20'	70.00	54.00
8	Madhya Pradesh	20.50	235.00	Completion of incomplete work of 3rd Plan and construction of new class rooms, 1000 new class rooms 200 L. B. Blocks and Sanitary Blocks in girls and co-education institutions	Completion of incomplete work of 3rd Plan and construction of new class rooms, 1000 new class rooms 200 L. B. Blocks and Sanitary Blocks in girls and co-education institutions	244.8	240.00
9	Maharashtra						Information awaited,
10	Mysore	16.30	33.00	8 High school Buildings	15 High school Buildings	160.00	[ 20.00
11	Nagaland	10.03	62.83	8 school buildings 5 Hostels 5 Staff quarters	14 School buildings 6 Hostels 3 Staff quarters	24.33	

SECONDARY SCHOOLS—*contd.*

(Rs. lakhs)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
12	Orissa	— (including Rs. 10·00 for school Buildings and Rs. 20·00 for teachers quarters and girls hostels)	46·60	..	..	..	..
			112·80	100 class rooms 5 school buildings 90 science rooms 10 science blocks 200 cheap sheds	250 class rooms 8 school buildings 150 science rooms 20 science blocks 2000 cheap sheds	125 class rooms 70 quarters 9 hostels	1883·60 200·00
13	Punjab						410·00
14	Rajasthan						Information not received
15	Tamil Nadu	31·87	312·50	31 High schools @ Rs. 1 lakh per school.	312 high schools	(Rs. 1200·00 for about 1200 school buildings which are at present without buildings)	Rs. 200·00 (for 200 High Schools)

SECONDARY SCHOOLS—Contd.

(Rs. lakhs)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
16	Uttar Pradesh	85.35	670.35	392 school buildings	2372 school buildings	423.00	134.55
17	West Bengal	25.00 (has been recommended by the Working Group)	95.00	Additional accommodation in 30 Govt. schools	Additional accommodation in 30 Govt. schools	50.00	45.00
18	A & N Islands	2.10	1.50	Extension of 3 school buildings	Extension of 7 middle schools	4.56	..
19	Chandigarh	..	2.00	Not laid down	50 rooms	5.00	10.00
20	Dadga & Nagar Haveli	2.25	2.25	1 school building 5 class rooms	1 school building 5 class rooms	2.25	..
21	Delhi	138.15	1000.00	(a) 290 class-rooms (b) 400 temporary rooms (c) 18 New buildings	(a) 500 class-rooms (b) 1000 temporary rooms (c) 115 New buildings	1300.00	1400.00
2	Goa, Daman & Diu	13.85	34.00	13 buildings	23 buildings	11.00	20.00

# SECONDARY SCHOOLS—contd.

(Rs. lakhs)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
23	Himachal Pradesh	1.50 (for completion of buildings undertaken in 1969-70)	23.75	..	..	..	..
24	Laccadives	4.23	13.30	8 class rooms	12 construction of new school buildings 17 completion of school buildings the construction of which were undertaken during 1968-69	400.00	200.00
25	Manipur	2.00	10.00	4 school buildings	20 school buildings	..	20.00
26	N.E.F.A.	4.32	28.67	Details not received	Details not received	120.00	90.00
27	Pondicherry	4.21	16.70	7 class rooms 1 high school building (17,110 sq. ft.)	35 class rooms 5 high school buildings (85,550 sq. ft.)	6.42	28.60
28	Tripura	24.73	49.75	Targets not fixed	Targets not fixed	No such assessment has yet been made.	60.00

### ANNEXURE III

*Copy of letter D. O. No. 11(3)/70-RO/439 from N. Sethuraman, Director, Ministry of Finance, Deptt. of Banking addressed to Shri R. P. Malaviya, Assistant Educational Adviser, Ministry of Education and Youth Services.*

Please refer to your Office Memorandum dated 28th October 1970 regarding construction of buildings for educational institutions, provision of funds etc. The position from the Department of Banking has been stated in our earlier O. M. dated 14th July, 1970. You would appreciate that unless commercially viable detailed schemes are worked out, it would be difficult for us to comment on the feasibility of banks lending to this sector. We have also pointed out that with the growing constraint on resources and priority loan to such sectors like agriculture, small scale industries, road transport operators, small business etc., it may be difficult for the banks to consider lending to other areas in substantial manner.



#### ANNEXURE IV

*Copy of letter received from Life Insurance Corporation of India, dated 21st August, 1970 addressed to the Deputy Educational Adviser, Government of India, Ministry of Education and Youth Services.*

We have carefully examined your request to make available funds for construction of school buildings. We appreciate the urgent need for construction of school buildings in the country. We would have, therefore, very much wished to participate in a scheme for financing the construction of school buildings. Considering however, our resources position at present and the demands on our resources from various other urgent schemes which we have already undertaken to finance viz., loans to Municipalities for water supply and drainage, loans for construction of houses etc. we are afraid it will not be possible for us to give any assistance for construction of school buildings. We however, assure you that we will always keep the needs for financing the construction of school buildings in view. Should our resources permit at a later date say after a period of four to five years, we would certainly consider financing the construction of school buildings.

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**ANNEXURE V**  
**PLANNING COMMISSION**  
**(Education Division)**

**SUBJECT:** *Unsatisfactory conditions of school buildings in India*

Will the Ministry of Education and Youth Services please refer to their u.o. No. 15-2/70-Schools 1 dated the 16th January 1971 on the subject cited above? The proposal of the Ministry to provide a sum of Rs. 1 crore as loan to State/Union Territories had been considered very carefully in the Planning Commission earlier. It is regretted that the proposal cannot be accepted as a Central or a Centrally Sponsored Scheme.

Sd/ A. H. Hemrajani  
Director (Education).

Ministry of Education & Youth Services (Schools Division)  
Planning Commission U.O.No. 1. 13(1) 69-Edn dt. 29.1.1971.

## ANNEXURE VI

### JOB-ORIENTED PROGRAMME OF SCHOOL BUILDING CONSTRUCTION

(A Scheme for affording employment to the Unemployed Engineers and Technicians through a Programme of Construction of School Buildings).

(Note prepared by the Central Building Research Institute, Roorkee (U.P.)

Country's overall primary school buildings programme will continue to be a large one for many years to come. It is due to heavy backlog of school buildings and everrising population of school going age-group. In the past considerable amount of money has been spent on the construction of schools. Such constructions were undertaken at individual level and built one at a time through village community. This system, while it has done much to improve school building situation, has not succeeded in generating employment opportunities. It is evident that the building industry has one of the largest employment potential for both skilled and unskilled manpower. Collectively, school buildings construction form a building market second only to housing. This paper outlines proposals to organise a large scale construction programme of school buildings in the country with a view to make it employment-oriented for a large number of technical educated unemployed persons.

#### Assessment of Needs

Before any organised effort is made to work out school building construction programme on a large scale at the national level it is necessary to have an estimate of school building requirements for the present and for the next ten year period. An

estimate of schools requiring repairs or replacement of roofs, walls, doors, windows, furniture,, etc., is also essential. To draw up these estimates a survey and projection study will be needed which can be undertaken by the State Governments or by the Planning Commission.

### **Organisation of the Building Programme**

For the purpose of construction of school buildings the following organisational system is proposed:

1. The National Development Group for Educational Buildings should coordinate the efforts of the State Governments.
2. The State Development Groups should coordinate the efforts at local and district levels.
3. Each State should be divided into a number of zones depending upon the climate, availability of buildings materials, soil conditions, transport facilities, topography and availability and type of skilled personnel.
4. A phased programme of construction should be worked out taking into consideration the financial resources, and priorities for the nature and types of schools at all local levels.
5. The State Development Groups should decide the type of school buildings, size, location and methods of construction.

### **Development of Construction System**

Community participation should always be encouraged in the school building construction programme. The present practice of matching grants should continue. The grants from the governments could however be in kind rather than in cash. This could be in the form of materials for a skeleton structure *i.e.*, precast columns, footings, roof truss, purlins or beams and slab components. The community should be encouraged to fill in

the walls and floors and also furnish labour to put up skeleton structure. The volume and range of skilled labour available in rural areas varies considerably from place to place and from time to time. Thus the maximum amount of prefabricated building system thereby reducing the skilled element required on site is to be preferred. It should be developed with the following considerations:

- (a) Minimum number of standard component.
- (b) Simplified casting methods, minimising the use of skilled labour.
- (c) Bullock carts as the main source of transportation in rural areas.
- (d) Lighter weight individual components to make use of manual labour for handling and hoisting.
- (e) Simplified joint details and erection methods.

In the light of the above the Central Building Research Institute, Roorkee, has developed a few schemes for sloping and flat roofs. Precast elements have been developed for columns, footing and roofing components. Cost comparisons with the traditional construction methods have been made and they are found economical.

### **Organisation of Construction Programme**

With the prospects of sizeable school building construction programmes the requirements of prefabricated elements will be large. Their mass scale production is therefore, suggested. This will also create employment opportunities for technical, skilled and non-skilled personnel.

### **Scheme I—School Building Consortia**

1. School building construction cell to be formed. This shall be formed by fresh recruitment except for deputation for some senior positions.

2. Manufacture of the components to be organised at a central place under the supervision of construction cell.
3. In each zone, a number of casting yards to be established. Each casting yard will manufacture precast elements to meet the needs of an area covering 20-30 Km in radius.
4. Each casting yard to be manned by technical, skilled and semi-skilled persons. The casting moulds, vibrators and other equipments shall also be provided to the casting yards.
5. After manufacturing required number of elements the personnel and equipments to be shifted to another site and the operation to continue.
6. The elements to be distributed to the villages as per their requirement and programme of construction.
7. At the casting yard site the users to be given instructions regarding handling of the units and erection methods.
8. A gang of skilled personnel shall also be made available in case site supervision is needed anywhere.
9. Alternatively a group of technicians should carry the elements and equipments to each site, take up erection of the skeleton *i.e.*, columns, footing, truss etc., and leave the rest to be filled by the community.

### **Employment Opportunities**

The above scheme shall provide employment opportunity for the following technicians and trades:

Engineers; Overseers; Carpenters; Bar-Benders; Fitters, Masons, Mechanics and Welders.

Since the school building works will be scattered, minor in nature, the normal mode of getting the works by contract will not be economical and often will not be of desired standard.

Therefore it is proposed that the works are carried out by employing direct labour. Incidentally departmental mode of construction will provide greater employment opportunities for the technical personnel than in a contract system.

Generally, in the State PWDS, an Assistant Engineer is expected to supervise works of Rs. 3 to 4 lakhs in a year. Considering the scattered nature of work and the proposed mode of execution, it may be assured that the work load for an Assistant Engineer may be reduced by half or say Rs. 2 lakhs per year. Thus for the total amount of Rs. 30 crores per year, as proposed by the Education Group, there will be employment opportunity for the following supervisory staff:

Engineers	1500	}	7500
Supervisors (overscers)	6000		
Technically skilled Personnel			12000

Further, the employment opportunity would increase if instead of proposing only skeleton construction for school buildings, the complete construction is considered. For this the villagers should be asked to give their contribution in money, materials and labour and the execution done by the team. Besides providing employment, this would help in better quality educational buildings.

### **Scheme II—Cooperative Construction Unit**

A cooperative of unemployed engineers should be formed in zones and a bulk order should be placed with them to manufacture and supply the pre-fabricated elements in phases.

The cooperatives should be given loans by the Government of India or nationalised banks.

The cooperative should employ locally available skilled and technical personnel.

The casting and other processes may be the same as described above. The formation of the cooperatives will encourage development of cottage industry of pre-fabricated units.

## **ANNEXURE VII**

### **RESEARCH ON COST REDUCTION IN EDUCATIONAL BUILDINGS AT THE CENTRAL BUILDING RESEARCH INSTITUTE, ROORKEE.**

The Central Building Research Institute, Roorkee has taken up a scientific study of methods of cost reduction in school buildings. The research carried out so far has shown promising results, making it possible to obtain important reduction in the cost of school buildings through rational use of spaces, through improved constructional techniques and through analysis and planning of cost during its design.

The programme of school building research at the Institute is oriented to investigate and study functional, economical and constructional aspects of primary schools. It includes studies on:

- (a) anatomy of children; to find out basic data for various activities and its application;
- (b) teaching spaces; to arrive at effective shape and size of class-rooms, keeping in view the pattern of teaching;
- (c) storage space requirement;
- (d) furniture and fixtures;
- (e) proper day lighting of teaching spaces;
- (f) effective planning and optimum utilisation of spaces;
- (g) development of constructional system for different regions of the country;

- (h) single teacher schools;
- (i) higher secondary schools;
- (j) planning data on university buildings.

The Institute has also helped in the formation of Development Groups in different States to develop suitable school building plans for different areas.

### Teaching Spaces

A detailed investigation regarding the shape and size of class room was taken up in relation to seating pattern and its effect on audibility and angle of vision on chalk board usefulness of wall area for display purposes, unused area per pupil in a class room and the perimeter of the wall; structural economy and lighting efficiency. The following optimum space requirements were worked out:

- (a) A minimum space of 1.11 sq. m (12 sq. ft.) per child for effective performance of all activities in a class room.
- (b) A class room  $7.32 \times 6.1$  m. ( $24' \times 20'$ ) for 40 students (with furniture).
- (c) A class room  $4.8 \times 6.1$  m. ( $16' \times 20'$ ) for students (for squatting pattern of seating).

### Storage Space

- (a)  $0.68 \text{ m}^3$  (24 cft.) of storage space in a class room to store teaching equipment, note books and display materials. Various designs of the storage space have been prepared. They are economical, durable and more functional than the existing practices of providing steel or wooden boxes.
- (b) A room  $8' \times 8'$  with three tiers of shelves, 1'6" wide to store old records; play equipments, old models etc.

### **Chalk Board**

Chalk board of 8'×4' size to be placed in the wall facing the students. Minimum distance between first row of seats and teachers' wall should be 6½ ft.

### **Dimensional Data for Furniture and Equipments**

Design data has been worked out for the following:

- (a) Furniture design (table, chair and standing working surfaces);
- (b) Reach extent (shelves, display boards, chalk board etc.);
- (c) Eye level (standing, seating and squatting postures).

Correlationship of body measurements with standing heights has also been worked out. On the basis of the above study standard furniture for class rooms have been worked out.

### **Daylighting of Teaching Spaces**

Optimum relations between window sizes, the working place and wall surface illumination has been worked out. For obtaining 150 lux of day light on the work plane a 15 per cent clear window opening has to be provided with a sill height of 90 to 105 mm (3' to 3'-6"). If proper lighting conditions are not provided children's eye-sight is effected.

### **Effective Planning and Optimum Utilisation of Spaces**

In a school building the teaching areas constitute the productive part while non-teaching areas represent the non-productive counterpart which could bear some pruning.

The Institute has carried out comprehensive study of use-efficiency of school spaces in several primary schools. It ranged

between 50 to 76 per cent. The average use-efficiency of the school building having five class rooms was found to be 52 per cent. Verandah, headmaster's room had use-efficiency value as low as 25 per cent. It was found that by judicious elimination of non-productive areas, the use-efficiency of the building could be increased to 63 per cent, thereby effecting a saving of about 25 per cent in the floor area. To increase the use-efficiency of class rooms further, an adjustment of the time table was made in relation to the plan of the building. It was found that a primary school building could do with only three class rooms and a sheltered space. This increased the use-efficiency of the school buildings to about 85 per cent, thereby economising nearly 40 per cent in the overall space for teaching purposes. The impact of three class rooms on the efficiency of teaching was studied in collaboration with the Education Department of the Uttar Pradesh Government in several schools.

It has, therefore, been concluded that through use-efficiency technique 20 to 40 per cent economy in the cost of construction can be achieved depending upon the climatic region of the country.

### Single Teacher School

A large percentage of schools in India belong to single teacher category. The demand for such schools is increasing and funds for construction are limited. A survey of existing schools was conducted and it was found that traditional schools do not provide environment for teaching. Also such schools provide only 60 per cent of space for teaching purposes.

A study was, therefore, carried out to rationalise the planning of teaching spaces and number of plans have been developed. In these 80 per cent areas go to teaching. The spaces provide segregation for different classes and the teachers' convenient supervision of the groups. Plans have also been provided

including teachers' houses for rural areas. The plans are 10-15 per cent economical than the traditional ones.

### **System Built Schools**

Studies on the system built school was taken up with a view to achieving economy and rapid construction. A pitched roof system has been developed which is based on standardised dimensions of roofing elements, simplicity of joints and construction. The trusses are of composite precast concrete and steel and can be constructed and erected by semi-skilled labour. These are 20 to 30 per cent economical as compared to existing wooden trusses, and 30 to 40 per cent cheaper than steel and tabular trusses. An experimental structure has been constructed to study the problems in the field.

### **Higher Secondary Schools**

A study of the use pattern of higher secondary schools was taken up to establish the norms for teaching space requirements with different enrolments. Analysis of curriculum, pattern of enrolments, nature of elective subjects, sizes and nature of group, occupancy of teaching spaces was carried out for a school with 400 enrolments. The existing use-efficiency of laboratories and class room was only 39 to 50 per cent respectively. An economy of about 12 per cent has been achieved by proper utilisation of space. A study on the multiple use of assembly hall has indicated that with optimum use an economy of 15 per cent can be achieved in the space requirements.

### **University Hostels**

The study deals mainly with basic design data on space requirements of various components of a hostel building and architectural and administrative decisions which need to be considered to bring about the desired economy in hostel designs.

Comparison between the prevalent space norms and those recommended in the study indicate that capacity of hostels can be increased by 10 to 12 per cent within the same built-up area

or 14 per cent in the construction cost. Important recommendations of the study are:

1. Minimum space requirement per student:

Recommended	72-75 sft for single study-bed 64-68 sft for double study-bed 60-65 sft for triple study-bed
Prevalent norms	93-100 sft for single study-bed 80-85 sft for double study-bed 70-75 sft for triple study bed

2. Area for dining hall:

Recommended	8 sft per dinner for self service 12 sft per dinner for table service.
Prevalent	14 sft per dinner

3. Kitchens:

Recommended	4.5 sft/dinner up to 400 dinners 5.5 sft/dinner up to 200 dinners
Prevalent	8 sft/dinner.

4. On an average 175 sft (16.26 m<sup>2</sup>) per student is considered adequate for total floor area of the hostel compared to 200 sft per student according to the prevalent norms.

### Development Groups

At the initiative of the Institute, the Union Ministry of Education and Youth Services, has set up a National Development Group for educational buildings. Development Groups in the States of Kerala, U.P., Punjab, Maharashtra, Tamil Nadu, Goa Daman and Diu have also been set up. Number of prototypes have been constructed in Goa and Punjab. Prototypes constructed in Goa, based on CBRI recommendations have been reported to be 20-25 per cent cheaper than the traditional schools. A number of States have shown interest in the work of the Institute and the Institute is helping to construct economical schools.

A study was undertaken by the Institute, in collaboration with Maharashtra Development Group for a detailed programme of school building construction for the Marathwada region. A survey of 2208 schools (Primary, Middle and Secondary) was conducted to assess the existing conditions. A comprehensive report has been submitted to the Government of Maharashtra.

## **ANNEXURE VIII**

### **THE FEASIBILITY STUDY OF ADJUSTING THE VACATIONS TO THE VARYING CLIMATIC CONDITIONS TO REDUCE THE QUANTUM OF SCHOOL BUILDINGS TO THE MINIMUM**

#### **Introduction**

Educational requirements are expanding at unprecedented scale due to the demographic explosion, increasing consciousness for education and changing socio-economic structure of the society. Though huge planning and building efforts are being made to provide proper educational facilities, yet large percentage of children are not getting proper facilities of schooling. The widening gap between demand and supply of provision of physical facilities can be attributed to the adoption of existing concept of traditional type of school buildings and lack of capital resources. Under these situations it has become necessary to review the fundamentals of the concept of educational buildings and examine concepts which would help in achieving overall targets of educational and physical facilities within the limited financial resources.

One way of effecting economy and tackling the problem of Primary School buildings suggested is that the teaching activities should be performed in open spaces. To take better advantage of the concept, vacations in the school may be adjusted to unfavourable or extreme climatic periods of the year.

Central Building Research Institute Roorkee has conducted extensive study to work out the school building space requirement for Primary Schools, and has suggested that 3 class rooms and a sheltered space can effectively serve the needs of the tra-

ditional five class rooms by adjusting time tables and performing teaching activities indoor and outdoor as per educational requirements. The approach adopted was to measure accurately the utilisation of space in schools by means of a use factor, and involved comparison of the optimum use of each unit area of covered space for every hour of the school day, with the actual use per hour. This study resulted in forty per cent saving in the space required for school buildings. In a country such as India the application of these ideas is of special relevance for although the overall enrolments in Primary School is high, the number of children yet to be housed is such as would require very heavy capital investment in buildings. Moreover, first level education is a State responsibility which has developed at different rates in different States. Some States thus face a much more acute Primary School building problem than might be thought from studies of the overall situation.

Though the above study indicates a substantial reduction of space requirements in schools yet it is worthwhile examining other possibilities to provide school spaces much more economically.

It is generally believed that the adjustment of the vacations in relation to uncomfortable conditions due to climatic elements in different regions of the country could reduce the quantum of school building to the minimum because teaching could then be performed outside in the open. Clearly the approach to the problem involves much more than mere reduction of built up area of the building. The feasibility of the solution will depend not only on maintenance of the quality of education but on the existence of suitable climatic conditions for outdoor teaching.

Buildings are being designed to suit the climate and provide the comfortable environment for the teaching activity. In some cases due to extreme climatic conditions even the buildings are not able to provide comfortable conditions and desirable educational environment inside the class room. Teaching activities are performed either in the open for the sake of solar

radiation in cold climate or under the shade of a tree due to requirements of breeze in hot-humid climate and the schools are being closed for vacations when it becomes impossible to hold classes even in buildings.

To study the feasibilities of regular outdoor teaching throughout the year in different parts of the country it is necessary to examine the climate in relation to its different elements so as to shift the school vacations to climatically uncomfortable period of the year and reduce the quantum of built up space for schools.

### Existing Vacation Pattern of Schools

The existing school vacation pattern for State and Union Territories of this country has been presented in *Table-1*. The analysis of the pattern indicates that almost throughout the country the schools are closed for about 40 to 50 days during the month of May-June-July. Short term vacations coincide with religious or cultural activities of the region and so these could not be adjusted to suit climatic requirements. The analysis also indicates that the long term vacations are due to climatic reasons. Adjusting the vacations to the varying climatic conditions is closely related to the possibility of teaching Primary School curriculum in the open.

TABLE 1

1. Existing long vacation pattern (As in 1968-69).

State/Union Territory	Vacation Periods
1. Andhra Pradesh	From 3rd May to 16th June.
2. Assam	Long vacations in June.
3. Bihar	1 month vacation during June-July.
4. Gujarat	Not available.
5. Haryana	Long term vacations in July-August.
6. Jammu & Kashmir	Vacations for 60 Days.

State Union Territory	Vacation Periods
7. Kerala	Mid-term vacations from 1st April to 2nd June.
8. Madhya Pradesh	Long vacations from 1st May to 30th June.
9. Maharashtra	April-May-June 4 to 5 Week's vacation.
10. Mysore	Long vacations from April to June.
11. Nagaland	Long vacations in January.
12. Orissa	1-1/2 month's short vacations in May-June.
13. Punjab	42 Days long vacations in July-August.
14. Rajasthan	Vacations from 17th May to 30th June.
15. Tamil Nadu	1-1/2 month's long vacations in May-June
16. Uttar Pradesh	16th May to 7th August Summer Vacations.
17. West Bengal	End of Summer.
<b>UNION TERRITORY</b>	
18. A. & N. Islands	Long vacations from 1st June to 17th July
19. Chandigarh	Summer vacations from 1st June to 14th July.
20. Dadra Nagar Haveli	3rd May to 9th June.
21. Delhi	1-1/2 months in May-June.
22. Goa, Daman & Diu	Vacations from 27th April to 9th June.
23. Himachal Pradesh	Vacations from 8th July to 31st August.
24. Laccadives N & A Islands	Long vacations for 60 days to coincide with Ramzan.
25. Manipur	Summer Vacations from: (i) 13th June to 15th July (Rural area). (ii) 16th June to 17th July (Urban area). (iii) 20th June to 16th July for hills.
26. N.E.F.A.	Not available.
27. Pondicherry	Vacations from 16th April to 15th June.
28. Tripura	Vacations from 15th May to 18th June. Vacations from 28th Sept to 31st October.

## Feasibility

The success of the above concept depends upon the availability of outdoor comfortable conditions in different climatic regions of India. It was therefore decided to examine the climate in relation to thermal solar, humidity, wind and rainfall data of different regions of India for all the twelve months and establish comfort indices, so that the results could be applied to evaluate probable success of outdoor teaching. Detailed climatic data of about sixty cities representing all regions of the country has been analysed. The thermal analysis indicates the range and distribution of temperatures based on hourly characteristics. The solar analysis diagram shows the solar direct radiation on horizontal surface for different hours of the day. The analysis of the wind pattern has indicated the velocities and duration in day. Humidity analysis gives the relative humidity on hourly basis. The data of two important and critical factors *i.e.*, rain and thermal comfort are discussed in detail.

## Rainfall

An examination of the mean number of rainy days for the following cities shows two distinct patterns of distribution.

Abu	Bangalore	Jodhpur	New Delhi
Agra	Baroda	Kanpur	Patna
Ahmedabad	Bijapur	Lucknow	Poona
Aligarh	Coimbatore	Ludhiana	Roorkee
Allahabad	Indore	Madras	Trichinapalli
Ambala	Jaipur	Madurai	Varanasi
Aurangabad	Jhansi	Mysore	Vishakhapatnam

In the southern part of the country from May to November there are generally more than five rainy days per month and from July to November the number increases to over eleven. In sharp contrast to this, in central and northern India from June to September there may be between 10 and 16 rainy days a month, while for the rest of the year there are only one or two days on which rain falls. Graphs in the appendices illustrate the pattern of rainy days in India.

It may be concluded from this brief examination that where rain falls on more than five or six days a month the interruptions to the teaching programme would be intolerable. Thus roughly south of latitude,  $19^{\circ}\text{N}$  the incidence of rainy days are too great for outdoor teaching.

### Thermal Comfort

Thermal comfort is subjective. Also a further difficulty occurs in connection with the establishment of criteria for thermal comfort. In the absence of suitable means of assessing thermal comfort, it is presumed\* that thermal comfort occurs between an index of  $75^{\circ}\text{F}$  and  $85^{\circ}\text{F}$  and the majority of the people will be comfortable at an index of  $78^{\circ}\text{F}$ .

In much of the north India where winter temperatures are very low, it is already customary for the children, who are often very lightly clothed, to go out side for lessons in the winter months, taking advantage of the early morning sun. Thus thermal comfort can be achieved outside the building. The problem that remains is to establish the optimum conditions for thermal comforts in out-door shaded situations in the various parts of India. Full analysis as given in *Table 2* indicates that *during the winter months* thermal discomfort is likely to be experienced even inside buildings and outside teaching in the sun may prove thermally more satisfactory. The reason for teaching in the morning only during May-July and August are implicit in the data. The area in which proposals for outdoor teaching are feasible from the point of view of thermal comfort, will roughly be of North Western Maharashtra, Gujarat, Rajasthan (except area round Mount Abu) Haryana, Punjab, Uttar Pradesh, Bihar, West Bengal and Orissa.

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\*Webb's work on comfort index. This may be found in various Article & Papers such as Indian Construction Journal 1961 (Dec). Webb has developed an index of comfort for a population acclimatised subject in Singapore. The comfort index which is for an ordinary indoor climate where radiation is limited is based on dry and wet bulb temperatures and air movement.

TABLE 2.—Mean Equatorial Comfort Index °F (Note \*70°=less than 70°)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov	Dec.	Ht. above Mean S.L. ft.
Abu . . . . .	*70°	*70°	*70°	*70°	*70°	S	*70°	*70°	*70°	*70°	*70°	*70°	3,945
Agra . . . . .	*70°	70°	76°	78°	74°	C	76°	75°	82°	78°	75°	70°	553
Ahmedabad . . . . .	74°	76°	82°	82°	75°	H	75°	74°	83°	82°	77°	75°	163
Aligarh . . . . .	*70°	*70°	75°	77°	73°	O	75°	75°	81°	80°	74°	70°	615
Allahabad . . . . .	*70°	71°	77°	79°	75°	OS	76°	75°	81°	79°	76°	70°	322
Ambala . . . . .	*70°	70°	75°	77°	72°	L	76°	76°	83°	78°	74°	70°	892
Aurangabad . . . . .	75°	75°	77°	78°	73°		*70°	*70°	77°	76°	75°	74°	1,905
Baroda . . . . .	*75°	77°	79°	82°	75°		75°	74°	82°	85°	80°	77°	115
Jaipur . . . . .	*70°	*70°	75°	77°	74°		75°	75°	81°	*78°	74°	*70°	1,431
Jhansi . . . . .	*70°	72°	76°	79°	76°	V	75°	75°	75°	79°	75°	*70°	824

Jodhpur	.	.	.	*70°	70°	75°	78°	73° A	75°	73°	83°	79°	75°	70°	73
Kaunpur	.	.	.	*70°	70°	75°	78°	75° OS	76°	76°	82°	79°	76°	*70°	41
Lucknow	.	.	.	*70°	73°	77°	79°	76° A	77°	76°	84°	81°	70°	*70°	371
Ludhiana	.	.	.	*70°	*70°	75°	80°	73° T	77°	77°	85°	81°	74°	*70°	812
New Delhi	.	.	.	*70°	*70°	75°	78°	73° I	73°	75°	82°	78°	73°	*70°	714
Patna	.	.	.	*70°	70°	75°	80°	76° O	76°	76°	81°	79°	*75°	*70°	173
Roorkee	.	.	.	*70°	70°	70°	78°	72° N	75°	70°	78°	70°	*70°	*70°	899
Varanasi (Banaras)	.	.	.	*70°	71°	80°	80°	78°	*77°	*75°	*82°	*80°	*76°	*70°	250

41

An index of 85°F = Uncomfortable hot.

75°F = Uncomfortable cold.

78°F = Comfortable.

S.L-Sea Level.

In the areas about 1000 ft. above mean sea level and higher, outdoor teaching will probably be difficult due to the wind.

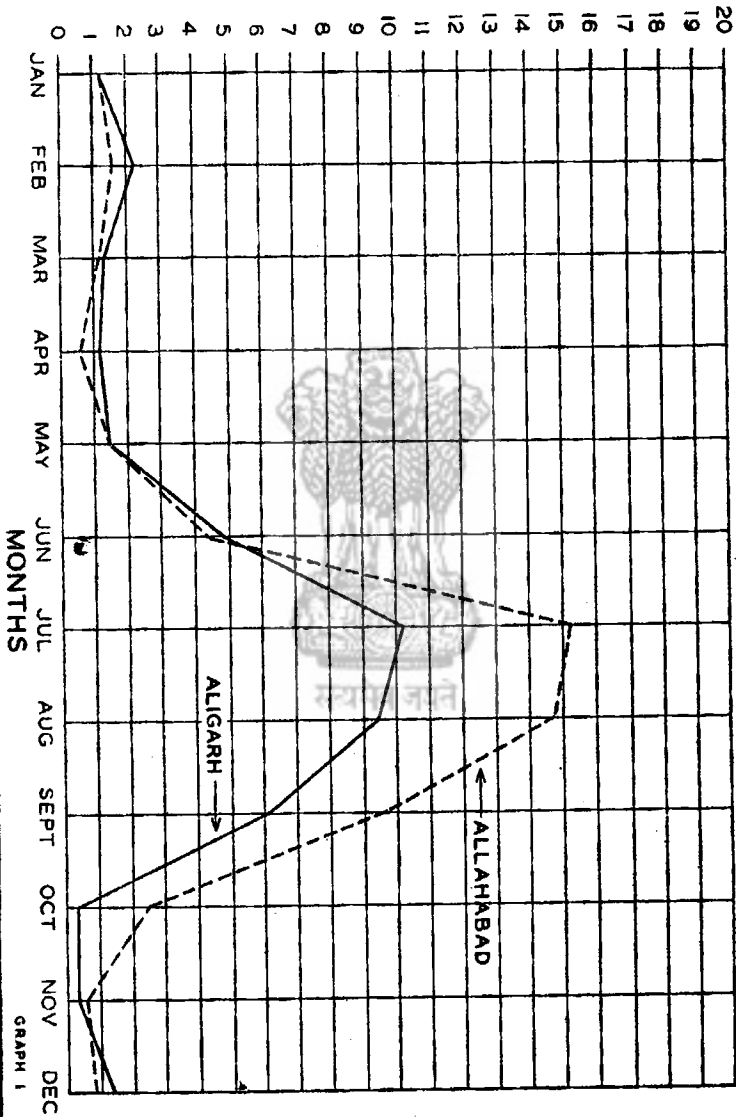
### **Feasibility of Adjusting the Vacations**

The climatic data presented may now be used to examine the possibility of adjusting the vacations with a view to teaching a part of the primary school curriculum in the open on the schools site. In the southern part of the country the occurrence of the rain from May to November (7 months) ranges from five to eleven days per month. The period for thermal discomfort outside is also maximum between May to July. This is too long a period and the adjustment of vacations may not help to reduce the quantum of built up space for teaching in schools.

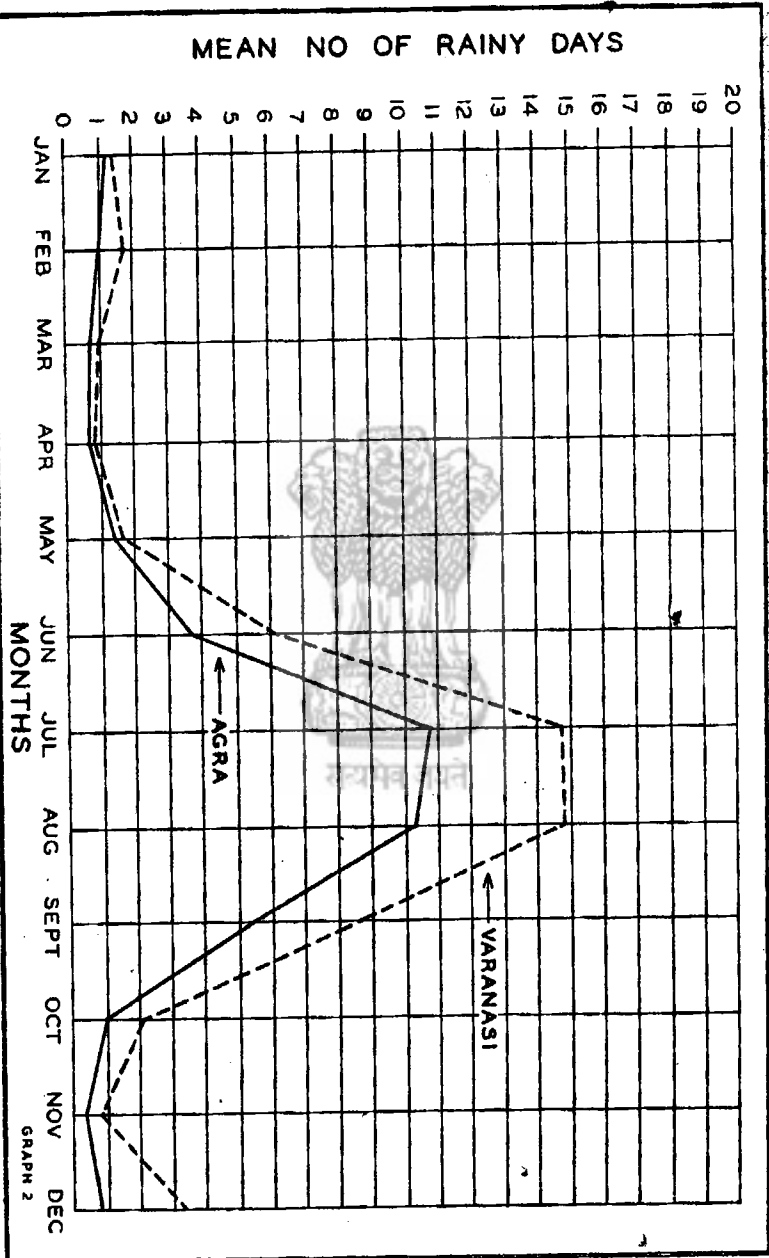
In Central and Northern part of the country the rain is critical in July and August and the period of May and June is critical from the point of view of thermal consideration. If the vacations are shifted to rainy seasons and reduced school hours are conducted early in the morning in the summer period, there is possibility of reducing the quantum of built up space, though the scope is very much limited. However the adjustment of vacations in order to reduce the quantum of School Buildings would appeal to be ruled out at the following conditions:

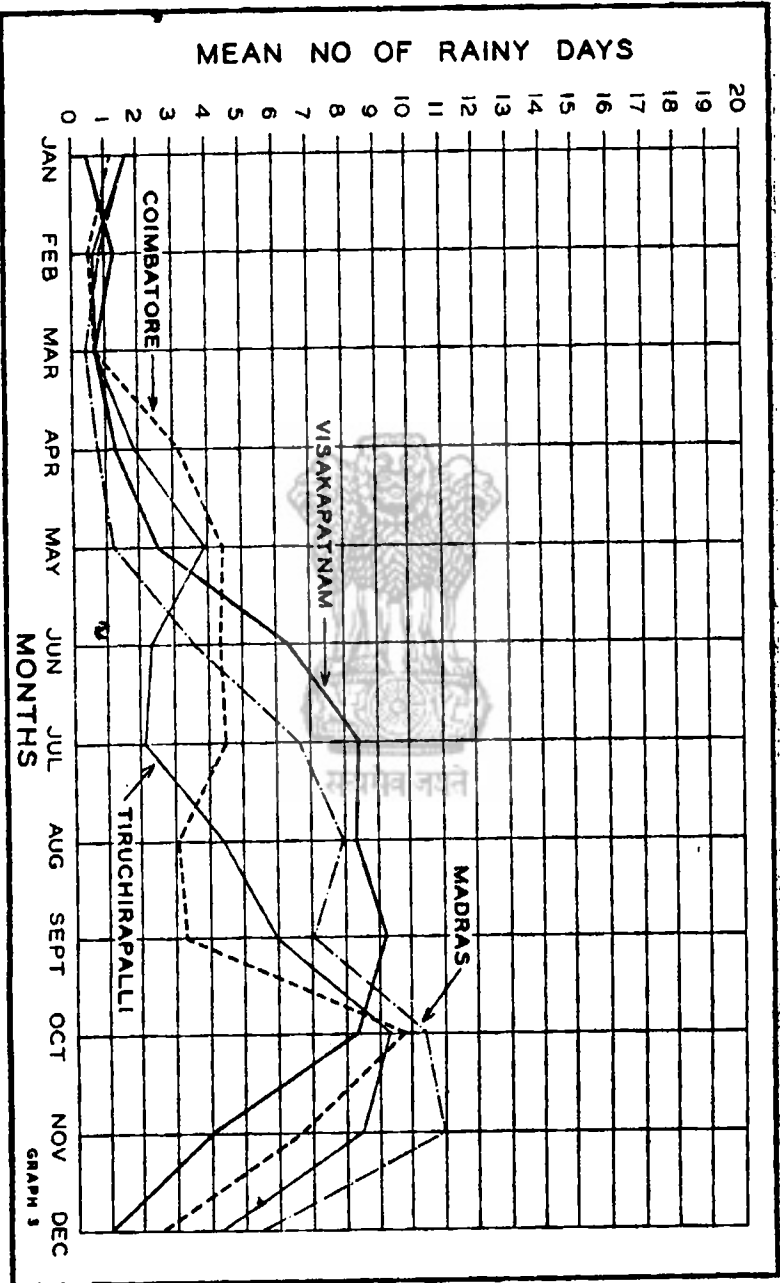
- (i) The minimum number of working days in schools is fixed. So the number of vacation days cannot be increased.
- (ii) If schools are closed for longer duration to reduce quantum of school buildings, the prescribed courses would not be complete.
- (iii) Some minimum facilities and services have to be provided to the school. If school buildings are dispensed with, these will not be available.

# MEAN NO OF RAINY DAYS

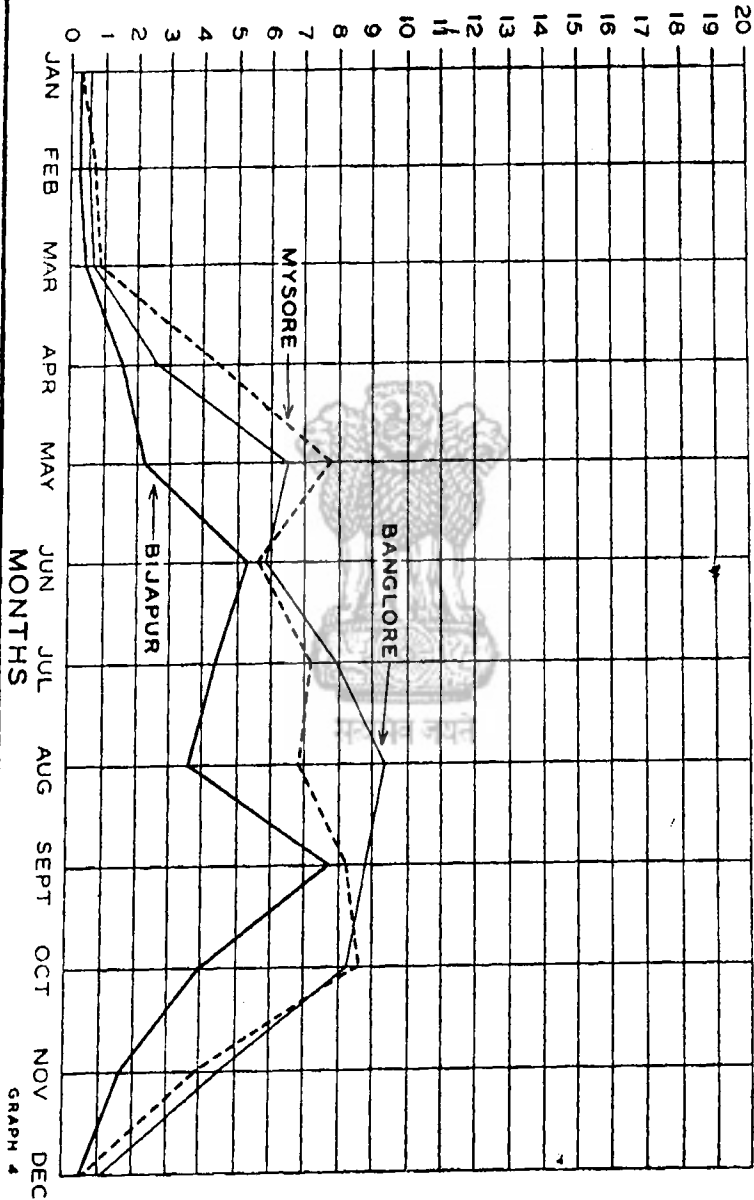


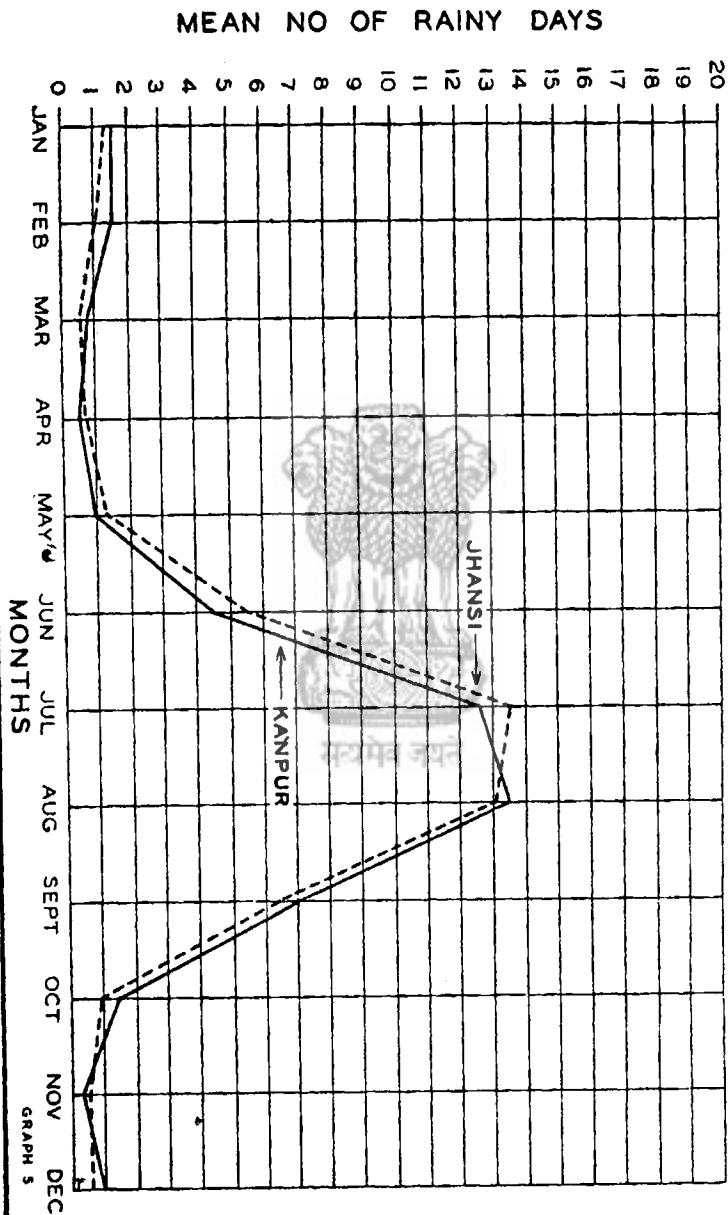
GRAPH 1

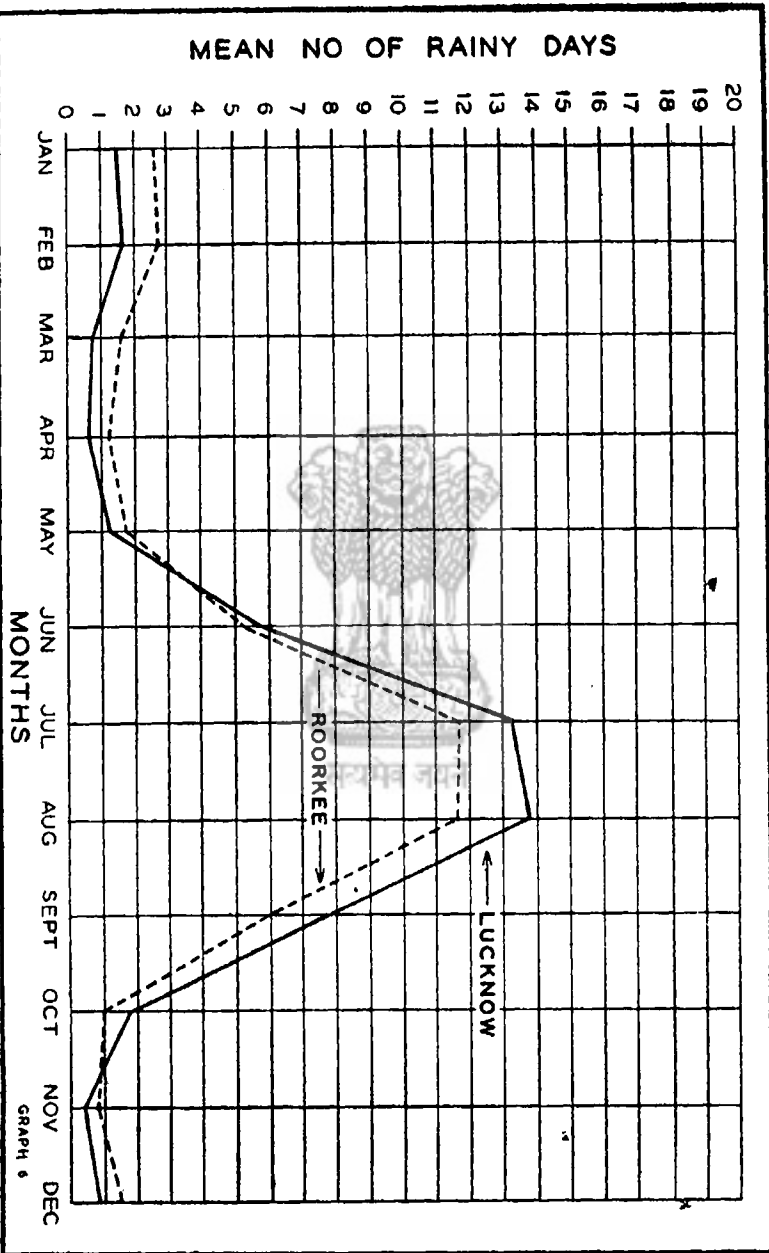


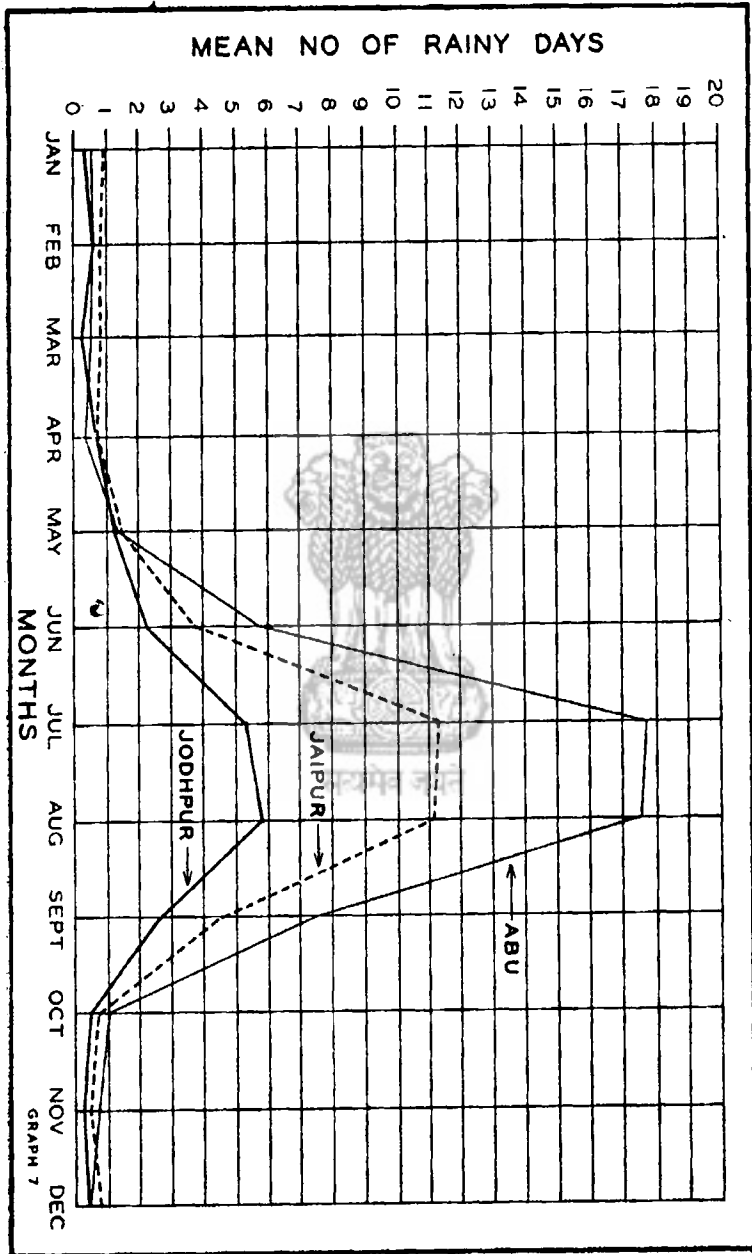


## MEAN NO OF RAINY DAYS\*

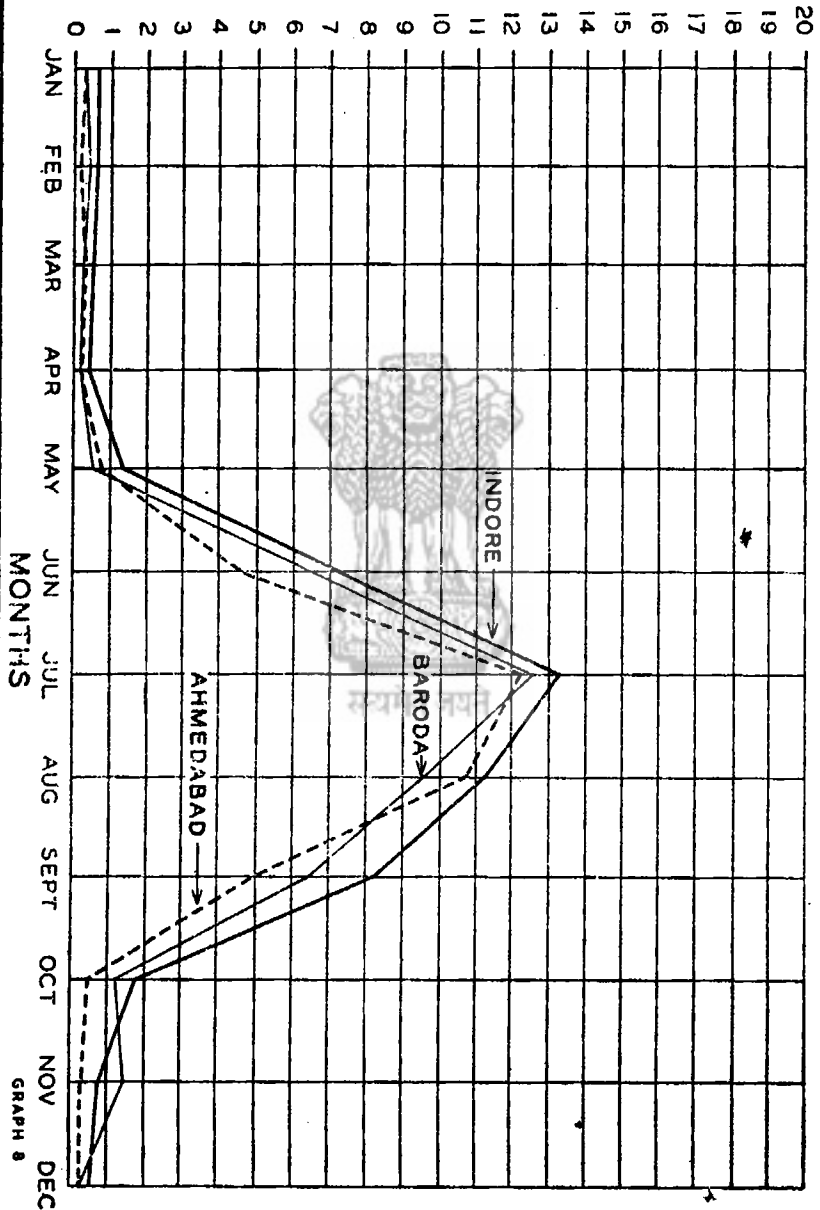


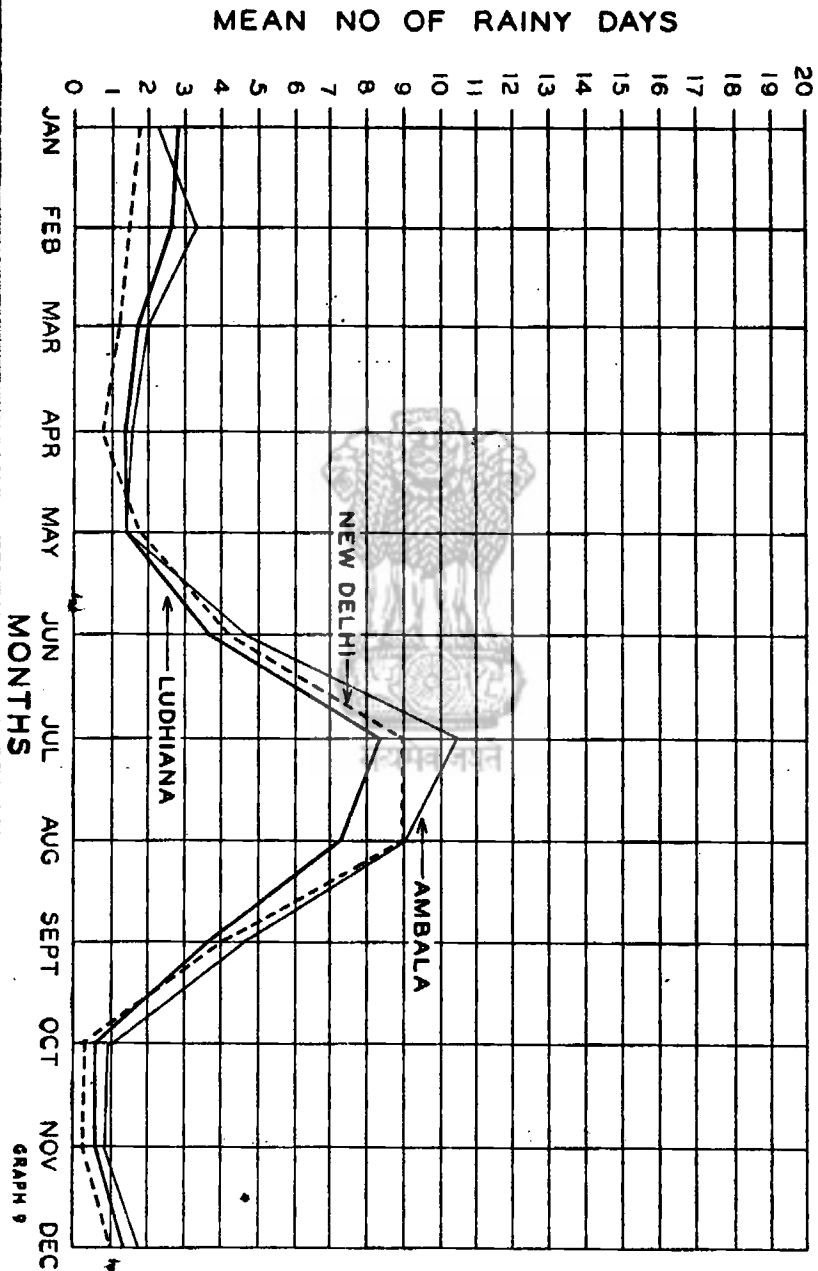






## MEAN - NO OF RAINY DAYS





## ANNEXURE IX

### STATEMENT REVIEWING THE PROGRESS MADE IN THE ADOPTION OF THE DESIGNS OF SCHOOL BUILD- INGS DEVELOPED BY THE CENTRAL BUILDING RESEARCH INSTITUTE ROORKEE IN DIFFERENT STATES THROUGH THE STATE DEVELOPMENT GROUPS

Following States have formed Development Groups:

1. Goa Daman and Diu.
2. Maharashtra
3. Kerala
4. Tamil Nadu
5. Punjab
6. Uttar Pradesh
7. NEFA
8. The Government of Mysore has also taken advantage of the work done at the CBRI pertaining to reduction of cost.

#### Goa, Daman and Diu

The Development Group in Goa was first constituted in 1967, and since its very inception a concerted effort is being enforced in the design and the execution of Primary Schools in this Union Territory towards the use-efficiency of school, criterious selection of building materials and improved building practices with an overall view of reducing the cost of educational buildings.

A systematic study has been carried out about the specific requirements of the school buildings in the Territory and priorities have been worked out based on these findings.

Plans developed by CBRI, Roorkee, were suitably altered for local conditions and local building practices and already 25 school buildings have been taken in hand out of which 15 are completed in all respects. New prototype are being evolved, and the others improved in the light of experience gained with the execution of the various schools.

Presently, the efforts of the Development Group are directed towards the development of new prototypes, which will secure a maximum utilisation of the funds invested in the educational facilities.

### **Actual Progress of the Development Work**

*Planning.*—In the first phase, the Group has taken up the design and development of the prototypes with the collaboration of CBRI Roorkee.

The first prototypes developed are for single class, two class, three class and four class rooms with a 'sheltered space', in each case. A list of schools constructed along these lines is given in Appendix I.

Based on the experience obtained from these schools, the prototypes are being further evolved.

As an instance, a statement of Appendix II is shown to illustrate how the new prototypes of 2 class rooms and sheltered space (3 compartments) are being evolved, after discussions held with the UNESCO and CBRI Experts.

*Execution.*—25 school buildings are already completed or are under execution in this territory.

while the planning stage is entirely controlled by the Development Group, the execution stage, however, is entrusted to various local units or Sub-Divisions and thus very often the ideas of the Group are not fully realised in the field. Some drawbacks are noticed, and due note has been taken of such defects to eliminate them at future constructions. It is verified that, in special, the location and the orientation, are very often subject to actual site conditions, rather than to ideal requirements.

### **Evaluation of the Work**

The State Development Group have, at various stages, evaluated the progress of the prototypes and introduced alterations as required.

In the last meeting held on 9th March, 1970, the Group in collaboration with the UNESCO experts on visit to this Territory, discussed further the improvements possible at the design and planning stage, and the drawbacks to be avoided in the execution phase.

Further study of the matter by ARISBR, Colombo (under UNESCO) and CBRI suggested some points towards cost reduction which are being incorporated in the revised schemes. The illustrative statement at Appendix II shows how the evaluation of the prototypes helps to cut down costs.

A final evaluation may be done by the National Development Groups, as soon as the final prototypes are evolved and tested for some time, so as to obtain also views from educational point of view.

An experiment of conducting four classes by four teachers in a three-room building with sheltered space was tried for several months in Government Primary School at Tonca. As per this method, classes move in rotation during the periods so that

one class is always engaged either in the space outside the premises or in the sheltered space. It was found out that classes can be very well engaged in the sheltered space without disturbance to other students who enjoy the mobility. Thus the sheltered space is well-utilised.

But as the buildings do not have verandahs, the students find it difficult to shelter themselves in rainy season when they arrive before the building is opened. This aspect needs examination so that a more suitable prototype can be evolved.

### **Maharashtra**

The State Development Group in collaboration with CBRI took up study of the development of schools for Marathwada. A survey of 2200 schools covering all the five districts of the region was undertaken by the CBRI. Existing enrolment pattern indicated the need of single teachers and two teachers schools in rural areas and multi-teacher schools in urban areas. But the problem was observed to be mainly of rural character since more than 50 per cent of the schools do not have buildings. Urban schools were short of spaces and most of them were in a very dilapidated condition. A report entitled "Development of School Buildings in Maharashtra" was prepared on the findings of the survey and formulating the recommendations on plans, methods of construction and implementation strategy for total building programme to be undertaken in the region. The Group considered it necessary to have a thorough discussion on this report with administrative and engineering staff of Zila Parishads of the five districts. A Seminar consisting of these people was, therefore, convened at Roorkee, which also provided an opportunity to officials for examining certain full scale prototypes of the new construction scheme erected at the Institute.

At the first phase of the scheme it was finally decided to construct three prototype buildings in the rural areas of Aurangabad and one in Osmanabad. The construction on

these sites have already been started and is under progress for the last one month.

The construction systems as developed by CBRI are being used in prototype schools in Aurangabad.

Results of the actual experiment are awaited. But judicious planning of spaces alone has resulted in 20 per cent of the total area of school building without effecting its educational performance.

### **Kerala**

Deputy Chief Engineer, Architect and Executive Engineer of PWD Kerala visited CBRI to have discussions on the cost reductions of school buildings. The architect of Kerala PWD in collaboration with CBRI has developed school plans for the State of Kerala. Roof truss developed at CBRI are being constructed in Trivandrum. It is expected, after the prototype is complete, large scale construction shall be taken up. Four prototype schools are under construction and eight are proposed to be taken up soon.

### **Tamil Nadu**

Tamil Nadu Development Group started working actively since last six months. Its terms of reference are (1) to examine and evaluate the existing plans, and if need be to revise them. (2) to find out ways and means to reduce cost of construction of school buildings. The Development Group of Tamil Nadu is fully aware of the work of CBRI in the field of cost reduction and research in the field.

On the advice of the CBRI, the Group has recently accepted new space standards for their schools. The designs of the prototype of three types of schools have been prepared. Construction is expected to be undertaken shortly.

## **Punjab**

Development Group after its inception selected the three border districts of Ferozepur, Amritsar and Gurdaspur on the priority basis as their first development scheme of school building programme. The Central Government had sanctioned a sum of Rs. 10 lakhs for primary school buildings for these three districts. With an aim of maximum utilisation of this limited amount the State Government decided to build schools on the recommendations of the Development Group with which CBRI is very closely associated. After studying the trend of enrolment pattern and the curriculum of lower and upper primary standard it was decided to develop prototype plans for three-teacher plans for rural areas and five to seven teacher plans for urban areas. Based on use-efficiency method of CBRI these prototype plans have been developed. The salient features of these plans are, firstly the future expansion is included in total plan with well defined phases (two) of construction and, secondly, the lay out of school includes the complete layout of the site including outdoor play and work areas, toilet facilities for boys and girls and the boundary wall. The first phase of construction of 40 rural primary schools has been started. Three buildings have already been completed and handed over to the education-department. At the preliminary evaluation response from the teachers have been noted to be very satisfactory. These buildings have been constructed with the traditional building specifications as followed by State PWD. Cost analysis of the already completed buildings have indicated the need and scope of further rationalisation in specification. Such a step is bound to result in reducing the construction cost of the buildings. The overall space economy achieved in these prototypes is to the extent of 12 per cent in comparison to the prevalent pattern of buildings. The plan of urban prototype will be finalised shortly to enable to test the research results in the towns of these districts. The group has requested the CBRI to prepare a manual on rural primary school buildings to be constructed by government and the private and voluntary agen-

cies with alternative specifications for various situations. Such a manual will go a long way in satisfying the need of standard and economic type plans for the State where private agencies are always eager to put up school buildings but for the absence of any organised technical know how and guidelines on the subject. The group has also entrusted the CBRI in evolving some economical furniture designs for use in primary schools of the State.

### **Uttar Pradesh**

The Development Group of Uttar Pradesh is working in close collaboration with CBRI. The group has spelled out its requirements for schools of various enrolments. It was decided to construct prototypes of schools one each in the five zones of the State to fix up the ceiling cost. Following places have been selected for the prototype—Roorkee, Gorakhpur, Jhansi, Ranikhet, Lucknow or suburb. The designs of the prototypes have been completed. Cost analysis is being made to bring down the cost to Rs. 5000.

### **Nepal**

North Eastern Frontier Agency has very recently formed the development group. Its first meeting was scheduled on 17th December.

### **Mysore**

In 1968 the Mysore State Education Federation and the Department of Public Instructions organised a Workshop on Functional Utility of School Buildings. The CBRI provided the main resource personnel for conducting the workshop. The Workshop was explained all the research work conducted at the CBRI pertaining to functional and cost reduction aspects. The Government of Mysore brought out a Report on the Workshop which included all the ideas suggested by CBRI and also some of its plans. These plans have the support of PWD Government of Mysore and it is expected that these will be adopted in the whole of Mysore.

# APPENDIX I

*School Building Constructed as per New Prototypes Evolved by the Development Group, Goa*

Sl. No.	Locality of school building	No. of rooms	No. of compartments including sheltered space	Date of completion
1.	St. Cruz Doulwada	2	3	28-6-68
2.	Tonca Sta Ines	3	4	27-8-68
3.	Salvader de Mundo	2	3	15-7-69
4.	Varca	2	3	27-7-68
5.	Corgao-Deusu	1		9-10-68
6.	Pernom	4	5	31-8-69
7.	Morjim-Katwada	3	4	15-7-69
8.	Panchawada-Usgao	3	4	25-8-68
9.	Tank Osgao	2	3	10-11-68
10.	Kantar Usgao	1		17-1-69
11.	Dhat-Usgao	1		6-7-68
12.	Sta Cruz-Sheldem	1		15-10-68
13.	Quepem Lusmnada	3	4	21-8-68
14.	Sandimol	3	4	30-9-68
15.	Chicolmel	2	3	28-11-68

*Sanctioned buildings that will be undertaken for construction*

1.	St. Jose Se Areal	2	3
2.	Fontainhas	6	7
3.	Corlim-Mapusa	4	5
4.	Aquem Alto	9	10
5.	Aquem Baixo	3	4
6.	Dhargal-Gauwada	1	2
7.	Merces	9	10
8.	Chinchelem	4	5
9.	Nerul	6	7
10.	Ponda Bazar	3	4

## APPENDIX II

Illustrative example showing comparative costs between old type school and the evolved prototype with 3 compartments

Type of schools with reference to our study	Old type school with 3 compartments (verandah)	New type school with 3 compartments 2 ms+sheltered space)	Same as (B) as revised by UNESCO Expert with reduction of c.rm. areas and other alterations suggested	Same as (C) but without reduction in area, but incorporation of alterations suggested
Reference column	A	B	C	D

Schedule of rate used to reach at estimated cost.

<p>Scheme now recast and re-estimated as per B by S.R. + 10 % as sanctioned by Chief Engineer (67).</p>	<p>Scheme originally prepared by the Department with Bombay S.R. + 10 % san. same as A&amp;B (67). by Chief Engineer (67).</p>
<p>Estimate now prepared with suggestions from UNESCO and CBRI expert &amp; additional point but with the present Goa S.R. approved for 69.</p>	<p>Estimate now prepared with suggestions from UNESCO and CBRI expert &amp; additional point but with the present Goa S.R. approved for 69.</p>

1	2	3	4	5
	Rs.	Rs.	Rs.	Rs.
Estimated cost as per B.S.R. 10% as sanctioned.	22,006.15 2,200.62	17,051.48 1,705.15	17,360.71 1,736.07	15,722.17
Total estimated	24,206.77	18,756.63	19,096.78 Deduct as worked out by UNESCO expert 3,462x1.10	
			1.075	
			Rs. 3,542	
			Net Rs. 15,554.78	
	1,815.51	1,406.75	1,166.61	..
Equivalent Total for Comparison	26,022.28	20,163.38	16,721.39	16,351.06

Approximate percentages 4% to be added to estimated cost to bring the estimate at market rates 7-1/2% prevailing in Goa (69).

## ANNEXURE X

A D.O. letter No. F.15-13/70-Schools I dated 16th January, 1971 (copy enclosed) was addressed to all Education Secretaries of State Governments/Union Territories. Summary of replies received from the State Governments/U.Ts is as under :

Sl. No.	Name of State/Union Territory	No of schools which are held in the		
		Primary	Middle	Secondary
1.	Rajasthan	2190	270	162
		(Part of classes are run in the open space).		
2.	Dadra & Nagar Haveli	..	..	..
3.	N.E.F.A.	..	..	..
4.	Tripura	..	..	..
5.	Chandigarh Admn..	18	1	1
6.	Laccadive Admn.	..	..	..
7.	Delhi Admn.	57 (using 296 tents)	86 (using 249 tents)	71 (using 903 tents)
8.	Punjab	164 (Information in respect of Amritsar is awaited)	..	3
9.	A & N Admn.	25	..	..
10.	Tamil Nadu	..	..	..
11.	Madhya Pradesh	16108	2150	306
12.	Kerala	350	..	126

**T. R. JAYARAMAN**  
Joint Secretary

D.O. No. F.15-13/70-Schools I

Government of India  
Ministry of Education  
&  
Youth Services  
New Delhi.

*Dated the 16th January, 1971*

Dear

Kindly refer to this Ministry's letter No. F.15-5/70-Schools I dated 29th July, 1970 in which you were requested to give information regarding the school buildings for primary and secondary schools. (Your Department's letter No. dt.....refers).

In order to assess the actual requirement and to fix up priorities, I shall be grateful if you could kindly let us know the number of schools district-wise which are being held in the open and for whom buildings need to be provided urgently. These district-wise figures may kindly be given separately for the primary schools and the secondary schools.

With kind regards,

Yours sincerely,

**T. R. JAYARAMAN.**

Copy to Director of Public Instruction/Director of Education, Government of .....

**T. R. JAYARAMAN,**  
*Joint Secretary..*

## ANNEXURE XI

### CABE COMMITTEE ON SCHOOL BUILDINGS

#### Summary of Recommendations

(1) The Committee has estimated that Rs. 90 crores will be required for the additional buildings for the primary and secondary schools started during the Fourth Plan. The Committee has also estimated that Rs. 250 crores will be required for clearing the backlog of school buildings required for primary and secondary schools started before the commencement of the Fourth Plan. The Committee has assumed that 50 per cent of the amount required for the construction of school buildings will be available through popular contribution. The Committee urge the Government of India to set apart Rs. 10 crores per annum for the next ten years as grants to the State Governments specifically for construction of school buildings. If necessary, half of this amount may be given as loan and the rest as grant.

(2) (a) Since the construction of school buildings would create additional employment opportunities for educated unemployed, teachers as well as engineers, overseers, carpenters etc. a revolving fund of at least Rs. 10 crores may be set up from which loans could be given to the States for the construction of school buildings.

(b) It is considered desirable to set up a Central Financing Corporation for educational buildings. An outlay of Rs. 14 crores spread over a period of 7 years at the rate of Rs. 2 crores per year would allow a revolving fund to be set up to be administered by the proposed Corporation.

(3) In order to mobilise local resources for school buildings following steps are recommended :

- (a) Funds may be collected through lotteries.
- (b) Local people may be asked to donate one or two rooms at the time of birthdays, marriages etc.
- (c) Religious institutions may be encouraged to donate buildings as part of their programme.
- (d) Other avenues like staging plays, organising exhibitions should be explored for raising funds for school buildings.
- (e) Contributions in kind such as cement, food for paying for labour etc. may be collected.

(4) The cost of school buildings may be reduced by adopting the designs and suggestions of the Central Building Research Institute.

(5) Priorities may be assigned for construction of new buildings, highest priority being given for schools now being held in open and for completing incomplete buildings followed by schools conducted in tents, and those having rented accommodation.



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