資　料　編

添付資料－1　基本設計調査団員リスト

(1) 現地調査

団長	：	岡本　茂	国際協力事業団無償資金協力調査部 調査審査課課長代理
橋梁計画	：	鈴木幹啓	本州四国連絡橋公団維持施設部維持企画課課長
業務主任	：	榎本功治	日本工営株式会社
橋梁設計	：	松澤勝文	日本工営株式会社
交通計画	：	本間政仁	日本工営株式会社
自然条件調査	：	可知利夫	(株) 片平エンジニアリング・インターナショナル
施工計画／積算	：	藤高勝巳	日本工営株式会社

(2) ドラフト報告書説明

団長	：	岡本　茂	国際協力事業団無償資金協力調査部 調査審査課課長代理
橋梁計画	：	鈴木幹啓	本州四国連絡橋公団維持施設部維持企画課課長
業務主任	：	榎本功治	日本工営株式会社
橋梁設計	：	松澤勝文	日本工営株式会社

添付資料－2　調査日程

（1）現地調査

日順	日付	曜日	調査内容	宿泊地
1	7月19日	火	移動、榎本団員、可知団員デリー到着	デリー
2	7月20日	水	・ JICAインド事務所訪問（調査に関する説明、打ち合わせ） ・ MOST（Ministry of Surface Transport）事務所訪問（ｲﾝｾﾌﾟｼｮﾝﾚﾎﾟｰﾄ説明、基本設計調査に関する説明、JAPAN'S GRANT AIDに関する説明） ・ 現場踏査（MOSTのスタッフと共に）	デリー
3	7月21日	木	・ 団内打ち合わせ（再委託業務、交通量調査要員） ・ MOSTにて打ち合わせ（基本的事項の確認） ・ 現場調査（水位調査）	デリー
4	7月22日	金	・ 地形測量業者に対する入札説明 ・ 団内打ち合わせ（自然条件調査） ・ JICAインド事務所打ち合わせ（調査進捗状況報告）	デリー
5	7月23日	土	・ ﾆｻﾞﾑﾃﾞｨﾝ橋、ｵｸﾗ橋現場調査（交差点調査、水門調査） ・ 地形測量入札業者の評価	デリー
6	7月24日	日	・ データ収集、本間団員デリー到着	デリー
7	7月25日	月	・ JICAインド事務所打ち合わせ（調査進捗状況報告） ・ 日本大使館表敬訪問 ・ 地質調査業者に対する入札説明	デリー
8	7月26日	火	・ JICAインド事務所と打ち合わせ ・ DELHI GOVERNMENTとの打ち合わせ ・ 交通量調査の打ち合わせ	デリー
9	7月27日	水	・ MOSTとの打ち合わせ（資料の請求、自然条件調査）	デリー
10	7月28日	木	・ 地形測量業者との契約、打ち合わせ ・ 地形測量入札業者の評価 ・ データ収集、資料解析	デリー
11	7月29日	金	・ 測量範囲の指示、監督 ・ 団内打ち合わせ	デリー
12	7月30日	土	・ 地質入札業者との契約交渉、地形測量業者との打ち合わせ ・ データ収集、資料解析	デリー
13	7月31日	日	・ 交通量調査に関する打ち合わせ	デリー
14	8月1日	月	・ 地質入札業者との契約および調査内容の打ち合わせ ・ ボーリング実施箇所の指示、監督 ・ 交通量調査ﾃﾞﾓﾝｽﾄﾚｰｼｮﾝの実施	デリー
15	8月2日	火	・ ボーリング実施箇所の確認作業および監督 ・ 交通量調査実施	デリー

16	8月3日	水	・交差点測量立ち会い ・交通量調査実施	デリー
17	8月4日	木	・地質業者との打ち合わせ、測量監督 ・交通量調査データ整理、解析	デリー
18	8月5日	金	・現場調査・データ収集 ・測量立ち会い ・藤高団員デリー到着	デリー
19	8月6日	土	・資料解析・交通解析 ・現場踏査	デリー
20	8月7日	日	・現場調査・データ収集、松澤団員デリー到着	デリー
21	8月8日	月	・JICAインド事務所と打ち合わせ、インド大蔵省表敬訪問 ・MOSTにて打ち合わせ、資料収集 ・地質調査、測量監督	デリー
22	8月9日	火	・現場調査 ・MOSTにて協議（交通調査結果、橋梁位置・型式、交差点処理、ﾌﾟﾛｼﾞｪｸﾄ実施要領）	デリー
23	8月10日	水	・国道2号線道路建設現場見学 ・建設関連調査（価格調査・税金制度）	デリー
24	8月11日	木	・現場調査・データ収集、測量および地質業者との打ち合わせ ・資料解析・交通解析、橋梁型式検討 ・建設関連調査（価格調査・税金制度）	デリー
25	8月12日	金	・MOSTにて協議（ミニッツ、橋梁位置・型式等） ・建設関連調査（価格調査・税金制度）	デリー
26	8月13日	土	・自然条件調査に関する打ち合わせ、測量および地質調査監督 ・現場調査・データ収集	デリー
27	8月14日	日	・現場調査、データ収集、可知団員デリー出発	デリー
28	8月15日	月	・資料整理	デリー
29	8月16日	火	・交通解析・橋梁設計 ・建設関連調査（施工業者・ｺﾝｻﾙﾀﾝﾄ業者の調査） ・岡本団長、鈴木団員デリー到着	デリー
30	8月17日	水	・JICAインド事務所訪問、日本大使館・インド大蔵省表敬訪問 ・MOSTにて協議（要請内容の確認、JAPAN'S GRANT AIDの説明）、現場視察、ミニッツの作成	デリー
31	8月18日	木	・MOSTとの協議（現況の確認、MOST・DELHI GOVERMENTの組織の確認、橋梁規模・型式、ミニッツ記載事項の確認）	デリー

32	8月19日	金	・ MOSTとの協議（JAPAN'S GRANT AIDの再説明、Draft ﾐﾆｯﾂの配付および説明、橋梁構造に関する協議） ・ Draft ﾐﾆｯﾂの配付・説明（インド大蔵省） ・ 本間団員デリー出発	デリー
33	8月20日	土	・ 資料整理、データ収集 ・ 建設関連調査	デリー
34	8月21日	日	・ データ収集・団内打ち合わせ	デリー
35	8月22日	月	・ ミニッツ、テクニカルノート協議 ・ IGNOU（ｲﾝﾃﾞｨﾗｶﾞﾝｼﾞｰ国立公開大学）建設現場視察	デリー
36	8月23日	火	・ ミニッツ、テクニカルノート協議 ・ ミニッツ作成	デリー
37	8月24日	水	・ ミニッツおよびテクニカルノート署名、日本大使館報告 ・ JICA事務所報告、団内打ち合わせ	デリー
38	8月25日	木	・ 団内打ち合わせ ・ 建設関連調査、為替レート調査、現場調査（指示、監督）	デリー
39	8月26日	金	・ データ収集・分析、DELHI GOV.との協議（建設関連調査） ・ ﾌﾚｼﾈｰｲﾝﾃﾞｨｱ社聞き取り調査 ・ 地質調査／測量業者との打ち合わせ ・ 岡本団長、鈴木団員、松澤団員デリー出発	デリー
40	8月27日	土	・ データ収集・分析、資料整理 ・ 現場調査、地質調査／測量業者との打ち合わせ	デリー
41	8月28日	日	・ データ収集・分析、資料整理	デリー
42	8月29日	月	・ 現場調査、地質調査／測量業者との打ち合わせ	デリー
43	8月30日	火	・ 日本大使館報告、JICA事務所報告 ・ IGNOU（ｲﾝﾃﾞｨﾗｶﾞﾝｼﾞｰ国立公開大学）現場視察 ・ 現場調査、地質調査／測量業者との打ち合わせ	デリー
44	8月31日	水	・ 資料整理	
45	9月1日	木	・ 榎本団員、藤高団員デリー出発、帰国	

(2) ドラフト報告説明書

日順	日付	曜日	調査内容	宿泊地
1	11月9日	水	・ 榎本、松澤団員デリー到着	デリー
2	11月10日	木	・ JICA事務所、日本大使館と打ち合わせ	デリー
3	11月11日	金	・ MOSTと協議	
4	11月12日	土	・ デリー市関係者と打ち合わせ	デリー
5	11月13日	日	・ サイト調査、岡本団長、鈴木団員デリー到着	デリー
6	11月14日	月	・ MOSTと協議、MOFと協議	デリー
7	11月15日	火	・ 日本大使館と打ち合わせ、MOST、MOFと協議	デリー
8	11月16日	水	・ MOSTと協議	デリー
9	11月17日	木	・ ミニッツ署名	デリー
10	11月18日	金	・ サイト調査、全団員デリー出発	機中
11	11月19日	土	・ 全団員成田到着	—

添付資料－3　面会者リスト

Department of Economic Affairs, Ministry of Finance, Government of India

Mrs. Rama MURALI	Joint Secretary
Mr. D. N. Narashimha RAJU	Deputy Secretary
Mr. G. S. GREWAL	Under Secretary
Mr. Mool CHAND	Section Secretary

Ministry of Surface Transport, Government of India

Mr. M. V. SASTRY	Director General (Road Development)
Mr. N.K. SINHA	Chief Engineer (Project Implementation Cell)
Mr. K.B. SARKAR	Predecessor of Chief Engineer (Project Implementation Cell)
Mr. M. R. KACHHWAHA	Chief Engineer (Bridges)
Mr. O. N. SAXENA	Superintending Engineer (Bridges)
Mr. B. R. SURI	Superintending Engineer (Bridges)
Mr. P. R. ACHARYA	Deputy Financial Adviser
Mr. Madan MOHAN	Assistant Financial Adviser

Ministry of Urban Development, Government of India

Mr. O. D. MOHINDRA	Additional Director General cumProject Manager (Chief Engineer), Yamuna Bridge Project Zone Delhi

Public Works Department, Government of the National Capital Territory of Delhi

Mr. O.P. PUROHIT	Superintending Engineer, Yamuna Bridge Project, Circle I
Mr. V. D. GUPTA	Superintending Engineer, Yamuna Bridge Project (Plan)
Mr. R. L. RAKHEJA	Executive Engineer, Yamuna Bridge Project

Embassy of Japan

Mr. Cyusei YAMADA	The Japanese Ambassador in India
Mr. Michio HIROSE	First Secretary
Mr. Masato FUKUSHIMA	First Secretary

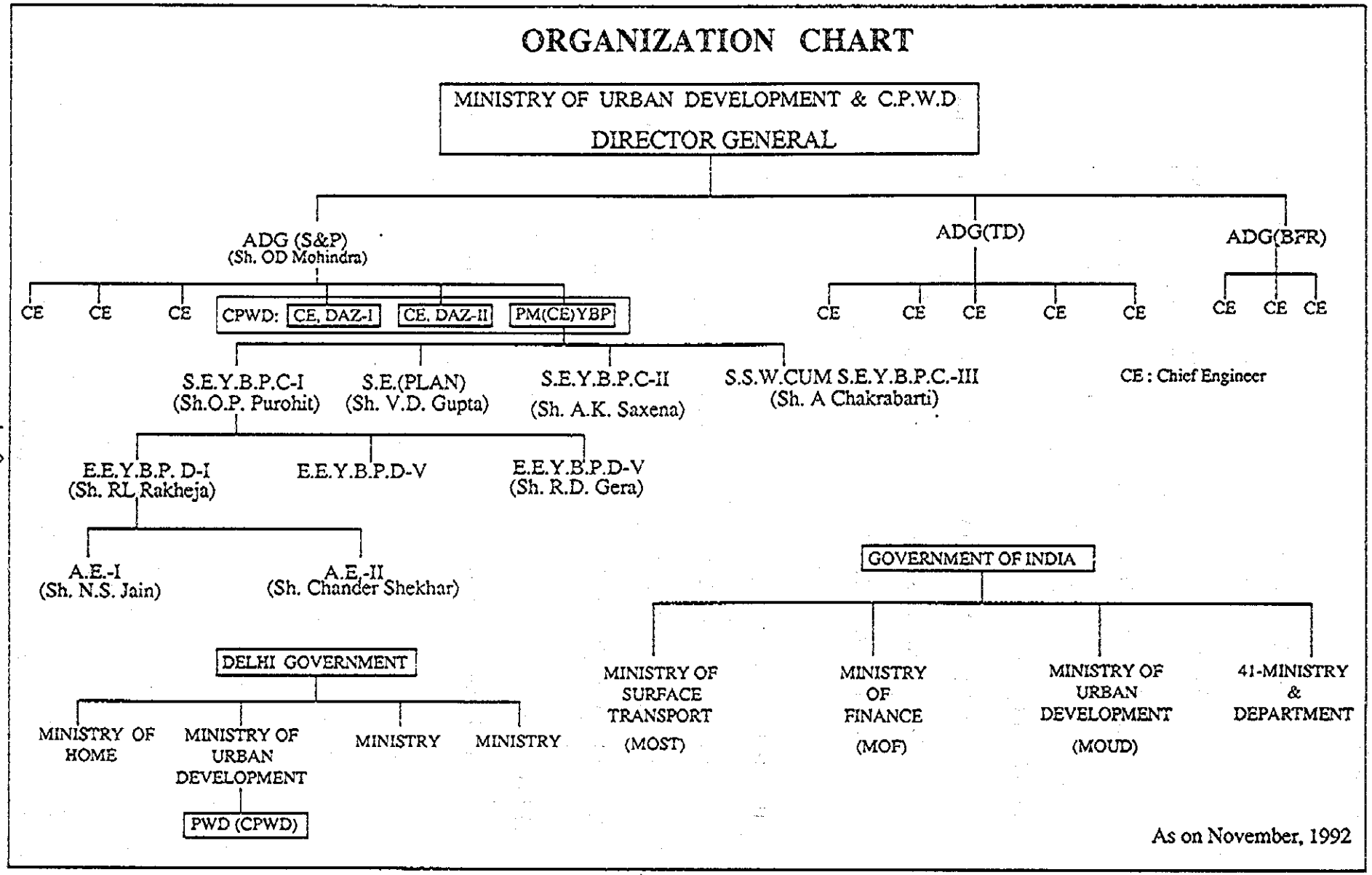
JICA India Office at MOST

Mr. Minoru SASAGO	Resident Representative
Mr. Masahiro NOMURA	Deputy Resident Representative
Mr. Toshifumi SAKAI	Deputy Resident Representative

JICA Expert

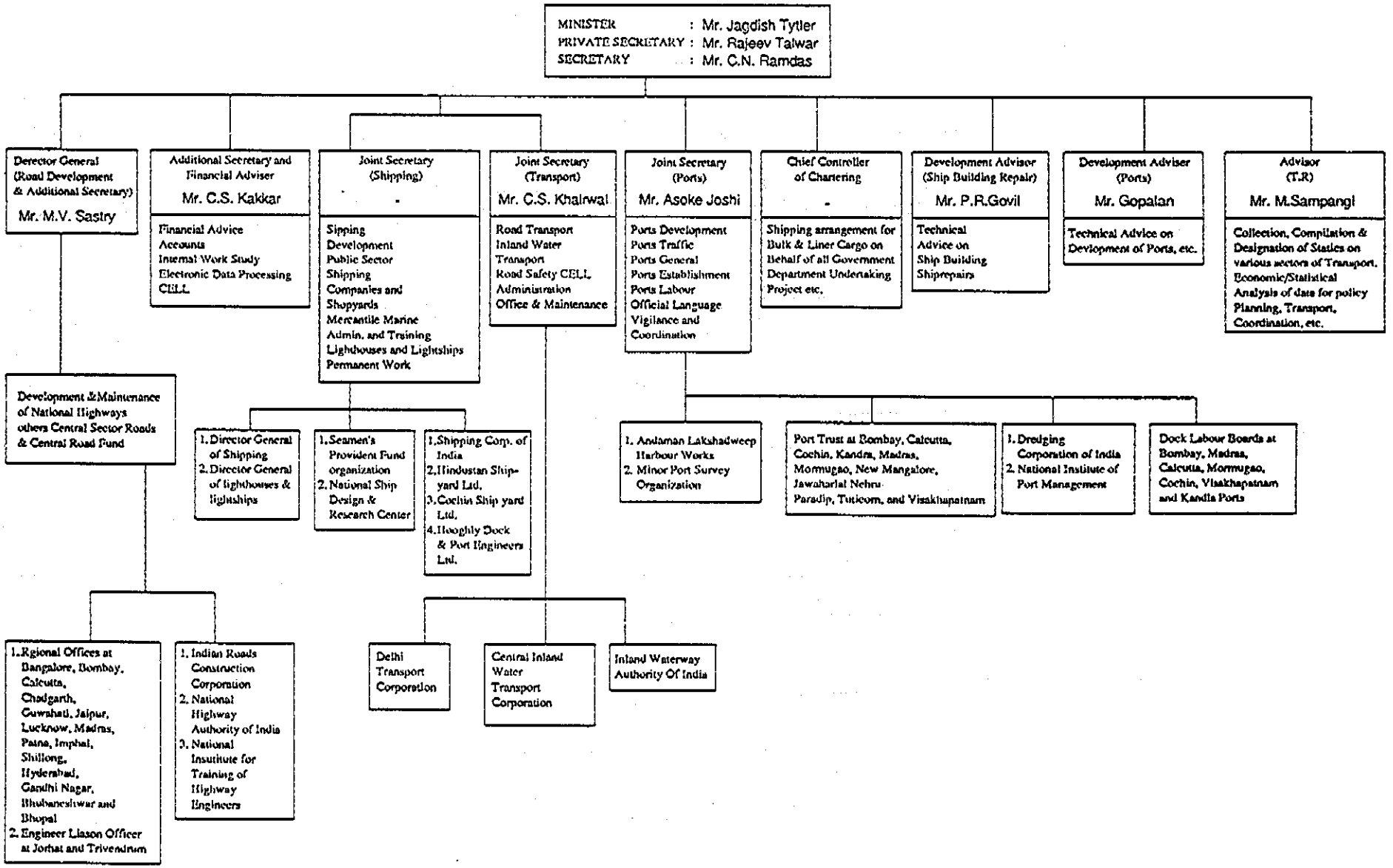
Mr. Hiroshi NAKAO	Ministry of Surface Transport (Roads Wing)

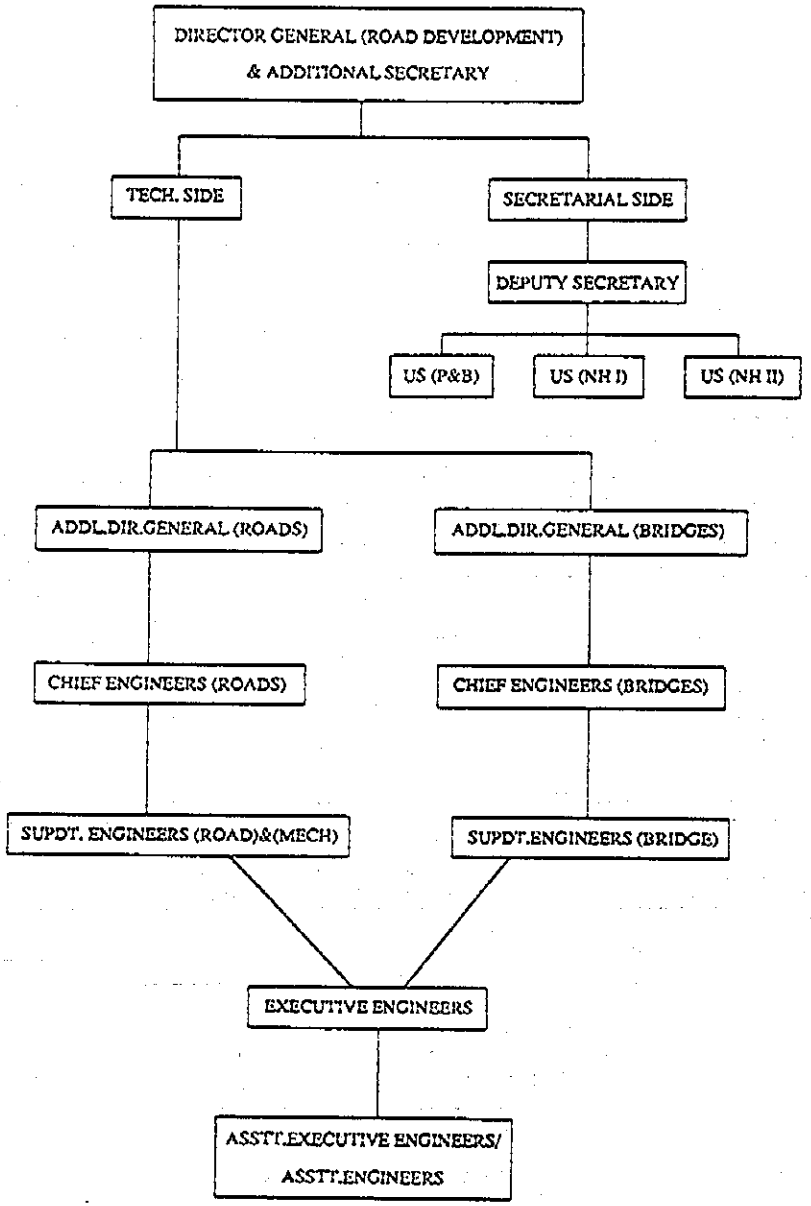
ORGANIZATION CHART



ORGANIZATION CHART (FUNCTIONAL)
MINISTRY OF SURFACE TRANSPORT

AS ON NOVEMBER, 1994




DIRECTOR GENERAL (ROAD DEVELOPMENT)
& ADDITIONAL SECRETARY
TECH. SIDE
SECRETARIAL SIDE
DEPUTY SECRETARY
US (P&B)
US (NH I)
US (NH II)
ADDL.DIR.GENERAL (ROADS)
ADDL.DIR.GENERAL (BRIDGES)
CHIEF ENGINEERS (ROADS)
CHIEF ENGINEERS (BRIDGES)
SUPDT. ENGINEERS (ROAD)&(MECH)
SUPDT.ENGINEERS (BRIDGE)
EXECUTIVE ENGINEERS
ASSTT.EXECUTIVE ENGINEERS/
ASSTT.ENGINEERS

添付資料－５　関係機関リスト

ORGANIZATIONS AND AUTHORITIES RELATED TO THE PROJECT

No.	Items	Things to be discussed or confirmed	Organization/Authority Responsible
(1)	Location/Alignment of New Bridge	Future plan of grade- separation interesection with Ring Road and Noida Road	MOST/Bridge Directorate
(2)	Configuration of Bridge	Bridge level, length and width, Nos. of lane, span length	MOST/Bridge Directorate
(3)	River training Works	Works in the river like construction of rivertraining etc	MOST/Flood Control Office/Central Water Research Estation (CWRE)
(4)	Approach Road	Type and construction method of approach road	MOST/Road Directorate
(5)	Traffic System	Traffic Volume, OD-data, traffic control, type of intersection, installation of traffic ignal	MOST/Road Directorate
(6)	Encroachment/Squatter	Resettlement of scatters and compensation, if necessary	Delhi Urban Art Commission
(7)	Land Acquisition	Compensation, if any	Delhi Development Authority (D.D.A)
(8)	High Voltage Wire	Rules or standards on high voltage wire for removal	State Electricity Board & Delhi Electricity Supply Undertaking (DESU)
(9)	Water Main	Relocation or protection of water main	Delhi Water Supply and Sweage undertaking
(10)	Environment/Evaluation	Environmental conservation, ecosystem, resettlement of residents	Ministry of Environment
(11)	River Flood Control	Flood records, rivertraining flood discharge, clearanc below bridge girders	I & F Dept., Chief Engineer Irrigation and Flood
(12)	Seismology/Meteorology	Seismic records/data, mateorological records/data	India Meteoroloogical Dept., New Delhi
(13)	Counterpart-Fund, EFC/PIB Clearance	Revenue/appropriation of budget for the Project, customs clearance	Through MOST, Dept. of Revenue, Dept. of Economic Affairs/Ministry of Finance
(14)	Maps	Topographic Maps	Survey of India

添付資料－6　協議議事録（1994年8月24日）

MINUTES OF DISCUSSIONS

BASIC DESIGN STUDY ON THE PROJECT FOR CONSTRUCTION OF THE NIZAMUDDIN BRIDGE IN INDIA

In response to a request from the Government of India, the Government of Japan decided to conduct a Basic Design Study on the Project for Construction of the Nizamuddin Bridge in India (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent a study team to India headed by Mr. Shigeru OKAMOTO, Deputy Director, Study Review and Coordination Division, Grant Aid Study and Design Department of JICA. The team is scheduled to stay in the country from July 19 to August 30, 1994.

The team held discussions with the officials of the Government of India and conducted field surveys in the study area.

In the course of the discussion and field surveys, both parties have confirmed the main items described in the attached sheets. Upon completion of the study team's trip to India, it will prepare the Basic Design Study Report in Japan.

Delhi, 24th August 1994.

Shigeru OKAMOTO
Leader
Basic Design Study Team
Japan International
Cooperation Agency

K. B. SARKAR
Chief Engineer (PIC)
Ministry of Surface Transport
Government of India

24/8/94

D. N. NARASIMHA RAJU
Deputy Secretary
Department of Economic Affairs
Ministry of Finance
Government of India

ATTACHMENT

1. Name of the Project

The Project for Construction of the Nizamuddin Bridge in India.

2. Objective of the Project

The objective of the Project is to construct a new 550m long four-lane bridge crossing the Yamuna River for substitution of the existing Nizamuddin Bridge.

3. Project Location

The Project Location is on the downstream side of the existing bridge as shown in Annex-I.

4. Executing Agency of the Government of India

The Ministry of Surface Transport (hereinafter referred to as "MOST") through Public Works Department of the Delhi Government is responsible for the execution of the Project.

5. Scope of the Project

After discussions with the Basic Design Study Team, the request for the Project by the Government of India was confirmed as follows:

1)	Bridge Name	:	Nizamuddin Bridge
2)	Route	:	National Highway No.24
3)	Location of Bridge	:	Near Nizamuddin in Delhi
4)	Bridge Length	:	Approx. 550 m
5)	Approach Road Length	:	Approx. 700 m on the left bank side
			Approx. 300 m on the right bank side
6)	Number of Lanes	:	4 lanes
7)	Bridge Width	:	22.500 meters (15-meter lane width plus 6 meters for side-walks)
8)	Structural Type of Bridges		
	• Superstructure	:	Prestressed Concrete Type
	• Substructure	:	To be determined in the study and analysis
	• Foundation	:	To be determined based on the results of the geotechnical investigation
9)	Design Standard		
	(1) Live Load	:	In accordance with Japanese Standards and being checked by Indian Standards (Indian Roads Congress Code)

(2) Design Standard : In accordance with Japanese Standards and Indian Standards by the Indian Roads Congress

10) Public Utilities and Facilities on the New Bridge

- Water Main : Excluded
- Telephone Line : Loading will be considered in the design
- Electricity Cable / Wire : Loading will be considered in the design
- Lighting Facility : To be provided

It should be noted that the final components of the Project will be decided upon after further studies are made.

6. Japan's Grant Aid System

1) The Government of India fully understood Japan's Grant Aid system as described in Annex-II.

2) The Government of India has understood the roles of Japanese consultant as executing detailed design and construction supervision and contractor as executing the work covered by Japan's Grant Aid to be contracted for implementing the Project after signing Exchange of Notes (E/N).

3) The Government of India agreed that the contract with the above Japanese contractor shall be executed in accordance with the "GUIDELINES FOR PROCUREMENT UNDER THE JAPANESE GRANT, 1991, JICA".

4) On condition that the Grant Aid Assistance by the Government of Japan is extended to the Project, the Government of India will take necessary measures as described in Annex-III for the smooth implementation of the Project.

5) MOST has agreed to secure the budget and other necessary clearances for fulfilling the undertakings to be covered by the Government of India prior to the commencement of the Project.

7. Fee of Use

No fee will be collected for use of this bridge being situated in urban limit of Delhi Metropolis.

8. Schedule of the Study

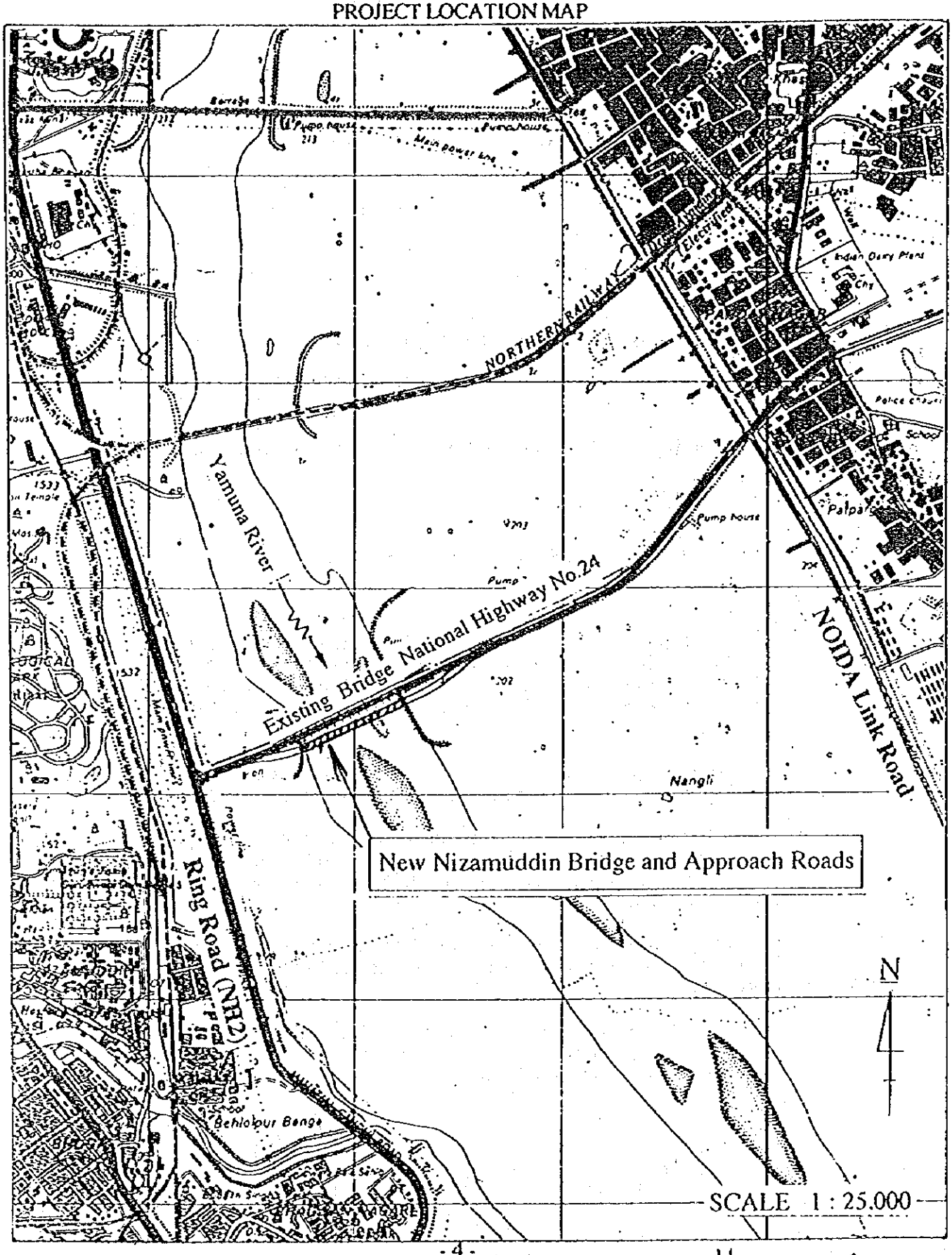
1) The Study Team will continue its studies in India until August 30, 1994.

2) JICA will prepare the draft final report and dispatch a mission to India in November 1994 in order to explain its contents.

3) In case that the contents of the report are accepted in principle by the Indian side, JICA will complete the final report and send it to the Government of India by the end of January 1995.

ANNEX-I

PROJECT LOCATION MAP



ANNEX-II

JAPAN'S GRANT AID PROGRAM

1. Japan's Grant Aid Procedures

The Japan's Grant Aid Program is extended in the following procedures.

1) • **Application** (A request made by the recipient country)

• **Study** (Basic Design Study conducted by JICA)

• **Appraisal & Approval** (Appraisal by the Government of Japan and Approval by the Cabinet of Japan)

• **Determination of Implementation** (Exchange of Notes between both Governments)

• **Implementation** (Implementation of the Project)

2) At the **first step**, application, a request made by the recipient country, is examined by the Government of Japan (the Ministry of Foreign Affairs), whether or not it is suitable for Grant Aid. If the request is confirmed that it has the high priority as the Project for Grant Aid, the Government of Japan instructs JICA to conduct the Study.

At the **second step**, the Study (the Basic Design Study) is conducted by JICA basically under contracts with a Japanese consulting firm to carry out.

At the **third step** (appraisal & approval), the Government of Japan appraise whether or not the Project is suitable for Japan's Grant Aid Program based on the Basic Design Study report prepared by JICA and is then submitted for approval by the Cabinet.

At the **fourth step** the Project approved by the Cabinet is officially determined to implement by signing the Exchange of Notes between both Governments.

In the course of implementation of the Project, JICA will take charge of expediting the execution by assisting the recipient country in terms of the procedures of tender, contract and others.

2. Contents of the Study

1) Contents of the Study

The purpose of the Study (the Basic Design Study), conducted by JICA, is to provide basic document necessary for the appraisal by the Government of Japan whether or not the project is viable for Japan's Grant Aid Program. The contents of the Study are as follows:

a) to confirm the background of the request, objectives, effects of the Project and maintenance ability of the recipient country necessary for the implementation,

b) to evaluate the appropriateness of the Grant Aid from the technological, social and economical points of views,

c) to confirm the basic concept of the plan mutually agreed upon through discussion between both sides,

d) to prepare a basic design of the Project,

e) to estimate the rough cost of the Project.

The contents of the original request are not necessarily approved as the contents of the Grant Aid as it is. The Basic Design of the Project is confirmed considering the Japan's Grant Aid scheme.

In the implementation of the Project, the Government of Japan requests the recipient country to take necessary measures in order to promote it's self-reliance. Those undertakings must be guaranteed even if the recipient implementing entity does not have jurisdiction. Therefore the implementation of the Project is confirmed by all relevant organizations in the recipient country in the Minutes of Discussions.

2) Selection of Consultants

For the smooth implementation of the study, JICA selects a consultant among those consultants who registered to JICA by evaluating proposals submitted by those consultants. The selected consultant carries out the Basic Design Study and prepares a report based upon the terms of reference made by JICA.

At the stage of implementation after the Exchange of Notes, for concluding the contract regarding the Detailed Design and Construction Supervision of the Project between a consultant and the recipient country, JICA recommends the same consultant which participated in the Basic Design Study to the recipient country in order to maintain the technical consistency between the Basic Design Study and the Detailed Design as well as to avoid undue delay caused by the selection of a new consultant.

3. Japan's Grant Aid Scheme

1) What is Grant Aid ?

The Grant Aid Programme provides the recipient country with nonreimbursable funds needed to procure facilities, equipment and services (labor or transportation, etc.) for economic and social development in the

country under the following principles in accordance with the relevant laws and regulations of Japan. The Grant Aid is not extended in a form of donation in kind to the recipient country.

2) Exchange of Notes (E/N)

The Japan's Grant Aid is extended in accordance with the Exchange of Notes between both Governments, in which the Objectives of the Project, Period, Conditions and Amount of the Grant etc. are confirmed.

3) "The period of the Grant Aid" is within the Japanese fiscal year in which the Cabinet approved the Project. Within the fiscal year, all procedure such as Exchange of Notes, concluding contracts by the recipient country with the consultant and contractor and the final payment to them must be completed.

In the case of a big project which requires net construction period more than 12 months, the period of the Grant Aid is designated covering more than one fiscal year depending on Basic Design Study Report.

However in case of the delay of delivery, installation or construction due to events such as weather, the period of the Grant Aid can be further extended for one fiscal year at most by mutual agreement between both Governments.

4) The Grant Aid is used properly and exclusively for the purchase of the products, in principle, of Japan or the recipient country and the services of the Japanese or the recipient country's nationals. The term "Japanese nationals" means Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons.

When both Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of the third country (other than Japan or the recipient country).

However in terms of the principle of the Grant Aid, the Prime contractors, that is the Consultant, Contractor and Procurement firm, necessary for the implementation of the Grant Aid are limited to "Japanese nationals".

5) Necessity of the "Verification"

The Government of recipient country or its designated authority will conclude the contracts in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. The "Verification" is necessary because the source of the Grant Aid is the taxes of Japanese nationals.

6) Undertakings required to the Government of recipient country

As described in Annex-III.

7) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign the necessary staff for operation and maintenance of them as well as to bear all the expenses other than those to be borne by the Grant Aid.

8) "Re-export"

The products purchased under the Grant Aid shall not be re-exported from the recipient country.

9) Banking Arrangement (B/A)

a) The Government of the recipient country or its designated authority shall open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by Government of the recipient country or its designated authority under the contracts verified.

b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay issued by the Government of the recipient country or its designated authority.

ANNEX-III

NECESSARY MEASURES TO BE TAKEN BY THE GOVERNMENT OF INDIA IN CASE JAPAN'S GRANT AID IS EXECUTED

1) To provide the Japanese side with the data and information necessary for the implementation of the Project.

2) To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities.

3) To secure land necessary for the execution of the Project and provide enough space for construction of such items as temporary offices, working areas and storage yards for equipment and materials.

4) To construct/develop access roads/detours for the transportation of materials and equipment to the Project site prior to the commencement of the construction.

5) To demolish or remove and relocate, if necessary, any existing public utilities, facilities and encroachments that may interfere the works and area of the Project.

6) To bear advising commissions of the Authorization to Pay (A/P) and payment commission to the Japanese foreign exchange bank for banking services based upon the Banking Arrangement (B/A).

7) To assist prompt unloading and ensure customs duties exemption and customs clearance of the equipment and materials for the Project at port of disembarkation.

8) To accord Japanese nationals, whose services may be required in connection with the supply of products and the services under the verified contract, such facilities as may be necessary for their entry into India and stay therein for the performance of their work.

9) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in India with respect to the supply of the products and services under the verified contracts.

10) To bear all the expenses other than those to be borne by the Grant, necessary in connection with the implementation of the Project.

11) To coordinate and solve any matters related which may arise with third party and inhabitants living in the Project area during implementation of the Project.

12) To ensure the necessary budget, clearances and personnel for proper and effective operation and maintenance of the facilities and equipment provided under the Grant Aid.

13) To maintain as well as to use properly and effectively the facilities constructed under the Grant Aid in terms of the policy of the Grant Aid.

添付資料－7　協議議事録（1994年11月17日）

MINUTES OF DISCUSSIONS
BASIC DESIGN STUDY ON THE PROJECT FOR CONSTRUCTION OF THE NIZAMUDDIN BRIDGE IN INDIA

In August 1994, Japan International Cooperation Agency (JICA) dispatched a Basic Design Study team on the Project for Construction of the Nizamuddin Bridge in India (hereinafter referred to as "the Project") to India and through discussions, field survey, and technical examination of the results in Japan, has prepared the Draft Report of the Study.

In order to explain and to consult the Indian side on the components of the Draft Report, JICA sent to India a study team, which is headed by Mr. Shigeru Okamoto, Deputy Director, Study Review and Coordination Division, Grant Aid Study and Design Department, JICA and is scheduled to stay in the country from 9th to 18th November 1994.

As a result of discussions, both parties confirmed the main items described on the attached sheets.

Delhi, 17th November 1994

Shigeru Okamoto
Leader
Basic Design Study Team
Japan International
Cooperation Agency

N. K. Sinha
Chief Engineer (PIC)
Ministry of Surface Transport
Government of India

Rama Murali
Joint Secretary
Department of Economic Affairs
Ministry of Finance
Government of India

ATTACHMENT

1. Components of the Draft Report

(1) The Government of India have agreed and accepted in principle the contents of the Draft Report including the scope of the Project, the configurations of the bridge to be constructed and the tentative implementation schedule which was proposed by the team.

(2) The bridge to be constructed under the Project is designed so that all traffic through the existing Nizamuddin Bridge will be shifted to the new bridge after the completion.

2. Japan's Grant Aid System

(1) The Government of India have understood the system of Japanese Grant Aid explained by the Team.

(2) In case the Grant Aid by the Government of Japan is extended to the Project, two separate Exchange of Notes (E/N) will be exchanged; first one covers the consultant services for the Detailed Design and second one covers the Construction Work as well as the consultant services for the Construction Supervision.

(3) The Government of India will take necessary measures described in Annex-I according to the tentative implementation schedule as per Annex-II, for smooth implementation of the Project on condition that the Grant Aid by the Government of Japan is extended to the Project.

(4) Sales Tax and Excise Duty for construction materials and others to be procured in India will not be borne by the Grant.

3. Further Schedule of the Basic Design (B/D) Study

The Team will make the Final Report in accordance with the confirmed items, and send it to the Government of India by the end of January, 1995.

ANNEX-I

NECESSARY MEASURES TO BE TAKEN BY THE GOVERNMENT OF INDIA IN CASE JAPAN'S GRANT AID IS EXECUTED

1) To provide the Japanese side with the data and information necessary for the implementation of the Project.

2) To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities.

3) To secure land necessary for the execution of the Project and provide enough space for construction of such items as temporary offices, working areas and storage yards for equipment and materials.

4) To construct/develop access roads/detours for the transportation of materials and equipment to the Project site prior to the commencement of the construction.

5) To demolish or remove and relocate, if necessary, any existing public utilities, facilities and encroachments that may interfere the works and area of the Project.

6) To bear advising commissions of the Authorization to Pay (A/P) and payment commission to the Japanese foreign exchange bank for banking services based upon the Banking Arrangement (B/A).

7) To assist prompt unloading by ensuring customs duties exemption and customs clearance of the equipment and materials for the Project at port of disembarkation.

8) To accord Japanese nationals, whose services may be required in connection with the supply of products and the services under the verified contract, such facilities as may be necessary for their entry into India and stay therein for the performance of their work.

9) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in India with respect to the supply of the products and services under the verified contracts.

10) To bear all the expenses other than those to be borne by the Grant, necessary in connection with the implementation of the Project.

11) To coordinate and solve any matters related which may arise with third party and inhabitants living in the Project area during implementation of the Project.

12) To ensure the necessary budget, clearances and personnel for proper and effective operation and maintenance of the facilities and equipment provided under the Grant Aid.

13) To maintain as well as to use properly and effectively the facilities constructed under the Grant Aid in terms of the policy of the Grant Aid.

ANNEX-II TENTATIVE IMPLEMENTATION SCHEDULE

CONSULTANT SERVICES FOR DETAILED DESIGN (D/D)

	Item \ Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Japanese Side	* Approval by the Cabinet	▽																																									
	* Exchange of Notes (E/N)			▽																																							
	Consultant Contract for D/D			▽																																							
	* Verification for Consultant Contract				▽																																					
	Detailed Design (D/D) & Tender Document																																									
Indian Side	Expenditure Finance Committee (EFC) Approval for D/D																																									
	Exchange of Notes (E/N)			▽																																						
	Banking Arrangement (B/A)			▽																																						
	Consultant Contract			▽																																						
	Authorization to Pay (A/P)				▽																																					
	Counterpart Fund Arrangement	MOST will allocate for the respective fiscal years at the appropriate time.																																								
	Completion Certificate							▽																																		

COSULTANT SERVICES FOR CONSTRUCTION SUPERVISION (S/V) AND CONSTRUCTION WORK

	Item \ Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Japanese Side	* Approval by the Cabinet						▽																																			
	* Exchange of Notes (E/N)							▽																																		
	Consultant Contract for S/V							▽																																		
	* Verification for Consultant Contract								▽																																	
	Consultant Services for S/V																																									
	Pre-qualification (P/Q) and Tender																																									
	Construction Contract										▽																															
	* Verification for Construction Contract										▽																															
	Construction Work: Bridge																																									
	Approach Road																																									
Indian Side	FEC and Cabinet Committee on Economic Affairs (CCEA) Approval for S/V and Construction																																									
	Exchange of Notes (E/N)							▽																																		
	Banking Arrangemnt (B/A)							▽																																		
	Consultant Contract for S/V							▽																																		
	A/P for Consultant Contract								▽																																	
	P/Q and Tender																																									
	Construction Contract										▽																															
	A/P for Construction Contract											▽																															
	Counterpart Fund Arrangement	MOST will allocate for the respective fiscal years at the appropriate time.																																								
	Land Acquisition / Removal of Encroachment																																									
	Utility Provision																																									
	Relocation Work: Electricity Wires/Poles																																									
	Water Mains																																									
	Completion Certificate																																									▽

Notes: B/A and A/P will be arranged by MOST.

The items marked with * show the activities by the Government of Japan.

添付資料－８　基本設計条件

TECHNICAL NOTE
ON
BASIC DESIGN CONDITIONS
FOR
CONSTRUCTION OF THE NIZAMUDDIN BRIDGE
ON NATIONAL HIGHWAY NO.24 IN DELHI

AUGUST , 1994

MINISTRY OF SURFACE TRANSPORT, GOVERNMENT OF INDIA

BASIC DESIGN STUDY TEAM, JICA

TECHNICAL NOTE

With regard to the Basic Design Study on the Project for Construction of the Nizamuddin Bridge and the Minutes of Discussions for the Project signed on 24th August 1994, Ministry of Surface Transport, Government of India and Basic Design Study Team, JICA have agreed on the major design conditions so as the home work of the study to be carried out in Japan after accomplishment of the field survey in India.

A. GEOMETRIC DESIGN REQUIREMENTS

1) National Highway No.24 (NH24) is to be classified into Arterial Category.

2) Design speed is to be 80 km per hour.

3) Number of traffic lanes is to be 4 (four).

4) The new bridge is to be located on the downstream side of the existing one and the connecting points of the new approach roads to the existing approaches are to be between the bridge and existing intersections.

5) Distance to be separated between the existing and the new bridge will be determined based on the following factors:

- Area affected by the adjacent foundations,
- Cross-sectional requirements of the roads,
- Geological requirements,
- Future plan of grade-separation intersection.

B. BRIDGE STRUCTURES AND APPROACH ROADS

1) Bridge length is approximately 550m.

2) Overall bridge width is 22.500 meters, including 15-meter lane width plus 6 meters for side-walks as shown in the proposed bridge cross-section.

3) Approach road length will be approx. 300m on the Ring Road (National Highway No.2) side and approx. 700m on the NOIDA Link Road side.

4) The new deck level will be determined considering the following factors:

- Design Flood Level (D.F.L), including afflux : 205.68m (1988.)
- Vertical Clearance 1.5m, as per Indian Roads Congress codal provisions (IRC : 5 - 1985.)
- Elevation of the soffit of the existing girders

5) Span Arrangement

The conceivable span length will be 42.3 meters, mitigating the adverse hydraulic effect. The 84.6 meter span length, however, will be studied as an alternative.

6) The superstructure will be Prestressed Concrete post-tension type.

7) The type of foundation will be selected after comparison study from the economical and technical viewpoint, conceivable types will be concrete caisson foundation and large diameter cast-in-situ concrete pile foundations.

The type of foundation was discussed with Ministry of Surface Transport (MOST), the JICA Study Team was in favor of large size of pile foundations. Ministry's officials, however, insisted on adoption of caisson foundation as per IRC-SP-33.

C. STANDARDS AND SPECIFICATIONS

1) The design live loads in the Specification for Highway Bridge, Japan Road Association (JRA) will be applied and structural safety will be checked in conformity with Indian Roads Congress, Standard Specifications & Code of Practice for Road Bridges.

2) On the seismic design, the basis for the seismic design of structures may be equivalent static force method. The horizontal seismic forces are to be calculated based on seismic coefficient which will be estimated through Japanese Standards (JRA) and Indian Roads Congress Standards with specific reference to I.R.C. Code for stability consideration.

3) Design Standards

Design Standards to be applied for the Basic Design Study are to be in accordance with Japanese Standards and Indian Roads Congress, Standard Specifications & Code of Practice for Road Bridges.

D. PUBLIC UTILITIES AND FACILITIES ON THE NEW BRIDGE

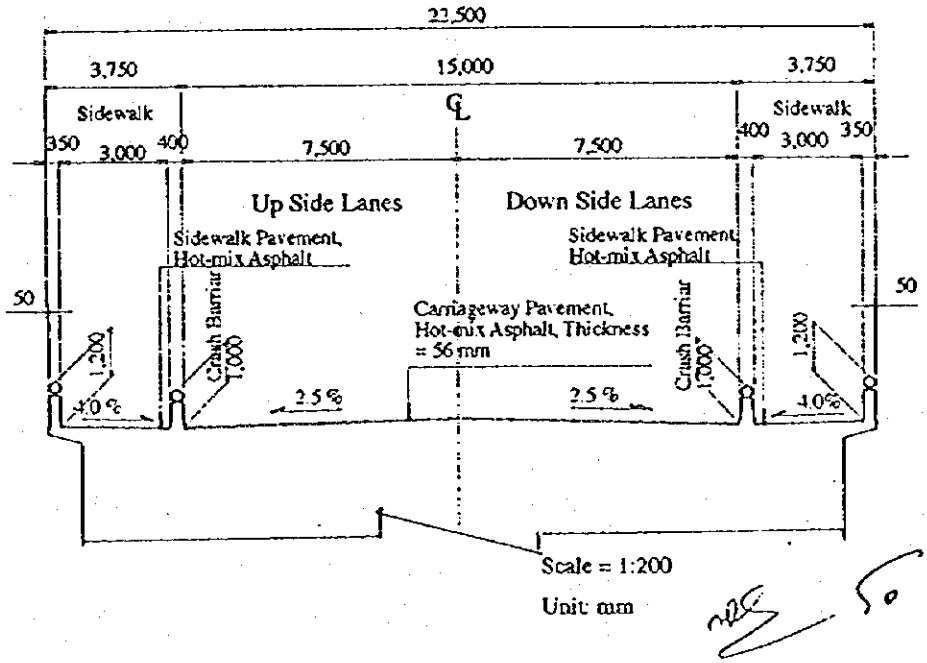
1) Water Mains	:	No water main is to be supported by or carried on the superstructure of the new bridge. However, in the design of substructure and foundation, the future extension of the caps to support the water-main installation will be considered.
2) Telephone Line	:	Loading will be considered in the design.
3) Electricity Cable / Wire	:	Loading will be considered in the design.
4) Lighting Facilities	:	To be provided, including the posts.

Delhi, 24th August, 1994.

Shigeru OKAMOTO
Leader
Basic Design Study Team
Japan International
Cooperation Agency

M. R. KACHHWAHA
Chief Engineer (Bridges)
Ministry of Surface Transport
Government of India

THE PROPOSED BRIDGE CROSS-SECTION OF THE NIZAMUDDIN BRIDGE



添付資料－9　インド国の社会・経済事情

国名	インド
	India

1994.11　1/2

一般指標					
政体	連邦共和制	*1	面積	3,287.0 千Km 2	*1
元首	President Shankar SHARMA	*1	人口	903,158 千人 (1993年)	*1
独立年月日	1947年08月15日	*1	首都	ニューデリ	*1
人種(部族)構成	ｲﾝﾄﾞ／ｱﾘｱﾝ72％、ﾄﾞﾗｳﾞｨﾀﾞﾝ	*1	主要都市名	ﾎﾞﾝﾍﾞｲ、ﾃﾞﾘｰ、ﾏﾄﾞﾗｽ	*1
		*1	経済活動可人口	284,400 千人 (1985年)	*1
言語・公用語	ヒンズー語、英語、他17言語	*1	義務教育年数	2 年間 (1992年)	*2
宗教	ヒンズー教	*1	初等教育就学率	－ % (0000年)	*2
国連加盟	1945年10月		識字率	48.0 % (1990年)	*1
世銀・IMF加盟	1945年12月	*1	人口密度	268.0人/Km 2 (1992年)	*2
		*1	人口増加率	1.86 % (1993年)	*2
			平均寿命	平均 58.12　男 57.7　女 58.6	*1
			5歳児未満死亡率	80.5/1000 (1993年)	*1
			ｶﾛﾘｰ供給量	2,230.0 cal/日/人 (1990年)	*2

経済指標					
通貨単位	ルピー	*1	貿易量	(1993年)	*3
為替ﾚｰﾄ(1US$)	1US$= 31.37 (09月)	*3	輸出	21,434.0 百万ﾄﾞﾙ	*2
会計年度	4 月～　3 月	*1	輸入	22,262.0 百万ﾄﾞﾙ	*2
国家予算	(1992年)	*2	輸入ｶﾊﾞｰ率	3.7 % (1992年)	*4
歳入	39,528.6 百万ﾄﾞﾙ	*2	主要輸出品目	宝石、衣服、工業製品、皮革、綿花	*1
歳出	44,721.9 百万ﾄﾞﾙ	*2	主要輸入品目	原油、石油製品、肥料	*1
国際収支	-1,937.00 百万ﾄﾞﾙ (1990年)	*2	日本への輸出	2,037.0 百万ﾄﾞﾙ (1992年)	*5
ODA受取額	2,354.00 百万ﾄﾞﾙ (1992年)	*2	日本からの輸入	1,487.0 百万ﾄﾞﾙ (1992年)	*5
国内総生産(GDP)	238,159.00 百万ﾄﾞﾙ (1992年)	*4			
一人当たりGDP	330.0 ﾄﾞﾙ (1991年)	*4	外貨準備総額	18,856.0 百万ﾄﾞﾙ (1994年)	*1
GDP産業別構成	農業　31.0 %	*4	対外債務残高	76,983.0 百万ﾄﾞﾙ (1992年)	*4
	鉱工業　28.0 %		対外債務返済率	25.6 % (1992年)	*4
	ｻｰﾋﾞｽ業　41.0 %		ｲﾝﾌﾚ率	10.1 % (1992年)	*2
産業別雇用	農業　62.0 %	*2			
	鉱工業　4.0 %				
	ｻｰﾋﾞｽ業　27.0 %		国家開発計画	第８次開発５ヵ年計画 92/93～97/98	*5
経済成長率	4.3 % (1992年)	*4			

*6

気象(1969 年～ 1979 年平均)　場所：Ｄｅｌｈｉ　(標高　218 m)													
月	1	2	3	4	5	6	7	8	9	10	11	12	平均/計
最高気温	21.0	24.0	31.0	36.0	41.0	39.0	36.0	34.0	34.0	34.0	29.0	23.0	31.8 ℃
最低気温	7.0	9.0	14.0	20.0	26.0	28.0	27.0	26.0	24.0	18.0	11.0	8.0	18.1 ℃
平均気温	14.0	16.5	22.5	28.0	33.5	33.5	31.5	30	29.0	26.0	20.0	15.5	25.0 ℃
降水量	23.0	18.0	13.0	8.0	13.0	74.0	180.0	173.0	117.0	10.0	3.0	10.0	642.0 mm
雨期/乾期							雨	雨			乾		

*1 The World Factbook(C.I.A)
*2 Human Development Report(UNDP)
*3 International Financial Statistics(IMF)
*4 World Debt Tables(WORLD)
*5 最新世界各国要覧(東京書籍)
*6 World Weather Guide

国名	インド India

1994.11　2/2

*7

我が国におけるＯＤＡの実績　（資金協力は約束額ベース、単位：億円）				
項目＼年度	1989	1990	1991	1992
無償資金協力	2,043.46	2,382.47	2,515.30	2,699.97
技術協力	2,146.74	1,989.63	2,050.70	2,194.95
有償資金協力	5,161.42	5,676.39	7,364.47	5,852.05
総　額	9,351.62	10,048.49	11,930.47	10,746.97

*7

当該国に対する我が国ＯＤＡの実績　（支出純額、単位：百万ﾄﾞﾙ）				
項目＼暦年	1989	1990	1991	1992
無償資金協力	10.51	11.72	13.17	165.90
技術協力	24.58	22.17	25.79	23.94
有償資金協力	222.15	53.38	852.09	384.64
総　額	257.24	87.27	891.05	574.48

*8

ＯＤＡ諸国の経済協力実績　（支出純額、単位：百万ﾄﾞﾙ）						
	贈　与 (1)		有償資金協力 (2)	政府開発援助 (ODA) (1)+(2)=(3)	その他政府資金及び民間資金 (4)	経済協力総額 (3)+(4)
		技術協力				
二国間援助	782.60	329.10	415.50	1,527.20	67.80	1,595.00
(主要供与国)						
1. イギリス	210.70	67.50	-60.30	217.90	-17.80	200.10
2. オランダ	134.50	70.90	-40.30	165.10	-0.50	164.60
3. アメリカ	116.00	39.00	-105.00	50.00	-4.00	46.00
4. ｽｳｪｰﾃﾞﾝ	64.60	53.30	0.00	117.90	0.00	117.90
多国間援助	233.30	107.20	1,031.20	1,371.70	688.00	2,059.70
(主要援助機関)						
	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
その他	531.50	203.20	140.00	874.70	-11.40	863.30
合　計	1,547.40	639.50	1,586.70	3,773.60	744.40	4,518.00

*9

援助受入窓口機関	
技術	関係各中央政府→大蔵省
無償	関係各中央政府→大蔵省
協力隊	関係各中央政府→大蔵省

*7 Japan's ODA(Annual Report)
*8 Geographical Distribution of Financial Flows of Developing Countris(OECD/OCDE)
*9 国別協力情報(JICA)

SUMMARY OF TRAFFIC COUNTING SURVEY

24 HOUR TRAFFIC VOLUME (No.of Vehicles & PCU

BRIDGE \ Vehicle	1 TRUCK	2 BUS	3 CAR	4 S/C.M/C	5 ATRKS	6 BICYCLE	TOTAL	TOTAL (PCU)
WAZIRABAD	6,698	4,155	3,830	12,301	1,886	17,924	46,794	53,388
ISBT	7,744	5,754	9,612	29,054	7,809	20,646	80,619	82,765
OLD YAMUNA	1,003	1,055	3,763	26,892	18,635	50,112	101,460	67,074
ITO	3,898	7,855	23,522	54,574	21,620	19,496	130,965	117,436
NIZAMUDDIN	6,783	2,314	25,964	22,464	4,458	9,366	71,349	73,628
OKHLA	4,254	438	8,054	10,194	646	5,595	29,181	30,671
TOTAL	30,380	21,571	74,745	155,479	55,054	123,139	460,368	424,961

Vehicle Composition by Each Bridge

(%)

BRIDGE \ Vehicle	1 TRUCK	2 BUS	3 CAR	4 S/C.M/C	5 ATRKS	6 BICYCLE	TOTAL
WAZIRABAD	14.31	8.88	8.18	26.29	4.03	38.30	100.00
ISBT	9.61	7.14	11.92	36.04	9.69	25.61	100.00
OLD YAMUNA	0.99	1.04	3.71	26.51	18.37	49.39	100.00
ITO	2.98	6.00	17.96	41.67	16.51	14.89	100.00
NIZAMUDDIN	9.51	3.24	36.39	31.48	6.25	13.13	100.00
OKHLA	14.58	1.50	27.60	34.93	2.21	19.17	100.00
TOTAL	6.60	4.69	16.24	33.77	11.96	26.75	100.00

Bridge Traffic Composition by Vehicle Type

(%)

BRIDGE \ Vehicle	1 TRUCK	2 BUS	3 CAR	4 S/C.M/C	5 ATRKS	6 BICYCLE	TOTAL
WAZIRABAD	22.05	19.26	5.12	7.91	3.43	14.56	10.16
I.S.B.T	25.49	26.67	12.86	18.69	14.18	16.77	17.51
OLD YAMUNA	3.30	4.89	5.03	17.30	33.85	40.70	22.04
I.T.O.	12.83	36.41	31.47	35.10	39.27	15.83	28.45
NIZAMUDDIN	22.33	10.73	34.74	14.45	8.10	7.61	15.50
OKHLA	14.00	2.03	10.78	6.56	1.17	4.54	6.34
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table HOURLY TRAFFIC VOLUME BY DIRECTION IN PCU

COMING INTO DELHI (PCU)

TIME	WAZI-RABAD	ISBT	OLD YAMUNA	ITO	NIZAMU-DDIN	OKHLA	TOTAL
7-8	1246	1675	1710	2571	1510	477	9188
8	3068	2717	3074	4997	4043	1260	19158
9	2939	4311	4969	7742	5403	1438	26801
10	1857	4107	3755	6678	2512	814	19721
11	1226	2808	2654	4826	2067	738	14318
12	998	1945	1739	4512	1911	598	11703
13	1095	1761	1859	3767	1683	643	10806
14	1094	1844	1783	3119	1731	620	10190
15	1003	1946	2023	3728	2037	676	11412
16	953	1926	2680	3917	1829	696	11999
17	812	1897	2203	3725	1795	832	11262
18	1297	2231	3645	2562	1974	1029	12738
19	1144	2028	615	2633	1533	1644	9595
20	1260	1819	760	2284	2009	1733	9864
21	883	2001	726	1900	1473	1238	8219
22	628	1350	543	956	1133	844	5453
23	507	1088	348	722	1201	322	4187
24	413	636	125	362	496	233	2264
1	295	472	66	300	360	159	1652
2	217	575	66	309	277	270	1712
3	252	421	93	241	259	149	1414
4	287	555	273	348	316	41	1820
5	487	548	606	711	532	143	3026
6-7	699	893	1004	1347	854	344	5141
TOTAL	24653	41548	37314	64254	38934	16935	223636
Peak Traffic	3068	4311	4969	7742	5403	1733	26801

Capacity /Hr./lane in PCU		
	(India)	1000
	(HCM)	1100
	(Japan)	1800

GOING OUT OF DELHI (PCU)

TIME	WAZI-RABAD	ISBT	OLD YAMUNA	ITO	NIZAMU-DDIN	OKHLA	TOTAL
7-8	670	879	731	1647	798	577	5301
8	877	1141	928	1686	1135	937	6702
9	1103	1423	1250	2095	998	930	7798
10	1095	1728	1197	2325	1343	734	8420
11	1209	1753	1328	2636	1354	800	9080
12	1367	1898	1662	3358	1219	692	10195
13	1294	1714	1594	3421	1725	681	10427
14	1340	1712	1835	3296	2017	687	10885
15	1316	1970	1622	2635	1750	719	10011
16	1586	1879	1785	2868	1976	658	10751
17	2129	2876	2387	3869	2886	1159	15305
18	3281	3835	2500	4556	3354	1368	18893
19	2187	3997	2052	4176	3604	1111	17126
20	2228	5123	2275	4088	3083	801	17597
21	1766	3149	2858	2737	2191	525	13225
22	1427	1680	1146	2815	1305	286	8657
23	681	917	794	1632	893	237	5153
24	505	623	343	707	531	121	2829
1	243	450	151	469	384	91	1787
2	170	403	109	286	306	84	1357
3	603	515	97	295	321	57	1886
4	535	413	102	382	387	64	1881
5	489	490	329	492	473	141	2413
6-7	640	653	693	719	669	281	3653
TOTAL	28735	41218	29761	53182	34695	13736	201325
Peak Traffic	3281	5123	2858	4556	3604	1368	18893

Capacity /Hr./lane in PCU		
	(India)	1000
	(HCM)	1100
	(Japan)	1800

添付資料－11　インドの道路延長（その１）

Growth in Road Lengths (in kms.)

Sl. no.	State/Union Territory	1986	1987	1988	1989
1.	Andhra Pradesh	133804	135218	137500	138911
2.	Arunachal Pradesh	6928	6931	7124	7128
3.	Assam	62645	63510	64300	64664
4.	Bihar	84296	84536	84805	84915
5.	Gujarat	73398	74348	74815	76819
6.	Haryana	25522	25397	25962	25831
7.	Himachal Pradesh	22096	22192	22418	24031
8.	Jammu & Kashmir	13014	13091	13169	13093
9.	Karnataka	125920	126371	126402	153102
10.	Kerala	115471	120558	125330	212858
11.	Madhya Pradesh	119545	122568	125791	128010
12.	Maharashtra	193690	203772	207194	216733
13.	Manipur	6380	6474	6570	6573
14.	Meghalaya	5977	6183	6412	6226
15.	Mizoram	2665	3258	3257	3417
16.	Nagaland	7716	7716	7890	8031
17.	Orissa	159071	175362	195491	173636
18.	Punjab	46915	49498	50890	54096
19.	Rajasthan	93985	96901	106267	111786
20.	Sikkim	1446	1514	1562	1544
21.	Tamil Nadu	154551	160115	167043	193618
22.	Tripura	10876	11008	11164	14078
23.	Uttar Pradesh	172963	177797	183957	188076
24.	West Bengal	57474	57606	57619	61494
25.	Andaman & Nicobar Islands	674	681	691	772
26.	Chandigarh	1336	1374	1437	1472
27.	Dadra & Nagar Haveli	315	315	315	315
28.	Delhi	17674	19033	19042	18835
29.	Goa, Daman & Diu	6147	6307	6309	5878*
30.	Pondicherry	2580	2643	2684	2492
	All India	1726104	1788577	1843420	1998434

Source : Motor Trasnsport Statistics of India, Transport Research Division, Ministry of Surface Transport, 1989-91

Note : * Excluding Daman & Diu

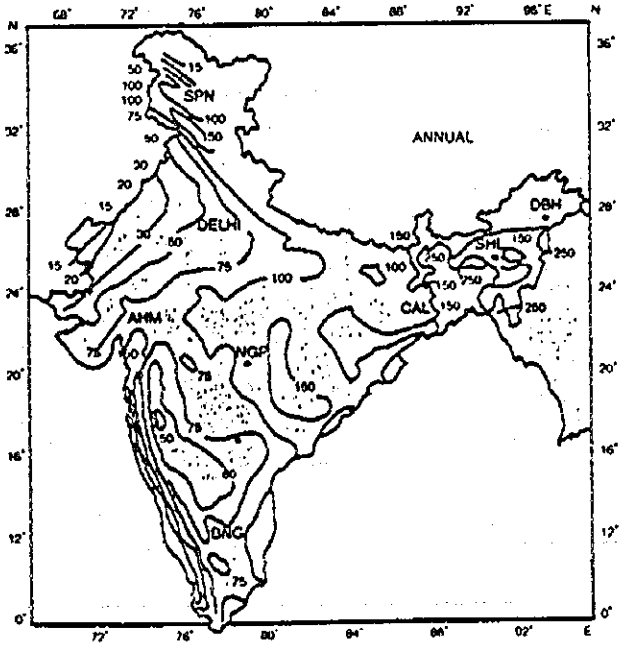
Trends in Roads Length by Category

(in kms.)

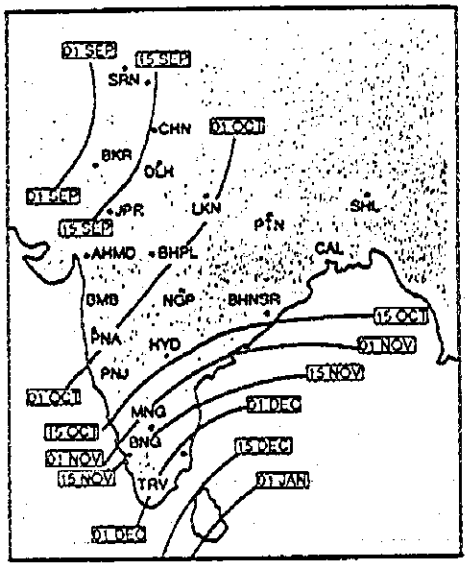
Sl. no	By categories/ authorities	1986		1987		1988	
		Surfaced length	Total length	Surfaced length	Total length	Surfaced length	Total length
	ALL INDIA	824916	1726104	85790	1780577	888380	1843420
1.	Highways	701066	1381181	731076	1431945	759764	1492551
	i) National Highways	31966	32142	32138	32307	32164	32333
	ii) State Highways	97237	100461	97853	100969	109466	112499
	iii) Other PWD roads	373360	500869	394796	525264	406270	536633
	iv) Panchayat Raj Roads	198503	747709	206289	773405	211864	811086
	a) Zilla Parished Roads	132951	296924	135631	298481	138250	300356
	b) Village Panchayat Roads	20954	236719	23549	258768	25237	285749
	c) Panchayats Samities Roads	44598	214066	47109	216156	48377	224981
2.	Projects Roads	24865	206276	25330	207014	25407	207332
	Forest Departmen	4431	130276	4471	130493	4494	130542
	Irrigation Department	11772	60915	11783	61029	11796	61087
	Electricity Department	1885	2405	1934	2446	1955	2489
	Steel Authority	1517	1727	1759	1980	172	2096
	Coal Mines Authority	1482	2042	1562	2112	1609	2159
	Sugarcane Development Authority	3778	8911	3821	8954	3826	8959
3.	Urban Roads	98985	138647	101484	141618	103209	143537
	Municipal Roads	82522	119914	84987	122868	86036	124089
	MES Roads	9667	9797	9809	9939	10302	10352
	Railway Roads	6104	8205	610	8205	6289	8492
	Port Roads	692	731	584	606	582	604

Source : Basic Road Statistics of India, Transport Research Division, Ministry of Surface Transport, 1987-88.

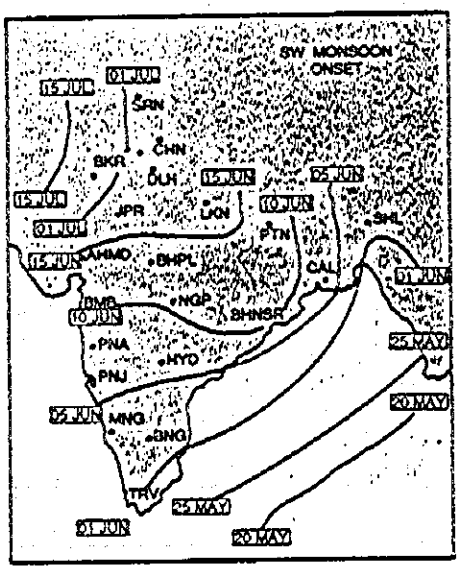
ANNUAL RAINFALL, NORMAL DATES OF WITHDRAWAL & ONSET OF THE MONSOON IN INDIA



Average annual rainfall - India (cm).



Normal dates of withdrawal - southwest monsoon.



Normal dates of onset - southwest monsoon.

添付資料−14 平均月降雨量

AVERACE MONTHLY RAINFALL

DELHI

MONTH	MONTHLY TOTAL	No. OF RAINY DAYS	TOTAL IN WETTEST MONTH WITH YEAR	TOTAL IN DRIEST MONTH WITH YEAR	HEAVIEST FALL IN 24 HOURS	DATE AND YEAR
	mm		mm	mm	mm	
JANUARY	24.9	1.6	173.2 1885	0	116.8	28 1885
FEBRUARY	21.8	1.5	153.4 1915	0	104.1	21 1942
MARCH	16.5	1.4	78.2 1915	0	62.2	11 1915
APRIL	6.8	0.8	103.2 1909	0	40.9	22 1909
MAY	7.9	1.2	63.3 1885	0	30.3	10 1885
JUNE	65.0	3.4	414.8 1936	0	235.5	28 1936
JULY	211.1	9.7	464.3 1949	4.1 1941	266.2	21 1958
AUGUST	172.9	9.3	582.9 1908	0	181.6	6 1891
SEPTEMBER	149.7	6.0	492.3 1900	0	176.5	16 1904
OCTOBER	31.2	1.3	230.3 1954	0	172.7	1 1954
NOVEMBER	1.2	0.1	31.2 1911	0	20.8	6 1923
DECEMBER	5.2	0.5	134.4 1884	0	53.3	15 1894
ANNUAL TOTAL OR MEAN	714.2	36.8	1533.1 1933	262.9 1929	266.2	

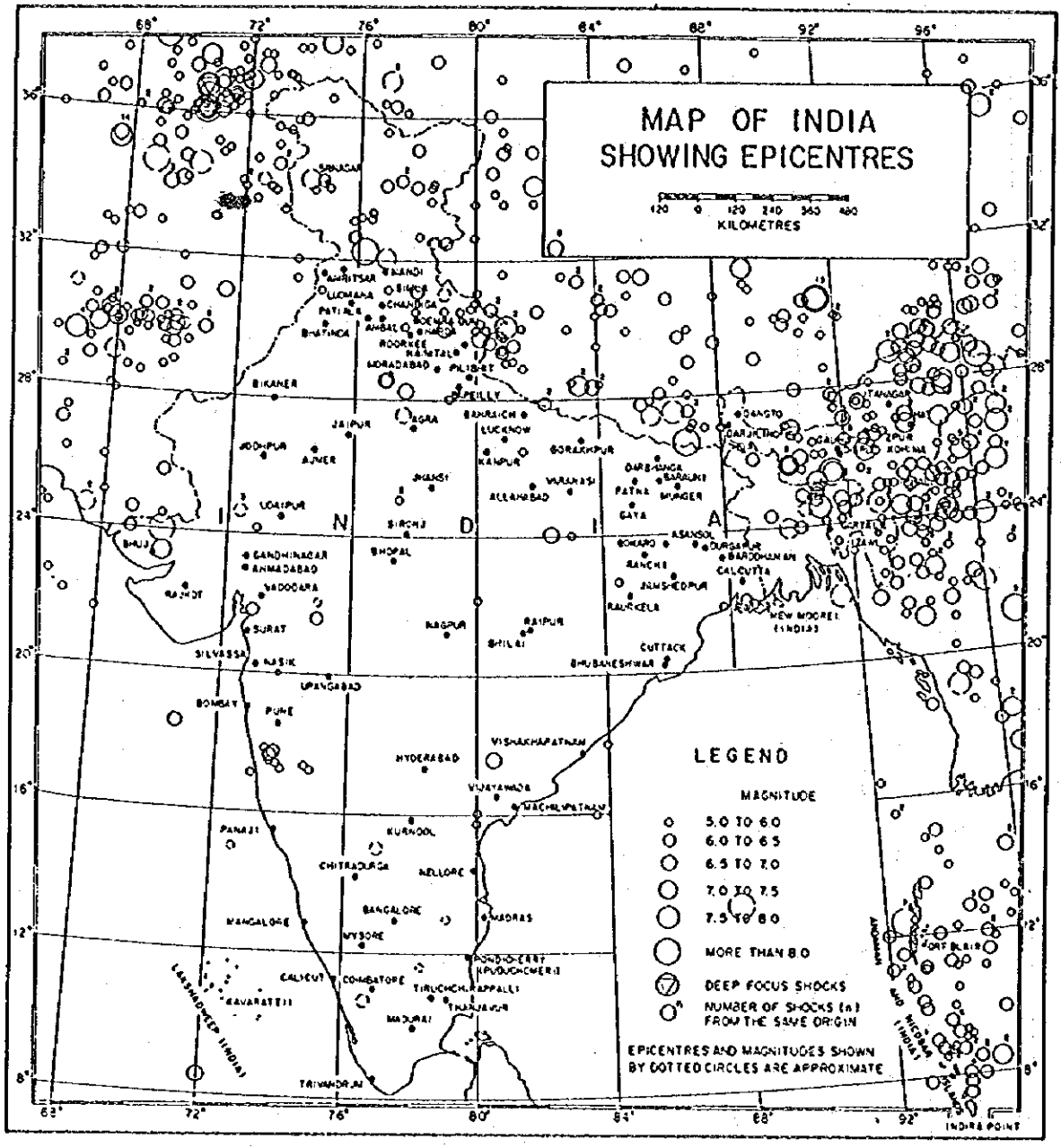
MEERUT

MONTH	MONTHLY TOTAL	No. OF RAINY DAYS	TOTAL IN WETTEST MONTH WITH YEAR	TOTAL IN DRIEST MONTH WITH YEAR	HEAVIEST FALL IN 24 HOURS	DATE AND YEAR
	mm		mm	mm	mm	
JANUARY	30.4	2.5	144.8 1919	0	58.4	4 1911
FEBRUARY	29.7	2.5	143.3 1898	0	84.3	11 1898
MARCH	14.9	1.5	114.3 1881	0	54.6	26 1951
APRIL	7.7	0.8	129.5 1918	0	111.8	6 1918
MAY	9.3	1.1	113.0 1848	0	64.3	29 1886
JUNE	70.9	3.8	411.2 1933	0	167.6	27 1870
JULY	246.9	10.1	696.2 1942	20.3 1877	227.1	20 1909
AUGUST	229.4	10.3	336.2 1891	0	186.9	11 1927
SEPTEMBER	151.6	5.9	545.1 1924	0	227.3	17 1880
OCTOBER	37.1	1.3	251.4 1953	0	123.9	2 1910
NOVEMBER	2.2	0.2	44.5 1894	0	28.5	4 1894
DECEMBER	7.7	0.9	96.5 1877	0	76.2	10 1877
ANNUAL TOTAL OR MEAN	837.8	40.9	1320.4 1844	302.3 1907	227.3	

KARNAL

MONTH	MONTHLY TOTAL	No. OF RAINY DAYS	TOTAL IN WETTEST MONTH WITH YEAR	TOTAL IN DRIEST MONTH WITH YEAR	HEAVIEST FALL IN 24 HOURS	DATE AND YEAR
	mm		mm	mm	mm	
JANUARY	40.3	3.8	92.5 1955	15.5 1958	36.3	14 1960
FEBRUARY	22.4	1.4	166.6 1954	0	45.7	5 1954
MARCH	23.1	2.0	59.2 1956	0	33.5	13 1956
APRIL	8.9	0.4	26.4 1955	0	26.4	13 1955
MAY	8.0	0.9	20.0 1951	0	21.2	24 1951
JUNE	59.5	3.2	139.9 1953	2.1 1958	68.6	5 1954
JULY	151.6	8.0	397.3 1949	73.9 1955	131.1	22 1950
AUGUST	229.7	9.8	486.2 1952	41.7 1958	167.6	21 1932
SEPTEMBER	130.7	5.3	319.5 1958	0	117.6	3 1950
OCTOBER	71.1	2.1	262.4 1956	0	130.3	9 1956
NOVEMBER	6.8	0.5	32.0 1959	0	23.0	7 1959
DECEMBER	8.4	0.6	38.7 1957	0	23.6	22 1958
ANNUAL TOTAL OR MEAN	760.5	38.0	1150.9 1956	383.9 1960	167.6	

添付資料－15　震央分布図



Source from Indian Standard

添付資料－16　主要都市の水平地震係数

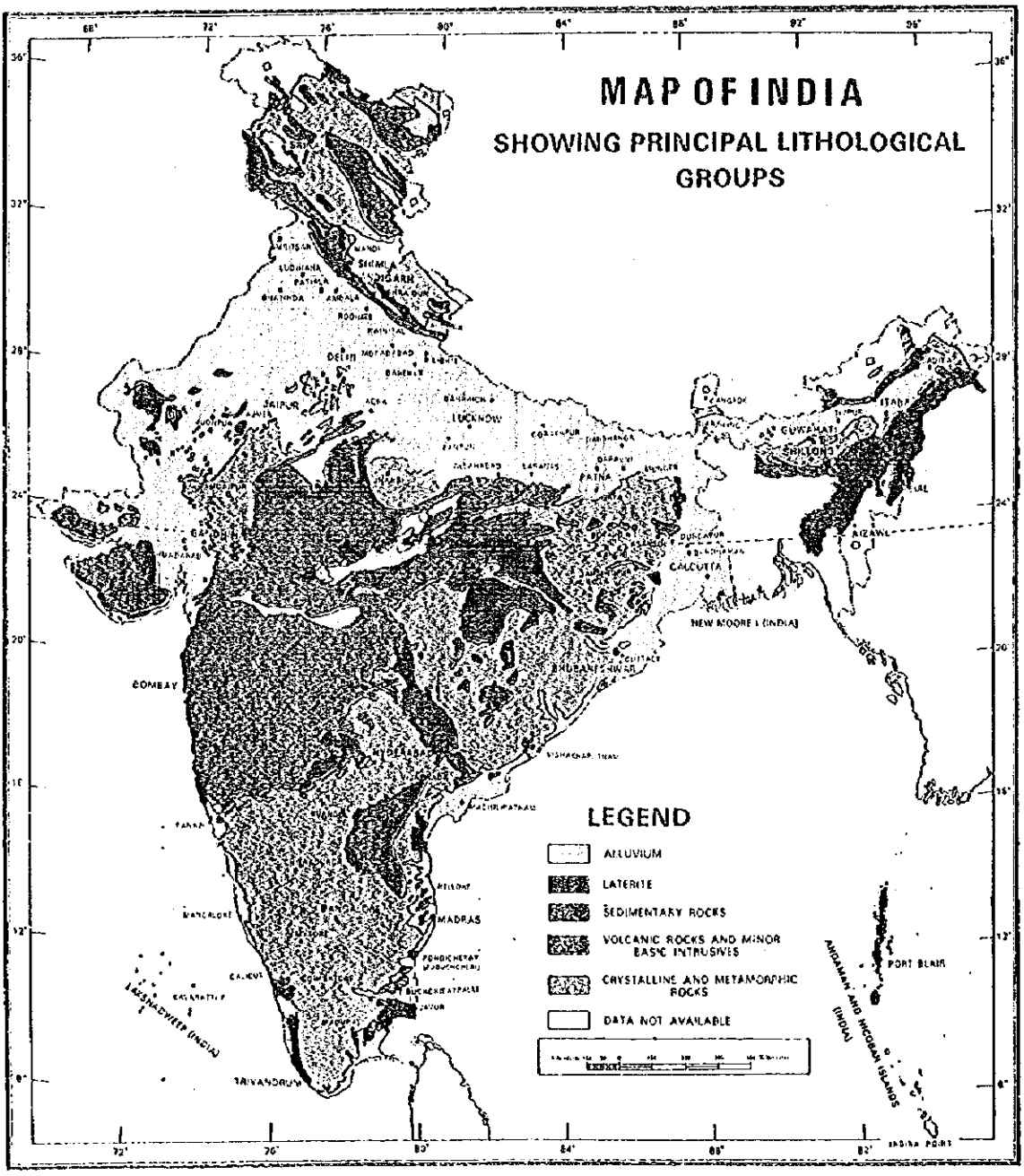
BASIC HORIZONTAL SEISMIC COEFFICIENTS FOR SOME IMPORTANT TOWNS

TOWN	ZONE	BASIC HORIZONTAL SEISMIC COEFFICIENT α	TOWN	ZONE	BASIC HORIZONTAL SEISMIC COEFFICIENT α
(1)	(2)	(3)	(1)	(2)	(3)
Agra	III	0.04	Kathmandu	V	0.08
Ahmadabad	III	0.04	Kohima	V	0.08
Ajmer	I	0.01	Kurnool	I	0.01
Allahabad	II	0.02	Lucknow	III	0.04
Almora	IV	0.05	Ludhiana	IV	0.05
Ambala	IV	0.05	Madras	II	0.02
Amritsar	IV	0.05	Madurai	II	0.02
Asansol	III	0.04	Mandi	IV	0.08
Aurangabad	I	0.01	Mangalore	III	0.04
Bahraich	IV	0.05	Monghyre	IV	0.05
Bangalore	I	0.01	Moradabad	IV	0.05
Barauni	IV	0.05	Mysore	I	0.01
Bareilly	III	0.04	Nagpur	II	0.02
Bhatinda	III	0.04	Nainital	IV	0.05
Bhilai	I	0.01	Nasik	III	0.04
Bhopal	II	0.02	Nellore	II	0.02
Bhubaneshwar	III	0.04	Punjim	III	0.04
Bhuj	V	0.08	Patiala	III	0.04
Bikaner	III	0.04	Patna	IV	0.05
Bokaro	III	0.04	Pilibhit	IV	0.05
Bombay	III	0.04	Pondicherry	II	0.02
Burdwan	III	0.04	Pune	III	0.04
Calcutta	III	0.04	Raipur	I	0.01
Calicut	III	0.04	Rajkot	III	0.04
Chandigarh	IV	0.05	Ranchi	II	0.02
Chitradurga	I	0.01	Roorkee	IV	0.05
Coimbatore	III	0.04	Rourkela	I	0.01
Cuttack	III	0.04	Sadiya	V	0.08
Darbhanga	V	0.08	Shimla	IV	0.05
Darjeeling	IV	0.05	Sironj	I	0.01
Dehra Dun	IV	0.05	Srinagar	V	0.08
Delhi	IV	0.05	Surat	III	0.04
Durgapur	III	0.04	Tezpur	V	0.08
Gangtok	IV	0.05	Tanjavur	II	0.02
Guwahati	V	0.08	Tiruchchirappalli	II	0.02
Gaya	III	0.04	Trivandrum	III	0.04
Gorakhpur	IV	0.05	Udaipur	II	0.02
Hyderabad	I	0.01	Vadodara	III	0.04
Imphal	V	0.08	Varanasi	III	0.04
Jabalpur	III	0.04	Vijayawada	III	0.04
Jaipur	II	0.02	Vishakhapatnam	II	0.02
Jamshedpur	II	0.02			
Jhansi	I	0.01			
Jodhpur	I	0.01			
Jorhat	V	0.08			
Kanpur	III	0.04			

NOTE – The coefficients given are according to *5.4.2.1* and should be suitably modified for important structures in accordance with *5.4.2.3* and *5.8* and should be read along with other provisions of this section.

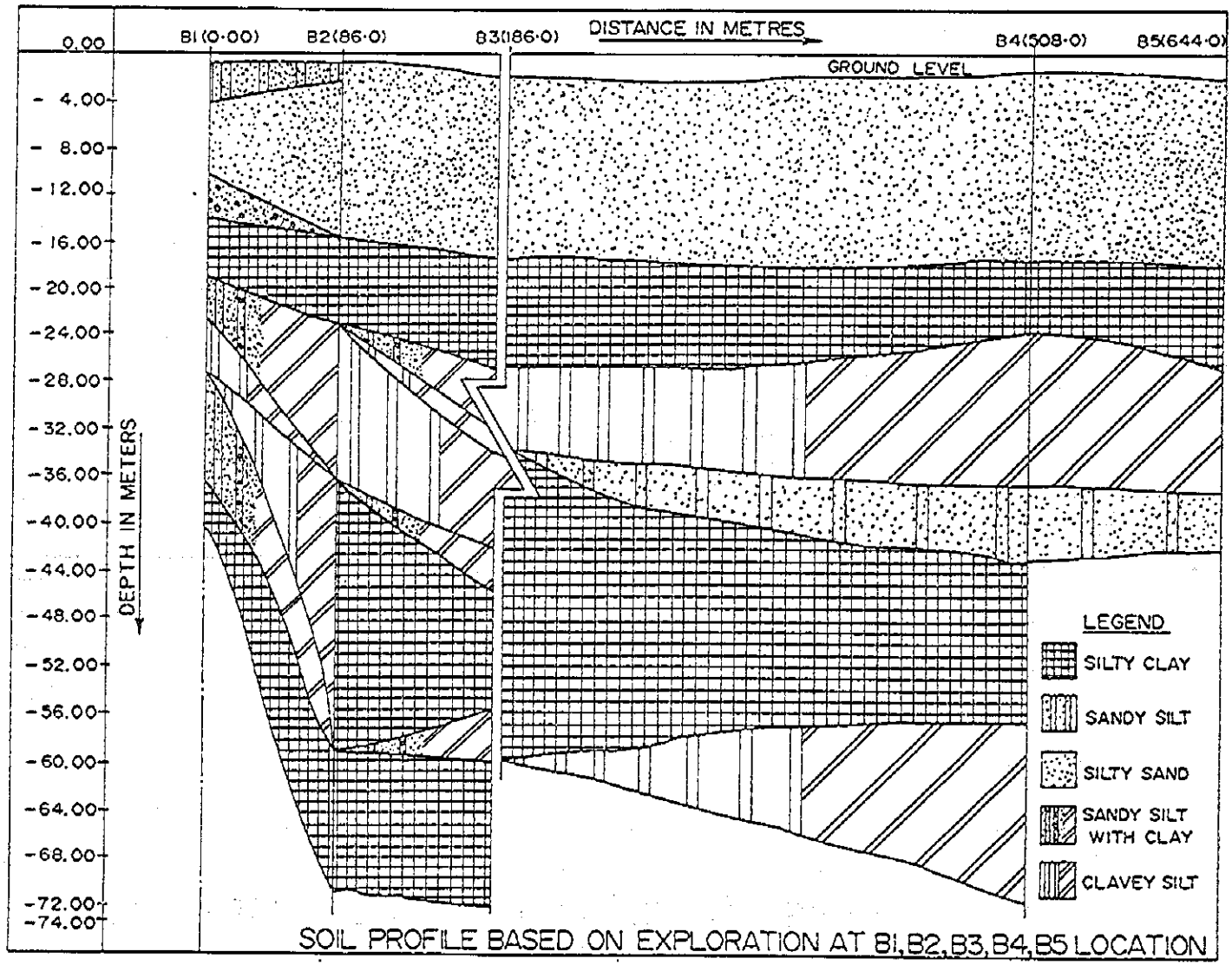
Source from Indian Standard

添付資料－17　地質構造図



Source from Indian Standard

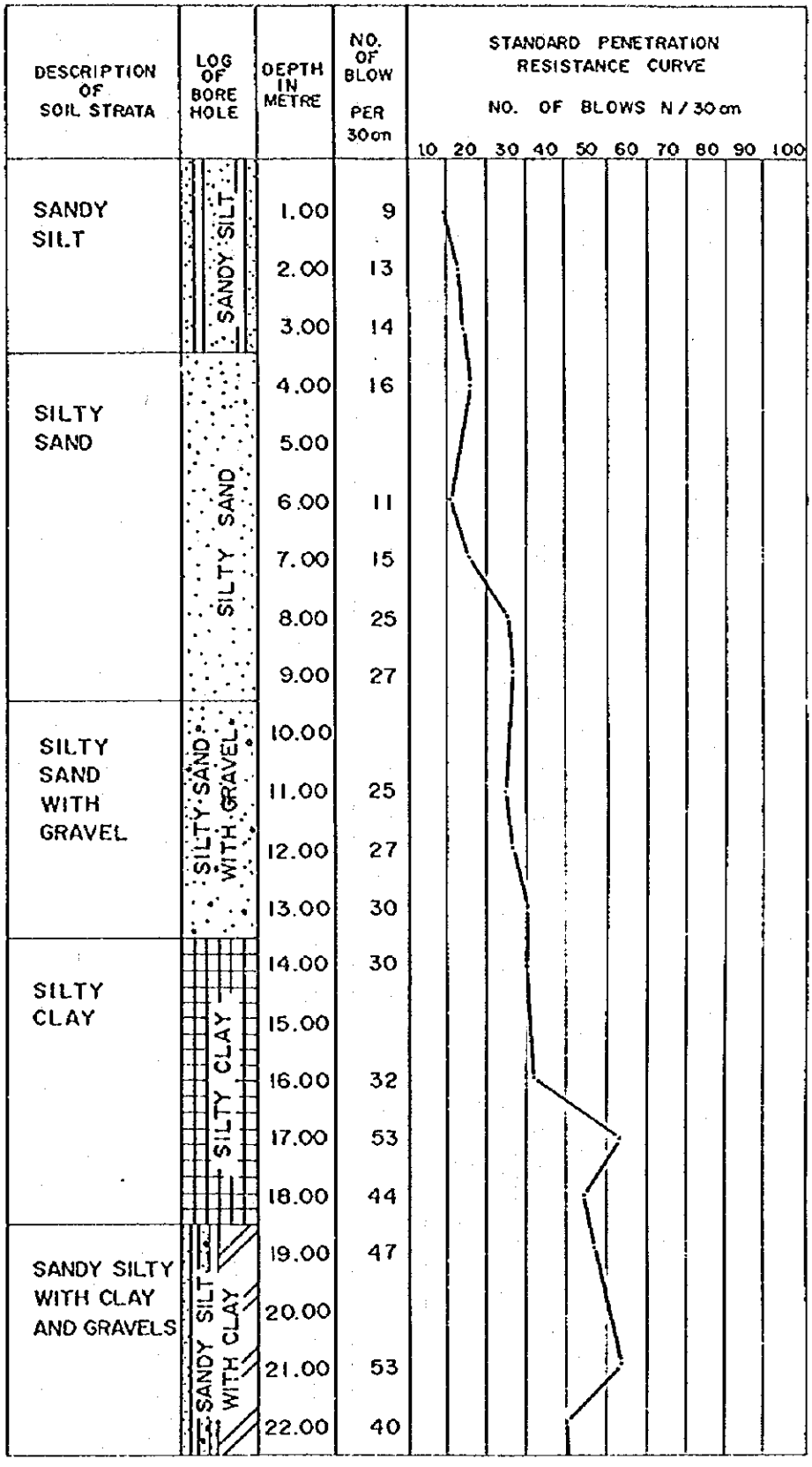
添付資料－18　ボーリング柱状図



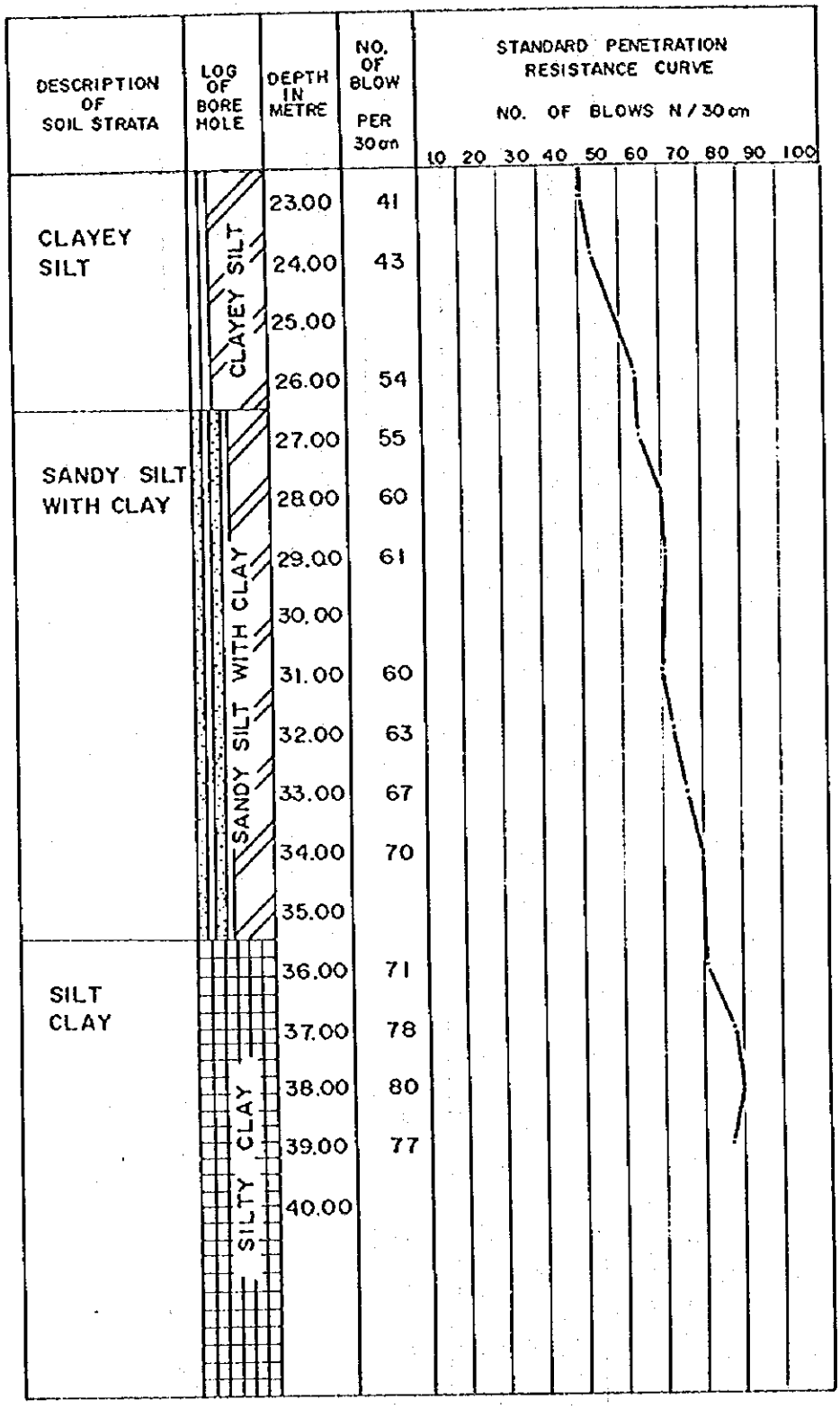
SOIL PROFILE BASED ON EXPLORATION AT B1,B2,B3,B4,B5 LOCATION

BORING LOG & STANDARD PENETRATION TEST

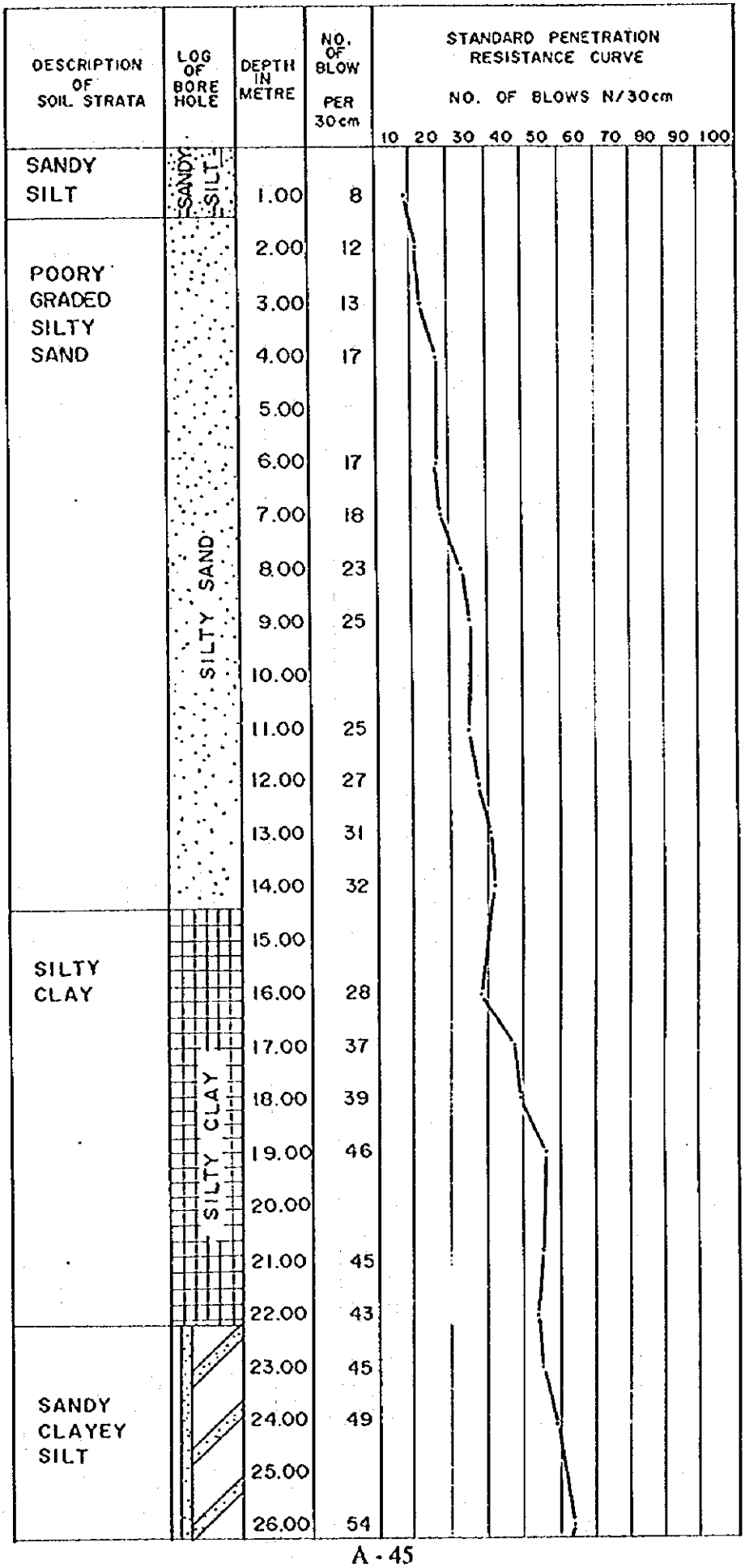
(B.H. 1 – 1)



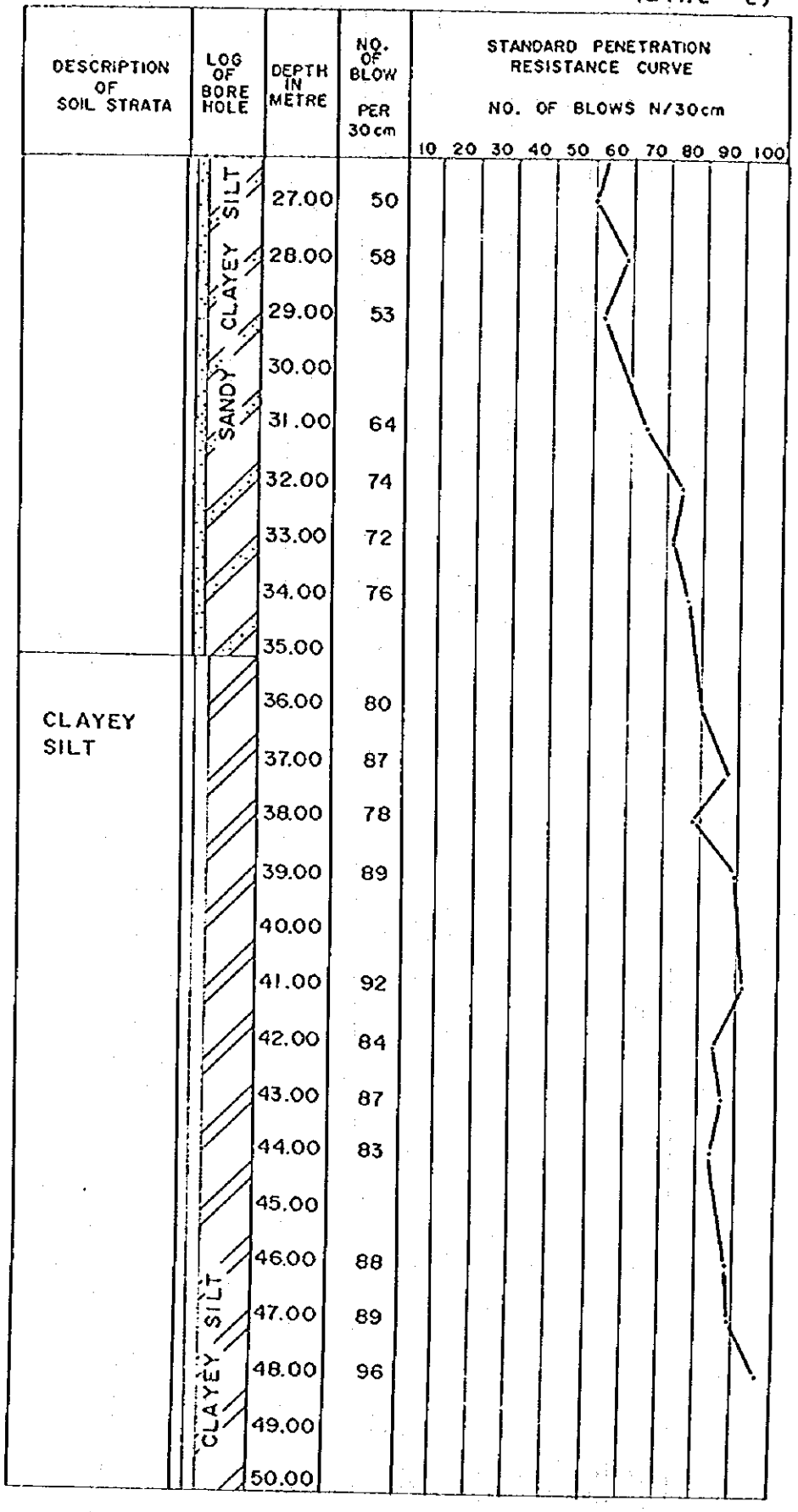
(BH.1－2)


DESCRIPTION OF SOIL STRATA
LOG OF BORE HOLE
DEPTH IN METRE
NO. OF BLOW PER 30cm
STANDARD PENETRATION RESISTANCE CURVE
NO. OF BLOWS N / 30 cm
10 20 30 40 50 60 70 80 90 100
CLAYEY SILT
SANDY SILT WITH CLAY
SILT CLAY
CLAYEY SILT
SANDY SILT WITH CLAY
SILTY CLAY
23.00
24.00
25.00
26.00
27.00
28.00
29.00
30.00
31.00
32.00
33.00
34.00
35.00
36.00
37.00
38.00
39.00
40.00
41
43
54
55
60
61
60
63
67
70
71
78
80
77

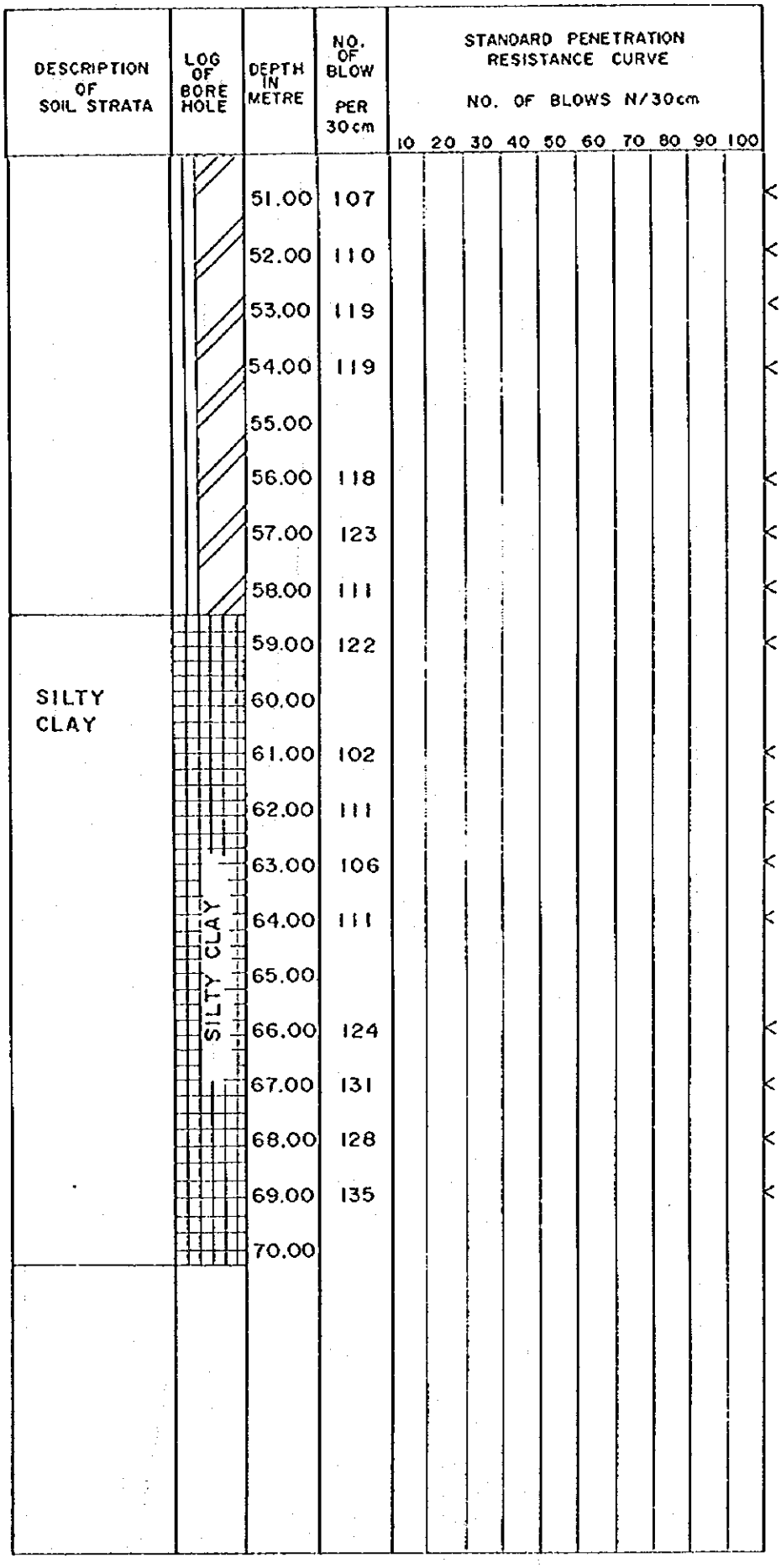
BORING LOG & STANDARD PENETRTION TEST
(BH.2-1)



(BH.2 – 2)

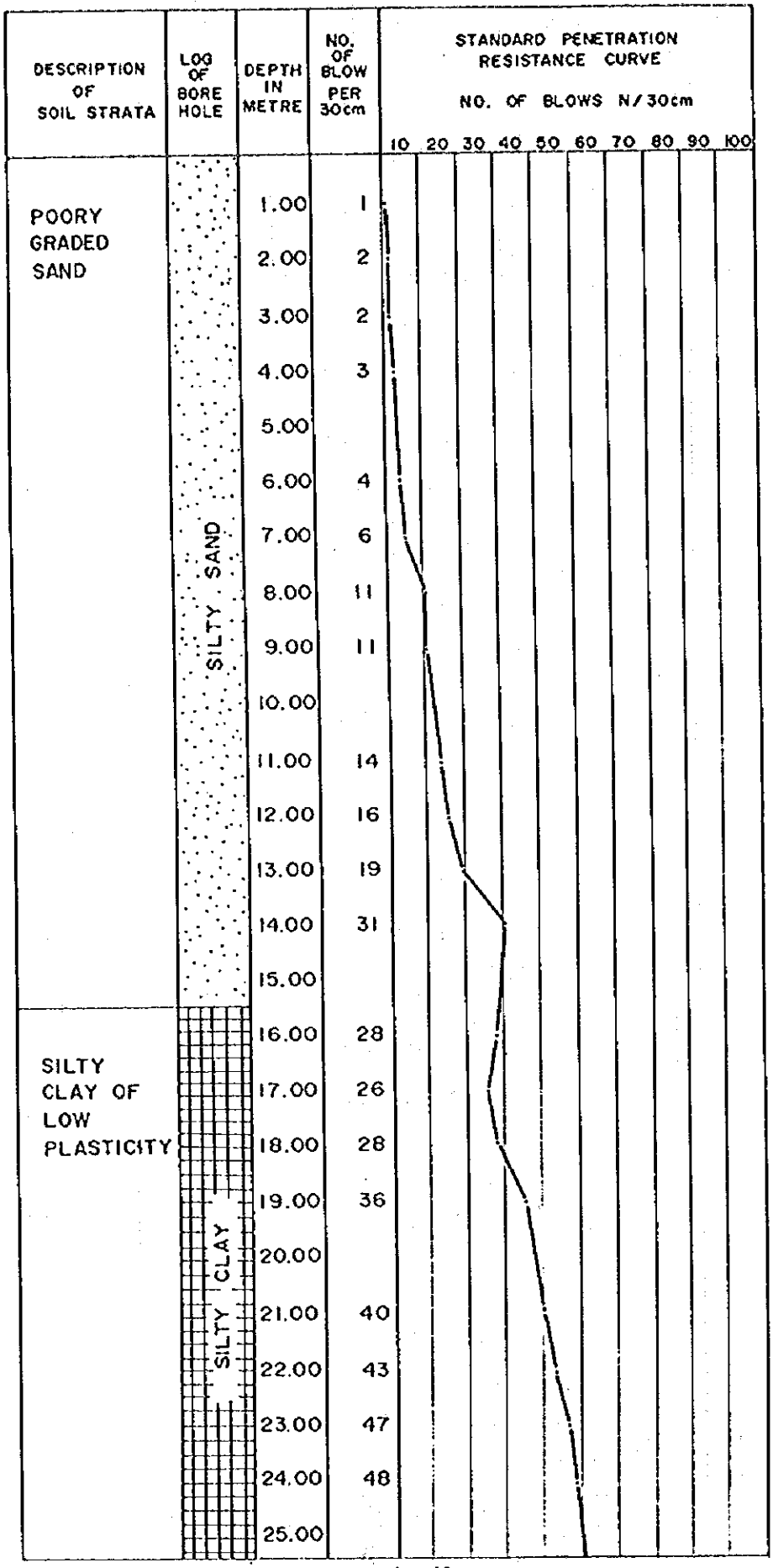

DESCRIPTION OF SOIL STRATA
LOG OF BORE HOLE
DEPTH IN METRE
NO. OF BLOW PER 30cm
STANDARD PENETRATION RESISTANCE CURVE
NO. OF BLOWS N/30cm
10 20 30 40 50 60 70 80 90 100
SILT
CLAYEY
SANDY
CLAYEY SILT
CLAYEY SILT
27.00 50
28.00 58
29.00 53
30.00
31.00 64
32.00 74
33.00 72
34.00 76
35.00
36.00 80
37.00 87
38.00 78
39.00 89
40.00
41.00 92
42.00 84
43.00 87
44.00 83
45.00
46.00 88
47.00 89
48.00 96
49.00
50.00

(BH.2-3)

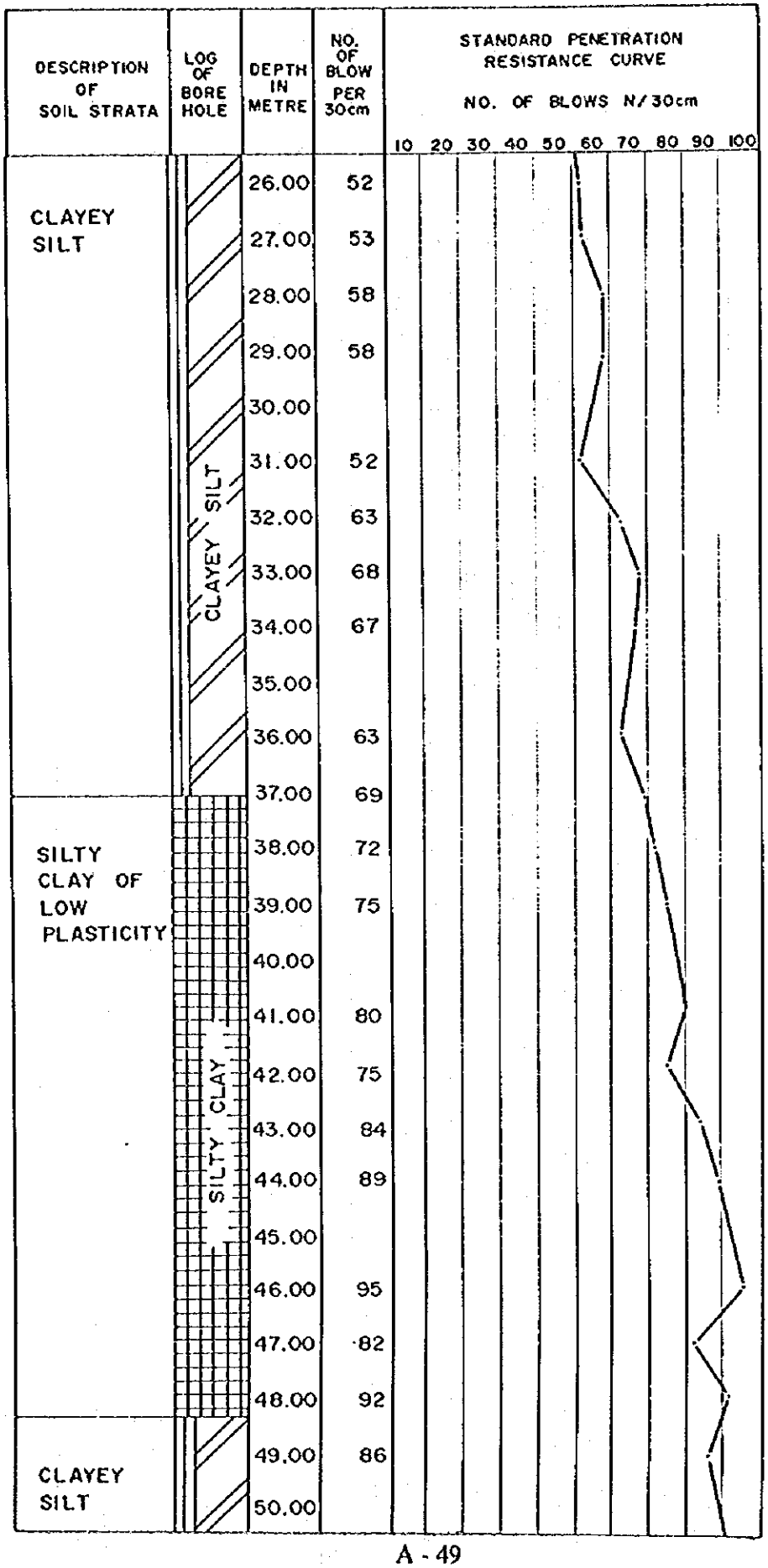

DESCRIPTION OF SOIL STRATA
LOG OF BORE HOLE
DEPTH IN METRE
NO. OF BLOW PER 30cm
STANDARD PENETRATION RESISTANCE CURVE
NO. OF BLOWS N/30cm
10 20 30 40 50 60 70 80 90 100
51.00 107
52.00 110
53.00 119
54.00 119
55.00
56.00 118
57.00 123
58.00 111
59.00 122
60.00
61.00 102
62.00 111
63.00 106
64.00 111
65.00
66.00 124
67.00 131
68.00 128
69.00 135
70.00
SILTY CLAY
SILTY CLAY

BORING LOG & STANDARD PENETRATION TEST

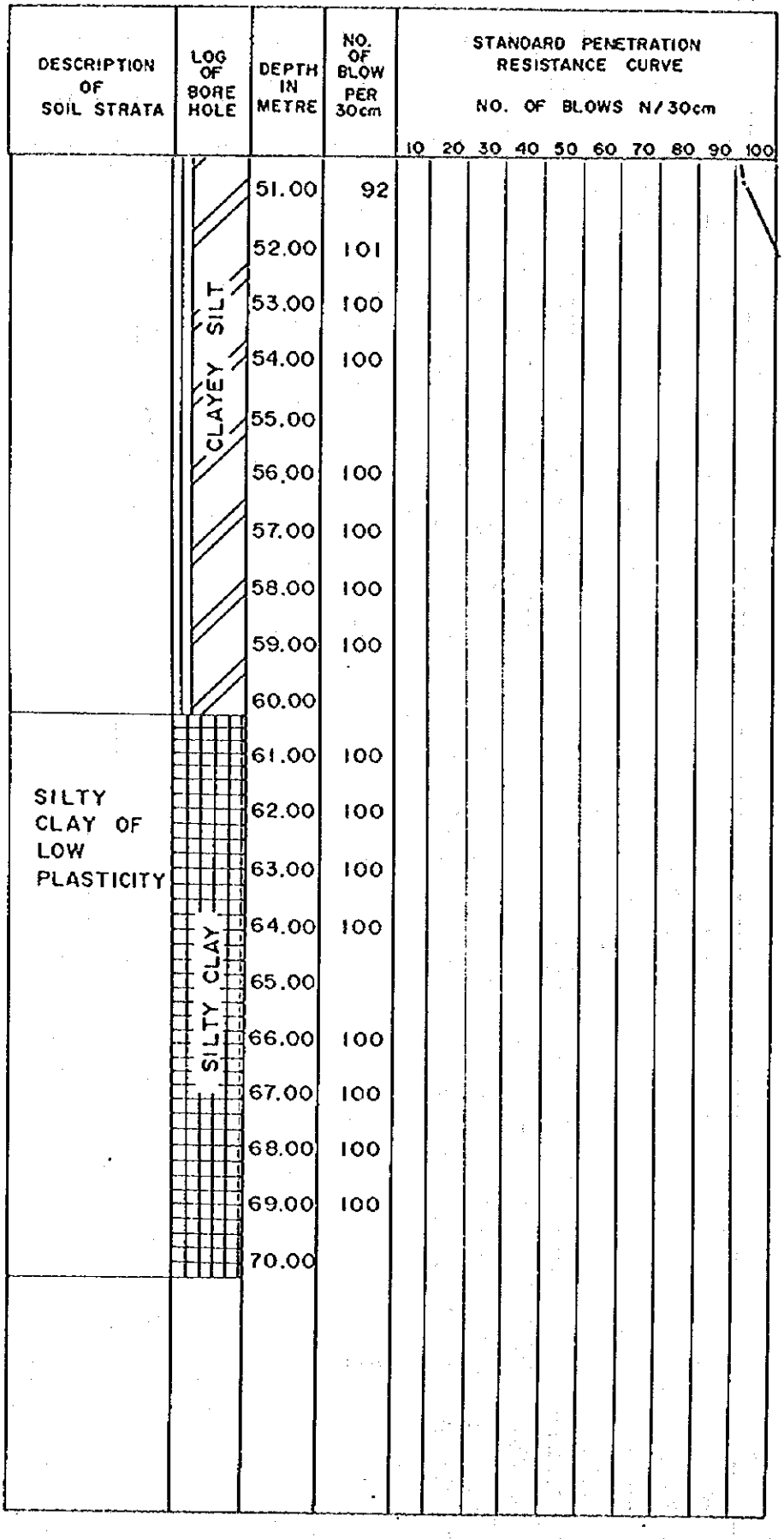
(B.H.3 – 1)



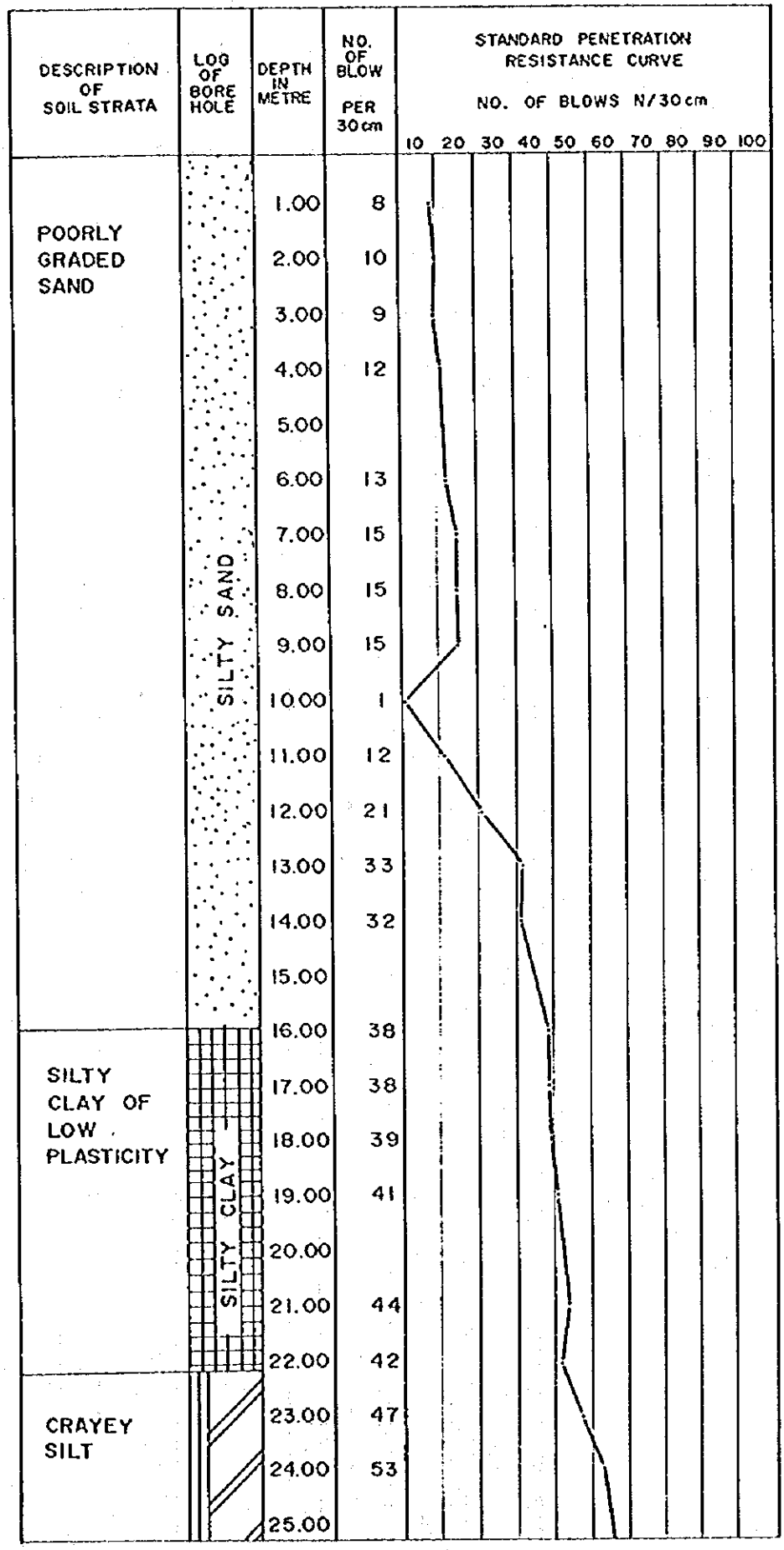
(BH.3 – 2)


DESCRIPTION OF SOIL STRATA
LOG OF BORE HOLE
DEPTH IN METRE
NO. OF BLOW PER 30cm
STANDARD PENETRATION RESISTANCE CURVE
NO. OF BLOWS N/30cm
10 20 30 40 50 60 70 80 90 100
CLAYEY SILT
SILTY CLAY OF LOW PLASTICITY
CLAYEY SILT
CLAYEY SILT
SILTY CLAY
26.00 52
27.00 53
28.00 58
29.00 58
30.00
31.00 52
32.00 63
33.00 68
34.00 67
35.00
36.00 63
37.00 69
38.00 72
39.00 75
40.00
41.00 80
42.00 75
43.00 84
44.00 89
45.00
46.00 95
47.00 82
48.00 92
49.00 86
50.00

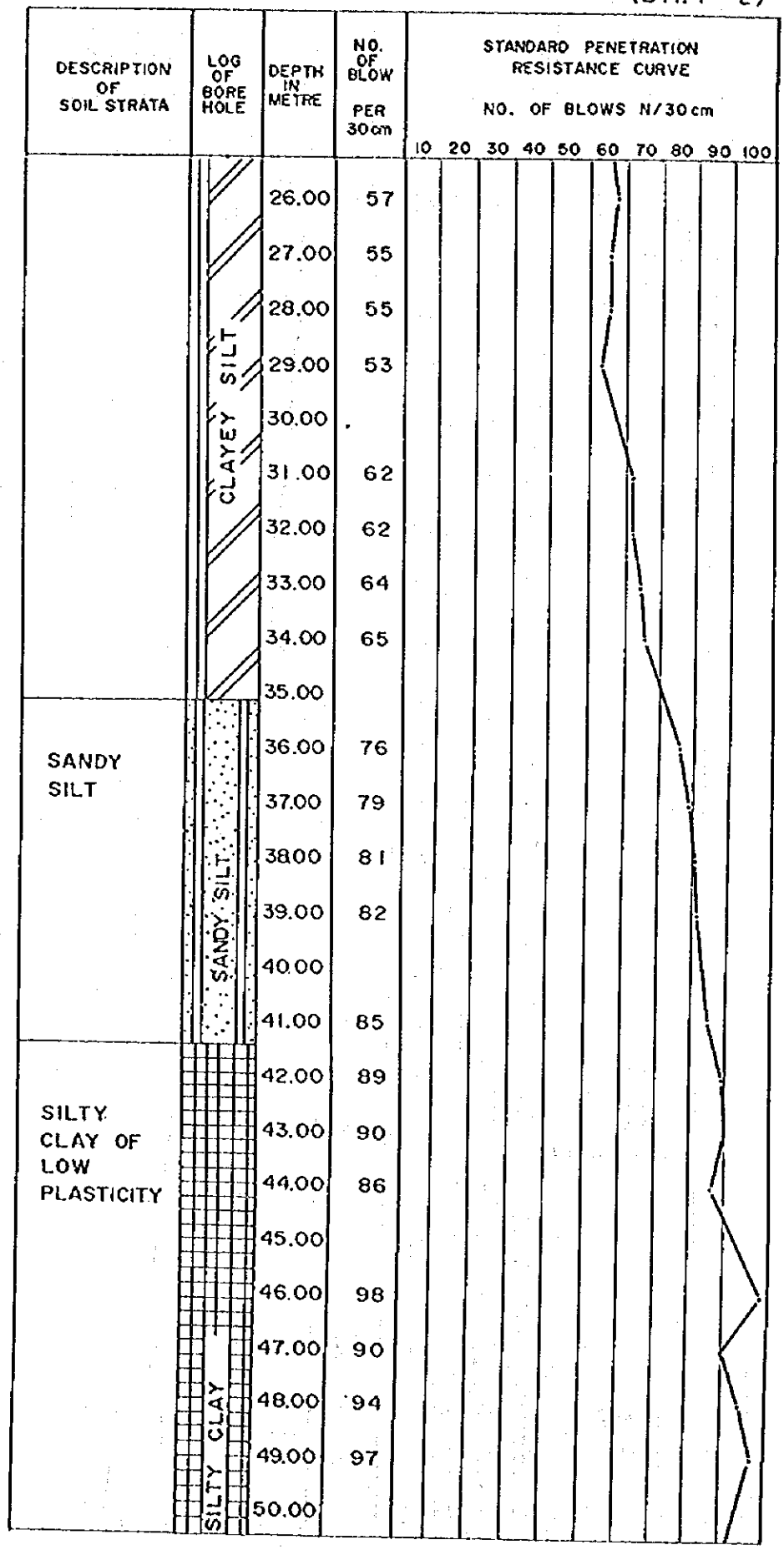
(BH.3 – 3)


DESCRIPTION OF SOIL STRATA
LOG OF BORE HOLE
DEPTH IN METRE
NO. OF BLOW PER 30cm
STANDARD PENETRATION RESISTANCE CURVE
NO. OF BLOWS N/30cm
10 20 30 40 50 60 70 80 90 100
CLAYEY SILT
SILTY CLAY OF LOW PLASTICITY
SILTY CLAY
51.00 92
52.00 101
53.00 100
54.00 100
55.00
56.00 100
57.00 100
58.00 100
59.00 100
60.00
61.00 100
62.00 100
63.00 100
64.00 100
65.00
66.00 100
67.00 100
68.00 100
69.00 100
70.00

BORING LOG & STANDARD PENETRATION TEST
(BH.4 – 1)



(BH.4 – 2)


DESCRIPTION OF SOIL STRATA
LOG OF BORE HOLE
DEPTH IN METRE
NO. OF BLOW PER 30cm
STANDARD PENETRATION RESISTANCE CURVE
NO. OF BLOWS N/30 cm
10 20 30 40 50 60 70 80 90 100
CLAYEY SILT
SANDY SILT
SILTY CLAY
SANDY SILT
SILTY CLAY OF LOW PLASTICITY
26.00 57
27.00 55
28.00 55
29.00 53
30.00
31.00 62
32.00 62
33.00 64
34.00 65
35.00
36.00 76
37.00 79
38.00 81
39.00 82
40.00
41.00 85
42.00 89
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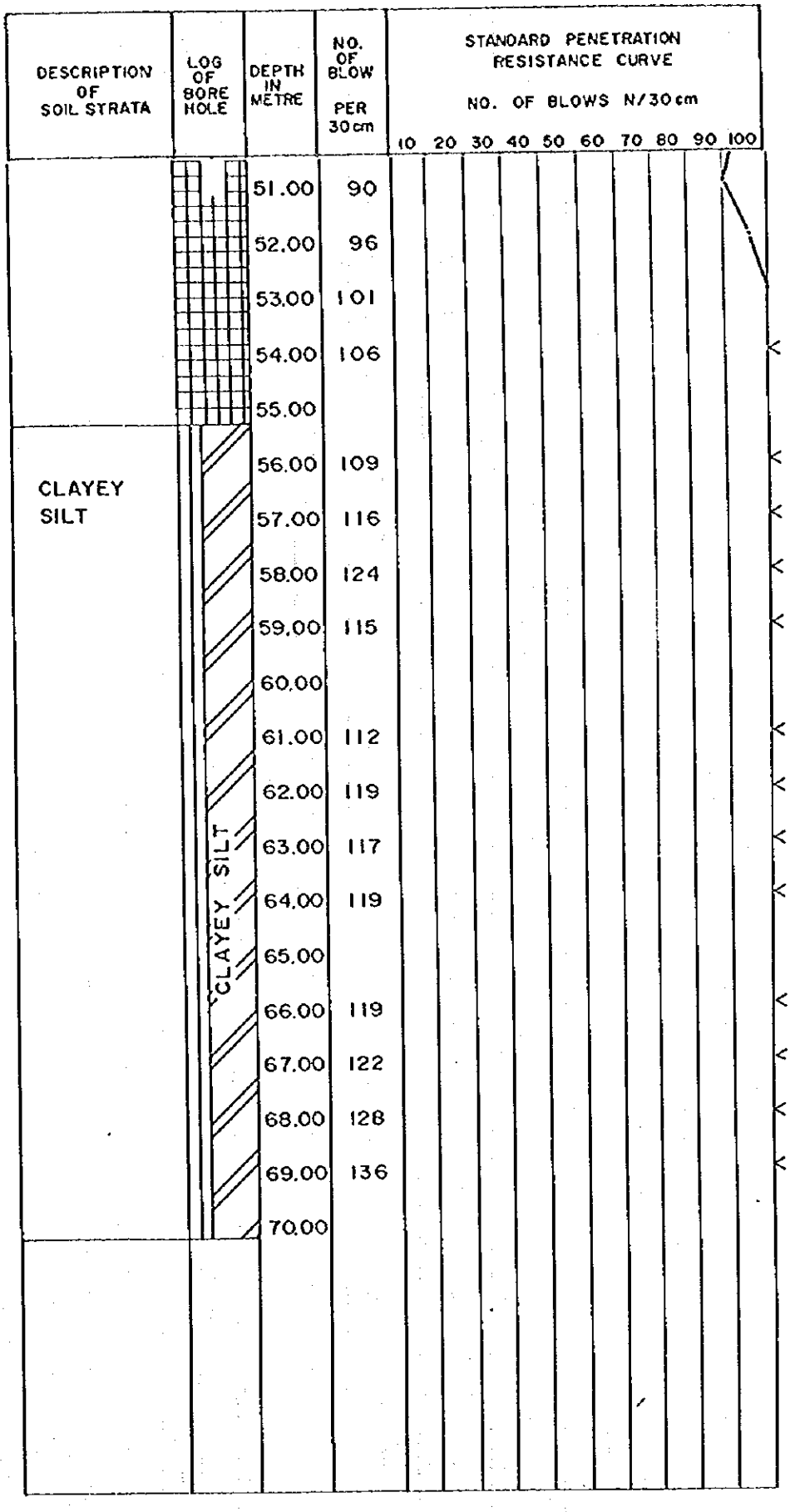
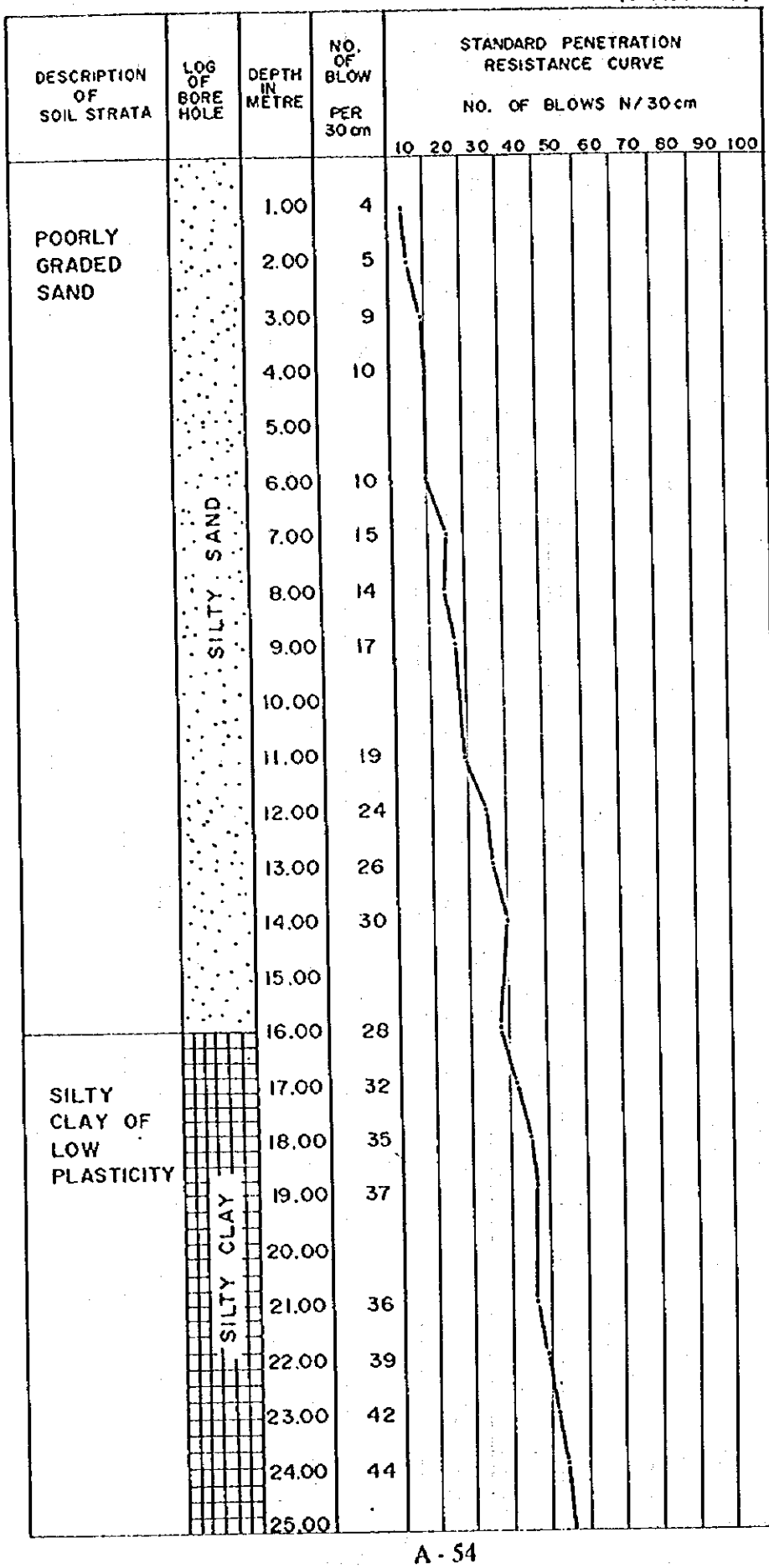
45.00
46.00 98
47.00 90
48.00 94
49.00 97
50.00

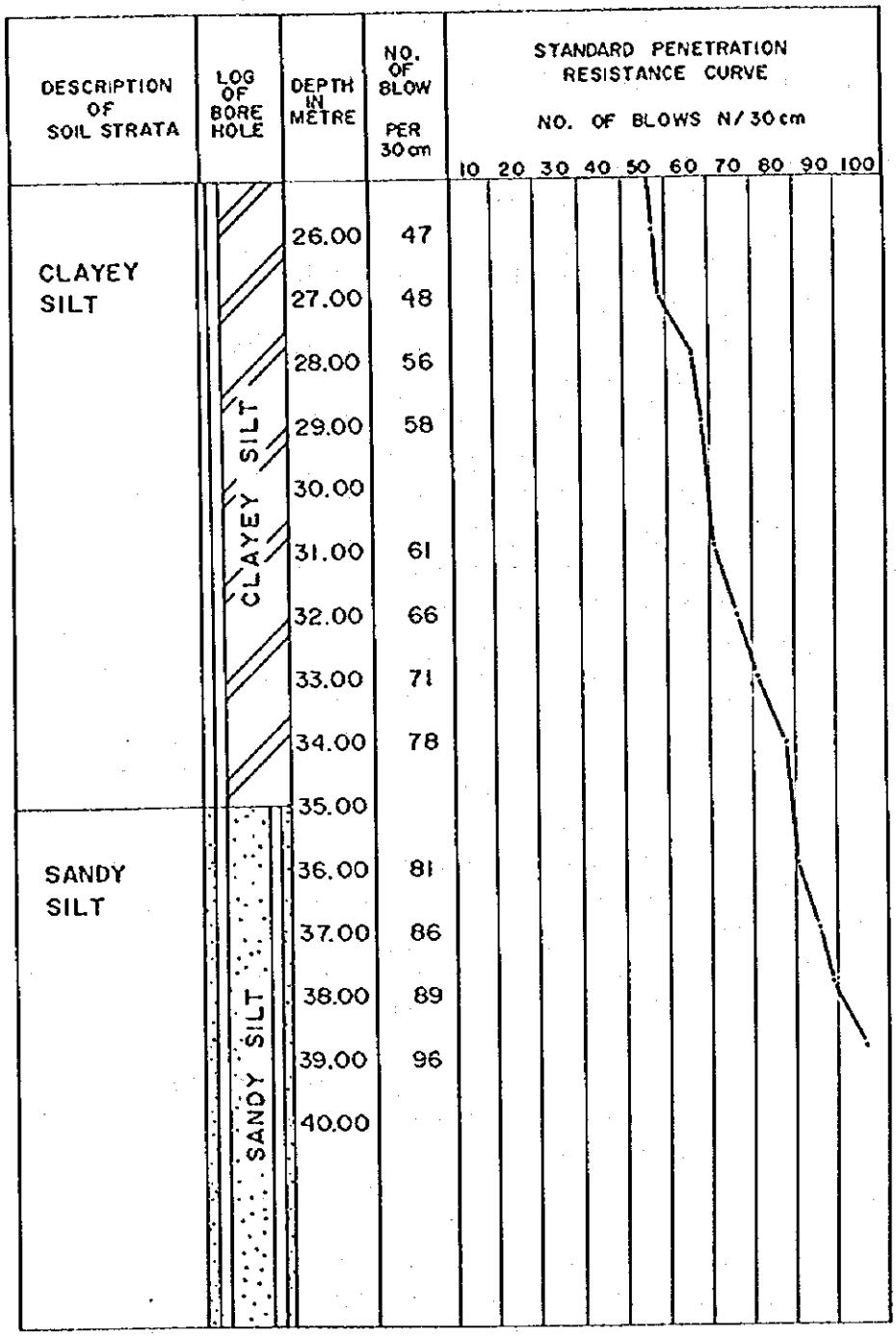
(BH.4--3)


DESCRIPTION OF SOIL STRATA
LOG OF BORE HOLE
DEPTH IN METRE
NO. OF BLOW PER 30cm
STANDARD PENETRATION RESISTANCE CURVE
NO. OF BLOWS N/30cm
10 20 30 40 50 60 70 80 90 100
CLAYEY SILT
51.00 90
52.00 96
53.00 101
54.00 106
55.00
56.00 109
57.00 116
58.00 124
59.00 115
60.00
61.00 112
62.00 119
63.00 117
64.00 119
65.00
66.00 119
67.00 122
68.00 128
69.00 136
70.00
CLAYEY SILT

BORING LOG & STANDARD PENETRTION TEST (BH.5 – 1)



(BH.5 – 2)


DESCRIPTION OF SOIL STRATA
LOG OF BORE HOLE
DEPTH IN METRE
NO. OF BLOW PER 30 cm
STANDARD PENETRATION RESISTANCE CURVE
NO. OF BLOWS N/30 cm
10 20 30 40 50 60 70 80 90 100
CLAYEY SILT
SANDY SILT
26.00 47
27.00 48
28.00 56
29.00 58
30.00
31.00 61
32.00 66
33.00 71
34.00 78
35.00
36.00 81
37.00 86
38.00 89
39.00 96
40.00

添付資料－19 収集資料

A. IRC SPECIFICATIONS, STANDARDS, DESIGN CODES

A-1	IRC:5-1985	Standard Specifications & Code of Practice for Road Bridges, Section I - General Features of Design (Sixth Revision).
A-2	IRC:6-1966	Standard Specifications & Code of Practice for Road - Loads and Stresses (Third Revision).
A-3	IRC:14-1977	Recommended Practice for 2 cm Thick Bitumen and Tar Carpets (Second Revision).
A-4	IRC:15-1981	Standard Specifications & Code of Practice for Construction of Concrete Roads(Second Revision).
A-5	IRC:17-1965	Tentative Specification for Single Coat Bituminous Surface Dressing.
A-6	IRC:18-1985	Design Criteria for Prestressed Concrete Road Bridges (Post-Tensioned Concrete)(Second Revision).
A-7	IRC:19-1977	Standard Specification and Code of Practice for Water Bound Macadam (Second Revision).
A-8	IRC:20:1966	Recommended Practice for Bituminous Penetration Macadam (Full Grout).
A-9	IRC:21-1987	Standard Specifications and Code of Practice for Road Bridges, Section III - Cement Concrete (Plain and Reinforced) (Second Revision).
A-10	IRC:22-1986	Standard Specifications and Code of Practice for Road Bridges, Section VI - Composite Construction (First Revision).
A-11	IRC:23-1966	Tentative Specification for Two-Coat Bituminous Surface Dressing.
A-12	IRC:24-1967	Standard Specifications and Code of Practice for Road Bridges, Section V - Steel Road Bridges.
A-13	IRC:27-1967	Tentative Specifications for Bituminous Macadam (Base & Binder Course).
A-14	IRC:28-1967	Tentative Specifications for Construction of Stabilized Soil Roads with Soft Aggregate in Areas of Moderate and High Rainfall.
A-15	IRC:29-1988	Specifications for Bituminous Concrete (Asphaltic Concrete) for Road Pavement (First Revision).
A-16	IRC:31-1969	Route Marker Signs for State Routes.
A-17	IRC:33-1969	Standard Procedure for Evaluation and Condition Surveys of Stabilised Soil Roads.
A-18	IRC:34-1970	Recommendations for Road Construction in Waterlogged Areas.
A-19	IRC:36-1970	Recommended Practice for the Construction of Earth Embankments for Road Works.
A-20	IRC:37-1984	Guidelines for the Design of Flexible Pavements (First Revision).

A-21	IRC:51-1992	Guidelines for the Use of Soil Lime Mixes in Road Construction (First Revision).
A-22	IRC:52-1981	Recommendations About the Alignment Survey; and Geometric Design of Hill Roads (First Revision).
A-23	IRC:54-1974	Lateral and Vertical Clearances at Underpasses for Vehicular Traffic.
A-24	IRC:55-1974	Recommended Practice for Stand-Bitumen Base Courses.
A-25	IRC:58-1988	Guidelines for the Design of Rigid Pavements for Highways (First Revision).
A-26	IRC:69-1977	Space Standards for Roads in Urban Areas.
A-27	IRC:70-1977	Guidelines on Regulation and Control of Mixed Traffic in Urban Areas.
A-28	IRC:72-1978	Recommended Practice for Use and Upkeep of Equipment, Tools and Appliances for Bituminous Pavement.
A-29	IRC:73-1980	Geometric Design Standards for Rural (Non-Urban) Highways.
A-30	IRC:75-1979	Guidelines for the Design of High Embankments.
A-31	IRC:78-1983	Standard Specifications and Code of Practice for Road Bridges, Section VII - Foundations & Substructure (First Revision).
A-32	IRC:81-1981	Tentative Guidelines for Strengthening of Flexible Road Pavements Using Benkelman Beam Deflection Technique.
A-33	IRC:82-1982	Code of Practice for Maintenance of Bituminous Surfaces of Highways.
A-34	IRC:83-1987	Standard Specifications and Code of Practice for Road Bridges, Section IX - Bearings, Part I: Metallic Bearings.
A-35	IRC:83-1987	Standard Specifications and Code of Practice for Road Bridges, Section IX - Bearings, Part II: Elastomeric Bearings.
A-36	IRC:86-1983	Geometric Design Standards for Urban Roads in Plains.
A-37	IRC:87-1984	Guidelines for the Design & Erection of Falsework for Road Bridges.
A-38	IRC:89-1985	Guidelines for Design & Construction of River Training & Control Works for Road Bridges.
A-39	IRC:92-1986	Guidelines for the Design of Interchanges in Urban Areas.
A-40	IRC:93-1985	Guidelines on Design and Installation of Road Traffic Signals.
A-41	IRC:94-1986	Specifications for Dense Bituminous Macadam.
A-42	IRC:98-1988	Guidelines on Accommodation of Underground Utility Services Along and Across Roads in Urban Areas.
A-43	IRC:101-1988	Guidelines for Design of Continuously Reinforced Concrete Pavement with Elastic Joints.
A-44	IRC:102-1988	Traffic Studies for Planning Bypasses Around Towns.
A-45	IRC:104-1988	Guidelines for Environmental Impact Assessment of Highway Projects.
A-46	IRC:106-1990	Guidelines for Capacity of Urban Roads in Plain Areas.

B. OTHER PUBLICATIONS

B-1	Paper No.238, 1963 - Considerations in the Design and Sinking of Well Foundations for Bridge Piers (with Discussions) by B. Balwant Rao and C. Muthuswamy.	
B-2	Study on Capacity Augmentation of East-West Corridor Across River Yamuna Along Nizamuddin Bridge	Center for Reserch and Planning in Highway and Transportation Systems
B-3	Regional Plan 2001	National Capital Region Planning Board Government of India
B-4	Feasibility Study for the Expressways in the National Capital Region	National Capital Region Planning Board
B-5	Journal Nov,1993	Indian Road Congress(IRC)
B-6	Indian Highways June,1994	IRC
B-7	Indian Standards (Criteria for Earthquake Resistance Design of Structures)	Indian Standards Institution
B-8	India 1993-1994	Indian Express-Vans
B-9	Handbook of Statistics, 1993	Confederation of Indian Industry
B-10	India, 1993	Ministry of Information and Broadcasting
B-11	Year Book, 1992	
B-12	Report on Currency and Finance 1989-90	Statistical Statement
B-13	Road Map of India	Survey of India
B-14	Annual Report, 1993-94	Ministry of Surface Transport
B-15	Eighth Five Year Plan, 1992-97	Planning Comission Gov. of India
B-16	Direct Taxes Ready Reckover,1989-90	
B-17	Customs Tariff of India,1989-90	
B-18	Income Tax and Sales Tax, 1994-1995	
B-19	Statistical Pocket Book, 1992 India	Central Statistical Organisation, Department of Statistics, Ministry of Planning, Government of India
B-20	Central Excise Tariff, 1944-95	A Cen-Cus Publication
B-21	Customs Tariff, 1994-95	A Cen-Cus Pubulication

C. SPECIAL PUBLICATIONS BY IRC

C-1	Manual for Highway Bridge Maintenance Inspection
C-2	Guidelines for Evaluation of Load Carrying Capacity of Bridges
C-3	Directory of Road/Bridge Making Machinery Manufactured in India
C-4	Guidelines for Inspection and Maintenance of Bridges
C-5	Guidelines on Supplemental Measures for Design, Detailing and Durability of Important Bridge Structures, 1989
C-6	Guidelines for the Design of Small Bridges and Culverts, 1990
C-7	Report on Rating of Bridges, 1986
C-8	A Manual for the Application of the Critical Path Method to Highway Projects in India
C-9	Handbook of Quality Control for Construction of Roads and Runways,1989
C-10	Guidelines on the Choice and Planning of Appropriate Technology in Road Construction, 1984

D. TOPOGRAPHIC MAPS

D-1	Topographic Map	1:1,000,000 1:50,000 1:25,000	Survey of India