



Statement laid on the Tables of both houses of
Parliament, by the Minister of Planning and
Irrigation and Power, on the 18th August,
1955, on the flood situation in Assam,
Bihar, West Bengal and Uttar Pradesh.

MINISTRY OF IRRIGATION AND POWER
GOVERNMENT OF INDIA

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Introductory

Even though the problem of floods in the country is an age-old one, no attempts were made by the States concerned, till recently, to tackle it in a systematic manner. Even the minimum data necessary for the preparation of schemes were lacking. Relief measures were undertaken as and when floods occurred and such protection works as were constructed were largely in the nature of temporary palliatives. There was no perceptible improvement in the position till the Central Government took up the matter, after the disastrous floods of 1954.

Schemes for flood control and protection cannot be worked out without the necessary technical data. Planning has to be done in an integrated manner. The problem is of a gigantic magnitude and adequate organizations have to be set up for the preparation and implementation of the schemes. As a result of a detailed examination of the whole question last year, a programme was evolved for combating the menace of floods on a planned way over the entire country. Several essential steps were taken immediately. A Central Flood Control Board was set up along with Flood Control Boards in all the States liable to be affected by floods. The State Boards are assisted on technical matters by Technical Advisory Committees. Three River Commissions were also constituted for the Ganga, Brahmaputra and the North West river systems. The Central Water and Power Commission's organization was suitably strengthened to coordinate all flood control work and assist in drawing up an integrated plan.

All the above measures were taken after the 3rd September, 1954 when I laid a comprehensive Statement on floods on the Table of the House. There was only one working season (1954-55) for implementing the "emergent" schemes. Within this short period, data had to be collected, experiments carried out, designs and estimates prepared, and works had to be executed.

By and large, the Works undertaken in the last season have withstood the floods very well and have afforded reasonable protection. The position is explained below in detail.

I. ASSAM

1. Causes of Floods

The plains of Assam can be divided into two valleys, viz., the Brahmaputra valley on the North and the Surma or Barak valley on the South, separated by the Assam range of hills. A considerable portion of both the valleys, where the land-building activities of the rivers and a large number of their tributaries is in progress, is affected by floods almost annually.

On account of the particular topographical features and meteorological conditions in the north-eastern region, the number of rivers in Assam is large and visitation of floods frequent. The Brahmaputra has as many as 35 tributaries and the Barak 9 tributaries, each of which has an extensive hill catchment. The rivers, having steep slopes, carry considerable silt.

Rainfall in Assam is heavy. The annual rainfall ranges from 70 inches in the plains to 250 inches or more in the north-eastern hills. There are places in the hills like Cherrapunji which have an annual precipitation of as much as 400 to 600 inches.

The local conditions are further aggravated by the frequent earthquakes which cause land slides, etc., resulting in obstruction to the courses of the rivers. A note on the causes of heavy rainfall of this year in the States of Assam, Bihar, West Bengal and Uttar Pradesh as prepared by the Indian Meteorological Department is given in Appendix I.

2. Earlier efforts at Flood Control

The efforts at controlling floods in the past have been rather spasmodic. No comprehensive plans could be drawn up for want of essential data. A beginning in this direction was made towards the end of 1952 with the setting up of a River Investigation Division. The organisation for collection of data has recently been strengthened by the addition of three more Divisions and a Supervisory Circle.

3. Progress on Flood Control Measures

Apart from the State Flood Control Board and the Technical Advisory Committee, a separate organisation has been set up by the State for preparing and executing flood control schemes. At present there are two Chief Engineers, three Superintending Engineers, ten Executive Engineers, one Special Officer for Dibrugarh Protection Works and one Town Planner for Palasbari Township.

The immediate problem which confronted the State as a result of the 1954 floods was the protection of Dibrugarh, Palasbari and Sualkuchi towns. The works programmed for affording protection to these towns were completed before the onset of 1955 floods by the strenuous efforts of the State officials under the direction of a Senior Engineer who was deputed from the Central Water and Power Commission, with the active cooperation of the Military Engineering Services and the Railway authorities. Certain other embankments and town protection works, which were under execution, recorded good progress. A statement showing the schemes undertaken, the progress achieved till the end of working season 1954-55 and other details is given at Appendix II. The progress made on surveys and investigations is given in Appendix III.

A loan of Rs. 1 crore was given to the Government of Assam for expenditure on their flood control schemes during 1954-55 and a sum of Rs. 2.1 crores has been earmarked for this purpose during 1955-56. The expenditure incurred up to the 30th June, 1955, is approximately Rs. 1.75 crores. In the case of Dibrugarh Protection Works, it has been decided that the Central assistance will be in the form of 50 per cent interest-free loan and the remaining 50 per cent as an outright grant.

4. Floods in 1955

On the 25th July, 1955, the Brahmaputra recorded the highest flood level at Dibrugarh in the past 50 years. It was one foot higher than the last year's level. A detailed assessment of the flood damages is being made by the State Government. The general position according to the latest reports received from the State Government is as follows:

Due to the incessant rains in the hills, the rivers in Assam have been in high spate, affecting an area of about 1,500 square miles. The district of Lakhimpur was the first area to be affected by floods; almost all the low lying areas of the district have been flooded. Almost the whole of Dibrugarh town went under water bringing normal life practically to a stand-still. Large areas of the district of Sibsagar lying along the Brahmaputra have also been flooded. The island of Majuli was under water and some erosion took place. Low lying areas in the district of Nowgong were inundated. In the district of Goalpara some of the tributaries of the Brahmaputra such as the Gaurang, the Tipkai and the Aie inundated villages, particularly, to the south of the railway line between Bilaspara and Gauripur.

Standing crops in the districts of Lakhimpur, Sibsagar and Kamrup have been damaged to a considerable extent. Damage to Jute crop is also feared in the districts of Goalpara, Darrang and Nowgong.

There has been a considerable damage to houses and property. Several hundred cattle have been washed away. There has been serious disruption of rail and road communications. Railway lines and roads including the G.T. Road breached at a number of places. The telephone and telegraphic communications were also dislocated.

The Assam Government are taking adequate steps to provide relief to the affected people. The State Government have sanctioned a sum of Rs. 2 lakhs as gratuitous relief, Rs. 1 lakh as agricultural and rehabilitation loans and Rs. 15,000 for test relief. Effective steps have been taken to provide food and shelter to the displaced persons and to carry out rescue operations. The Army authorities have despatched 12 Ranger boats and a Junior Commissioned Officer for rescue operations. Instructions have also been issued to the Deputy Commissioners and Sub-Divisional Officers to meet all emergencies.

5. Effect of Works already undertaken

Although the floods in the Brahmaputra in July, 1955, exceeded the highest recorded last year, I am glad to say that the protection works already executed have withstood the onslaught effectively. The Dibrugarh protection works have succeeded in checking erosion. A wide bank of silt has accumulated as a result of the stone and wooden spurs. Owing, however, to the unprecedented level of the river all the low lying areas of the town were inundated. Due to the short time available work during the last season was concentrated on the provision of spurs to check erosion. Suitable measures, like construction of embankments, re-modelling and conversion of town drainage system are being planned to prevent future flooding of the town. These works will be undertaken during the next working season.

At Palasbari, the temporary protection works, which were undertaken over a length of 11,000 ft., withstood the flood but for a slight damage at the downstream end. The river bank beyond protected length was badly eroded over a length of 4,000 ft. This erosion had some repercussions on the work done in the reach 10,500 to 11,000. The mats laid in this reach held but there was slight erosion of the bank behind the mats. Appropriate measures have been taken to check further erosion. The works at Saulkuchi have not been effected by the floods.

The embankments built along the Brahmaputra and its tributaries have stood well. The 30-mile embankment from Khormuja to Fakirganj which was intended to provide protection to an area of about 300 sq. miles, has enabled the cultivators to harvest a bumper crop in an area of 270 sq. miles. Another embankment about 40 miles long in the district of Kamrup has saved rich crops in an area of 360 sq. miles which was usually inundated in the past. The protection works

put up on both sides of the Brahmaputra in the districts of Goalpara and Kamrup have been of great benefit in providing protection to the homes and fields of a large proportion of the people.

The flood levels are low at present and almost all the main road communications have been restored. All railway breaches have been repaired except that between Chaprakata and Bijni where work is expected to be completed in September. Telegraphic communications have been restored. The Flood Warning system was effectively used from one end of the State to the other.

6. *Future Programme*

Assam has programmed to spend Rs. 2 crores in 1955-56 on town protection works and embankments along the Brahmaputra and its tributaries. The observations made as a result of this year's floods will be utilized while preparing the designs and details of the schemes to be undertaken.

II BIHAR

1. *Causes of Floods*

North Bihar can be broadly divided into three zones, each one of which possesses different flood characteristics. These are (1) the Gandak Valley from the Ghagra on the West to the Burhi Gandak on the East; (2) the Central zone which includes the Bagmati, the Adhwara system of rivers and the Kamla; and (3) the Kosi zone which includes the Balan, the Kosi and the Mahananda on the East.

The Gandak valley has the lowest gradient. Except in the upper region at the foot hills of the Himalayas, the country has a slope varying from 0.75 ft. to 1.5 ft. per mile. The various drainage channels in this valley have, therefore, more or less steady courses, and do not meander to any appreciable extent. The three important rivers which carry water from the hill catchment to the Ganga are the Ghagra, the Gandak and the Burhi Gandak. There are other small rivers which either drain into these rivers or into the Ganga direct. Besides the floods in the main rivers, spilling occurs in the small rivers during heavy rains due to inadequate waterways and the obstructions put by the local people either for irrigation or for fishing. In the Ghagra and Burhi Gandak basins, there are a number of chauras which do not get drained in time.

The Central zone has got two main rivers, *viz.*, the Bagmati and the Kamla besides the other rivers like the Lakhandeyi, the Adhwara, etc. which have small catchments in the Himalayan regions. As a result of the steep gradient of about 2 ft. per mile these rivers have

often changed their courses within Bihar. The Kamla and the Bagmati bring very heavy discharge from their catchments in the mountains. The movements of the Bagmati are like those of the Kosi on a smaller scale. During the last century, the Bagmati has been moving in a belt 8 miles wide. This river causes inundation of large tracts in Muzaffarpur and Sitamarhi. The Kamla inundates large areas in Darbhanga district.

In the third zone, Kosi is the main river which has been changing its course westwards. The havoc caused by the floods in this river is too well-known to be detailed here. Owing to the magnitude of the problem, a separate project has been prepared for the Kosi consisting of a barrage at Hanuman Nagar and two embankments from the high ground near the foot-hills of the mountains upto the confluence of the Kamla and the Bagmati with the Kosi.

The average intensity of rainfall in North Bihar is about 50" per year, the maximum precipitation being from June to September.

2. Earlier Efforts at Flood Control

Except for the embankments along the Gandak in almost the entire reach of the river in Bihar, no serious attempt was made for controlling floods in North Bihar. The construction of certain small embankments along various rivers had been done without any planning or coordination; such embankments have been able to give only local protection.

In 1934, after the great earthquake, the Bihar Government undertook an examination of the problems arising out of the apprehended change of drainage courses as a result of the earthquake. The State Government accordingly set up the Tirhut Waterways Division under the State Irrigation Department in 1934; this Division was later converted into a Circle in 1952.

3. Progress in Flood Control Measures

In addition to the State Flood Control Board and the Technical Advisory Committee, the Government of Bihar have set up special organisations including a whole-time Chief Engineer for North Bihar, a Superintending Engineer and the requisite staff. A number of schemes estimated to cost Rs. 11 crores have been approved by the State Flood Control Board. Schemes costing about Rs. 4.3 crores are under execution and embankments over a length of 233 miles have been completed giving protection to an area of about 1,000 sq. miles. Funds for meeting the expenditure on these works have been provided by the Centre in the form of 30-year loans which are interest-free for

the first five years. A sum of Rs. 1.55 crores has been earmarked for being given as loan for financing the schemes during 1955-56. A statement showing the schemes undertaken, the progress achieved till the end of the working season 1954-55, and other details is given at Appendix IV. A statement giving the progress on the Kosi Project which was laid on the Table of the Lok Sabha on the 25th July, 1955, will be found in Annexure (1) to Appendix IV. Another statement showing the flood control schemes completed under the First Five Year Plan is given in Annexure (2) to Appendix IV.

The progress made on the surveys and investigations in connection with flood control schemes is given in Appendix V and annexures thereto. Further schemes are under investigation (Appendix VI). These flood control works excluding the Kosi Project are estimated to cost about Rs. 24.19 crores and the State Government desire assistance to the extent of Rs. 17.5 crores during the Second Five Year Plan period.

4. Floods in 1955

In the last week of July, the Gandak rose to the second highest level on record. There are marginal embankments on either side of the river in the districts of Champaran and Muzaffarpur on the left bank and in the district of Saran on the right bank. A few gaps in the left bank in the upper reaches were filled up before the current flood season. While this region was protected by the embankments, the Diara land between them was subjected to heavy floods seriously affecting the people living there. The Burhi Gandak inundated large areas in the districts of Champaran, Muzaffarpur, Darbhanga and North Monghyr. At Muzaffarpur the river recorded a very high level, only one inch below last year's level. The embankments constructed in the Darbhanga district have withstood the floods satisfactorily except for a few breaches.

Samastipur, a town considered to be safe from floods, has also been badly inundated this year due mainly to the sustained flooding in the Burhi Gandak for 16 days against the maximum of 7 days last year, the heavy spill of the Bagmati entering the Burhi Gandak and the incomplete construction of the embankment on the right side of the Burhi Gandak. The Bundh, two miles on the North-West of Samastipur therefore got overtopped, causing heavy flooding of the town.

Crops over an area of about 13 lakh acres have been damaged. About 38 lakh persons have been affected and the number of houses damaged is over 30,000. There has been no loss of human or cattle life.

Sufficient foodgrains have been stocked at suitable places for distribution. Adequate medical facilities and boats for rescue operations have been provided. Funds to the tune of Rs. 1.5 crores have been placed with the District authorities for relief purposes. Mobile and stationary dispensaries have been started for public health relief. Similarly veterinary dispensaries are also operating to control cattle diseases. Wireless stations have been set up within the State in the upper reaches of the Gandak, the Burhi Gandak, the Bagmati and the Kamla for issuing flood warning messages. These have been working since 1st July, 1955. Messages are transmitted to the Headquarters at Patna and to the various local officers concerned.

5. *Effect of Works already undertaken*

As already referred to the embankments in the Darbhanga district have withstood the floods satisfactorily except for a few minor breaches. The groynes constructed to protect Chapra town have effectively checked erosion. Embankments, in a total length of 235 miles have protected an area of about 1,000 sq. miles. Fortunately, the Kosi has experienced only a flood of 2.5 lakh cusecs so far. As a result of the flood banks, the inundation this year has been less in the upper reaches than in the past. The ring bund at Nirmali is intact and has been serving its purpose. The marginal embankment across the Tiljuga, though still incomplete, is holding up the Tiljuga spill.

6. *Future Programme*

It is proposed to undertake construction of embankments over a length of 243 miles involving an expenditure of about Rs. 4 crores during the next working season. Details of the schemes are given in Appendix VI-A. The programme of work on the Kosi Project for 1955-56 is given in Appendix VII.

III WEST BENGAL

1. *Flood Affected Areas*

The State of West Bengal may be broadly divided into three zones, viz., the Central, the Southern and the Northern. The Central zone comprises the districts of Murshidabad, Birbhum, Bankura, Burdwan and Nadia, while the Southern zone comprises the districts of Hooghly, Howrah, 24-Parganas and Midnapore. The districts of Darjeeling, Jalpaiguri, Cooch Behar, Malda and West Dinajpur are situated in the Northern zone.

Central zone

The districts of Murshidabad and Burdwan in the Central zone are served by a large number of flood embankments. The rivers concerned

are the Ganga, the Bhagirathi, the Damodar and the Ajoy. The district of Burdwan has been visited by severe floods as a result of breaches in the flood embankments particularly in 1913, 1916, 1935 and 1943. With the construction of the storage reservoirs in the upper catchments of the Damodar including its tributaries, the danger from floods in this river will be eliminated.

Southern Zone

In the district of Midnapore there are extensive embankments to check flooding from the rivers Kaliaghye, Subarnarekha and Kangsabati. The danger from floods of the river Kangsabati will be further reduced considerably with the implementation of the Kangsabati Reservoir Project proposed for inclusion in the Second Five Year Plan by West Bengal. The southern portion of the Midnapore and 24-Parganas districts are traversed by a large number of tidal creeks and flood embankments exist in this portion also for the protection of the areas on the banks of these creeks.

Northern Zone

The Darjeeling district is mostly hilly. The districts of Jalpaiguri and Cooch Behar covering a total area of about 3,700 sq. miles, are situated close to the foothills. The remaining two districts in this zone are situated in the plains.

Floods in the districts of Darjeeling, Jalpaiguri and Cooch Behar seem to be of recent origin. It is observed from the records that, whereas in the distant past there were occasional floods in these districts at long intervals, they have become in recent years more or less a regular feature in Jalpaiguri and Cooch Behar districts and the southern portion of the Darjeeling district. The low portion of the district of Malda known as 'Tal' area has for a long time past been subject to annual flooding by the back-spill of the Ganga entering through its several branches. Low portions of the district of West Dinajpur have also been subject to the floods of the rivers Purnabhabha, Atrai, etc.

2. Earlier Efforts at Flood Control

The Government of Bengal appointed a Flood Enquiry Committee in 1922 but very little seems to have been done to implement its recommendations. The West Bengal Government appointed another committee known as the North Bengal Flood Enquiry Committee in April, 1954, to undertake the necessary investigations, to ascertain the causes of floods and to advise the State Government on measures which should be taken both in the upper catchment areas and in the lower reaches of the rivers Teesta, Diana, Jaldhaka, Torsa, Raidak and Sankosh, etc., for the prevention or moderation of floods.

3. Progress on Flood Control Measures

Apart from the State Flood Control Board and the North Bengal Flood Enquiry Committee which functions as the Technical Advisory Committee to the State Board, the State Government have established an engineering Circle with five Divisions. Two Divisions are engaged on investigations and two others on planning and execution of flood control works in North Bengal. The fifth Division is an Irrigation Division meant for normal works.

Flood Control Works estimated to cost Rs. 2 crores are under execution. A loan of Rs. 50 lakhs was given to the Government of West Bengal for expenditure on their flood control schemes during 1954-55. A sum of Rs. 73.43 lakhs has been spent up to the end of June, 1955. A sum of Rs. 2 crores has been earmarked for loan assistance in 1955-56. The assistance from the Centre is in the form of 30-year loans which are interest-free for the first five years.

The flood control works so far undertaken are town protection works in the shape of flood embankments with or without revetments, spurs, etc. A statement showing the works undertaken, their estimated cost, the progress achieved upto the end of the last working season *i.e.*: 30th June, 1955, is given in Appendix VIII. The progress made on surveys and investigations is given in annexures to Appendix VIII.

4. Flood in 1955

During the current monsoon season, rainfall has been excessive in North Bengal. The districts of Darjeeling, Jalpaiguri and Cooch Behar have been affected by floods during this year also. The damage caused has not been fully assessed but is not likely to be as extensive as in 1954, even though the floods in some of the rivers like the Jaldhaka, the Kaljani and the Mahananda were of higher intensity than in 1954. Considerable erosion has taken place in some villages bordering the Torsa and several families have been rendered homeless. In the district of Dinajpur, high flood has been reported in and around the district headquarters at Balurghat and Raiganj Sub-divisional town and several Unions under four Police stations. Road communications from Balurghat to Kaliaganj Railhead as also Malda have been disrupted due to spilling of flood water at four places. An area of about 15 square miles has been flooded on account of a breach in the Barnes-Domohani embankment. The waters of the Jaldhaka have also breached the Dharaikuri embankment. Road communications have been disrupted, and the Assam Rail link has been affected. There has been some loss of cattle but no loss of human life has been reported.

50 per cent of the Jute and Bhadaï crop have been damaged in the 'Tal' area by the floods of river Kankar and Ganga spill. Aman paddy over an area of 5 sq. miles has also been damaged. Jadavpur and Bholanath Tea Estates were submerged under water.

The State Government are taking adequate steps for providing relief to the distressed people. Hundreds of stranded families were brought to safer areas and accommodated in schools and private houses. In view of the reports of fodder scarcity and outbreak of cattle diseases, the State Agriculture Department has made arrangements for free distribution of concentrates and for squads of veterinary officers to reinforce existing organisation. A sum of Rs. 1,15,000 has already been sanctioned for grants for house building purposes. The State Government are also giving dry doles to the affected persons. Milk canteens have been opened and other relief measures have been taken.

5. *Effect of Works already undertaken*

A flood embankment with revetment was constructed during the last working season along the Kaljani river to protect Alipurduar town. Although the river was in high flood in July, 1955, there was no flooding of the town except local congestion of drainage due to heavy rainfall. In Darjeeling district, the Mahananda rose up to the highest recorded flood level. The works undertaken for the protection of Siliguri town have withstood the onslaught of floods. There was however, some erosion on the right bank of the river opposite Phansidawa Hat about 8 miles below Siliguri. With a view to check the erosion, the protective works are being extended to cover the threatened area. The Cooch Behar town protection works on the left bank of the river Torsa, which is noted for frequent changes in its course, are also standing well except for a few rain-cuts which are being attended to. Except for one breach about 800 feet wide in the Barnes-Domohani embankment and another in the Dharaikuri embankment, the protection works in West Bengal have withstood the onslaught of floods. According to the State Government's report, the floods this year were three feet higher than last year and the embankment which was designed to the level of the 1954 floods was overtopped resulting in the breach. Steps are being taken by the State Government to fill the gap.

6. *Future Programme*

No new schemes have yet been prepared for the working season of 1955-56. The second phase of some of the works which were undertaken in the last working season will be completed in 1955-56. Appendix IX gives the details of the works to be done.

IV UTTAR PRADESH

I reviewed the flood situation in U.P. in the statement which I laid on the Table of the Lok Sabha on the 2nd August, 1955. Subsequent developments up to the 14th August, 1955, based on the latest report from the State Government are given below.

According to the reports received up to August 6, 1955, the overall flood situation in this State was satisfactory and water was receding almost in all rivers. On account of heavy and incessant rains at some places and particularly in the districts of Ballia, Azamgarh, Gonda and Bahraich after August 6, 1955, the rivers Ghagra, Rapti and Tons again registered a rise.

In Ballia the river Ghagra eroded the entire abadi area of village Hewantpur consisting of 185 houses rendering 300 families homeless. Further erosion from this river is continuing. The Tons also swept away 51 houses in village Inderpur and 50 houses in village Rampur. Sixty villages of Rasra and Sadar Tahsils of Ballia district inundated by the waters of river Tons continue to be water-bound. In all some 4000 persons have been rendered homeless. No loss of life has however been reported so far.

In Azamgarh the big bridge of river Tons and all other bridges on this river have been damaged.

In Jaunpur the water levels of the rivers Gomti and Sai have gone down to the levels of July 17 last, *i.e.*, just prior to the floods.

In District Bahraich heavy rains occurred on the 5th and 6th August, and this resulted in rise of water in the rivers Ghagra, Sarju, Rapti, Bhakla and Tehri. About 86 villages covering an area of about 11,000 acres were affected. Four villages were completely marooned. The level of these rivers has started falling.

In District Gonda heavy rainfall occurred on the 4th and 5th August—about 7.5" of rain having fallen in Utraula Tahsil on the 4th August. All the small rivers in the District started rising and a large number of villages were affected, particularly due to water-logging. The position has continued to improve for the last one week.

The Bari Gandak (Narayani) which flows through Deoria and Gorakhpur is behaving normally and has not caused much damage. In Gorakhpur district, the floods are now subsiding gradually. Sheets of water which had collected have almost cleared except in local depressions. The situation has now improved.

The District of Ghazipur has experienced mild floods. In tahsil Saidpur 18 villages were inundated by small rivers and some 200 villages suffered from water-logging owing to rains. In tahsil Mohammadabad some 30 villages have been affected by floods in the Tons. There has, however, been no loss of life or cattle in any of these tahsils. All possible relief measures were taken and about 500 persons were evacuated from the affected villages in tahsil Mohammadabad. As the waters receded, however, they gradually went back to their places.

According to the latest information the levels of the rivers Tons and Ghagra are again going down although slowly. Overall flood situation in other districts is satisfactory and the District Officers and their staff are busy in providing relief to the flood affected persons.

The flood protection schemes covering the districts of Ballia and Ghazipur are given below:—

Name of Scheme	Estimated cost	Remarks
	Rs.	
1. Goshalpūr Bund in Ghazipur District	2,57,000	50 % of work completed.
2. Ballia-Baria Bund along the Ganga river	16,28,000	60 % of the work completed.
3. Asawar Bund in Ghazipur district	2,04,000	25% of work completed.
4. Govindpur Bund in Ghazipur district	2,25,000	40% of work completed.
5. Mustafabad khunti Prithvipur Bund, Ballia district	3,17,000	25% of work completed.
6. Protection of marooned villages along Ghagra river in Ballia district	16,13,000	} The estimates have been prepared and work will be started soon.
7. Protection of marooned villages along Ghagra in Ballia and Azamgarh districts	9,91,000	
8. Bakulaha sansar Tola Bund along river Ghagra District Ballia	4,07,000	
9. Turtipur Srinagar Bund along Ghagra river in Ballia district	30,59,000	

A statement showing the financial assistance granted by the State Government to the flood affected districts upto *August, 14, 1955* is attached (Appendix X).

The relief measures sanctioned up to the end of July, 1955. are detailed in Appendix XI.

The following further relief measures are being taken:—

(1) To relieve the shortage of fodder in the flood affected districts, the Forest Department is despatching hay to the various districts and so far 37 wagons of hay have been sent. The State Government have also decided to supply bhusa to the flood affected districts at cost price and to bear the incidental and other overhead charges themselves. A sum of Rs. 1,85,000/- has been placed at the disposal of these districts for this purpose. Further allotments will be made as the need arises.

(2) Orders have been issued for the remission of fees of children of poor persons affected by floods for a period of 5 months from August to December.

(3) Subsidies and loans will be granted for rebuilding of houses both in the rural areas and in the towns.

(4) Taccavi for purchase of seed and bullocks will be distributed on an extensive scale.

(5) The State Government propose to advance short term loans to the extent of Rupees 1 crore and 50 lacs for the purchase of seed, bullocks, fertilizers, agricultural implements and for the construction of their houses. No interest would be charged.

(6) The State Government are also proposing to remit taccavi dues of the past 7 years outstanding in respect of such villages of these flood affected districts which were visited by natural calamities in 1953 and again in 1954 and where land revenue was remitted during both the years. These remissions would amount to about Rs. 30 lacs.

(7) The State Government further propose to spend about Rs. 2,43,000 on the free distribution of charkhas in these districts in order to provide gainful employment to the flood sufferers. In addition, test works are being opened wherever necessary so as to enable the victims to find employment and to tide over this period of crisis till the next rabi crops are harvested.

APPENDIX I

Causes of Heavy Rainfall

The monsoon advanced into Assam and the Sub-Himalayan West Bengal about the usual time in the first week of June and extended into Bihar by the 10th. In association with a land depression which formed over Vindhya Pradesh on the 16th and moved to north Bihar and filled up by 22nd, the activity of the monsoon over the region from east Uttar Pradesh to Assam was considerably intensified and heavy rainfall occurred in North Bihar, Sub-Himalayan West Bengal and upper Assam during the period 18th to 22nd. Champaran, Darbhanga districts of Bihar, Goalpara, Kamrup, Darrang districts of Assam and the Darjeeling, Cooch Behar districts of Bengal had 2 to 3 times the normal rainfall during this period and all the rivers of this area which were probably full by the previous rain began to be in spate. After the filling up of this depression the axis of monsoon trough continued to remain close to the Himalayas instead of getting back to its normal position with the result that widespread rain continued to occur in the Himalayas from Uttar Pradesh to Assam till the end of first week of July. There was thus little time for the abatement of the floods in the rivers of this area.

After a respite of rain for a week from 6th-13th of July due to the weakening of the monsoon in general, the monsoon strengthened again on the 15th July when a low pressure area developed over Bihar. This intensified into a depression by the 18th and remained stationary over the east Uttar Pradesh upto 22nd July weakening thereafter. Under the influence of this depression the monsoon was vigorous over Bihar and the eastern division of Uttar Pradesh between the 16th and 20th. Even after the weakening of this depression, the axis of the monsoon trough continued to remain over the foot of the Himalayas and widespread rain with local heavy falls persisted along and near the Eastern Himalayas from Uttar Pradesh to Assam. During all this period the rainfall in the Central parts of the country and northwest India was much below normal. A vigorous rush of monsoon air from the Bay of Bengal to the Eastern Himalayas caused a spell of very heavy rainfall in Sub-Himalayan West Bengal and upper Assam between the 23rd and 28th. This heavy fall coming on top of the already swollen rivers was responsible for the severe floods in North Bengal and upper Assam in the last week of July.

Thus the main feature of this year's monsoon upto the end of July was the continued disposition of the monsoon trough near the foot of the Himalayas most of the period and as a consequence the continued rainfall along and near the foot of the Himalayas throughout this period with two or three heavy spells there in association with two land lows developing over the areas. As usual with such a situation, the rainfall in the rest of the plain of Uttar Pradesh, the central part of the country and northwest India was much below than normal.

Analysis of July Rainfall

The years in which the actual rainfall during July in different districts was twice or more than twice the normal, during the period 1901-1954 are set out in the table. Twice the normal rainfall for the month as a whole may be considered sufficiently heavy rainfall from the point of view of floods. July 1955 rainfall as a ratio of the normal - July rainfall is also given in the statement. A comparison of these figures with the ratios in the past indicates that this year's total rainfall for the month as a whole has been unprecedented in Fyzabad and Jaunpur districts, but not in the others. The analysis of July 1955 rainfall week by week given in the table, however, brings out exceptionally intense falls (as much as 4-7 times the normal) having occurred in one or two weeks in a number of districts.

As the table shows, there is hardly any periodicity in the occurrence of the years of excessive rainfall in any of the districts.

RAINFALL OF JULY

District	Years in which July rainfall was twice or more than twice normal with the ratios actual to normal rainfall within bracket.				Actual July	Rainfall in July 1955			
						6th	13th	20th	27th July
					Normal	Ratio of actual to normal rainfall for week ending			
<i>East Uttar Pradesh</i>									
Allahabad	1911 (2.2)	1920 (2.0)	1925 (2.4)	..	1.3	2.2	0.8	3.5	0.6
Banaras	1914 (2.2)	1920 (2.0)	1922 (2.1)	1946 (2.3)	2.4	3.1	0.4	6.0	0.5
Jaunpur	1914 (2.0)	1946 (2.1)	..	..	3.3*	5.0	0.2	7.2	0.7
Gazipur	1904 (2.1)	1922 (2.0)	..	..	1.5*	1.5	0.2	3.9	0.3
Ballia	1920 (2.0)	1924 (2.2)	..	..	1.2*	1.3	0.2	2.6	0.9
Gorakhpur	1905 (2.0)	1934 (2.0)	1936 (2.1)	..	1.1*	1.0	0.1	1.7	0.1
Azamgarh	1924 (2.2)	..	..	..	1.8	1.0	0.8	5.2	0.2
Faizabad	1925 (2.5)	1947 (2.1)	1948 (2.8)	1953 (3.1)	4.0*	4.5	0.3	6.1	5.9
Gonda	1924 (2.2)	1938 (2.9)	1953 (2.2)	..	2.2	1.8	0.5	3.6	4.1
Bohraich	1922 (2.5)	1936 (2.2)	1953 (2.5)	..	2.5	1.0	1.0	3.6	6.6
<i>North Bihar</i>									
Champanan	..	..	..	..	1.0	0.1	0.2	1.3	1.6
Muzaffarpur	1933 (2.1)	1949 (2.0)	..	..	2.1*	..	..	..	..
Darbhanga	..	..	..	..	2.1	1.4	1.1	4.0	1.0
Purnea	1948 (2.1)	..	..	..	1.5	1.7	0.6	1.9	2.0
<i>North Bengal</i>									
Jalpaiguri	..	..	..	..	1.8	0.9	0.9	1.2	4.0
Darjeeling	1910 (2.0)	..	..	..	0.9	..	..	..	..
Kalimpong	..	..	..	..	1.6	1.1	0.7	1.3	0.7
Cooch-Behar	1921 (2.4)	..	..	..	1.9	1.4	1.2	0.7	4.3
<i>North Assam</i>									
Goalpara	1906 (2.0)	1918 (2.1)	1931 (2.0)	1954 (2.2)	1.3	0.7	0.4	1.4	4.7†
Kamrup	1917 (2.1)	..	..	..	1.3	1.5	0.5	1.8	1.8
Darrang	1918 (2.6)	..	..	..	1.6	1.8	0.4	1.8	1.5
Lakhimpur	..	..	..	..	1.7	1.3	1.7	1.5	1.3

*Rainfall data upto 27th July only available.

†Rainfall data upto 27th July only available.

APPENDIX II

ASSAM

Flood Protective Works

1. Works taken up during 1954-55 working season.

(E. W.-Earth works in lakhs cft.)

S. No.	Name of Schemes	Estimated cost in lakhs of rupees	Area to be benefited in acres	Total estimated Qty. of work	Target of work for the working season	Upto-date progress upto 15-7-55		Date of commencement	Target date of completion	Remarks
						% age of column (5)	% age of column (6)			
1	2	3	4	5	6	7	8	9	10	11
A.	<i>Schemes costing above Rs. 10 lakhs.</i>									
1	Dibrugarh Town Protection.	160			100%		100%			The estimated cost of Rs. 160 lakhs will need revision as considerable work has been done in addition to that visualised in the estimate. Additional works are necessary; some more spur may be constructed during 1955-56 working season.
2	Palasbari Town Protection (Temporary bank works).	9.95			100%		100%	Feb. '55		Model experiments are in progress, for evolving suitable permanent measure which will be carried out during 1955-56 working season.

ASSAM

I	2	3	4	5	6	7	8	9	10	11
8	Flood Control Measures in Nowgong district (Kopilli valley)	10	..	..	..	..	100 %	..	..	..
B.	Scholar costing below Rs. 10 lakhs.	..	..	..	..	..	..	..	..	..
I	Town Protection Works	..	..	..	..	..	..	..	..	..
	(a) Sualkuchi	4.22	..	..	100%	..	100	Feb. '55.	..	20 Spurs provided at dangerous points and further erosion arrested.
	(b) Nowgong	1.88	..	..	100%	..	22 %	..	..	..
	(c) Goalpara	1.25	..	..	100%	..	15 %	..	..	..
21	Extension of Demow bund upto Dhaiali (7.5 miles).	3.78	..	..	..	71 E.W.	..	..	..	..
3	Extension of Brahmaputra bund from Desangmulh to Dikumukh (3.5 miles)	4.5	..	..	..	92%(E.W.)	..	..	..	..
4	Marginal bunds on Namti river (6.5 miles).	0.71	..	..	..	92%(E.W.)	..	..	..	..
5	Dhansiri bund from PWD road upto Kazironga R. F. (3 miles).	2.99	..	..	..	85%(E.W.)	..	..	..	..

APPENDIX III

Surveys and Investigations in Assam

After the extensive damage done by the floods in Assam in the years 1950 and 1952, Shri Garg, the then Director, C.W. & P.C. visited the flood affected areas in August, 1952. At his recommendation which was endorsed by the Government of India, one River Investigation Division was opened in March, 1953 for undertaking hydrological observations at 30 sites on Brahmaputra and its tributaries in Assam. In July, 1954 another Division was opened for carrying out further surveys at the abovementioned sites and also on some more rivers.

While the surveys by these two Divisions were in progress, the developments following the catastrophic floods of 1954 resulted in the formation of flood control board and organisations necessary for undertaking flood control measures in a co-ordinated manner.

At the request of the State Government, Assam, an Investigation Circle was opened under the control of C.W. & P.C. in September, 1954 with four Divisions. The entire river system in the State has to be investigated. The programme of surveys and investigations in Assam broadly includes aerial photography in approximately 20,000 sq. miles, topographical, hydrological and silt surveys of Brahmaputra and its tributaries, meteorological observations in the main and subsidiary catchments and reconnaissance and geological surveys of high priority projects.

The work of field investigations in Assam is being carried out by the Assam Investigation Circle, C.W. & P.C. as well as by the State Government. The major portion of this work is entrusted to the C.W. & P. Commission. The progress (upto 31-7-55) of the work being carried out by C.W. & P.C. is given below:

Aerial photography in an area nearly 12,500 sq. miles and spot-levelling over 1,369 sq. miles have been completed (upto 15-7-55) against 15,711 sq. miles and 4,483 sq. miles respectively programmed for 1954-55 season.

River Surveys were undertaken on the Barak and 11 tributaries. These have been nearly completed on the Barak (88 miles) and 1 tributary (27 miles) and completed on the Noa Dihing (83 miles), the Kopilli (64 miles) and 4 other tributaries (122 miles). Some cross-

sections of the Brahmaputra have also been taken. Further work has been suspended due to persistent inclement weather and will be resumed after monsoons. These surveys consist of (i) Single-levelling for cross-sections (ii) double-levelling for longitudinal sections.

Hydrological observations consisting of gauge readings on the Brahmaputra (at 6 places) and the Barak and on 46 other tributaries and (ii) discharge observations on the Brahmaputra, the Barak and their 40 tributaries are in progress. Setting up of some other gauge and discharge sites is in hand. In addition gauge and discharge data and other data are being collected from State P.W.D. and Railways. Discharge data observed for the river Tsangpo (the upper reach of the Brahmaputra) in Tibet are being received from Hydro-meteorological stations, Peoples Republic of China since 21.7.55.

Silt observations are in progress at one site each on Brahmaputra and the Barak and also on 19 tributaries.

Rainfall data is being recorded at two places one each in Manas and Dihang basins. In addition available rainfall and temperature data are being collected from Tea Estates and State and Railway Departments.

The preliminary reconnaissance surveys have been carried out for selecting suitable storage sites and locating dam-sites in the Kopilli, the Noa Dihing and the Parak basins; some further investigations have been found necessary in case of the last one.

The project reports pertaining to the Kopilli and the Noa Dihing have been completed and are under examination in C.W. & P.C. Draft report for the Barak is under preparation; this will however be finalised after further investigations during the next working season.

The Geologist of the Geological Survey of India has also inspected the tentatively selected dam sites on the rivers Barpani and Diyung (Kopilli Basin), Subansiri and Luhit and his report is awaited.

Investigation by State.—The particulars of the work being done by the State are given below:

Survey work is in progress along the entire length of the proposed Brahmaputra embankment from Nowgong District boundary up to Hiloikhunda in Kamrup District. The alignment of the proposed embankment from Silghat to Dihing has been completed.

Reconnaissance and detailed surveys are also in progress for 9 of a number of new embankment schemes proposed to be taken up in the Brahmaputra, the Noa Dehing, the Buri Dehing, the Jhanjit and Bhagdoi basins, and some of these have been completed.

River gauges are being observed daily on the Brahmaputra, the Barak and 8 tributaries.

One discharge observation site on one of the tributaries and one rainfall station at Silchar have been established.

A note on the rain gauge stations as well as of existing gauge and inventory of existing gauge and discharges sites prior to monsoon of 1954 in Assam are given as Annexures to Appendix III.

Annexure to Appendix III

RAIN GAUGE STATIONS

Assam

In Assam the position of the raingauges is rather unsatisfactory and great difficulty is being experienced in planning flood control projects in this area because of lack of basic hydrological data. The following steps have, therefore, been taken for the collection of this data.

After the August 1950 earthquake in Assam, it was recommended by the various committees set up for surveying the flood affected areas and suggesting remedial measures that hydrological data should be collected forthwith. A scheme was then prepared by the India Meteorological Department for installation of 76 additional raingauges in the river catchments of Assam, Manipur and Tripura States. The distribution of these raingauges is as below:—

Assam	40
N.E.F. Agency	17
Manipur State	9
Tripura State	3
Bhutan	7
	<hr/>
	76

The concerned State authorities have started action on the installation of the above stations excepting those of Bhutan. The Central Water & Power Commission is arranging through the India Meteorological Department for the setting up of Bhutan raingauges.

After the 1954 floods a scheme was prepared by the India Meteorological Department in consultation with the Central Water & Power Commission for installation of 160 raingauges in the Himalayas. Details of this scheme have already been given by me in my report on flood control measures laid on the Table of the House on 4-4-1955.

Out of these 160 stations, it is proposed to instal 21 stations in Assam and N.E.F. Agency and 7 in the catchments of Assam rivers lying in Bhutan territory. Thus in all 14 stations, 7 from each scheme, will be installed in the Assam river catchments in Bhutan. These stations and the twentyone proposed for Assam and N.E.F. Agency will be established during the next two years.

In addition to the 14 raingauges in Bhutan, it is proposed to instal 6 river gauges and 6 wireless stations. Parties of technical personnel consisting of wireless operators and overseers had left the base camps in North Bengal for the installation of 8 raingauges, 4 river gauges and 4 wireless stations proposed for this year but have been held up on the way due to very heavy rains and breaches in road communications. They will proceed forward as soon as the communications are restored. The work of installation of the remaining 6 raingauges, 2 river gauges and 2 wireless stations is expected to be completed before the 1956 monsoon. Discharge and silt observations will also be started at five river gauge sites and aerial surveys of river catchments begun after the present monsoon. The aerial surveys will be continued to completion after 1956 monsoon while ground parties consisting of Forest Officers, Engineers and Geologists of the Government of India accompanied by the Administrative and Technical officers of the Government of Bhutan will go over the river catchments to find the exact spots where soil conservation measures are necessary. The soil conservation measures will consist mainly of afforestation, gully plugging and similar anti-erosion measures. Possibilities of detention reservoirs to hold back the flood peak will also be investigated in this period.

After the wireless stations are installed, the information about rainfall and river heights during floods will be communicated at short intervals to Dhubri in Assam for taking necessary precautions in the areas which will be exposed to flooding.

Forecasting of Floods

Arrangements have been made with the Government of China for getting information about the floods on the upper reaches of Brahmaputra in Tibet. The Government of China has agreed to transmit the reports of the rainfall and river levels at three hydrographic stations Shigates, Chusui and Tsela Dzong in Tibet. These messages are now being received by the Posts & Telegraphs Station at Darjeeling and transmitted to the officers of Central and State Governments at Gauhati, Shillong and Dibrugarh.

Inventory of Gauge & Discharge sites in Assam prior to Monsoon 1954.

Sl. No.	Main Basin	Sub-basin	Site	Discharge and gauge site
1	2	3	4	5
1	Brahmaputra	Brahmaputra	Dibrugarh	G
2	Do	Do	Neamati	G
3	Do	Do	Tezpur	G
4	Do	Do	Pandu	G & D
5	Do	Do	Goalpara	G & D
6	Do	Dihang	Passighat	G & D
7	Do	Buri Dihang	Margherita	G
8	Do	Do	Khowang	G & D
9	Do	Subansiri	2 miles downstream of N.T. Road crossing	G & D
10	Do	Do	Gorge site near Pathalipam	G
11	Do	Do	Backwater	G
12	Do	Jai Bhorelli	Siloni Ghat	G & D
13	Do	Puthimari	Crossing of Barpeta Tejpur Road at mile 87/7.	G & D
14	Do	Boralia	Mile 93/5 Barpeta Tejpur Road	G & D
15	Do	Nona	Mile 97/6 Barpeta Tejpur Road	G & D
16	Do	Pagladiya	Mile 103/5 Barpeta Road	G & D
17	Do	Buradiya	Mile 107/7 Barpeta Road	G & D
18	Do	Tihu	Mile 118/7 Barpeta Road	G & D
19	Do	Kaladipa	Mile 120/6 Barpeta Road	G & D
20	Do	Pahumara	Mile 128/5 Barpeta Road	G & D
21	Do	Manas	Mathanguri	G & D
22	Do	Kopilli	Karikhana	G & D
23	Do	Barapani (tributary of Kopilli)	Baitha-Langso	G & D
24	Do	Killing (tributary of Kopilli)	Auguri Tea Estate	G & D
25	Barak	Barak	Lakhipur	G & D
26	Do	Do	Silchar	G & D
27	Do	Katakai	Kukichera	G & D
28	Do	Do	S.T. Road	G & D

Inventory of Gauge & Discharge sites fixed in Assam after floods of 1954

Sl. No.	Main Basin	Sub-basin	Site	Discharge & gauge site
1	2	3	4	5
1	Brahmaputra	Brahmaputra	Murgensolek	G
2	Do	Disang	Naglamara Ferry	G & D
3	Do	Dikhu	Sibsagar	G & D
4	Do	Jhanji	Jhanji	G & D
5	Do	Ranganadi	Mile 125 of N.T. Road	G & D
6	Do	Do	Gorge site	G
7	Do	Do	Backwater	G
8	Do	Dikrang	Mile 111 of N.T. Road	G & D
9	Do	Do	Gorge	G
10	Do	Do	Backwater site near Silikhaguri	G
11	Do	Borgong	On N.T. Road 58 miles from Tezpur.	G & D
12	Do	Do	Gorge (7 miles above Discharge site)	G
13	Do	Do	Backwater zone (Katuileai ghat)	G
14	Do	Gabhuru	15 miles from Tezpur	G & D
15	Do	Do	Railway bridge crossing on Rangia Tezpur Section	G
16	Do	Do	Near Novel village	G
17	Do	Belsiri	On N.T. Road 18 miles from Tezpur	G & D
18	Do	Do	Belsiri foothill camp	G
19	Do	Do	Near village Bara Sungri	G
20	Do	Jai Bhorelli	Gorge site	G
21	Do	Do	Backwater zone	G
22	Do	Panchnoi	Mile 32/1 N.T. Road	G & D
23	Do	Do	Gorge site	G
24	Do	Do	Backwater zone	G
25	Do	Dhansiri (N)	Mile 36/4 N.R. Road	G & D
26	Do	o	Gorge site	G
27	Do	Do	Backwater zone	G

1	2	3	4	5
28	Brahmaputra	Noa	Mile 63/4 N.T. Road	G & D
29	Do	Do	Gorge site	G
30	Do	Do	Backwater zone	G
31	Do	Nonai	Mile 73/6 N.T. Road	G & D
32	Do	Do	Gorge site	G
33	Do	Do	Backwater zone	G
34	Do	Barnadi	Mile 76/4 N.R. Road	G & D
35	Do	Do	Gorge site	G
36	Do	Do	Backwater zone	G
37	Do	Puthimari	Gorge site	
38	Do	Do	Backwater zone	G
39	Do	Baralia	Gorge site,	G
40	Do	Do	Backwater Zone	G
41	Do	Nona	Gorge site	G
42	Do	Do	Backwater zone	G
43	Do	Pagladiya	Gorge site	G
44	Do	Do	Backwater zone	G
45	Do	Buradiya	Gorge site	G
46	Do	Do	Backwater zone	G
47	Do	Tihu	Gorge site	G
48	Do	Do	Backwater zone	G
49	Do	Kaladiya	Gorge site near Kakitbari	G
50	Do	Do	Backwater zone near Kalmari	G
51	Do	Pahumara	Gorge site near Hagua	G
52	Do	Do	Backwater zone	G
53	Do	Kulsi	Ukiam	G & D
54	Do	Do	Chayagaon (Backwater zone)	G
55	Do	Do	Kulsi village at mile 26 of Gauhati and Goalpara Road	G
56	Do	Do (River Khaklaria)	Mile 30/2 Gauhati Road	G
57	Do	Dosila	Mile 53/4 Gauhati road	G & D
58	Do	Do	Gorge site	G

1	2	3	4	5
59	Brahmaputra	Dosila	Backwater zone at Chapla Gaon	G
60	Do	Dudnai	Mile 66/3, Gauhati Road	G & D
61	Do	Do	Gorge site	G
62	Do	Do	Backwater zone near village Dumani	G
63	Do	Krishnai	Mile 74/4 Gauhati Road	G & D
64	Brahmaputra	Krishnai	Gorge site at Methipath	G
65	Do	Do	Backwater zone	G
66	Do	Jinari	Mile 79/7 Gauhati Road	G & D
67	Do	Do	Gorge site at Boddahpur	G
68	Do	Do	Backwater zone near Dubapara	G
69	Do	Jinjiram	Mile 94/6 Toru Road	G & D
70	Do	Bhogdoi	Jorhat	G & D
71	Do	Do	Gorge site near Mariani	G
72	Do	Do	Backwater zone	G
73	Do	Dhansiri (S)	Gorge site near Dimapur village	G
74	Do	Do	A.T. Road	G & D
75	Do	Do	Backwater zone	G
76	Do	Diyang (tributary of Kopilli)	Lamsakhong	G & D
77	Do	Noa Dihing	Gorge site	G
78	Do	Kopilli	Gorge site	G
79	Do	Do	Backwater zone	G
80	Do	Barapani (tributary of Kopilli)	Gorge site	G
81	Do	Do	Backwater	G
82	Do	Killing	Gorge site Rangphlang	G
83	Do	Do	Backwater zone	G
84	Do	Sonai	Gorge site	G
85	Do	Do		G & D
86	Do	Jatinge	Gorge site	G
87	Do	Do		G & D
88	Do	Tirak		G & D

1	2	3	4	5
89	Brahmaputra	Tirak	Gorge site	G
90	Do	Tipkai	Sapatgram	G & D
91	Do	Do	Backwaters zone near Bagribari	G
92	Do	Gaurang	Kokrajhar	G & D
93	Do	Do	Backwaters near Bilasipara	G
94	Do	Champarnati	Basugaon	G & D
95	Do	Do	Backwater zone near Chapar	G
96	Do	Burai Aie (tributary of Manas)		G & D
97	Do	Beki-Bhaluka- doba (tributary of Manas)		G & D

BIHAR (NORTH)
FLOOD PROTECTIVE WORKS

Appendix IV

I. Works taken up during 1954-55 working season
(excluding Kosi Project)

(E.W.=Earthwork in lakhs cft.)

Sl. No.	Name of Scheme	Estimated cost in lakhs of rupees	Area to be benefited in acres	Total estimated quantity of work	Target of work for the working season	Up-to-date (up to % age of col. 5	Progress (15-7-55) % age of col 6.	Date of commencement	Target date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
	<i>A. Scheme Costing above Rs. 10 lakhs</i>									
	1. Embankments on the Burhi Gandak :									
	(a) Along right bank from Muzaffarpur to Darbhanga district boundary (Muzaffarpur district).	35.97	2,51,620	(E.W.) 539.7	339.7	79.6	79.6	January, 1955.		
	(b) Along left bank from Rosera to Parihara (Darbhanga and Monghyr districts).	66.08	1,12,600	(E.W.) 1111.9	947	83	97	January, 1955.		
	(c) Along right bank from Rosera to Nima (Darbhanga and Monghyr districts).	61.32	1,02,400	(E.W.) 1046.4	950	69.4	76.4	January, 1955.		
	2. Embankment on the old Bagmati and the Burhi Gandak from Hathauri to Rosera.	43.54	36,000	(E.W.) 830.4	500	57.6	97.2	January, 1955.		

(E.W.—Earthwork in lakhs cft.)

I. Works taken up during 1954-55 working season.

I	2	3	4	5	6	7	8	9	10	11
3	Khirohi Scheme : Desilting, and forming embankments on Khirohi river (Darbhanga and Muzaffarpur districts).	50.43	68,500	(E. W.) 731.3	731.3	8.5	8.5	April, 1955		
4	Embankment from confluence of the Mahi with the Ganga upto the end of 8 No. bund with river Mahi, in Saran district.	16.35		(E.W.) 278.1	278.1	4.5	4.5	May, 1955		
5	Repairing and strengthening bunds (7 Nos.) along the Gogra (Called the Ghahra in U. P.) river, in Saran district.	19.46	4.00	(E. W.) 389.7	211	35	65			
6	Improvement of Kharika bundh on the right bank of Burhi Gandak.	10.47		(E.W.) 169	80	41.8	88.3			
7	Rosera-Angarghat embankment, on the right bank of the Burhi Gandak (10 miles).	18.01		(E. W.) 324.3	200	52	84.2	April, 1955		
8	Balan river embankment (23 miles)	41.01		(E.W.) 411.3	230	28.4	50.7	April, 1955		
9	Bainty river embankment (17 miles)	28.82		(E. W.) 250.4	139	33.6	60.4	April, 1955		

10	Embankment on the right Bank of the Burhi Gandak from Darbhanga district border to Pusa estate (5 miles).	10.08		187.5	36	15.8	81.7	April, 1955
<i>B. Schemes costing below Rs. 10 lakhs.</i>								
1	Chambarbandha embankment including further raising.	6.31	7,000	(E. W.) 162	162	80	80	
2	Improvement of Saran embankment along River Gandak.	1.22		(E. W.) 32.3	29	78	86	
3	Filling up gaps in Champaran embankment along river Gandak.	6.76		(E. W.) 106.6	105.6	99	99	
4	Protection of Chapra town.	1.04					Completed	
5	Protection of Khagaria town	2.25					Completed	
6	Protection of Sitamarhi town.	3.60					Completed	
7	Groynes in Spill Channel of the Bagmati.	1.94					Completed	
8	Embankment on the right bank of Burhi Gandak for the protection of Muzaffarpur town (2 miles).	1.24		(E. W.) 5.5		13		

The work was taken up during 1953-54. Further raising has been found necessary.

ANNEXURE (1) TO APP. IV

STATEMENT SHOWING THE PROGRESS OF WORK ON THE KOSI PROJECT LAID ON THE TABLE OF THE LOK SABHA ON THE 25TH JULY, 1955, IN REPLY TO STARRED QUESTION NO. 20 BY DR. RAMA RAO.

I. *Western Embankment*

In the nine northern miles of the flood embankment falling in the *Nepal Territory*, the work of embankment could not be taken up for want of land acquisition. As an alternative the reconstruction and raising above flood height of the dilapidated road, running from Kanhauli to Bharda, was taken up towards the end of May. It is now about 80 per cent complete. The construction is still going on and is expected to be completed within a few days.

In *Indian territory* from Kanhauli Bazar to Bhutaha, a distance of 16 miles, work is 78 per cent complete. The entire length is far above the designed high flood level. Work on 8 miles is being done by the contractors, on 2,000 feet by Shramdan and on nearly 7 miles by Public Cooperation.

Besides these, there are two *ring bunds*, one around Nirmali and the other around Mahadeomath, with a total length of about 7 miles. This is being done entirely by contractors and 90 per cent has already been completed.

On further investigation it was noticed that after the completion of the main embankment whereas the spill of Kosi would be stopped, the river Tiljuga, combined with other hilly streams, would still flow down the countryside of the embankment. Hence a return bund along the western bank of Tiljuga was proposed over a distance of about 2½ miles in order to divert its flow back to Kosi. This was entrusted to a Contractor and was started in the beginning of May last. As the time was short partial section was prescribed which has been completed all through.

An abstract of the volume of work and percentage of work done in different sectors is given below:—

Sector		Length	Quantity of earth work involved	Quantity of earth-work done till 30-6-55	Progress percentage to the total
Main Embankment	{ Shramdan	2,000 feet	18.0	12.50	69.40
	{ Public Cooperation	40,000 ,,	266.2	190.00	71.40
	{ Contractors	45,680 ,,	490.6	417.10	85.02
Bunds through Contractors	{ Ring Bunds around Nirmali & Mahadeomath.	36.940 ,,	345.8	311.30	90.02
	{ Marginal Return Bund along the Western bank of the river Tiljuga.	11,140 ,,	170.0	39.00	22.90

The consolidation of the embankment has been done manually all through except in the Shramdan reach where water tankers, Sheep-foot rollers and tractors have been used. Consolidation Units have been used in some of the contractors' sectors also where the soil was hard. According to Poona Model tests, the portion of the embankment between Kanhauli to Mahadeomath and the ring bunds at Mahadeomath and Nirmali were liable to flood attacks. To counteract the same, spurs have been constructed at Nirmali and Mahadeomath and also between Mahadeomath and Kanhauli. Further protective measures to the embankment are being provided by *Kans* grass roller revetment between Mahadeomath and Kamalpur, and by turfing in the rest of the embankment on the river side upto a height to control a normal flow of 5 lakh cusecs.

In all 13 gaps (two in Nirmali ring bund, one in Mahadeomath ring bund, one in Tiljuga marginal embankment and 9 in the main embankment) were left for country drainage where sluice constructions have been started in the early part of May 1955. The work is under construction and safety precautions by sandbagging the gaps, piling and revetment of the noses during the flood have already been taken. Out of these sluices those in the Nirmali ring bund are expected to be completed in July, 1955.

The Siani Sikrata, one of the Dhars allowing the maximum flow towards the western embankment which had out-flanked last year, has again been closed and adequate protective measures have been taken for the safety of the bund this year. Dagmara, the only dhar left open for the Kosi to spill towards the western embankment, has also been closed and protective measures for the same are in progress.

The telegraph line originally constructed about a couple of months before has been converted into an internal telephone system between the Divisional and the Sub-Divisional Offices. A Soil Testing Laboratory has been established at Mahadeomath which carries out tests in regard to consolidation throughout the entire work and the percentage consolidation reported has been from 42 to 80 per cent. which is regarded as quite satisfactory for an embankment of average 18' height. Investigation of the alignment south of Ghoghardiha has been finalised over a distance of 12 miles, *i.e.* upto a little distance beyond Madhepur. Concrete centre-line pillars are being installed.

Due to excessive rain in the foot hills of Himalayas on the western side of Kosi all the small drainage rivers, channels and tributaries to Kosi were in spate simultaneously resulting in flooding of the country side. This has been mostly drained out through the sluice openings. Some water-logging on the country side is still existing, the drainage of which is being attempted by cutting drains and connecting some of the sluice openings.

II. Eastern Embankment from Therbitia to Supaul

Nearly 9 miles were taken up and completed on 30-6-1955 as per reduced section and partial section. A few places were not, however, quite upto the mark and further work thereon was undertaken either to bring them upto full height or to make up the slope of 1:3 from the slope of 1:2 as had been prepared.

The work done was as follows:—

	Shramdan	A.C.C. and N.C.C. boys.	Gram Sewaks	Con-tractor	Panchaya labourers
Length	1,000 ft	6,000 ft.	800 ft. 600 ft.	1,100 ft.	36,500 ft.
Quantity of earthwork in- volved	7.35 lakh cft.	74.18 lakh cft.	12.41 lakh cft. 8.39	14.79 lakh cft.	401.65 lakh cft.
Reduced target	4.76 ,,	44.51 ,,	4.43 ,, 3.12 ,,	5.72 ,,	240.27 ,,
Quantity achieved till 30-6-55	4.76 ,,	44.51 ,,	4.43 ,, 2.41 ,,	5.37 ,,	260.27 ,,
Progress percentage to the total	64.8	60.0	35.7 28.7	36.3	59.8
Progress percentage to the reduced target.	100	100	100 77.21	93.88	100

Water Tankers and tractors were employed for mechanical *compaction* in the Gram Sewaks and portion of contractor sectors only. Further protection to the embankment is being provided by grass turfing on the river side slope. Electric generating sets have been installed along the embankment and electric light has been provided during night for mazdoors. For protection of embankment against the current in front of village Bhabhini, bamboo and ball pitching and spur works have been done.

The soil testing laboratory had been established along the embankment and different tests were carried out. The investigation of the further alignment, dag-belling and marking of land proposed for acquisition is in progress.

Land Acquisition.—The crop compensation for temporary acquisition of land is being paid by the land acquisition department. For further land acquisition, measurements are being taken by Land Acquisition staff within dag-belled area.

Labour Amenities.—Welfare facilities to labour were always provided. Now all the labourers are gone as there is no space for work due to sudden and heavy flooding on eastern and western sides of the embankment.

Construction of Colony for Staff and Office Accommodation.—The work of construction of twin quarters is in progress. In the meantime several sheds are being constructed to accommodate stores, vehicles and staff who are without any accommodation due to rains and flood water in hutments.

III. Afflux Bund and the Flood Embankment Above Barrage

The eastern afflux bund above the barrage at Bhimnagar is 43,000 feet long. Beyond this it is connected by a 54,000 feet long flood embankment. The work on both these embankments is being executed through Contractors. The total work done till the 30th June, 1955, on the afflux bund and the flood embankment is as follows:—

Name of sector	Length	Quantity of earthwork involved	Reduced target	Quantity achieved till 30-6-55	Progress	Progress percentage to reduced target
			(In lakh cubicfeet).			
Afflux Bund	43,000 ft.	320·0	287·5	218·4	68	76
Flood protective eastern embankment	54,000 ft.	650·0	298·0	296·2	45·6	99

The compaction of the earthwork is mainly by manual labour. The field laboratory for soil testing work has been established in this area and different tests are being carried out. To counteract the formation of the current parallel to the embankment at the apprehended spots, 4 permeable spurs about 3 miles long each and 75 spurs 100 ft. long each have been constructed. As a further measure of protection, the river side slope of the embankment is being provided with grass turfing. For protection of the embankment and the toe, etc., stone boulders from the river bed, etc., to the extent of 4 lakh cft. have been collected at Chakraghati for use during emergencies. The telephone lines are now under construction. The Telephone service between Haripur and Birpur is already in operation. When the river started rising in the middle of June, 1955, the water that escaped through the little margin at Baghjora touched the bank at R.D. 65,000 and travelled down upto R.D. 18,000 where most of it turned back

into the river. The countryside also became swampy due to percolation and so no earth could be borrowed from nearby. However, buffalo carts were arranged and earth is being brought from a distance of 3,000' and the bank strengthened.

IV. Barrage

A survey of the area just above the barrage has been completed to finalise the plans for the coffer dam and diversion of water. A detailed survey at the nose of the Chapri island has also been completed. The various small dhars coming between the Chapri island nose and the barrage axis have been investigated. Proposals for diversion of water here have also been drawn up. Masonry blocks have been fixed along the barrage axis so that the axis line can be recognised after floods. The borrow area in Bhimnagar village has been surveyed and land plans have been prepared. An area of about 30 acres in the impervious zone had been already used for the manufacture of bricks and, therefore, the borrow area has been extended to include this additional area after putting in test pits. As the land from the borrow area to the left afflux bund is sandy, a haulage road is proposed over a distance of about 2 miles and an estimate has been prepared. Detailed investigation for the collection and conveyance of sand from Ganga Jali Dhar has been completed. The quantity available here would be adequate. The conveyance route from the Dhar to the Kosi river bank along an existing cart tract has also been finalised. Detailed proposals for laying a tram track along this route are being worked out.

The quarry for coarse aggregate has been investigated and land plans for the quarry site and screening equipment site covering about 20 acres have been sent to the Land Acquisition Officer for acquisition. Samples of coarse aggregate and sand have been sent to the Hirakud Research Station for testing and results are awaited. Some concrete blocks were made at site also and got tested at Patna Engineering College. The site survey for taking filter material from zones 14 and 15 has been completed. The site survey for taking rip-rap from the hills on the left of the Kosi river near Chatra has been completed.

About 500 tons of steel has already been indented for, for which quota certificates have been received. Orders are being placed for the same. Indent for another 1100 tons is being submitted for the barrage work.

An indent has been placed for 2056 tons of sheet piles through the D.G.S. & D.

List of machinery required for the Earth Dam and Left Afflux bund for 1955-56 and 1956-57 has been finalised and an estimate has been submitted to Government.

► The list of machinery required for the entire project is also being finalised.

V. Construction of Railway Line

SURVEY & LOCATION

(a) *Survey*.—Survey from Bhimnagar to Chatra and from Chakra-ghati to Quarry sites No. 8 and 10 has been completed.

(b) *Location*.—Demarcation from Bhimnagar to end of flood embankment has been completed.

(c) *Acquisition of land and clearing of Jungle*.—Permission for clearing a strip of land 22 miles long and 400 ft. wide along the proposed flood embankment has already been given by the Nepal Government.

CONSTRUCTION OF RAILWAY EMBANKMENT

Construction of railway embankment by departmental labour was started on 23-3-1955. Petty contractors were also employed on piece-meal system to do the earth work. The work has been divided into four reaches as follows:—

1. From Bhimnagar to Kusaha.
2. From Kusaha to Chakra-ghati.
3. From Chakra-ghati to Chatra.
4. From Chakra-ghati to Dharan.

So far work in reach No. 1 has been completed.

PROCUREMENT OF RAILWAY MATERIALS

(a) *Sleepers*.—About 50,000 sleepers have been delivered so far.

(b) *Rails and fittings*.—About 45 miles of railway tracks have, so far been received and stacked at Bathnaha. 2,50,000 Dog spikes and 100 tons of fish-plates, bolts and nuts are under despatch.

(c) *Locomotives*.—16 N.G. locomotives have been arranged from the Railway Board and are under repairs and overhauling in the workshops of the owning railways.

(d) *Wagons*.—The North Eastern Railway has arranged for 52 old N.G. wagons including some coaches.

VI. Collection of Basic Data

Discharge and silt observations on the three tributaries of the Kosi were continued. A wireless set, till recently at Delhi, has already been pressed into service at Patna in connection with broadcasts relating to daily discharges at Barakshetra. Hourly gauge readings and velocity observations at the new site st. 19 were continued. An estimate amounting to Rs. 12.89 lakhs has been prepared for soil conservation measures in the Kokah Khola catchment. Estimates for diffe-

rent items of observations, viz., gauge and discharge, seismological, meteorological and wireless operations are under preparation.

VII *Access Road from Bathnaha to Birpur and Bhimnagar*

The total length of the road is 28.54 miles. The earthwork in formation is in progress. About 75 per cent of the work has been completed over a length of 27 miles. Earthwork has yet to be done at the approaches to some of the dhars for a length of about $1\frac{1}{2}$ miles. The work in the reaches of Bathnaha to Balua and Balua to Birpur shows fairly good progress.

All the bricks required for the construction of the access road have been burnt and kept ready at the kiln sites. Out of the total requirements of 114 lakh bricks, 75.5 lakh bricks have already been carried to the road side and stacked and the rest are being conveyed.

Four new diesel road rollers and one 5 ton hand roller, with tractor, are in use for consolidation work. Another old steam roller obtained from the District Board, Patna, is under repairs and is being re-conditioned. About 30 per cent of the consolidation was completed by the end of June, 1955.

The service road already made along the alignment for inspection purposes and for transporting of materials is functioning fairly well. More intensive repairs have become necessary due to the rains and they are being attended to.

The construction of the temporary wooden bridges across the Kajra, Sursar, Bochaha, Haya, Dighi, Sanjaya and Izraha Dhars is in progress. Most of the works have been taken up departmentally. Pile driving in the Sursar and the Haya dhars has been completed and cross beams are being fixed. Pile driving in Bochaha dhar is in progress. Temporary crib work for the Kajara dhar and Dighi dhar has been completed. The bridge across the Kajra dhar has been completed and opened for vehicular traffic. Crib work in Sanjaya and Izraha dhars is in progress.

VIII *Construction of Residential and Non-residential Quarters at Various Camp Sites*

The revised lay-out plan for the Birpur colony has been completed.

Out of the 36 'E' type quarters taken up for construction in the Birpur Colony, 10 have come upto lintel level and 6 have come up about 5' above the basement level.

Messrs. Shalimar Tar Products Ltd., who have been given the work of the construction of the roof in all the 36 'E' type quarters, have already cast more than 4,000 pre-cast slabs for their specialised type of roof. Laying of the roof is expected to be taken up shortly.

The work on the construction of 80 'F' type quarters has been allotted to Contractors. They have started the excavation and concreting in foundation in 24 quarters

Out of one crore bricks for the colony, given on contract for supply, 80 lakh bricks have been manufactured.

The construction of eight 70' x 14' store sheds has been completed up to lintel level. All materials for the roofing work have already been collected.

The lay-out of roads in the northern half of the Birpur Colony, where buildings are under construction, has been completed. Planting avenue trees along the streets has been started to take advantage of the monsoon. An estimate for colony roads and sewage water drains for Rs. 5.50 lakhs has been prepared. It is proposed to do the road work now, taking advantage of the rainy season.

The surveys for the lay-out of the colonies at Forbesganj, Bathnaha, Chatra and Dharanbazar are in progress and estimates are also under preparation.

ANNEXURE (2) TO APPENDIX IV

Flood Control Schemes Completed under Scheme No. 83 of 1st Five Year Plan.

Serial No.	Name of the Scheme.	Length of Embankment in miles.	Estimated cost in lacs of rupees.
1.	Repairs to Bazidpur Embankment	17.5	1.52
2.	Repair to Bansidhar-Ka-Bund	1	0.49
3.	Gupta Lakhmania Embankment	12	12.54
4.	Phaphout Bund	2.6	0.55
5.	Kasba-Rupnagar Embankment	5.9	1.58
6.	Strengthening of 12 Nos. of bund in Saran district	38.6	20.06
7.	Remodelling of Naini Bund	7.5	3.31
8.	Bund across Jan Nallah	1	0.06
9.	Nagarpara Embankment	1.6	1.65
10.	Musmara Parbandh Mohanpur Nalah Scheme.	12	7.74
11.	Gogri Narayanpur Embankment	27	21.46
12.	Satraja Nallah Embankment	12	9.39
13.	Karahgola, Bhawanipur-Azampur Sankar Embankment	17	26.09
		155.3	106.44

APPENDIX V

SURVEYS AND INVESTIGATIONS IN BIHAR

For carrying out surveys and collection of necessary data, a Flood Investigation Circle with three Divisions has been set up to formulate flood control schemes in respect of the Bagmati, the Burhi Gandak, the Kamla and the Adhwara group of rivers.

Some existing data in the form of old bund maps, survey records and flood reports has been collected.

A reconnaissance survey for the following rivers has been carried out.

(i) *Bagmati*.—A reconnaissance report on the subject has been prepared. A tentative site for the construction of a barrage at Kármaiya has been proposed. The alignment survey of the river Bagmati from Hayaghat to outfall in Kosi has been completed. Alignment of both sides has been taken from Hayaghat to Phuhia and from Phuhia to outfall in Kosi only on the right side.

(ii) *Kamla River*.—A reconnaissance report has been prepared. A project report is under preparation. It is proposed to provide embankment on either bank of the Kamla, right from Darjia, its outfall into the Kosi to Chisapani where it debouches in the plains; the embankments in the Nepal portion will be sufficiently apart to serve as a reservoir and take in the detritus brought down from the hills as in the case of reservoir. Provision for a weir below the off-take of the Kamla canal under construction will also be made.

(iii) *Burhi Gandak*.—A project report has been prepared. A reconnaissance survey for a diversion cut to divert flood waters of the Masan (a major tributary of Burhi Gandak) into the Great Gandak is under contemplation.

Progress on the ground surveys for longitudinal sections showing bed levels at every 1,000 ft. and the cross sections spaced one mile apart along the length of rivers and tributaries is given below:—

Rivers	Longitudinal Sections		Cross Sections	
	Programme	Progress ending 15-7-55	Programme	Progress ending 15-7-55
I	2	3	4	5
Bagmati . . .	513 miles	440 miles	699 miles	640 miles
Kamla . . .	592 „	362 „	602 „	424 „
Burhi . . .	„	„	„	„
Gandak . . .	336 „	336 „	382 „	382 „

A note on the rain gauge stations as well as an Inventory of existing gauge and discharge sites (1-4-55) in Bihar are given in the Annexures to Appendix V.

Plane Table Survey for river Kamla for a length of nearly twenty miles from Indo-Nepal border to Pipraghat has been completed.

42 river gauges have been installed to carry out the observations during the 1955 monsoons. 7 discharge observation sites and 3 silt observation sites have been established.

Rainfall data is being observed at 13 stations in Champaran district, at 16 stations in Muzzaffarpur district and at 28 stations in Darbhanga district in the plains of Bihar. Besides these 34 rain gauge stations and observatories in Nepal and 5 rain gauges in Bihar were proposed to be installed by the I.M.D. and the State Government respectively. Out of these the following five rain gauge stations have been started recently.

(1) Hariharpur garhi	27°	25'	85°	30'
(2) Amlekhganj	20°	20'	85°	30'
(3) Nijgarhi	27°	15'	85°	10'
(4) Sinduhli garhi	27°	15'	85°	55'
(5) Chisa pati	26°	55'	86°	10'

The work in the Circle has been greatly handicapped for want of full strength of overseers.

In addition to above surveys, aerial photography in an area of nearly 6,500 sq. miles and spot-levelling over 3,175 sq. miles, against 753 sq. miles and 3,420 sq. miles respectively programmed for 1954-55 season, have been carried out (upto 15-7-55) by the Survey of India.

ANNEXURE TO APPENDIX V RAINGAUGE STATIONS

Rainfall stations are fairly well spread in the plains of Bihar and only 5 additional stations are proposed to be set up after the present monsoon. In the catchment areas lying in Nepal, thirty-four rain gauge stations are proposed to be established during the next two years. These will be in addition to the 46 already existing in Kosi catchment in Nepal. Five out of the ten stations for which permission of Nepal Government was received have already been established. The remaining five will be set up after the present monsoon. A party of the India Meteorological Department was ready to proceed to Nepal for installation of another 19 stations in its interior but it could not go as the permission of the Nepal Government was not forthcoming. This work will now be taken up as soon as the rainy season is over provided the permission is received by that time.

Six wireless stations have been proposed to be set up in Kosi basin in Nepal for flood warning purpose. These stations will form a part of the scheme of wireless stations which is being prepared by the Ministry of Communications for Nepal.

Inventory of existing gauge and discharge sites in Bihar (1-4-56)

S. No.	Basin	River	Location of site	Gauge and Discharge or Gauge
	Bagmati	Bagmati	Dhang railway bridge	G
	"	"	Kalan Jar Ghat	"
	"	Dharbanga Bagmati	Ekmi Ghat	"
	"	Old Bagmati	Badla Ghat	"
	"	Lakandhai	Sitamarhi	"
	"	"	Bakchi Bridge at Katri	"
	"	"	Runi Syed Pur	"
	"	Kareh	Haya Ghat	"
	"	Tiljuga	Gopalpur Ghat	"
	"	Siari	Kalanjar Ghat	"
	"	Barhor Baha	"	"
	Kamla	Kamla	Raj Nagar	G
	"	"	Andhra Ghat	"
	"	Kamla (Sakri Bank)	Sakri	"
	"	"	Hatisupal	"
	"	Kamla (Jiwachh)	Dharm Ghat	"
	Burigandak or Sikrana	Burigandak or Sikrana	Akhara Ghat	G&D
	"	"	Champatia	"
	"	"	Segauli	"
	"	"	Pusa	G
	"	"	Secundur Pur	G&D
	"	"	Barnawaghat	"
	"	"	Samastipur Railway Bridge	"
	"	"	Rosera Railway Bridge	"
	"	"	Khagaria Ghat	"
	"	"	Bara Ghat	G
	"	"	Madhubani Ghat	"
	"	Masan	Ramnagar Rly. Bridge	"

S. No.	Basin	River	Location of site	Gauge and Discharge or Gauge
	Burigandak or Sikrana	Tilaway . . .	Ghorher Ghat	G
	"	Balor	Shikarpur Rly. Bridge	"
	"	Teur	Sarawaghat	"
	"	Shanti	at fall of Nargauna Baha at Rahua	"
	Kosi	Dharma Spill	Bubhniculvant	"
	"	Uddhadhar	Bhaptiahi	"
	"	Westernly direction of spill of Kosi	Manjhari	"
	"	Gajna	Gajna railway Gauge	"
	"	Kosi	Bārashetra	G&D
	"	Sun Kosi	—	"
	"	Sapt Kosi	—	"
	"	Arun	—	"
	"	Tamur	—	"
	"	Kosi	Kursela	"
	Great Gandak	Great Gandak	Tribenighat	D&G
	"	"	Bharanipur	"
	"	"	Siswasota	"
	"	"	Bayanalla	"
	"	"	Chetia	"
	"	"	Hajipur	"
	"	Dha	Ram Dauli	"
	"	Mahi	Sarangpur	"
	Ghaghra	Ghaghra	Tartipur	"
	"	"	Manjhi	"
	Ganga	Ganga	Chapra	"
	"	"	Buxar	"
	"	"	Digha	"
	"	"	Mokamuh	"
	"	"	Near Monghyr	"
	"	Gomati	Gomati-Mohana	"

S. No.	Basin	River	Location of site	Gauge and Discharge or Gauge
	Ganga	Baya	Rly. crossing between Bhagwanpur-ground station	G
	"	"	Burha Sluice	"
	Karnasa	Durgauti	378 miles G.T. Road	D&G
	"	"	275 miles G.T. Road	"
	"	Kudra	362 miles G.T. Road Distt. Shahabad	"
	Son	Son	Dehri.	"
	"	"	Barun	"
	"	Koel	Mohammad Gung	G
	Punpun	Koel	Punpun Rly. Station	"
	"	"	Futua	"
	"	Batuni	328/27th mile G.T. Road	"
	"	"	330th mile G.T. Road	"
	"	Morhar	290th mile G.T. Road	"
	"	Lavjan	283/84 miles G.T. Road	"

Additional River Gauges set up

Name of State	Name of River	Number	Location of sites	Gauge & Discharge (G&D) or only Gauge (G)	Remarks
1	2	3	4	5	6
Nepal	Bagmati		Noonthou	G&D	
North-Bihar	Bagmati	12	1. Dheng	G&D	
			2. Off-take of Sugia Paradesia	G	
			3. Minapur	G	
			4. Sitamarhi road 10th mile at 2 places	G	
			5. Sitamarhi road 14th mile	G	
			6. Berua (16th mile) Dharbhanga road	G	
			7. Staridhar 21st mile Dharbhanga road	G	
			8. Hayaghat	G	
			9. Badlaghat	G	
			10. Puranidhar	G	
			11. Kola Sitamarhi Seshar section crossing	G	
	Lakhandeyi	3	1. Sitamarhi	G & D	
			2. Rajkhand	G	
			3. Keitas	G	
	Karnla	8	1. Ekmighat	G	
			2. Chisapani	G	
			3. Jainagar	G & D	
			4. Bhakua	G	
			5. Jhani jharpur	G	
			6. Rajnagar]	G	
			7. Tarasarai	G	
			8. Gousaghat	G	

1	2	3	4	5	6
North-Bihar	Adhwara	1	1. Kumna Sitamarhi-Sursand road crossing	G	
	Hardi	1	1. Sitamarhi-Sursand road crossing	G	
	Nawkhal	1	1. Sitamarhi-Sursand road crossing	G	
	Marha	2	1. Sitamarhi road 2. Sursand-Charaut road	G G	
	Rato	1	1. Sursand	G	
	Singni	1	1. Sitamarhi-Sursand road Bridge	G	
	Sikas	1	1. Sursand pupri road crossing.	G	
	Burnad	2	1. Sursand pupri road bridge	G	
			2. Agropatti	G	
	Khiroi	2	1. Agropatti	G	
			2. Darbhanga Muzaffarpur road crossing (Sobhan bridge).	G	
	Burhi-Gandak	4	1. Chanpattia	G&D	
			2. Sikandarpur	GD	
3. Rosera			G		
4. Khagaria			G		
Ghaghra	2	1. Darauli 2. Manjhi	G G&D		

APPENDIX VI

Bihar—Future Schemes

Sl. No.	Name of the Scheme	Total estimated cost in crores
1	Flood Control Works (including Drainage) Schemes originally intended for execution under the programme of the permanent improvement of scarcity areas	1·50
2	Drainage of chauris in the basin between Gandak and Burhi Gandak above 3 sq. miles in areas and desilting of rivers for 235 miles	1·07
3	Embankments along Burhi Gandak 280·5 miles long	4·66
4	Embankments along Bagmati 338 miles long and proportionate cost of weirs.	6·56
5	Embankment along Kamla 200 miles long and proportionate cost of weirs.	4·42
6	Barrages, weirs and storages on Bagmati Kamla	4·09
7	Miscellaneous works to be executed	0·89
		<u>23·19</u>
	<i>South Bihar</i>	
8	Patna Protection schemes	1·00
	GRAND TOTAL	<u>24·19</u>

APPENDIX VI-A

Further Flood Control Schemes to be taken up during 1955-56

Sl. No.	Name of the Scheme	Length of embankment in miles	Estimated cost in lacs of rupees	Remarks
1	Deokuli bund scheme in the district of Saran.	9.1	6.65	
2	Embankment on the right bank of Burhi Gandak from Khagaria to Nima	17.2	37.69	
3	Embankment on the left bank of Burhi Gandak from Khagaria to Parihara	18.4	30.37	
4	Embankment on the left bank of Burhi Gandak from Akharaghat to Panapur	15	24.00	
5	Embankment on the left bank of Burhi Gandak from Akharaghat to Pakri	5	9.60	
6	Embankment on the right bank of Bagmati from Hayaghat downstream	50	80.00	
7	Embankment on the left bank of Bagmati from Hayaghat downstream	40	64.00	
8	Embankment on the right bank of Burhi Gandak from Pusa to Angaraghat	22	35.20	
9	Embankment on the left bank of Burhi Gandak from Rosera to Darbhanga-Muzaffarpur district border	42	63.00	
10	Embankment along the left bank from Muzaffarpur Darbhanga district border to point opposite Akharaghat.	26	40.00	
		<u>242.7</u>	<u>390.51</u>	

APPENDIX VII

KOSI PROJECT

Programme for 1955-56 Working Season

A rough outline of work programmed for 1955-56 is as below:—

Embankments below Barrage

Western Embankment.—The bank will be carried north of Kashauli Bazar up to Bharda (distance 13 miles). This is in Nepal Territory. The bank between Ghoghardiha and Madhopur will also be taken up (distance 12 miles). The bank from Bathatra to Kashauli Bazar (length 16 miles), that has been done this year, could not be completed to full section everywhere; this will be completed. A number of sluices have to be built but that work also could not be completed; so it will be done next season.

Eastern Embankment.—The bank between Therbita to Rupaulighat will be taken up (distance 17 miles). The work taken up this year *i.e.* from Supaul to Therbita, could not be completed to the final section; so this work also will be completed. No work will be done below Supaul.

Embankment above Barrage

The flood embankment beyond the eastern afflux bund will be completed to full section (distance 13 miles).

The afflux bund will be completed next year (distance 9 miles). This work will have to be carried out with machinery.

Eastern Earth Dam.—This is the embankment that contents the present Zero H.D. of the afflux bund to the diversion spillway of the Barrage, which is about 1½ miles in length, is proposed to be taken up and completed. This work will also have to be carried out with machinery.

Barrage.—If all the requisite machinery is collected in time it is proposed to take up a small length of diversion spillway in the next working season. At the moment an estimate is being prepared for this machinery and preliminary enquiries are being sent out about the availability etc. The machinery required for taking up this work are:—

- (1) Shovels and Dumpers at Dharan Bazar Quarry.
- (2) Aggregate processing and screening equipment.
- (3) Pumping Equipment.

Of course, the Railway line also must be got ready and railway wagons for conveying the aggregate secured. There is a good deal of difficulty in securing these wagons.

Railway line.—From Bhimnagar to Dhran Bazar efforts will be made to complete this work. A narrow gauge siding from Sathnah to Bhimnagar will enable a quick completion of this work. Proposals for this have been submitted.

Colony at Birpur.—The work has already commenced and it is expected to make good deal of progress in this in the next working season.

Approach Road from Bathnaha to Birpur and Bhimnagar.—This work will be completed in the next working season.

Landing ground at Birpur.—It will be quite essential to make the landing ground an all weather one. Estimate will be submitted and attempts made to carry out the work in the ensuing season.

Soil Conservation.—In the next working season some works pertaining to soil conservation will be done in the Kosi catchment. A good amount of investigation has to be done for preparing estimates.

Canal Investigation and Design.—Sanction has been requested for forming two Divisions for doing canal investigation and design work. In the next working season a good portion of work is proposed to be carried out.

General.—A temporary embankment will be formed from Rupaulighat to Bhimnagar as decided in the Control Board meeting on 6th July, 1955.

The above programme has to be elaborated and detailed notes have been called for from the Executive Engineers. It may be possible to give a final programme by end of August only.

The programme is liable to alteration as a result of observations made during the current flood season. It looks, more sluices will have to be constructed, along the Western Embankment than was originally contemplated. Bund along the left margin of River Tiljuga will also have to be constructed. Jhanjharpur Balan seems to be flooding the country a good deal before it falls into the Kosi so before the embankment for the Kosi below Ghoghariha is formed, this will have to be investigated and marginal bunds for the Balan may have to be formed, to a certain extent.

APPENDIX VIII

WEST BENGAL

Flood Protective Works

Works taken up during 1954-55 working season.

(E.W.=Earthwork in lakhs cft. ; B=Boulder pitching and dumping in lakhs cft. =P=Pile driving (Nos)

S. No.	Name of Scheme	Estimated cost in lakhs of rupees	Area to be benefited in acres	Total estimated quantity of work	Target of work for the working season	Upto date progress (upto 30-6-55)		Date of commencement	Target date of completion	Remarks
						%age of col. 5	%age of col. 6			
1	2	3	4	5	6	7	8	9	10	11
A. Schemes costing above Rs. 10 lakhs.										
1.	Protection of Jalpaiguri town (on Teesta river)	160		(E.W.) 190 (B.) 10 (P.) 12450	190 8.5 12450	100% 85% 100%	100% 97% 100%	December 1954 ..	May 1956 ..	First phase of the scheme costing Rs. 70.61 lakhs taken up. Second phase to be taken up during 1955-56 season.
2.	Protection of Alipurduars town (on Kaljani river).	19.47		(E. W.) 30 (B.) 6 (P.) 4000	25 5.7 3700	70% 95% 87%	84% 100% 94%	December 1954	May 1956	
3.	Protection of Cooh-Bihar town (on Torsa river).	145		(E. W.) 136.37 (B.) 25 (P.) 10500	98 15 11970	71% 59% 114%	98% 98% 100%	December 1954	May 1956	

(E.W. = Earthwork in lakhs cft. ; B=Boulder pitching and dumping in lakhs cft; P= Pile driving (Nos.)

S. No.	Name of Scheme	Estimated cost in lakhs of rupees	Area to be benefited in acres	Total estimated quantity of work	Target of work for the working season	Upto-date progress (upto 15-7-55)		Date of commencement	Target date of completion	Remarks
						%age of col. 5	%age of col. 6			
1	2	3	4	5	6	7	8	9	10	11
4.	Protection of Mathabhanga town (on Jaidhaka river)	15.71	..	(E. W.) 25 (B.) 0.3 (P.) 2000	12.5 0.3 2033	49% 54% 102%	98% 54% 100%	December 1954	May 1956	Construction of a bund across river Giriya (at its off take also taken up. Has been completed according to programme. 1st phase of the scheme costing Rs. 29.5 lakhs taken up. 2nd phase of scheme to be taken up during 1955-56 working season.
5.	Embankments (on left bank of river Teesta) in Barnes-Mainaguri (Domohani Area, in Jalpaiguri district.	49.76	3200	(E. W.) 67 (B.) 0.55	54 0.55	80% 80%	100% 80%	Beginning of March 1955	May 1956	
B. Scheme costing below Rs. 10 lakhs.										
1.	Protection of Siliguri town (on Mahanada river).	9.06		(E. W.) 4.68 (B.) 3.25 (P.) 3200	4.68 2.4 3200	100% 74% 100%	100% 100% 100%	December 1954	May 1956	Construction of 3 long spurs to be taken up during 1955-56 working season.
2.	Protection of Phansidewa village in Darjeeling district.	0.76		(B.) 0.7 (P.)	0.5 100%	70% 100%	100% 100%	March 1955		

ANNEXURE TO APPENDIX VIII

SURVEYS AND INVESTIGATIONS IN WEST BENGAL

Most of the survey and investigation work has been completed in respect of the short term flood protection measures already undertaken. Investigations for the proposed barrage on river Karala (in connection with Jalpaiguri Town Protection Scheme) are in progress. Investigations for formulation of long term schemes are also being conducted.

The reconnaissance surveys have so far been made in the following regions:—

(i) In the valley of River Teesta, in Upper Sikkim: A detailed report has been submitted to the North Bengal Flood Enquiry Committee; the Committee's recommendations are awaited.

(ii) In the valley of the River Great Rangit: A preliminary report has been submitted to the Committee and a detailed report is under preparation.

(iii) In the upper catchments of the tributaries of the River Teesta lying within the district of Darjeeling, namely Leesh, Ghish, Chel, Naora and Relli: The report is awaited.

River surveys (comprising longitudinal and cross sections) will be started in November, 1955. A large number of B.M. Pillars have been fixed on the banks of the rivers Mahananda and Teesta.

At present there are 24 river gauge stations on the Teesta, the Mahananda, the Torsa and other tributaries where observations are being made five times a day. The discharge observations are carried out once daily at 14 discharge sites. The silt observations are being conducted at 8 sites once a day. The analysis of the silt is being done by the silt laboratory at Siliguri. The number of hydrological observation posts will be increased in the following working season.

Aerial photography in an area of 2,854 sq. miles and spot levelling over 760 sq. miles (including the districts of Jalpaiguri and Cooch Behar and Biliguri Sub-Division of the Darjeeling Distt) have been completed (upto 15-7-55) by the Survey of India against 4,014 sq. miles and 1,500 sq. miles respectively programmed for 1954-55 season.

A note on the Raingauge stations as well as an Inventory of the existing gauge and discharge sites in West Bengal are given in the Annexures.

RAINGAUGE STATIONS

Rainfall stations are fairly well distributed in the plains of West Bengal and only two stations are proposed to be added in North Bengal after the present monsoon.

In the catchment areas lying in Sikkim, three raingauges were proposed to be set up. One of these has already been installed while the remaining two will be established after the rainy season is over.

In April, 1955 representatives of Bhutan Government were invited to New Delhi for discussions in connection with surveys and collection of data in Bhutan territory for flood control work. A detailed report entitled "Collection of Rainfall and River data in Bhutan" was then prepared and handed over to the Bhutan representatives. In this report, the work to be done in Bhutan territory has been indicated. The Maharaja of Bhutan has very kindly consented to the scheme detailed in the report to be put into operation straightway.

According to the above scheme, the work proposed for river catchments of West Bengal will consist of installation of six raingauges, four river gauges and two wireless stations. Parties of technical personnel had left the base camps in North Bengal for the installation of two raingauges, two river gauges and two wireless stations which were proposed for this year but have been held up on the way due to very heavy rains and breaches in road communications. They will proceed forward as soon as the communications are restored. The installation of the remaining stations is proposed to be completed before the 1956 monsoon. During this period silt and discharge observations will also be started at two gauge sites and aerial surveys of river catchments will be begun. After the 1956 monsoon, the aerial surveys will be continued to completion while ground parties consisting of Forest Officers, Engineers and Geologists of the Government of India accompanied by the Administrative and Technical officers of the Government of Bhutan will go over the river catchments to find the exact spots where soil conservation measures are necessary. The soil conservation measures will consist mainly of afforestation, gully plugging and similar anti-erosion measures. Possibilities of detention reservoirs to hold back the flood peak will also be investigated in this period.

After the raingauges, river gauges and wireless stations are set up, information about the rainfall and river heights during floods will be communicated at short intervals by wireless to Jalpaiguri and Cooch Behar in West Bengal for taking necessary precautions in the areas where flooding will be expected.

Gaugé and discharge sites in Bengal

Name of River	Location of Site	Gauge or discharge	Remarks
I	2	3	4
<i>A. Mayurakshi & its Tributaries.</i>			
Mayurakshi	Maharo	G & D	
„	Messenjore	G & D	
„	Tilparaghat	G	
Tepra	Sijakura	G & D	
Bhamri	Nuni	G & D	
<i>B. Ajoy</i>			
Ajoy	Jamtara	D	
„	Pandayeswar	G	
„	Bata	G	
„	Sat Kahania	G	
„	Maliara	G	
„	Budra	G	
„	Karwa	G	
<i>C. Damodar</i>			
Damodar	Disergarh	G	
„	Ranigunj	G	
„	Bharatpur	G	
„	Saldanga	G	
„	Rangamati	G	
„	Rondia	D	
„	Silna	G	
„	Guhagram	G	
„	Juguti	G	
„	Tarwana	G	
„	Jhanpur	G	
„	Edilpur	G	
„	Sadarghat	G	

1	2	3	4
Damodar	Amirpur	G	
„	Manikhati	G	
„	Palla	G	
„	Salalpur	G	
„	Sarangpur	G	
„	Jamalpur	G	
„	Dhapdhara	G	
„	Jearah	G	
„	Champadanga	G	
„	Amta	G	
„	Bansberia	G	
<i>D. Damodar Left Bank Channels.</i>			
Kana Nadi . . .	Gopalnagar	G	
Kana Damodar . .	Bishtupur	G	
„	Kristopur Regulator	G	
Rajpur Dr. Channel .	Rajpur	G	
„	Siddeswar	G	
„	Seijberia	G	
Howrah Dr. Channel	Nazirgunj	G	
Dancooni Dr. Channel	Baidyabati	G	
„	Nilki	G	
„	Bandar Bil	G	
Burrojola . . .	Saranga	G	
Saraswati . . .	Domjur	G	
<i>E. Darakeswar Selva Rup Narayan.</i>			
Darakeswar . . .	Gopalpur Road	D	
„	Arambag	G	
„	Shaikpur	G	
Selye	Banka	G	
„	Dewanchak	G	
„	Gadghat	G	

1	2	3	4
Rup Narayan	Bandar	G	
"	Ranichak	G	
"	Gopigunj	G	
"	Dainan	G	
"	Goonkhali	G	
<i>F. Others Rivers & Channels on the Damodar Right Bank.</i>			
Noor Hoor Khal	Baligori	G	
"	Khararghai	G	
Gaighata & Baxi Khal	Baxi	G	
"	Heop	G	
"	Koria	G	
"	Gaighata	G	
Darbachatty	Khaniady	G	
<i>G. Cossye & its Tributaries.</i>			
Cossye	Purulia	G	
"	Payrachulli	G	
"	Damdi	G & D	
"	Ambikanagar	G & D	
"	Jamda-Mosra	D	
"	Nazargunj	G	
"	Bograhat	G	
"	Mohanpur	D	
"	Bengai	G	
"	Kapastikri	D	
"	Kapastikri down gauge	D	
"	Panskura	D	
Old Cossye	Kalmijore	G	
"	Kapastikri	D	
Kumari	Vingardih	G	
"	Sarangarh	G & D	
Jam	Gholadalghat	G	

1	2	3	4
H. Other Rivers & Channels in South West Bengal.			
Papal Khal . . .	Near Ankua Bank. (P.S. Jamboni) . . .	D	
Dolong . . .	Dolong	D	
Nahar Khal . . .	Nahar Khal (in Jhargaram P.S.) . . .	D	
Kaliaghai . . .	Amgachia	G	
Haldi . . .	Etamogra	G	
" . . .	Teropakia	G	
Rasulpur . . .	Bhaitgarh	G	
" . . .	Kalingar	G	
Contai Nullah . . .	Contai	G	
Orissa Coast Canal . . .	Mosagoon	G	
I. Ganga.			
Ganga . . .	Moharajpur (Rt. Bank)	G	
" . . .	Rajmahal (Rt. Bank)	G	
" . . .	Faracca (Rt. Bank)	G & D	
" . . .	Faraca (Lt. Bank)	G	
" . . .	Dhulian	G	
" . . .	Ghakghat	G	
" . . .	Jallangi Bazar	G	
J. River Bhagirathi and Hooghly.			
Bhagirathi . . .	Nurpur	G	
" . . .	Geria	G	
" . . .	Jangipur	D	
" . . .	Berhampore	D	
" . . .	Katwa	G	
Hooghly . . .	Hanspukur	D	
" . . .	Chitpur Lock	G	
" . . .	Monikhali	G	
" . . .	Uluberia	G	
" . . .	Diamond Harbour	G	

1	2	3	4
<i>K. Tributaries of Bhagirathi and Hooghly.</i>			
Bhairab . . .	Akhirgunj	G	
Bhairab-Jallangi . . .	Krishnanagar	G	
" . . .	Swarupganj	G	
Churni . . .	Hanskhali	D	
<i>L. Tidal Channels on the Left Bank of River Hooghly.</i>			
Ichhamati . . .	Tentulia	G	
Nonagong . . .	Beliaghata	G	
Kultigong . . .	Kulti Lock		
" . . .	Chasiaghata (Kulti outfall)	G & D	
Tolly's Nullah . . .	Kidderpore	G	
" . . .	Tollygunge Bridge	G	
" . . .	Russa	G	
" . . .	Keorapukur	G	
" . . .	Samukpota	G	
Nawi Khal . . .	Nilgunj	G	
Ichhapur Khal . . .	Kairapur	G	
Peali . . .	Dhosa (Hobka Sluice)	G	
Moni . . .	Mahamaya	G	

S. No.	Basin	River	Site	Gauge or Gauge & Discharge
	Teesta	Teesta	Milli bridge Ref. No. 128.	D & G
	"	"	Teesta bridge Ref. No. 129	D & G
	"	"	Coronation bridge Ref. No. 130	D & G
	"	"	Paharpur Ref. No. 131	G
	"	"	Domohoni Ref. No. 132	G
	"	"	Jalpaiguri Ref. No. 133	G
	"	"	Barnesghat Ref. No. 134	G
	"	Ranjit	Champa Ref. No. 135	D & G
	"	Leesh	Bagrakot Ref. No. 136	D & G
	"	Gesh	Oodlari Ref. No. 137	D & G
	"	Cheel	Oodlari Ref. No. 138	D & G
	"	Neora	Kantadighi Ref. No. 139	D & G

RIVER GAUGES SET UP INSIDE INDIA

Names of State	Name of river	Number?	Location of sites	Gauge & Discharge (G&D) or only Gauge (G)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
North Bengal	Teesta	4	1. Teesta, above its junction with R. Rangpo.	G & D	Gauge readings 5 times a day. Discharge readings once a day.
			2. Teesta at Anderson Bridge.	"	
			3. Teesta at Coronation bridge.	"	
			4. Teesta at junction of river Relli.	"	
	Rungpo (Tributary of Teesta). Lish } Tributaries of Teesta Gish } Chel }	1 2 1 2	1. At Rangpo city.	"	
			1. On National highway bridge.	G	
			2. On Railway bridge.	G & D	
			1. On National Highway bridge.	G & D	
			1. On National Highway Bridge.	G & D	
			2. At Gorubathan Bazar.	"	
North Bengal	Great Rangit (Tributary of Teesta)	1	At Manjitar	G & D	
	Karala (Tributary of Teesta).	1	At Mashkalaibari	G	
	R. Naora (Tributary of Teesta).	1	On National Highway Bridge.	G & D	
North Bengal	Charkhola (Tributary of Teesta).	1	At junction of Charkhola & river Relli.	G	

1	2	3	4	5	6
	Jaldhaka	1	At road bridge between Mayanaguri & Dhupguri.	G & D	
	Torsa	2	1. At Cooch Behar	G & D	
	Siltorsa (Tributary of Torsa).	1	2. At Road crossing between Falakata Alipurduar. Do	G G	
	Raidok	2	1. At Road Bridge at Tufanganj.	G & D	
			2. At Road crossing on Jayanti & Dhowla Road.	G	
	Mahanda Mal	1	At Siliguri National Highway Crossing.	G G & D	

APPENDIX IX

Statement showing details of the second phase of the approved flood control works

Programme for the Year 1955-56

Sl. No.	Name of work	Estimated cost in rupees in lakhs	Programme of work Second phase	Probable estimated cost in rupees in lakhs	Remarks
1	Protection of Jalpaiguri town	160.00	Diversion of the Karala.	52.00	} Model experiments are in progress.
2	Protection of Siliguri town	9.06	Construction of long spurs.	3.00	
3	Protection of Cooch-Bihar town	145.00	Diversion of a part flow of the Torsa through the Mora Torsa.	85.00	
4	Protection of Alipurduar town.	19.47	Training works.	2.00	

APPENDIX X

Statement of amount of Financial Assistance granted by the State Government to the Flood Affected Districts upto the 14th August, 1955

Sl. No.	Name of District	Gratui-tous Relief	Subsidy for recon-struction of houses	TAKAVI			Allotments out of the Chief Minister's Dis-tress Relief Fund for cons-truction of houses in the flood affect-ed areas	Allotment made out of the Chief Minister's Dis-tress Relief Fund to the District authori-ties & public workers for flood relief work
				Normal	Distress	House building		
1	2	3	4	5	6	7	8	9
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
1	Azamgarh	1,25,000	25,000	1,00,000	1,00,000	25,000	10,000	Rs. 34,000
2	Basti	1,50,000	50,000	1,02,000	2,00,000	..	15,000	
3	Faizabad	2,00,000	25,000	40,000	1,00,000	..	5,000	
4	Jaunpur.	1,00,000	25,000	12,000	1,00,000	..	..
5	Gorakhpur	1,00,000	25,000	5,20,150	1,00,000	..	15,000	
6	Sultanpur	60,000	25,000	55,000	1,00,000	..	5,000	
7	Allahabad	45,000	25,000	80,000	1,50,000	..	10,000	
8	Rae Bareli	10,000	..	25,000	1,00,000	..	..

1	2	3	4	5	6	7	8	9
9	Deoria	45,000	..	3,00,000	20,000	} Rs. 34,000
10	Pratapgarh	10,000	..	26,710	..	..	..
11	Gonda	25,000	..	1,00,000	80,000	..	10,000	
12	Bara Banki	10,000	20,000	50,000	..	40,000	5,000	
13	Bahraich	20,000	..	4,70,000	50,000	..	10,000	
14	Ballia	30,000	..	42,000	20,000	20,000	15,000	
15	Banaras	25,000	..	3,32,000	..	..	10,000
16	Ghazipur	15,000	..	17,000	..	..	..
	TOTAL	9,70,000	2,20,000	22,71,860	11,00,000	85,000	1,30,000	
	Other Districts	45,000	65,000	
	GRAND TOTAL	10,16,500	2,20,000	22,71,860	11,00,000	85,000	1,95,000	

FOOT NOTE :—(i) Rs. 2,50,000/- have also been placed at the disposal of the District Magistrate, Basti for starting test works.

(ii) Rs. 1,85,000/- have also been placed at the disposal of 51 districts (No. 1 to 15 above) for the purchase of Bhusa for cattle.

APPENDIX XI

RELIEF MEASURES SANCTIONED BY THE GOVERNMENT OF U.P. UP TO THE END OF JULY, 1955.

The Chief Minister has already extensively toured in the flood affected areas for over 3 days commencing from the 26th July, 1955. He has travelled by road, by railway trolley, by motor boat, etc., and has met the M.L.As., M.Ps., and other prominent non-officials and also the District Authorities of the flood affected districts. He has already passed orders on the spot on problems presented before him. On his return to headquarters he has announced the formation of a non-official flood relief committee with the Minister for Information and Irrigation as Chairman. A sum of Rs. 50,000/- is proposed to be placed at the disposal of this committee in the first instance and the committee is also expected to raise funds itself. It would render assistance in such cases which are not strictly covered by the existing rules and where accordingly official assistance cannot be provided.

The following relief measures have broadly been taken so far:—

(a) *Gratuitous relief*.—A sum of about Rs. 7 lacs has been sanctioned to the various District Officers for flood relief measures and distribution of gratuitous relief. The worst affected districts of Faizabad, Azamgarh, Jaunpur, Basti and Gorakhpur have so far been given Rs. 1 lac each. The Chief Minister has also placed out of the Distress Relief Fund, a sum of Rs. 1,95,000/- at the disposal of the flood affected districts for construction of houses in the affected areas. Additional funds are being placed telegraphically at the disposal of District Magistrates as and when demands are received.

The Prime Minister of India has been pleased to send a cheque for Rs. 10,000/- to the District Officer of Allahabad for organising relief work in that district. The State Chief Minister has also further advanced a sum of Rs. 27,500/- out of the Distress Relief Fund at his disposal to the district authorities and the public workers engaged on rescue work in the affected districts.

(b) *Takavi*.—A sum of Rs. 50,000/- has been sanctioned as distress takavi for Allahabad district and funds at the disposal of other District Officers will also be placed immediately on receipt of their demands. Further demands are likely to be received as soon as flood waters have receded and some idea has been formed of the extent of damage.

(c) *Fodder*.—Arrangements have been made with the Director of Animal Husbandry to send Bhusa to the affected districts. Forest hay is also available for supply to the districts which are feeling scarcity of fodder. Government forests have been thrown open for free grazing of cattle. So far demands have been received for about 60 wagons of Bhusa from some of these districts. Orders have been issued for the despatch of 24 wagons of Bhusa from two Government farms to two of these districts. The rest of the quantity is being supplied to the districts through a firm whose rates have been approved by Government. Railway wagons on a priority basis have been arranged for the movement of Bhusa as well as of foodgrains and other material required in this connection.

(d) *Foodgrains and other materials*.—The District Officers had already made arrangements in advance for the storage of various necessities of life, such as gram, sattu, salt, kerosene oil, match boxes, etc. at the flood posts for supply to the flood sufferers. Where such supplies have fallen short, arrangements are being made to supply them from other places. Emergency arrangements are being made by the Regional Food Controller and his staff for rushing 30 wagons of wheat, 10 wagons of gram, one wagon of salt and one wagon of sugar to Azamgarh which is in particular distress at the moment. In addition to foodgrains, milk powder is also being supplied for the use of children and infirm people.

There are no stocks of foodgrains with the State Government except those that have been purchased on behalf of the Central Government recently under the Price Support Scheme. In consultation with the Government of India, however, these stocks are being released to meet the situation in these districts both for free distribution to the destitutes and for sale.

(e) *Medical relief*.—The District Officers had already made arrangements in advance for supplying medicines and medical aid to the affected persons. A large number of doctors and compounders etc. with medicines have been sent to the various places for rendering medical aid. Measures against epidemics are being vigorously taken. Anti-cholera inoculations are being given and medicine chests are being distributed.

Orders have also been issued by the Director of Medical and Health Services, U.P. that the entire resources of the Medical and Health Departments in the districts be mobilized and the staff so pooled be put in specific sectors. The District Officers have been authorised to withdraw medical officers from fixed dispensaries of Allopathic and Ayurvedic system and to put them in this pool for doing work in the affected areas. Staff in the affected districts has been further strengthened by transfer to such districts of epidemic

assistants and medical officers from other districts. Extra beds are being put in the dispensaries and hospitals and additional quantities of medicines have been despatched to the affected districts. The U.P. Branch of the Red Cross has supplied a large number of articles such as clothing, blankets, bedding material, milk powder, multi-vitamin tablets, etc., etc., to the affected districts and more help is likely to be extended to these districts as soon as the Central Red Cross Society sanctions a requisition sent to it in this connection.

(f) *Building Material*.—Arrangements are also being made for the supply of building material, such as bamboos, ballis and thatching grass etc. by the Forest Department for construction of houses. Arrangements are already under way for the supply of building material for 20,000 rural houses at Faizabad.

In fact ballis and bamboos have already started arriving at Faizabad and thatching grass which was not available in the nearby forests has been ordered from the forest areas in Pilibhit. The Provincial Iron and Steel Controller has also been instructed to supply tin sheets to the affected districts for the construction of houses and shelters for the cattle.

(g) *Boats*.—The District Officers have already got some Government boats at their disposal for evacuation purposes. In addition, a sum of Rs. 80,000/- was placed at the disposal of Gaon Sabhas for constructing their own boats on subsidy basis. The District Officers have also hired a large number of boats. Some half a dozen motor boats available with the Public Works Department have also been placed at the disposal of the District Officers for flood relief work. In addition six 25 H.P. flat bottom boats and one big storm power boat have been sent by the Army authorities from Allahabad to Azamgarh. One motor boat of the Police Department stationed at Banaras has gone to Jaunpur for rescue work. District Officers have locally requisitioned necessary number of boats under the provisions of the Flood Emergency Powers Act, and also taken boats on hire.

There have been no complaints about shortage of boats from any sector. Minor difficulties were faced at some places, e.g., the size of crafts that generally ply in bigger rivers like the Ghagra and Rapti was found unsuitable for some marooned villages where these were surrounded by shallow waters. These difficulties have, however, been overcome as mentioned above by the requisitioning and hiring of boats.

The State Government had issued orders last year to the State Public Works Department authorities for getting 10 motor boats constructed before the start of 1955 monsoons for use in these districts. While these boats are ready, engines which had to be imported from

other countries have not yet arrived due to the reported difficulty of getting import licences at Delhi.

(h) *Man-power help.*—Fifty PRD men have reached Faizabad for clearance of debris. A company of PAC has also been sent to Azamgarh for rescue work. In addition, three units of Auxiliary Cadet Corps each consisting of 200—250 men are being arranged by the Army authorities for Azamgarh, Jaunpur and Faizabad for helping the district authorities in clearing the debris and other rescue operations.

(i) *Tents.*—Army tents for 3,000 persons have been sent from Kanpur to Jaunpur to house the evacuated persons. More Army tents have been kept in readiness for being sent to Azamgarh as soon as a demand is received.

(j) *Railway arrangements.*—One shuttle was arranged for the evacuation of affected persons from Jaunpur. A number of goods wagons and passenger bogies were sent to Jaunpur for providing shelter to the evacuated persons.

(k) *Communications.*—One mobile army wireless station is being established at Azamgarh which is suffering from breakdown of communications. A similar station has been established at Lucknow so that, in addition to telephone and Police Wireless sets, this will be the third and the most reliable and convenient communication between the State Government and the district authorities.

FURTHER RELIEF

(1) Orders have been passed by the District Officers locally for postponing the realisation of Government dues in the flood affected areas.

(2) Orders are under issue that school fees from students in the flood affected areas should not be charged for a period of 4-5 months.

(3) Subsidies and loans will be granted for re-building of houses both in the rural areas and in the towns.

(4) Takavi for purchase of seed and bullocks etc. will be distributed on an extensive scale.

(5) After the floods are over it will be necessary to provide land to a large number of persons for rehabilitation on other sites. It may also be necessary to provide them land for cultivation. Necessary instructions have already been issued to the District Officers for providing land to the flood affected persons. As a result of the abolition of Zamindari large areas of waste land have vested in Gaon Samajas and the Land Management Committees will be asked by the District Officers to provide land for houses in such areas. Similarly, after the abolition

of Zamindari blocks of waste lands have come to the Forest Department, on which there are no valuable forest growth. These blocks of waste land will be given to the affected persons for cultivation purposes. Government have also passed legislation under which land for building sites and building material for relief for sufferers of flood affected areas can be acquired by the District Officers and the District Officers have been advised to make use of this enactment where necessary.

(6) Orders have also been issued to arrange for the inoculation of cattle against cattle diseases and for the disinfecting of wells as soon as water recedes.

Local agencies both official and non-official are at present engaged in evacuation work and in relief and rescue operations. District Officers have, however, been asked that as soon as they are free from this first phase of relief work, they should give thought to the assessment of damage and send reports to Government so that further action to relieve distress may be taken. This will include remission of land revenue and other dues and a large number of other steps.

STATEMENT LAID ON THE TABLE OF THE LOK SABHA ON
THE 2ND AUGUST, 1955, AND ON THE TABLE OF THE
RAJYA SABHA ON THE 18TH AUGUST, 1955.

*Review of the Flood situation in Uttar Pradesh upto the end of
July, 1955.*

1. *Flood affected areas*

The State of Uttar Pradesh is predominantly a flat plain with a gentle slope towards the east. The western zone is about 500 to 900 feet above sea level, while the eastern zone at Allahabad is about 340 feet above sea level.

The western zone can be broadly sub-divided into 2 parts namely the Upper Yamuna Districts and the Upper Ganga Districts. The Upper Yamuna Districts, upto the confluence of the Chambal with the Yamuna, are not, on account of comparatively light rainfall, subject to any serious floods. The areas on both the banks of the Ganga consisting mainly of the districts of Bulandshahr, Bijnor, Meerut, Moradabad etc., do not also get flooded to any appreciable extent till the Ganga reaches Shahjahanpur District, a distance of about 200 miles from Hardwar. Some occasional floods occur in the western zone due mainly to the waters brought by the Ramganga and other tributaries. The proposed storage reservoir across the Ramganga will reduce the incidence of the floods in this area.

In the eastern zone, the southern portion has never been in great danger of floods on account of light rainfall. The northern portion drained by the Ghagra and the Rapti is the tract which is most liable to floods and the control of floods in these rivers is the real problem in Uttar Pradesh. The districts affected are: Kheri-Lakhimpur, Sitapur, Barabanki, Gonda, Basti, Deoria and Gorakhpur.

Due to floods in the Ganga, the districts east of Allahabad, namely, a portion of Mirzapur, Banaras, Ghazipur and Ballia are affected.

Besides these large rivers, there are many small rivers north of the Ganga such as the Gomti, the Tons etc. which rise in the plains of U.P. A heavy concentration of local rainfall as occurred during this monsoon can cause serious flooding of the valleys of the Gomti and the Tons. Thus, the flood-affected areas in U.P. are generally three to six thousand square miles in extent.

Earlier Efforts at Flood Control

No attempts at flood control in U.P. appear to have been made prior to 1938. Mr. Wattel investigated the Ghagra and the Rapti basins in 1938 and 1939 and recommended that essential hydrological data must be collected and surveys conducted in the first instance. But only some limited surveys were carried out.

Assessment of the Flood Damages

Complete information is unfortunately not available in respect of the flood damages in the State. Table I (attached), however, indicates the extent of flood damage during the years 1950—55 as far as information is available. It has been reported that the floods of 1948 affected nearly 35 lakh acres of land and 41 lakh persons. A sum of about Rs. 4.86 lakhs had to be spent on gratuitous relief in 1948-49 as against Rs. 2 lakhs in 1947-48. A precise assessment of the damages caused by the floods during this year is not possible at this stage. It is clear, however, that damage to crops has been considerable and that lakhs of people have been rendered homeless. A sum of Rs. 7 lakhs has already been sanctioned by the U.P. Government for flood relief measures and distribution of gratuitous relief.

Flood Control Programme

As the House is already aware, steps were taken after the disastrous floods of 1954 to constitute Flood Control Organisations in certain flood affected States as well as at the Centre. The Government of Uttar Pradesh has organised a full-fledged Flood Control Organisation under a whole-time Chief Engineer. The State Government have also set up a State Flood Control Board and a Technical Advisory Committee. The Board has already met five times and has done commendable work. Schemes costing about Rs. 4.5 crores have been approved so far by the State Flood Control Board. Of these, schemes costing Rs. 2 crores are under execution. These works consist mainly of the construction of marginal embankments, raising of the level of village sites in the flood affected areas and construction of protective works like revetments, spurs etc. The necessary funds for these works have been advanced by the Centre. The expenditure upto the 31st March, 1955 is approximately Rs. 38 lakhs, and since then further work to the same amount has been done. The schemes sanctioned, together with the percentage progress and other details of works undertaken during the working season of 1954-55, are shown in Table II. The schemes proposed to be taken up during the working season 1955-56 are given in Table III. This list will necessarily undergo some modifications as a result of this year's floods.

The progress made on the surveys and investigations in connection with flood control schemes is given in Appendix I. Further schemes have been investigated and estimates drawn up. The list of works and the estimated costs thereof may be seen in Appendix II. These Flood Control works are estimated to cost Rs. 46.52 crores and the State Government desire assistance to the extent of Rs. 27 crores towards the expenditure to be incurred on these during the Second Five Year Plan period.

1955 Floods

The floods that have occurred so far this year are not of the usual nature. In the eastern districts of U.P. the monsoon had established itself a little earlier than usual. An examination of the rainfall during the earlier part of the season shows that by the end of June the rainfall in most of the stations in east Uttar Pradesh had exceeded the normal quantity. During the subsequent month, after spells of the normal activity of the monsoon, a "low" appeared over the east U.P. on the 16th July; this intensified into a "depression" by the 18th and remained stationary over the east U.P. up to the 22nd of July, weakening thereafter. This depression caused vigorous monsoon conditions in the east Uttar Pradesh with widespread and very heavy rain in some of the districts. Thus districts like Gonda, Gorakhpur, Azamgarh etc. had already become more or less water-logged and the river valleys through these districts had been filled to capacity to the heavy rains in the period ending 22nd July.

With the weakening of the "depression" the axis of the monsoon trough, instead of swinging southwards and distributing the rainfall of the subsequent period towards the southern districts of U.P. and the central parts of the country, was pushed up towards the foothills of the Himalayas. This condition is known to give widespread and fairly heavy rain in the hill districts both in the upper catchments of some of the river systems and also in the Terai districts where some of the east U.P. river systems have their origin. This concentrated rainfall for days on end in the upper catchments of the river systems of the east Uttar Pradesh has accentuated the stream flow down the already over-full river basins. It seems that these two factors as well as the flat gradients of the rivers and possible obstructions which might have been put in by farmers during May and June for diverting water for irrigation are responsible for the extensive inundation in the eastern districts of Uttar Pradesh.

On receiving reports regarding serious floods in U.P., I carried out an aerial inspection of the flood affected areas on 29.7.1955. During my flight I noticed large areas of the Ghagra and the Rapti basins under water, especially in Basti and Gorakhpur districts. Extensive

areas near the confluence of both the rivers at Barhaija are under inundation. A breach occurred in the Old Maloni embankment, six miles downstream of Gorakhpur, on 30-7-55. Efforts were being made to close the breach. It is understood that Gorakhpur town will not be seriously affected as most of the water is flowing into the Ramgarhtal.

The worst situation has arisen in the valleys of the Tons and Gomti. Besides, smaller local rivers like the Sai and the Varna have also caused inundation. The Gomti has caused widespread havoc in Sultanpur and Jaunpur districts where water was seen standing up to the first floor of the buildings and tree tops, while the Tons with its tributaries has been responsible for large scale damages in Faizabad, Azamgarh and Ghazipur districts. In Azamgarh town a protective bund built many years ago was breached and aggravated the position. In Jaunpur and Azamgarh, the previous highest flood levels were exceeded. Due to heavy and incessant rainfall, there was widespread waterlogging in Allahabad and Rae-Bareilly Districts. In Allahabad District alone nearly 500 sq. miles with 400 villages suffered from excessive inundation.

In the Tons and Gomti Valleys, the rainfall in four days during the third week of July, 1955, was between 18" to 24" as can be seen from the table given below. This enormous precipitation has not occurred for the last 84 years *i.e.* since 1871.

. Rainfall figures

District	Normal for July (inches)	From July 1 to 23 1955 (inches)	Week ending July 23, 1955 (inches)	Week ending July 23, 1954 (inches)
I	2	3	4	5
Faizabad . . .	11.91	37.95	26.83	4.02
Jaunpur . . .	11.89	30.10	20.94	2.14
Sultanpur . . .	12.09	32.62	20.44	3.12
Basti . . .	14.34	30.36	19.40	3.45
Pratapgarh . . .	11.32	32.48	18.51	3.66
Bahraich . . .	12.68	26.23	16.24	3.53
Azamgarh . . .	11.99	20.32	13.77	2.95

According to the report received from the Uttar Pradesh Government lakhs of people have been rendered homeless; thousands of villages (nearly 10,000) have been affected and crops in large tracts have been damaged by standing water. Acute shortage of fodder for cattle is being felt. Those who have been rendered homeless are

in urgent need of food. Communications have become difficult. Most of the metalled roads have been breached and the unmetalled ones are covered with water. Seventeen lives were lost and the exact loss of cattle is not yet known. A detailed description of the flood conditions in the various districts is given in Appendix III.

Relief Measures

The Chief Minister of Uttar Pradesh made an aerial survey of all the flood affected districts and in consultation with prominent officials and non-officials has already taken necessary steps for giving relief to the flood affected people. A special officer has been appointed for taking relief measures.

Necessary funds have been sanctioned by the State Government for gratuitous relief, construction of houses, and grant of taqavi loans to the distressed persons. Arrangements have been made for the supply of fodder where there is scarcity, and Government forests have been thrown open for free grazing of cattle. Essential food supplies and necessities of life are being rushed to the affected areas. In addition to food grains, milk powder is being supplied for the use of children and infirm people. Medical aid has been arranged and vigorous measures are being taken against the outbreak of epidemics. Steps are also being taken to inoculate cattle against diseases. Disinfection of wells will be taken up as soon as the flood waters recede. Arrangements are being made for supplying building materials for construction of houses.

Prompt action has been taken in mobilizing all the Government Department boats, and requisitioning public boats for evacuation and flood relief work. The Army has also sent motor boats and three units of A.C.C. for rescue operations. Fifty P.R.D. men have reached Faizabad and a company of P.A.C. has also been sent to Azamgarh for similar work. Army tents are being despatched to house the evacuated persons. Arrangements have been made with the Railways for a shuttle train to evacuate flood affected persons from Jaunpur.

A mobile army wireless station is being established at Azamgarh and Lucknow in addition to telephone and police wireless stations. These will ensure reliable communication between the headquarters of the State Government and the district authorities.

The State Government have agreed to consider sympathetically cases for the postponement of the realisation of government dues in the flood affected areas.

Flood Control Measures in the Tons and Gomti Vallyes

Though it is not possible to eliminate completely the damages due to heavy local rainfall, something can be done to improve the drainage and protect the towns by the construction of local ring bunds (which may be single or double) and the installation of pumps to drain out the rain water. Surveys and investigations have to be carried out before undertaking protective drainage measures in these areas and the other small river basins. These will be taken up as soon as the monsoon is over.

Progress

Satisfactory progress has been made on the flood control schemes already undertaken. The Chitauni bund on the Gandak has prevented the inundation of an area of nearly 1.5 lakhs of acres, not withstanding the fact that the Gandak had experienced this year a flood of 5.6 lakh cusecs. Protection has been afforded to 600 villages against inundation by raising the level of the village sites.

TABLE I

Statement of flood Damages in the State of Uttar Pradesh—Years 1950-54

Year	Area affected in lakhs of acres	Population affected	Crops damages (in crores of rupees)	Damage to houses (in crores of rupees)	Human lives lost (No.)	Cattle lost (No.)	Damage to public utilities worth Rs.	Remarks
1950	26.0		12.0	1.25	128	2200		
1951	2.52		1,65,000 tons					
1952								
1953	22.51	35,92,434	10.8	4.00	23	341		
1954	32.96		5.94	1.91	27	1553		
1955	19.20 (upto July)	approximately 50,00,000	Not assessed yet Extensive.	Not assessed yet Extensive.	17	Not known so far		

TABLE II
Uttar Pradesh Flood Protection Works.

I. Works taken up during 1954-55 working season.

Sl. No.	Name of Scheme	Estimated amount in rupees	Percentage of target for working season of 1954-55	Target achieved before current flood season		Expenditure incurred rupees	Remarks	
				%age of estimated quantity	%age of programme for working season of 54-55			
1	2	3	4	5	6	7	8	
A.	<i>Schemes costing above Rs. 10 lakhs.</i>							
1.	Constructing Chitauni Bund on River Gandak (Deoria)	27,00,000	75	80	107	8,18,000*		
2.	Constructing Ballia Beria Bund along Ganga River	16,28,000	29	30	100	1,97,000		
3.	Estimate for raising marooned villages in district Basti, Gorakhpur and Deoria	66,00,000	25	28	114	9,17,274*		
4.	Flood Protection works in Banaras Ghats	49,16,000	work is under execution by C. E. PWD. U.P.				7,33,100	
5.	Protection of marooned villages along Ghaghra River in Bahraich district	16,20,000	Nil	0.4		6,000		
	C. O.	174,64,000				26,71,374		
6.	Constructing Turtipar Srinagar Bund along right bank of Ghaghra River in Ballia District	30,59,856	Nil	1.7	Nil	51,000		
7.	Constructing Behra Bondi Bund along left bank of River Ghaghra (length 26 miles) District Bahraich.	16,60,000	Nil	0.06		1,000		
	Total	221,83,856				27,23,374		

* Note :—Figures of expenditure marked with asterisk above are upto March 1955 only as latest figures are not available.

1	2	3	4	5	6	7	8
<i>B. Schemes containing below Rs. 10 lakhs.</i>							
1.	Constructing of Goshalpur Bund in Ghazipur District.	2,57,625	63	63	100	84,000	
2.	Constructing Assawar Bund in Ghazipur District.	2,04,750	45	45	100	27,000	
3.	Constructing Haha Nala Bund along Ghagra in Azamgarh District.	5,06,250	27	27	100	1,61,000	
4.	Estimate for relieving flooded areas by constructing 4 drains in Gorakhpur District.	17,797	80	80	100	10,062*	
5.	Extension of Waterways on culverts of C.P.W.D. Roads in 12 districts.	8,64,000	Works is under execution by Chief Engineer, P.W.D., U.P.			61,000*	
6.	Estimate for extension of Waterways on culverts of P.W.D. Roads in 5 districts.	7,86,881	Do.				
7.	Constructing Madhopur Bund in Gorakhpur District.	86,625	70	75	107	42,138*	
8.	Constructing Govindpur Bund in Ghazipur District.	2,24,555	68	66	100	71,000	
9.	Constructing Mustafabad Khunti Privithipur Bund in Ballia District.	3,17,357	67	66	100	76,000	
10.	Constructing Bilha Binra Bund in Bahraich District.	6,52,500	40	34	100	66,000	
11.	Minor Estimate of Drainages.	7,00,662	79	79	100	4,17,022*	
12.	Constructing of Mlaon Bund.	2,43,880	55	55	100	80,099	
13.	Constructing Bunds along River Kwano from Mukhlis-pur to Bahera.	5,19,750	Nil	1	..	5,000 (approximately)	
14.	Constructing Bund along River Kwano from Lohia Kalan to Chital.	5,50,125	Nil	0.5	..	2,500 (approximately)	
TOTAL		59,32,757				11,02,821	

NOTE.—The estimate for flood surveys in Uttar Pradesh amounting to Rs. 4.78 lakhs has not been included in the above list as it does not relate to construction work. The target for the working season of 1954-55 is 22% of the total estimated value and the progress achieved on this is 45% of the figure target. An expenditure of Rs. 35,000 has been incurred.

II. Works Programme for 1955-56 Working Season (New Schemes)

TABLE III

Sl. No.	Name of Scheme	Estimated cost in lakhs of rupees	Area to be benefited in acres	Total estimated quantity of work	Target of work for the working season	Remarks
1	2	3	4	5	6	7
<i>A. Schemes costing above Rs. 10 lakhs.</i>						
1.	Protection of marooned villages along river Ganga in Ballia district.	16.13				
2.	Protection of marooned villages along river Ghagra in Bahraich district.	16.2				
3.	Mahola Garhwal bund along right bank of Ghagra river in Azamgarh district (length 36 miles).	30.09	88,114			
4.	Bund along left bank of Ghagra river to stop spilling into river Kwano (length 33 miles).	21.23	10,000			
5.	Bund along right bank of river Narsini in Nepal territory (length 8 miles).	19	17,000 (Nepal) 8000 (U.P.)			
6.	Paraspur Dharaura Bund along left bank of Ghagra river in Gonda district (length 31 miles)	27	51,000	875 (EW)		Approved by S.F.C. Board on 26-4-55. Alignment being marked at site.
	TOTAL	129.65				
<i>B. Schemes costing below Rs. 10 lakhs</i>						
1.	Bund on Kwano river from Dhanbara to Bankat	2.62				
2.	Bund along Kwano river from Mukhleshpur to Pallia.	5.20				Works noted against items 2 and 3 have already been taken up during the

1	2	3	4	5	6	7	8
3.	Bund along Kwano river from Lohia Bhar Kalan to Chitai:	75.5					working season of 1954-55 and the progress has been reported in the work in Appendix I A.
4.	Bund along right bank of Ghonghi river and left bank of Kumra river.	8.58					
5.	Protection of marooned villages along Ghagra river in Ballia and Azamgarh districts.	9.91					
6.	Extension of Bund on Kosi river (near Bazpur) in Nainital district.	0.82					
7.	Bakulaha Sansar Tola bund along right bank of Ghagra river in Ballia district (length 5½ miles).	4.07	15000	93 (EW)			
8.	Majholia bund along Rapti river in Gorakhpur district.	0.57					
9.	Extension of Chitauni bund (Southwards) upto Chitauni ghat in Deoria district (length 3 miles, 5 furlongs).	3.9					
10.	Extension of Chitauni bund (northwards) upto Naraini Bhainsa bund in Deoria district (length 7 miles, 4 furlongs).	4.4					
11.	Marginal bund along Baigul river in Bareilly district (length 12 miles)	9.81	15000				
12.	Protection works on river Songh in Dehra Dun district	4.21	500				
13.	Protection works on river Suswa in Dehra Dun district	2.52	400				
14.	Protection works on Naghdeo works on Naghdeo Rao in Saharanpur district	3	500				
TOTAL		65.11					

NOTES (Uttar Pradesh)

The new schemes shown under the Works Programme for 1955-56 working season will be under execution in addition to those continuing from the previous season.

Funds allotted by the Government of India to the State for carrying out the flood protective works, during 1954-55 (financial year) amounted to 35 lakhs. The expenditure incurred by the State amounted to Rs. 38.93 lakhs.

Funds required by the State during 1955-56, amount to Rs. 197.5 lakhs for schemes costing above Rs. 10. Rs. 86.36 lakhs for schemes costing below Rs. 10 lakhs (each), including the schemes continuing from 1954-55.

APPENDIX I

REVIEW OF PROGRESS UPTO 10-7-55

Flood Control Investigations in the State of Uttar Pradesh

Flood Organisation.—There are 2 Circles with Headquarters at Gorakhpur and Faizabad. The Circles have 7 Divisions in all, 3 in Flood Circle, Gorakhpur and 4 in Flood Circle, Faizabad. Out of these 7 Divisions, six are already working and the remaining one will start functioning soon. Some flood control schemes are being executed by the regular Public Works Department.

Surveys and collection of Data.—The hydrological data as also surveys of the different river systems in Eastern U.P. is found insufficient to plan any comprehensive flood control measures. The only data available has been mentioned by Shri Wattal in his report "Floods in Eastern U.P.—1938" and consists of Longitudinal sections and cross sections of some reaches of Ghaghra and Rapti. There was no further collection of data since then and the U.P. Flood Committee report of 1954 recommended systematic collection of data and surveys of drainage systems etc.

After the establishment of the flood control organisation in U.P. and at the centre, immediate steps were undertaken to remedy the deficiencies in data. The State Organisation started reconnaissance and ground surveys and the progress achieved is as follows:

(a) RECONNAISSANCE SURVEY

(i) *Ghaghra River.*

Reconnaissance of the entire area flooded by the Ghaghra river in the districts of Bahraich, Gonda, Basti, Gorakhpur, Azamgarh and Ballia has been made.

(ii) *Rapti river.*

Reconnaissance of the area submerged in the State has been made.

(iii) *Ganga and Tons rivers.*

The area submerged by the Ganga and the Tons rivers in the districts of Ghazipur and Ballia has been reconnoitred.

(b) GROUND SURVEYS INCLUDING PLOTTING

(i) *Ghaghra river.*

Cross sections across Ghaghra from Nepal Border to its junction with Ganga and its tributaries at the limits of 2 miles are in progress.

(ii) *Rapti river.*

Cross sections of river Rapti from Nepal—U.P. border to its junction with Ghaghra and its tributaries at the limits of 2 miles are in progress.

Further, surveys required for the immediate protection works have been mostly completed.

Spot levelling over 2,400 sq. miles in eight districts namely Gorakhpur, Deoria, Basti, Bahraich, Gonda, Ballia, Ghazipur, and Azamgarh has already been completed. Surveys in respect of the longitudinal and bed slopes pertaining to Ghaghra have been completed in about 1/3 of the length of the river, that is about 100 miles. For determining the alignment of marginal bunds, levelling has been done along 250 miles of the Ganga in Ballia and Ghazipur districts, and along 200 miles of Tons river.

The total area for aerial photography programmed for the season of 1954-55 is 7,020 sq. miles against which the progress up to 15th July, 1955 is reported to be 4,403 sq. miles. Photo mosaics for an area of 1,493 sq. miles has been completed.

Hydrological Observations

Table 1 is an inventory of river gauge and discharge stations which were existing in the Uttar Pradesh before the monsoon of 1954. After the heavy floods of 1954 when a special flood control organisation was set up in the State to intensify the collection of data and the execution of flood control work, it was noticed that the existing net work of hydrological stations did not cover well the eastern parts of the State, which were affected by floods. To remedy this deficiency, additional gauge and discharge stations have since been established in eastern U.P. to yield essential data in respect of eastern rivers. Table 2 shows the stations recently set up in the State.

Rainfall stations are fairly well spread in the plains of U.P. and only fourteen additional stations are proposed to be added after the present monsoons. In the catchment areas lying in Nepal, 30 raingauge stations will be established during the next two years.

Silt observations are being made on important river systems in the Eastern districts.

Storage Sites

A reconnaissance survey of the area submerged by the Rapti and its tributaries has been made and proposals for some 30 to 35 detention basins are under the consideration of the State Government. Twenty-two sites for the construction of small reservoirs in Gonda have been reconnoitered. Ground levelling has been done for a length of 300 miles in Bahraich, Gonda, Basti and Gorakhpur districts and has been completed for 15 reservoirs.

In addition, surveys have been done in Nepal for marginal embankments and those for retention reservoirs on the tributaries of the Rapti are in progress.

All the data that is available up-to-date has been collected and analysed in a report entitled "Flood Studies of Rapti" for the use of the design offices to draw up integrated plans of flood control.

TABLE I-

Inventory of Gauge and Discharge Stations in U. P.

S.No.	Main Basin	Sub-basin	Site	Discharge & Gauge Site
1	2	3	4	5
1	Yamuna	Yamuna	Tajewala	G & D
2	"	"	Ponta	G
3	"	"	Hatnikund	G
4	"	"	Okhla U/S	G & D
5	"	"	Okhla D/S	G
6	"	"	Mathura	G & D
7	"	"	Agra	G & D
8	Hindan	Hindan	Muzaffar Nagar	G
9	"	"	Okhla or Hindan Dam	G & D
10	"	Kali Nadi	U/S of Muzaffarnagar	G & D
11	"	"	Muzaffarnagar	G
12	Yamuna	Kurwan Nadi	Bulandshahr	G
13	"	"	D/S of Bulandshahr	G
14	"	"	Further D/S of Bulandshahr	G
15	"	"	15 miles from Aligarh	G & D
16	"	"	Hathras	G & D
17	"	"	Agra	G & D
18	"	Utangan R	—	G
19	"	Utangan "	Agra	G
20	Sehgar Basin	Sehgar Basin	—	G & D
21	Sengar Basin	Sengar Nadi	—	G & D
22	"	Sarsa Nala	Dand Khar	G
23	"	"	"	D & G
24	"	"	"	D & G
25	"	"	"	G
26	"	"	—	G
27	"	"	—	D & G
28	Yamuna	Pahuj River	Pahuj Dam	G & D

1	2	3	4	5
29	Berwa Basin	Berwa River	Dhukwar Dam	G & D
30	"	"	Matatila Dam	G & D
31	"	"	U/S Parichha Dam	G & D
32	"	"	D/S Parichha Dam	G & D
33	"	Jamni River	Pali tank	G & D
34	"	Shahjad River	Lalitpur Dam	G & D
35	"	Sajham River	Narhat park	G & D
36	"	"	D/S of Pakari Dam	G & D
37	"	"	U/S of Sapar Dam	G & D
38	"	"	U/S of Lachhura Dam	G & D
39	"	"	U/S of Borwar Lake	G & D
40	"	Birma River	Arjun Dam	G & D
41	"	Non River	Amouli	G & D
42	Arind River	Arind River	Near Etah	G & D
43	"	"	Other sites	G
44	"	"	"	G & D
45	"	"	Near Airwa	G
46	"	"	Near Bidhana	G & D
47	"	"	Linaur (Rly. Bridge)	G & D
48	"	"	Other Site	G & D
49	"	"	Kora	G & D
50	Ken Basin	Magarya Nadi	Kabrai dam	G & D
51	Yamuna Basin	Tributary at Fatehpur	Fatehpur	G
52	"	"	12 miles D/S of Fatehpur	G
53	"	Jalwanthi River	Jalwanthi Dam	G & D
54	"	Ahjbhar River	Ahjbhar Dam	G & D
55	"	Barera River	Khaptia Dam	G & D
56	"	A Tributary of Barera River	Katra Khamba Dam	G & D
57	"	Sonsur Khondri Nadi	Chail	G

1	2	3	4	5
1	Ganges	Ganges	Bhimgoda Head Works	G & D
2	"	"	Further U/S of Bhimgoda Head Works.	G & D
3	"	"	U/S of Narora Head Works	G & D
4	"	"	D/S of Narora Head Works	G & D
5	"	"	Kanpur	G & D
6	"	"	Allahabad	G & D
7	"	"	Rampur	G & D
8	"	"	Banaras	G
9	"	"	"	G & D
10	"	"	"	G & D
11	"	Solani	Roorkee	G & D
12	"	A Tributary of Solani	"	G & D
13	"	Sot Nadi	Budaun	G
14	Ram Ganga	Ram Ganga	Surjan Nagar	G
15	"	"	Moradaha	G & D
16	"	Khoi Nadi	—	G & D
17	"	"	Burhapura	G & D
18	"	Kosi River	Rampur	G & D
19	"	"	"	G
20	"	A Tributary of Kosi	—	G & D
21	"	Gangan River	Mazempur	G & D
22	"	"	Mihtaur	G & D
23	"	"	—	G
24	"	"	Moradabad	G & D
25	"	"	8 miles south of Moradabad	G & D
26	"	"	—	G & D
27	"	A Tributary of Gangan	—	G
28	"	Pilkhar River Kemri	—	G & D
29	"	Bhakra	Bilaspur	G

1	2	3	4	5
30	Kali Nadi	A Tributary of Bhakra	—	G & D
31	”	A Tributary of Bhakra	Bilaspur	G
32	”	Kichha River	Lalkua	G
33	”	1st Tributary of Kichha River (Central)	—	G
34	”	2nd Tributary of Kichha River (Western)	4 miles u/s of Shishgarh	C
35	”	”	Shishgarh	G
36	”	3rd Tributary of Kichha River (Western)	Kichha Road	G
37	”	Aril Nadi	Jargaon	G & D
38	”	Aril Nadi		G
39	”	Behgul Nadi	Sitarganj	G
40	”	”	6 miles east of Kichha	G
41	”	Begul Nadi	Railway Bridge near Bihuria	G
42	”	Tributary of Begul Nadi	—	G
43	”	”	—	G
44	”	Deoha Nadi	At the confluence of nandhaur to Deoha	G
45	”	”	—	G
46	”	Khanant Tributary of Deoha	—	G
47	”	”	—	G
48	”	”	—	G
49	”	”	—	G
50	”	”	—	G
51	Ram Ganga	Sukhata tributary of Deoha	—	G
52	”	”	Unchanlia	G
53	”	”	Shahabad	D & G
54	Kali Nadi	Kali Nadi	Meerut	D
55	”	Kali Nadi east	Hapur	D & G

1	2	3	4	5
56	Kali Nadi	Kali Nadi east	Buland Shahr	G
57	"	"	Haluaganj	G
58	"	"	Madanpur	D & G
59	"	Nim Nadi	Lauangirabad	G
60	"	"	Obrai	D & G
61	Ganga	Isan Nadi	...	D & G
62	"	"	Kasmira	G
63	"	"	Near Kasmiara	D & G
64	"	"	Munuarwa Near Kasganj	D & G
65	"	Tributary of Isan Nadi.	Kurauli	G
66	"	Pandu Nadi	...	G
67	"	"	8 miles S.W. of Kanpur	G
68	"	Tons River Tri- butary from South.	...	D & G
69	"	Belan Nadi Tri- butary of Tons.	4 miles in W. of Lobert ganj	D & G
70	"	"	6 miles N. of Mallia	D & G
71	"	"	Near Baraundha	D & G
72	"	"	4 miles d/s. of above.	D & G
73	"	Bhakar (a tribu- tary of Balan)	Sirsi Dam	D & G
74	"	Sukhara (a tribu- tary of Belan)	u/s of Sukhar Dam	D & G
75	"	A tributary of Belan Between Bhakar & Su- khara	d/s of Dhari Dam	D & G
76	"	Harri Nadi (a tributary of Ganges u/s of Mirzapur.	d/s of Horri Dam	D & G
77	"	Khajuri Nadi, tributary of Ganges d/s of Mirzapur.	d/s of Khajoni Dam	D & G
78	Gomti	Gomti River	Nimkhar	D & G
79	"	Katna River	...	D & G

1	2	3	4	5
80	Gomti	Katna River	Near Maholi	G
81	"	Sai River	Bihani	D & G
82	"	"	...	D & G
83	"	"	Mardoï	D & G
84	"	"	Karna	D & G
85	"	"	Raibrelli	D
86	"	"	Partapgarh	G
87	Karmansa	Karmansa	Ghaghar Dam	D & G
88	"	"	Silhat Dam	D & G
89	"	"	Nagwa Dam	D & G
90	"	"	Bhainsora Dam	D & G
91	"	"	Naugarh Dam	D & G
92	"	"	Latifshah Dam	D & G
93	"	Garai	Bingia Dam	D & G
94	"	"	Ahraura Dam	D & G
95	"	"	Husainpur Dam	D & G
96	"	Chandra Prabha Nadi	Chandra Prabha Dam	D & G
97	Son River	Rihand River	u/s of Rihand Dam	D & G
98	"	"	Rihand Dam site	D & G
99	"	Thema Nadi	Barwatola Dam	D & G
100	Ghagra	Ghagra River	Katanian Ghat	G
101	"	"	Senwal Road	G
102	"	"	Near Faizabad	G
103	"	Sharda River	Banbasa Head Works	D & G
104	"	"	Near Dalhi	D & G
105	"	Kamriala Nadi	Kamirala ghat	G
106	"	Sarju Nadi (tributary of Sharda)	u/s of Gaighat	D & G
107	"	Kuwana River	Basti	G
108	"	"	Alinagar	D & G
109	"	Rapti River	Iomaniaganj	D & G

1	2	3	4	5
110	Ghagra	Bhuri Rapti (a tributary of Bhuri Rapti)	...	... D & G
111	»	Banganga (atributary of Bhuri Rapti)	...	D & G
112	»	Dand a Nadi (a tributary of Rapti)	...	G
113	»	Rohind River (a tributary of Danda).	...	G

TABLE II

River Gauges set up inside Uttar Pradesh

Name of States	Name of River	Number	Location of sites	Gauge & discharge G. D. or Gauge only (G)	Remarks
I	2	3	4	5	6
U. P.	Ghaghra	7	1. Elgin bridge.	G & D	These stations lie in Nepal. Permission has been sought for their installation.
			2. Turtipur bridge	G & D	
			3. Inchape bridge		
			4. Kauriala		
			5. Dohri Ghat		
	Little Gandak	1	Near Deoria	G & D	
	Rapti	7	1. Bhojpur	G & D	
			2. Balrampur	G & D	
			3. Sahjan	G & D	
			4. Uska	G	
			5. Bird Ghat	G	
			6. Dhakaket	G & D	
			7. Rear	G & D	
	Rohni	2	1. Domingarh	G & D	
			2. Nautanwa	G & D	
Kunhra	1	Uska	G & D		
Banganga	1	Canal Head Works at Shorat garh	G & D		
Kwano	2	1. Basti	G & D		
		2. Mukhlipur	G		
Sarju	2	1. Balai ghat	G & D		
		2. Near Elgin bridge	G & D		
Sarda	2	1. Kath Kola Ghat	G		
Ganga	9	1. Banaras (u/s of Barna)	G & D		

1	2	3	4	5	6
			2. Allahabad (u/s of Jumna)	G & D	
			3. Kanpur	G & D	
			4. Narora	G & D	
			5. Raiwala	G & D	
			6. Ballia	G	
			7. Syeedpur	G	
			9. Banaras (d/s of Barna)	G	
			9. Allahabad (d/s of Jumna)	G	
	Tons	2	1. Man. Rly. bridge 2. Akbarpur Rly. Bridge.	G & D G & D	
	Gomti	1	1. Lucknow Rly. Bridge	G & D	
	Sai	1	1. Partapgarh	G & D	
	Barna	1	1. Banaras	G & D	
	Ram Ganga	2	1. Barielly 2. Raini Head Works	G & D G & D	
	Jamuna	4	1. Okhla 2. Sumerpur 3. Agra 4. Allahabad	G & D G & D G & D G & D	
	Dhasan	1	1. Lachura	G & D	

APPENDIX I

FLOOD CONTROL WORKS IN UTTAR PRADESH FOR INCLUSION IN THE SECOND FIVE YEAR PLAN

Sl. No.	Name of Scheme	Estimated cost in Rs.	Remarks
1	2	3	4
1	Short term Flood protection schemes on which work has already been started (Balance of expenditure to be carried over to 2nd Five Year Plan).	4,75,00,000	
2	Marginal Bunds along Gaura and Rapti Rivers.	1,00,00,000	
3	Baria-Sansartela Bund along Ganga-Ballia (10 miles).	6,00,000	
4	Raising marooned village in Gonda district along Ghagra.	10,00,000	
5	Raising marooned village along Ganga River in Ghazipur district.	5,00,000	
6	Marginal Bund along Jamuna near Tajewala.	30,00,000	
7	Marginal Bund along Ghagra and Sarda—Nighasen Tehsil (Kheri) and Biswa Tehsil Sitapur.	90,00,000	
8	Raising marooned villages in Nighasan and Biswa Tehsil.	20,00,000	
9	Marginal Bund along Magai Nadi (Ganga) Ghazipur-Ballia (30 miles).	20,00,000	
10	Marginal Bund along Burhi Rapti and Fajihatwa Nala from Dasia to Dhamwa Baring.	11,00,000	
11	Marginal Bund from Shahrpur-Qadarganj-Nadraulī along right bank of River Ganga district Etah.	5,00,000	
12	Marginal Bund on other rivers (100 miles).	60,00,000	
13	Minor Flood relief schemes (improvement of local drainages).	1,00,00,000	
		6,12,00,000	

1	2	3	4
	B.O.	6,12,00,000	
14	Flood detention Reservoirs on River Rapti.	13,00,00,000	
15	Flood detention Reservoirs on River Dhaura.	50,00,000	
16	Protection of Banaras town against erosion of River Ganga.	60,00,000	
17	Protection of the following towns against erosion of Rivers:—		
	(i) Mirzapur	60,00,000	
	(ii) Bateshwar	20,00,000	
	(iii) Badri Nath	20,00,000	
	(iv) Ballia	40,00,000	
	(v) Barhaj	30,00,000	
	(vi) Pillibhit	20,00,000	
	(vii) Ayodhya	30,00,000	
	(viii) Anupshahr	20,00,000	
	(ix) Rajapur	20,00,000	
	(x) Kalpi	20,00,000	
	Protection of Abadies from erosion by Ghagra River (25 miles).	20,00,00,000	
	Ramganga Project Flood Share.	3,50,00,000	
	Grand Total	46,52,00,000	

Break up of expenditure during each year of plan period in lakhs of rupees.						Total for plan period	
	'56-57	'57-58	'58-59	'59-60	'60-61		
	4652	800.0	650.0	550.0	400.0	300.0	2700

APPENDIX III

FLOOD CONDITION IN VARIOUS DISTRICTS

(Upto the end of July, 1955).

Jaunpur

On July 19, the District Officer, Jaunpur, reported that on account of continuous and heavy rainfall since the afternoon of 16th July, rivers Sai and Gomti were in spate and that Jaunpur was badly affected. The roads connecting Jaunpur and Lucknow and Banaras were submerged and Jaunpur bridge was in danger of being submerged with some further rise in water. The District Officer again reported later on that heavy rains were continuing and the entire district was in the grip of one of the worst floods beating the 1936 record. Rivers Gomti, Sai and tributaries were in extraordinary spate. The position has now somewhat eased. The levels of rivers Gomti and Sai are now falling. The city is, however, still water-logged and separated. Over 1,000 villages are affected. Trouble in rural areas is greater. No loss of human life or cattle is reported but the loss to crops and houses is expected to be very heavy.

A sum of Rs. 1,00,000 has been placed at the disposal of the District Magistrate for flood and gratuitous relief. 4,500 city flood sufferers are being supplied free food daily. Evacuation work has been almost completed. A number of goods wagons and passenger coaches are stationed to provide protection to the people. A number of flood posts have been established from where all possible help is being given to the affected persons. It is proposed to establish a colony of 3,000 evacuees for which tentage has been sent from Kanpur Central Ordnance Depot by the Military authorities.

Azamgarh

On July 20, the District Magistrate reported that on account of heavy and continuous rains for the last four days the level of rivers Ghagra and Tons was rising rapidly. He further reported that the rise in the river Tons was alarming and the roads were partly under water in Azamgarh town. Communications were also affected at several places in tahsils Phulpur, Sadar, Mohammadabad and Ghosi. On July 24, the District Magistrate reported that the river Tons was in spate and had also crossed the 1953 flood level. A large portion of the town was under water and one of the bridges over river Tons at Sidharia was also under water. The town was cut off from the railway station. 400

villages in the interior of the district had been marooned and an area of approximately 100 sq. miles was under water. Despite the all-night heroic efforts of the people, jail convicts, Police and Army personnel, the newly constructed *bund* protecting the main abadi of the town collapsed at 12-30 P.M. on 27th July with the result that water of river Tons rushed through the main streets of the town of Azamgarh. Azamgarh has experienced the greatest flood in living memory. People in the low lying area of the town have been evacuated. No loss of human life or cattle has been reported so far. Houses, mostly *kúchcha* ones, have collapsed on a large scale. Telephonic communication has broken down. A company of P.A.C. has been sent to Azamgarh for rescue work. In addition a Unit of Auxiliary Cadet Corps consisting of 200 men is being arranged by the Army authorities to Azamgarh for helping the district authorities for clearing off the debris and other rescue operations. Six 25 HP flat bottom power boats and one big storm boat have been sent to Azamgarh. A sum of Rs. 100,000 has been placed at the disposal of the District Officer, for flood and gratuitous relief. Foodgrains are being rushed from other places to Azamgarh and the entire staff is busy in providing relief and shelter to the affected persons.

Flood water in river Tons had crossed the 1871 level also but is now receding slowly. Flood water is having its maximum pressure near Mau at the time. Traffic is suspended on Ghazipur-Dohrighat road. Road bridge at Mau on Dohrighat-Ghazipur national highway has collapsed and Mau-Ballia road is breached. Courts have been closed from about the 21st July to 3rd August and educational institutions upto the 5th August. Salvage operations are now in hand.

Faizabad

It was reported on July 22 that on account of extremely heavy rains for the last 4 days the rivers Ghagra and Tons had crossed the high flood level. Much more extensive damage was, however, feared by dangerous water-logging all over the district. Faizabad-Lucknow, Faizabad-Allahabad and Faizabad-Azamgarh roads had been cut at many places within the district making communications very difficult. The Allahabad-Faizabad railway line was also cut by villagers at one place and breached at another spot by floods. Sohawal Power House was also threatened. The cause of this trouble in Faizabad are the rivers Tons and Biswi. The river Tons flows through the centre of the district while the river Biswi flows towards its south. Both these rivers had joined and had completely washed away everything in the area lying between the two rivers. River Ghagra was, however, behaving properly and not much damage has been caused by it. The situation is now slightly better. There is, however, tremendous water-logging in areas where there have never been floods in living memory. Nearly all

roads and communications have been interrupted. Town areas Akbarpur, Goshainganj and Bhadarsa are very much affected. 8 to 10 persons are reported to have died. No loss of cattle is reported. Nearly 2,000 villages have been affected and about 60% of the houses in each village have been damaged or wiped off. Relief operations are going on briskly. A sum of Rs. 1,00,000 has been placed at the disposal of the District Officer so far for flood and gratuitous relief. Military and Railway authorities have rendered valuable help. 28 flood relief posts and 20 medical posts have been established for making supplies and giving medical attendance to sufferers. 60 PRD volunteers have been sent from Lucknow while locally 75 trainees of the Development Training School and a huge labour force is helping towards relief operations. The area in the west of the town is still water-logged but east is free. The level of flood water is receding.

Basti

On July 20, the District Magistrate, Basti reported that on account of incessant rains during the last 10 days there was water logging in the district and the rivers Ghagra and Rapti had risen almost to the flood level. The Basti-Bansi road was breached at one place. Tahsil Khalilabad and major portions of tahsils Basti, Bansi, Harraiya Naugarh and Domariaganj are affected. Flood, however, began to recede from July 25, in all the rivers and the situation is now under control. The floods have affected about 1500 villages. Nearly 2,32,000 acres of land was submerged under flood water. Out of the above nearly 1,30,000 acres are cultivated areas. The loss to crops is expected to be very heavy. There has so far been a loss of two human lives and two cattle. Damage to houses will however, be heavy. The entire revenue staff with the help of police is busy in providing relief to the affected persons. Distribution of all essential commodities is going on. Medicines are also being distributed and mass scale cholera inoculation has started. A sum of Rs. 1,00,000 has been placed at the disposal of the District Officer for flood and gratuitous relief.

Gorakhpur

Gorakhpur is also now in the grip of floods. River Rapti in particular and rivers Ghagra, Rohin and Ami are all in spate. Out of the 4 tahsils 3 tahsils are affected by floods, viz. Sadar, Bansgaon and Pharenda. Tahsil Mahrajganj is, however, still free from floods. Some 740 villages are expected to have been affected. Extensive damage is likely to be caused to the standing crops. A sum of Rs. 1,00,000 is with the District Officer for gratuitous relief etc. and at present Revenue Staff is busy in providing relief to the affected persons. Malauni bund six miles down stream from the town on the left bank of river Rapti has collapsed in spite of all efforts to save it. The level of river

Naraini (Bari Gandak) is now also rising and is affecting the Mahrajanj tahsil.

Allahabad

On account of very heavy and incessant rains an area of 500 sq. miles in tahsils Phulpur, Soron, Handia and Karchaura suffered from water-logging. About 400 villages are reported to have been affected, 180 in tahsil Phulpur, 116 in tahsil Handia, 90 in tahsil Soron and 20 in tahsil Karchaura. The position has, however, now eased. A sum of Rs. 35,000 has been placed at the disposal of the District Magistrate for gratuitous and flood relief work. A sum of Rs. 50,000 has also been sanctioned as distress taqavi. A cheque of Rs. 10,000 has also been sent by the Prime Minister of India to the District Magistrate, Allahabad for organizing relief work in the district.

The District Officer and his staff are busy in providing relief to the affected persons. For this purpose 30 relief centres have been opened. The Sub-Divisional Officers and the Tahsildars have been charged with the specific responsibility of supervising the work at these centres. It is reported by the District Magistrate that public response has been fairly satisfactory and volunteers have been coming forward to work at these centres. Contributions in food grains, Kerosene Oil and clothes have been received and are being distributed. The District Magistrate has also issued an appeal for funds.

Sultanpur

According to the wireless message of July 21, extensive rains had created water-logging which created serious problems in all the tahsils of the district. River Gomti was also in spate. According to the latest report about 225 villages have been affected by floods and very large number of villages have been affected by water-logging. Floods are, however, receding and the situation is well under control. The district staff is busy in providing relief to the affected persons. A sum of Rs. 35,000 has already been placed at the disposal of the District Officer for flood and gratuitous relief.

Rae Bareli

According to the wireless message of July 21, heavy rains resulted in water-logging in the surrounding villages of Mohanganj and Parashadipur and town area Jais. Now the position has eased. Water has started receding from the 23rd. More than 200 villages are affected and large number of houses are reported to have fallen down. Loss to standing crops is expected to be very heavy. The special feature of the floods in Rae Bareli is that almost all the rivulets which were never flooded before in the history of Rae Bareli have been flooded this

year on account of heavy rains. Five persons and two cattle are reported to have died.

Deoria

The District Magistrate reported on July 21 that the rivers Rapti and Ghagra were rising and had reached danger point. Only on 26, he, however, reported that floods were subsiding rapidly in Ghagra and Rapti and the situation was well under control. According to the latest reports, floods both in Ghagra and Rapti are receding. 96 villages have been marooned and 73 villages are affected partly. There has been no loss of human life or cattle.

Pratapgarh

Owing to heavy and incessant rains, great accumulation of water was reported in most of villages and there were several cases of house collapse. Later on, on account of stoppage of rains the condition of water-logging was vastly improved and water level had decreased. The situation is well under control. Patti is reported to be the worst affected tehsil.