［ 資　料 ］

資料１　調査団員・氏名

調査団員名簿
Member of the Study Team

ネパール国第 3 次カトマンズ地区配電網拡張整備計画
基本設計調査

（現地調査）

The Basic Design Study on the Project for
Extension and Reinforcement of Power Transmission and Distribution System
in Kathmandu Valley (Phase-3)

1. 総括：堀米　昇士朗
Team Leader: Shoshiro HORIGOME
国際協力事業団　国際協力総合研修所　国際協力専門員
Senior Advisor,
Institute for International Cooperation, JICA

2. 計画管理：坂部　英孝
Project Coordinator: Hidetaka SAKABE
国際協力事業団無償資金協力部　業務第三課　職員
Officer,
Third Project Management Division,
Grant Aid Management Department, JICA

3. 業務主任／電化計画：福地　智恭
Chief Consultant / Power Supply Planner: Tomoyasu FUKUCHI
日本工営株式会社　プラント事業部
Nippon Koei Co., Ltd.

4. 変電設備計画：上村　利成
Substation Planner: Toshinari UEMURA
日本工営株式会社　プラント事業部
Nippon Koei Co., Ltd.

5. 送電設備計画：森田　浩行
Transmission Line Planner: Hiroyuki MORITA
日本工営株式会社　プラント事業部
Nippon Koei Co., Ltd.

6. 施工・調達計画／積算：多田　和幸
Procurement Planner / Cost Estimator: Kazuyuki TADA
日本工営株式会社　プラント事業部
Nippon Koei Co., Ltd.

調査団員名簿
Member of the Study Team

ネパール国第 3 次カトマンズ地区配電網拡張整備計画
基本設計調査

（基本設計概要書説明）

The Basic Design Study on the Project for
Extension and Reinforcement of Power Transmission and Distribution System
in Kathmandu Valley (Phase-3)

1. 総括：三苫　英太郎
Team Leader: Eitaro MITOMA
国際協力事業団　ネパール事務所　所長
Resident Representative,
JICA Nepal Office

2. 計画管理：坂部　英孝
Project Coordinator: Hidetaka SAKABE
国際協力事業団無償資金協力部　業務第三課　職員
Officer,
Third Project Management Division,
Grant Aid Management Department, JICA

3. 業務主任／電化計画：福地　智恭
Chief Consultant / Power Supply Planner: Tomoyasu FUKUCHI
日本工営株式会社　プラント事業部
Nippon Koei Co., Ltd.

4. 変電設備計画：上村　利成
Substation Planner: Toshinari UEMURA
日本工営株式会社　プラント事業部
Nippon Koei Co., Ltd.

5. 送電設備計画：森田　浩行
Transmission Line Planner: Hiroyuki MORITA
日本工営株式会社　プラント事業部
Nippon Koei Co., Ltd.

資料２　調査行程

調査行程
(現地調査)

日順	月日	曜日	宿泊地	官団員		コンサルタント団員			
				JICA 堀米 (団長)	JICA 坂部 (計画管理)	福地団員	上村団員	森田団員	多田団員
1	4月9日	火	バンコック		成田 (TG641/11:00)→バンコック (15:30)				
2	4月10日	水	カトマンズ		バンコック (TG319/10:30) →カトマンズ (12:35) 、 大使館表敬、JICA事務所着任報告				
3	4月11日	木	カトマンズ		水資源省表敬、実施機関 (NEA) 表敬とインセプション・レポート内容及び調査日程等協議				
4	4月12日	金	カトマンズ		アジア開発銀行表敬、現地調査				
5	4月13日	土	カトマンズ		現地調査				
6	4月14日	日	カトマンズ		団内ミーティング及び資料解析、自然条件調査現地再委託準備				
7	4月15日	月	カトマンズ		NEAとインセプション・レポート内容及び調査日程等協議、現地調査				
8	4月16日	火	カトマンズ	成田 (TG641/11:00)→ バンコック (15:30)	現地調査、団内ミーティング及び資料解析、自然条件調査現地再委託準備				
9	4月17日	水	カトマンズ	バンコック (TG319/10:30) →カトマンズ (12:35) 、 団内ミーティング	NEAとの協議、現地調査、団内ミーティング、自然条件調査現地再委託準備				成田 (TG641/11:00)→ バンコック (15:30)
10	4月18日	木	カトマンズ	NEAとの協議、現地調査			現地調査及び資料収集、 自然条件調査現地再委託準備、 地中送電線ルート測量		バンコック (TG319/10:30) →カトマンズ (12:35) 、 現地調査及び資料収集
11	4月19日	金	カトマンズ	ミニッツ署名、大使館及びJICA事務所へ報告			現地調査及び資料収集、地中送電線ルート測量		
12	4月20日	土	カトマンズ	カトマンズ (TG320/13:40) →バンコック (18:10)、 バンコック (NH916/23:15) →成田 (07:10、4/19)		現地調査、団内ミーティング及び資料解析、地中送電線ルート測量			
13	4月21日	日	カトマンズ			現地調査及び資料収集、地中送電線ルート測量			
14	4月22日	月	カトマンズ			現地調査及び資料収集、地中送電線ルート測量			
15	4月23日	火	カトマンズ			現地調査及び資料収集			
16	4月24日	水	カトマンズ			現地調査及び資料収集			
17	4月25日	木	カトマンズ			NEAとの協議、現地調査及び資料収集			
18	4月26日	金	カトマンズ			現地調査結果についてNEAと協議			
19	4月27日	土	カトマンズ			団内ミーティング及び資料解析			
20	4月28日	日	カトマンズ			資料解析・整理		カトマンズ (TG320/13:40) →バンコック (18:10)	資料解析・整理
21	4月29日	月	カトマンズ			現地調査及び資料収集		バンコック (TG642/11:20) →成田 (19:30)	現地調査及び資料収集
22	4月30日	火	カトマンズ			資料収集、JICA事務所へ調査結果報告			資料収集、JICA事務所へ 調査結果報告
23	5月1日	水	バンコック			カトマンズ (TG320/13:40) →バンコック (18:10)			カトマンズ (TG320/13:40) →バンコック (18:10)
24	5月2日	木	帰着			バンコック (TG640/11:20) →成田 (19:30)			バンコック (TG640/11:20) →成田 (19:30)

調 査 行 程
(基本設計概要書説明)

日順	月日	曜日	宿泊地	官団員		コンサルタント団員		
				JICA 三苫 (団長)	JICA 坂部 (計画管理)	福地団員	上村団員	森田団員
1	8月31日	土	バンコック		成田 (TG641/11:00)→バンコック (15:30)			
2	9月1日	日	カトマンズ		バンコック (TG319/10:30) →カトマンズ (12:35)			
3	9月2日	月	カトマンズ	JICA事務所着任報告、大使館表敬、水資源省表敬、実施機関 (NEA) 表敬と協議				
4	9月3日	火	カトマンズ	NEAにて概要書説明および協議				
5	9月4日	水	カトマンズ	ミニッツにかかる協議				
6	9月5日	木	カトマンズ	ミニッツにかかる最終協議・ミニッツ署名				
7	9月6日	金	カトマンズ	大使館報告・JICA事務所報告				
					カトマンズ (TG320/13:40) →バンコック (18:10) バンコック (TG642/23:10) →成田 (07:30、9/7)	現地補足調査及び資料収集、 機材仕様、実施工程等技術的事項にかかる協議		
8	9月7日	土	カトマンズ					
9	9月8日	日	カトマンズ					
10	9月9日	月	カトマンズ					
11	9月10日	火	カトマンズ					
12	9月11日	水	機中泊			カトマンズ (TG320/13:40) →バンコック (18:10) バンコック (TG642/23:10) →成田 (07:30、9/12)		

資料３　関係者（面会者）リスト

関係者（面会者）リスト
Person in Charge of Recipient Country

ネパール国第 3 次カトマンズ地区配電網拡張整備計画
基本設計調査
（現地調査）

The Basic Design Study on the Project for
Extension and Reinforcement of Power Transmission and Distribution System
in Kathmandu Valley (Phase-3)

1. 水資源省 (Ministry of Water Resources)
   1. Mr. Bishnu B. Thapa — Joint Secretary, Policy, Planning & Environment

2. ネパール電力公社 (Nepal Electricity Authority)
   1. Mr. Bishnu Bam Malla — Managing Director
   2. Mr. Bhuwan Chand Thakuri — Deputy Managing Director, Generation and Transmission
   3. Mr. Prachar M. S. Pradhan — Deputy Managing Director, Planning & Administration
   4. Mr. D. B. Thapa — Deputy Managing Director, Power Development
   5. Mr. Uttar K. Shrestha — Director, Financial Management Department
   6. Mr. Bhoj Raj Regmi — Director, Medium Hydro Department
   7. Mr. Shyam B. Shrestha — Chief, Grid Operation Department
   8. Mr. Jeevan R. Shrestha — Chief, Corporate Planning Department
   9. Mr. Keshab B. Shrestha — Chief, System Planning Department
   10. Mr. Shree P. J. Rana — Chief, Training Center
   11. Mr. Mrigendra P. Pradhan — Manager, Load Dispatch Center
   12. Mr. Mahendra L. Shrestha — Manager, Transmission Line Design and Construction Department
   13. Mr. Tirtha M. Shakya — Manager, Bagmati Transmission Division
   14. Mr. Divakar Vaidya — Deputy Manager, Transmission Line Design and Construction Department

3. 道路局 (Department of Roads)
   1. Mr. D. B. Thapa — Regional Director, Central Regional Road Directorate No. 2
   2. Mr. Sunil Poudyal — Traffic Engineering and Safety Unit

4. アジア開発銀行 (Asian Development Bank)
   1. Mr. Krishna R. Panday — Project Implementation Officer

5. 在ネパール日本大使館
   1. 豊口　佳之 — 二等書記官

6. JICA ネパール事務所
   1. 三苫　英太郎 — 所長
   2. 矢部　哲雄 — 次長
   3. 萩原　律子 — 職員
   4. 三島　耕二 — 専門家
   5. Mr. Sourab Bickram Rana — Program Officer

関係者（面会者）リスト
Person in Charge of Recipient Country

ネパール国第 3 次カトマンズ地区配電網拡張整備計画
基本設計調査
（基本設計概要書説明）

The Basic Design Study on the Project for
Extension and Reinforcement of Power Transmission and Distribution System
in Kathmandu Valley (Phase-3)

1. 水資源省 (Ministry of Water Resources)
   1. Mr. Bishnu B. Thapa　Joint Secretary, Policy, Planning & Environment

2. ネパール電力公社 (Nepal Electricity Authority)
   1. Dr. Janak Lall Karmacharya　Managing Director
   2. Mr. Bhuwan Chand Thakuri　Deputy Managing Director, Generation and Transmission
   3. Mr. Gobinda K. C.　General Manager, Generation
   4. Mr. Balaram Shrestha　Director, Transmission Line/Substation Construction Department
   5. Mr. Keshab. B. Shrestha　Chief, System Planning Department
   6. Mr. Dipak P. Upadhyay　Chief, Grid Operation Department
   7. Mr. Mrigendra P. Pradhan　Manager, Load Dispatch Center
   8. Mr. Krishna. J. Rayamajhi　Project Manager, K-3 Substation Project
   9. Mr. Tirtha. M. Shakya　Manager, Bagmati Transmission Division
   10. Mr. Divakar Vaidya　Deputy Manager, Transmission Line/Substation Construction Department

4. 在ネパール日本大使館
   1. 豊口　佳之　二等書記官

5. JICA ネパール事務所
   1. 三苫　英太郎　所長
   2. 今井　史夫　次長
   3. 古田　茂樹　職員
   4. 三島　耕二　専門家
   5. Mr. Sourab Bickram Rana　Program Officer

資料４　当該国の社会経済状況

	ネパール王国
	Kingdom of Nepal

一般指標					
政体	立憲君主制	*1	首都	カトマンズ (Kathmandu)	*2
元首	国王／ギャネンドラ・ビール・ビクラム・シャー・デーヴ	*1,3	主要都市名	ポカラ、パタン、ポカラ	*3
			労働力総計	10,850 千人 (1999 年)	*6
独立年月日	1769 年 (全国統一)	*3,4	義務教育年数	5 年間 (年)	*13
主要民族／部族名	ﾘﾝﾌﾟｰ、ライ、タマン、ネワール、マガル族等	*1,3	初等教育就学率	113.0% (1997 年)	*6
主要言語	ネパール語	*1,3	中等教育就学率	42.3% (1997 年)	*6
宗教	ヒンズー教 (国教)	*1,3	成人非識字率	58.6% (2000 年)	*13
国連加盟年	1955 年 12 月 14 日	*12	人口密度	169.53 人／km^2 (1999 年)	*6
世銀加盟年	1961 年 9 月 6 日	*7	人口増加率	2.5% (1980-99 年)	*6
IMF 加盟年	1961 年 9 月 6 日	*7	平均寿命	平均 58.10　男 58.30　女 57.80	*10
国土面積	147.00 千 km^2	*1,6	5 歳児未満死亡率	109 (1999 年)	*6
総人口	23,384 千人 (1999 年)	*6	カロリー供給量	2,366.0 cal／日／人 (1997 年)	*10

経済指標					
通貨単位	ネパール・ルピー (Rupee)	*3	貿易量	(1999 年)	
為替レート	1 US$ = 77.37 (2002 年 3 月)	*8	商品輸出	708.8 百万ドル	*15
会計年度	Jul. 14	*6	商品輸入	-1,589.5 百万ドル	*15
国家予算	(2000 年)		輸入カバー率	6.6 (月) (1999 年)	*14
歳入総額	40,185 Millions of Rupees	*9	主要輸出品目	金、既製服、カーペット、皮革及び皮製品	*1
歳出総額	62,077 Millions of Rupees	*9	主要輸入品目	石油製品、機械機器及び部品	*1
総合収支	130.2 百万ドル (1999 年)	*15	日本への輸出	28.4 百万ドル (2000 年)	*16
ODA 受取額	343.7 百万ドル (1999 年)	*18	日本からの輸入	31.1 百万ドル (2000 年)	*16
国内総生産 (GDP)	4,994.61 百万ドル (1999 年)	*6			
一人当たりの GNI	220.0 ドル (1999 年)	*6	総国際準備	887.4 百万ドル (1999 年)	*6
分野別 GDP	農業 41.7% (1999 年)	*6	対外債務残高	2,970.1 百万ドル (1999 年)	*6
	鉱工業 21.3% (1999 年)	*6	対外債務返済率 (DSR)	7.9% (1999 年)	*6
	ｻｰﾋﾞｽ業 36.9% (1999 年)	*6	インフレ率 (消費者価格物価上昇率)	9.0% (1990-99 年)	*6
産業別雇用	農業 男 % 女 % (1996-98 年)	*6			
	鉱工業 % % (1996-98 年)	*6			
	ｻｰﾋﾞｽ業 % % (1996-98 年)	*6	国家開発計画	第9次5ヵ年計画 (1997 年7月から 2002 年7月まで)	*11
実質 GDP 成長率	4.9% (1990-99 年)	*6			

気象 (1951 年～1960 年平均)　観測地：カトマンズ (北緯 27 度 42 分、東経 85 度 22 分、標高 1,337m)													*4,5
月	1	2	3	4	5	6	7	8	9	10	11	12	平均/計
降水量	14.4	10.3	36.2	34.1	100.9	205.9	389.2	344	182.8	38.0	4.1	1.0	1,361.0mm
平均気温	9.7	12.8	16.6	20.4	23.1	24.0	23.9	24.0	23.2	19.9	15.0	11.2	18.6℃

*1　各国概況 (外務省)
*2　世界の国々一覧表
*3　世界年鑑 2000 (共同通信社)
*4　最新世界各国要覧 10 訂版 (東京書籍)
*5　理科年表 (国立天文台編)
*6　World Development Indicators 2001 (WB)
*7　BRD Membership List (WB)
　　IMF Members' Financial Data by Country (IMF)
*8　Universal Currency Converter
*9　Government Finance Statistics Yearbook 2000 (IMF)
*10　Human Development Report 2000, 2001 (UNDP)
*11　Country Profile (EIU)、外務省資料等
*12　United Nations Member States
*13　Statistical Yearbook 1999 (UNESCO)
*14　Global Development Finance 2001 (WB)
*15　International Financial Statistics Yearbook 2001 (IMF)
*16　世界各国経済情報ﾌｧｲﾙ 2001 (世界経情報ｻｰﾋﾞｽ)

注：　商品輸入については複式簿記の計上方式を採用しているため支払い額はマイナス表記になる

	ネパール王国
	Kingdom of Nepal

我が国における ODA の実績　（単位：億円）　*17

年度 / 項目	1995	1996	1997	1998	1999
技術協力	25.91	27.92	23.43	23.18	19.34
無償資金協力	57.43	63.44	62.82	52.02	67.92
有償資金協力		204.00			
総額	83.34	295.36	86.25	75.20	87.26

当該国に対する我が国 ODA の実績　（支出総額、単位：百万ドル）　*17

暦年 / 項目	1995	1996	1997	1998	1999
技術協力	29.42	30.21	23.00	21.49	22.88
無償資金協力	95.38	64.36	59.11	35.79	1.08
有償資金協力	2.80	-5.78	4.05	-0.40	1.08
総額	127.60	88.79	86.15	56.88	65.59

OECD 諸国の経済協力実績（1999 年）　（支出総額、単位：百万ドル）　*18

	贈与(1)（無償資金協力・技術協力）	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)
二国間援助（主要供与国）	202.5	2.3	204.8	0.3	205.1
1. Japan	64.5	1.1	65.6	0.0	65.6
2. United Kingdom	26.4	0.0	26.4	-1.3	25.1
3. Denmark	23.8	0.0	23.8	0.0	23.8
4. Germany	22.1	0.0	22.1	2.3	24.4
多国間援助（主要援助機関）	47.1	90.1	137.2	19.5	156.7
1. AsDB			56.3	8.2	64.5
2. IDA			33.9	0.0	33.9
その他	3.0	-1.2	1.8	0.0	1.8
合　計	252.6	91.1	343.7	19.9	363.6

援助受入窓口機関　*19

技術協力：　大蔵省対外援助調整局
無償　　：　大蔵省対外援助調整局
協力隊　：　大蔵省対外援助調整局

*17　我が国の政府開発援助 2000（国際協力推進協会）
*18　International Development Statistics (CD-ROM) 2001 OECD
*19　JICA 資料

資料５　討議議事録

Minutes of Discussions on the Basic Design Study on the Project for Extension and Reinforcement of Power Transmission and Distribution System in Kathmandu Valley (Phase-3) in the Kingdom of Nepal.

In response to a request from the Government of the Kingdom of Nepal (hereinafter referred to as "Nepal"), the Government of Japan decided to conduct a Basic Design Study on the project for Extension and Reinforcement of Power Transmission and Distribution System in Kathmandu Valley (Phase-3) (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Nepal the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Shoshiro Horigome, a Senior Advisor, Institute for International Cooperation, JICA and is scheduled to stay in the country from April 10 to May 1, 2002.

The Team held discussions with the officials concerned of the Government of Nepal and conducted a field survey at the study area.

In the course of discussions and field survey, both parties confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Basic Design Study Report.

Kathmandu, April 19, 2002

Shoshiro Horigome
Leader
Basic Design Study Team
Japan International Cooperation Agency

Bishunu Bam Malla
Managing Director
Nepal Electricity Authority

ATTACHMENT

1. Objective of the Project

The objective of the Project is to construct the Kathmandu-3 substation (hereinafter referred to as "the K3 substation") and connect transmission line to the Kathmandu-3 substation for reinforcement of the power distribution to the center of Kathmandu city.

2. Project Site

The site of the Project is shown in Annex-1.

3. Responsible and Implementing Organizations

The responsible Ministry is the Ministry of Water Resources (MOWR).

The implementing agency is the Nepal Electricity Authority (NEA).

The organization chart of implementing agency is shown in Annex-2.

4. Items requested by the Government of Nepal

After discussions with the Team, the following components of the Project were finally requested by the Nepalese side.

- Construction of new K3 substation comprising of 66/11kv, 36MVA transformers (including switchgears, 11kV cubicles).
- Procurement and installation of 66kV transmission line and related equipment necessary for feeding to the K3 substation.

JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval.

5. Japan's Grant Aid Scheme

5-1. The Nepalese side understands the Japan's Grant Aid scheme explained by the Team, as described in Annex-3.

5-2. The Nepalese side will take the necessary measures, as described in Annex-4, for smooth implementation of the Project, as a condition for the Japan's Grant Aid to be implemented.

6. Schedule of the Study

6-1. The consultants will proceed to further study in Nepal until May 1, 2002.

6-2. JICA will prepare the draft report in English and dispatch a mission to Nepal in order to explain its contents the end of August 2002.

6-3. In case that the contents of the report are accepted in principle by the Government of Nepal, JICA will complete the final report and send it to the Government of Nepal by December, 2002.

7. Other Relevant Issues

7-1. The Nepalese side explained that the land for the planned site of the K3 substation had been provided from the Singha Durbar Reconstruction Project, which is responsible for managing the land inside Singha Durbar secretariat.

7-2. The Nepalese side requested the following considerations on the equipment planning.

- the installation of 66kV switchgears in Siuchatar Substation,
- the installation of Remote Terminal Unit (RTU) in the K3 Substation for Load Dispatching Center (LDC) and communication line between Siuchatar and the K3 substation.

7-3. The Nepalese side strongly requested the procurement, install and test of equipment necessary for the connection from the K3 substation to existing 11kV feeder to be implemented by the Grant Aid.

7-4. The Nepalese side confirmed that the following undertakings should be taken by the Nepalese side at the Nepalese expenses.

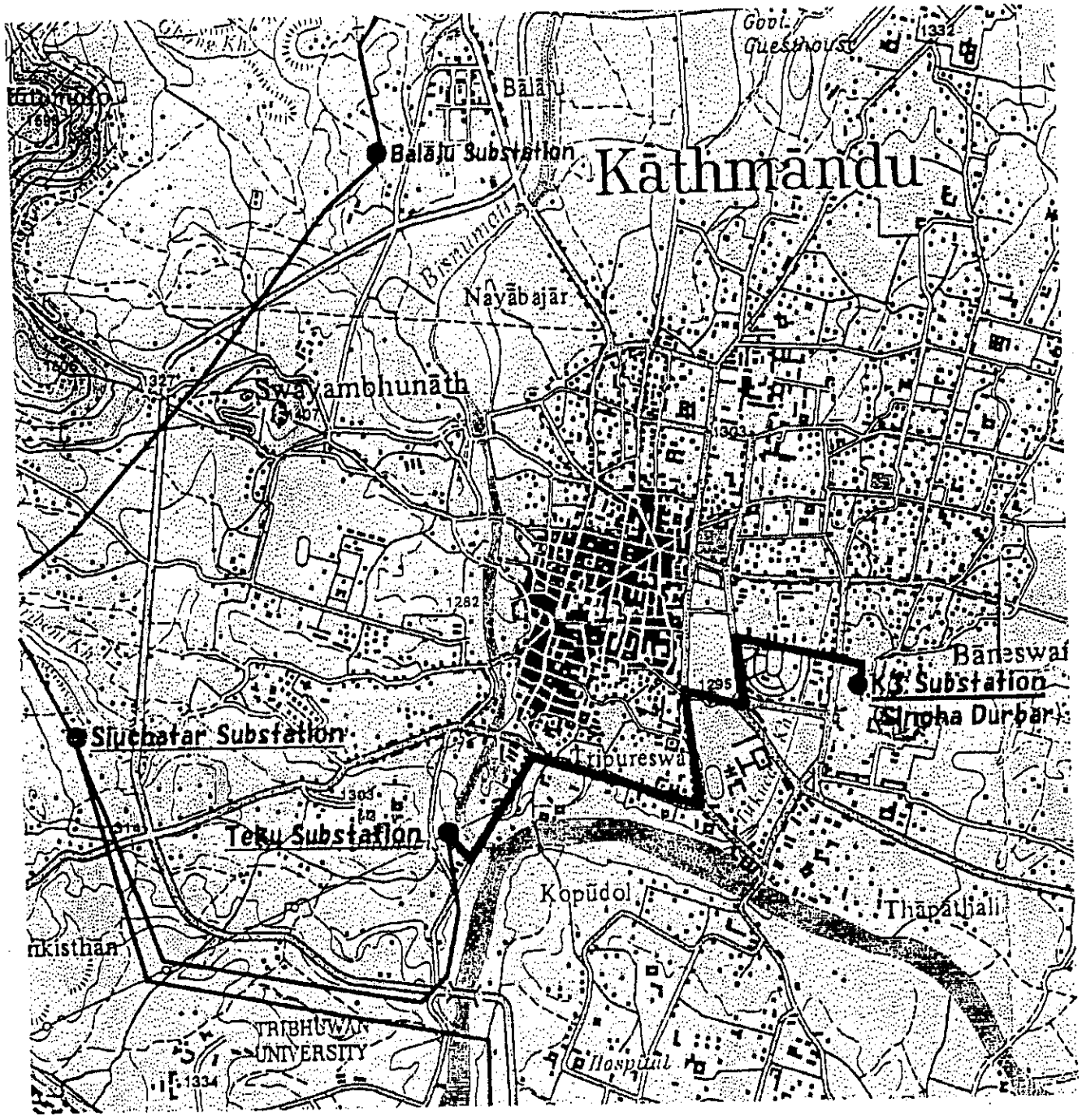
- the security and clearance of the land necessary for the K3 substation and 66kV transmission line (including stock yard),
- the improvement and/or repair of feeder from the K3 substation to customers, if necessary.

7-5. The Nepalese side shall take necessary procedures to implement the Initial Environment Evaluation (IEE) and/or the Environmental Impact Assessment (EIA), if necessary, before the commencement of the Project.

7-6. The Nepalese side shall take necessary procedures to obtain the permissions for implementation of the Project, such as the permission for excavation of roads, construction of building, etc.

7-7. The Nepalese side shall secure enough budget and personnel necessary for the operation and maintenance of the facilities implemented by the Project, including the periodical maintenance work after the completion of the Project.

PROJECT SITE

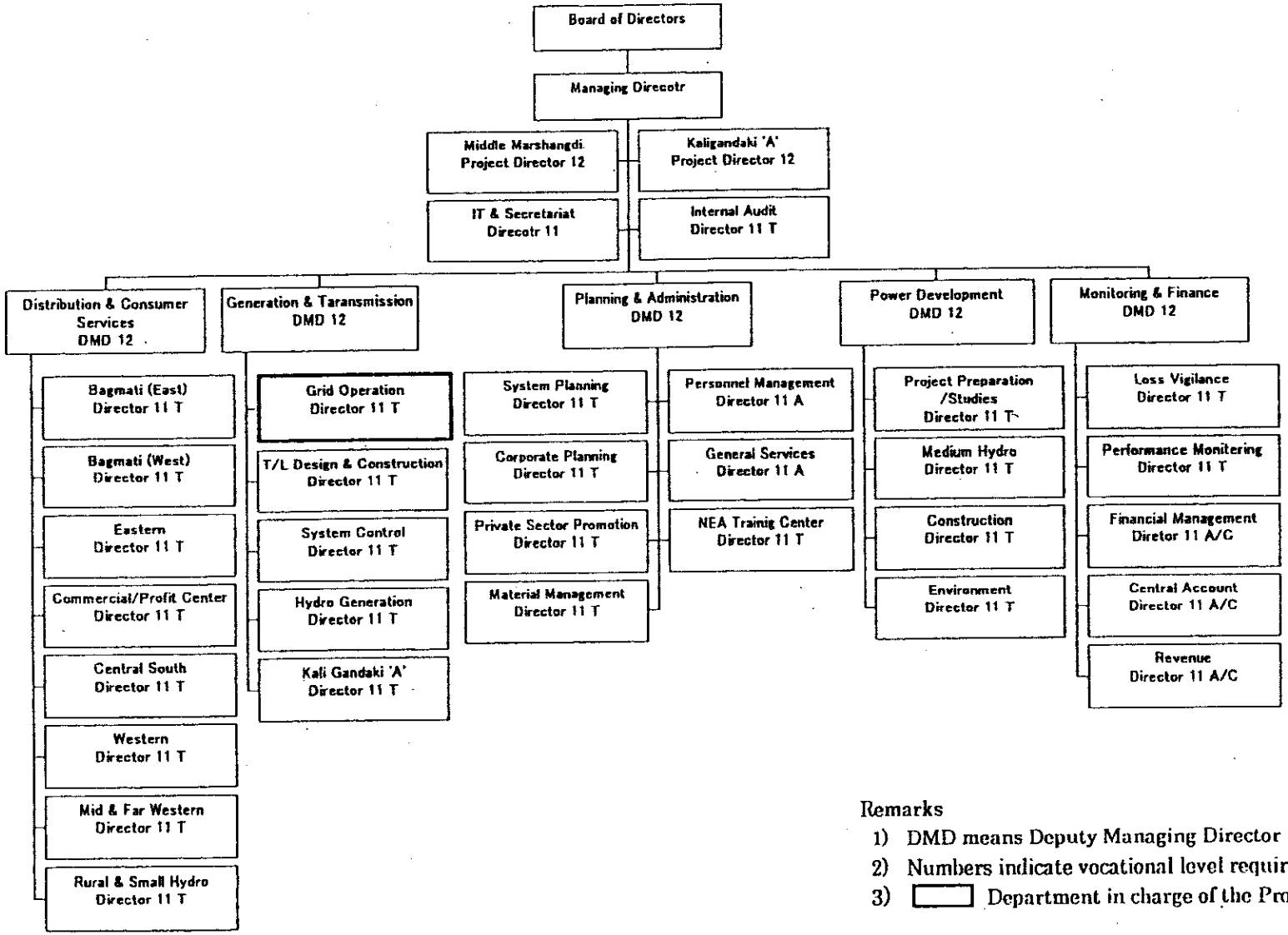


*Remarks

The planned route of 66kv transmission line requested by the Nepalese side

The existing 66kv transmission line

ORGANIZATION CHAT OF NEPAL ELECTRICITY AUTHORITY



Remarks

1) DMD means Deputy Managing Director
2) Numbers indicate vocational level required
3) ☐ Department in charge of the Project

(Annex-2)

(Annex-3)

JAPAN'S GRANT AID SCHEME

The Grant Aid scheme provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

Japan's Grant Aid scheme is executed through the following procedures.

Application	(Request made by a recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by the Government of Japan and Approval by Cabinet)
Determination of Implementation	(The Notes exchanged between the Governments of Japan and the recipient country)

Firstly, the application or request for a Grant Aid Project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (the Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study), using Japanese consulting firms.

Thirdly, the Government of Japan appraises the Project to see whether or not it is suitable for Japan's Grant Aid scheme, based on the Basic Design Study Report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes (E/N) signed by the Governments of Japan and the recipient country.

Finally, for the smooth implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study (hereinafter referred to as "the Study"), conducted by JICA on a requested project (hereinafter referred to as "the Project"), is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid scheme from a technical, social and economic point of view.
- Confirmation of items agreed upon by both parties concerning the basic concept of the Project.

- Preparation of a basic design of the Project.
- Estimation of cost of the Project.

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

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even through they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For smooth implementation of the Study, JICA uses registered consulting firms. JICA selects firms based on proposals submitted by interested firms. The firms selected carry out a Basic Design Study and write a report, based upon terms of reference set by JICA.

The consulting firms used for the Study are recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency.

3. Japan's Grant Aid Scheme

1) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

2) "The period of the Grant Aid" means the one fiscal year which the Cabinet approves the project for. Within the fiscal year, all procedure such as exchanging of the Notes, concluding contracts with consulting firms and contractors and final payment to them must be completed.

However, in case of delays in delivery, installation or construction due to unforeseen factors such as natural disaster, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

3) Under the Grant, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However, the prime contractors, namely consulting, contracting and procurement firms, are limited to "Japanese nationals." (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

4) "Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

5) Undertakings required to the Government of the recipient country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as the following:

a) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction,
b) To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities in and around the sites,
c) To secure buildings prior to the procurement in case the installation of the equipment,
d) To ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid,
e) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies including Value Added Tax which will be imposed in the recipient country with respect to the supply of the products and services under the verified contracts,
f) To accord Japanese nationals, whose services may be required in connection with supply of the products and services under the verified contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

6) "Proper Use"

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

7) "Re-export"

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

8) Banking Arrangement (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a 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 the Government of the recipient country or its designated authority under the verified contracts,
b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay (A/P) issued by the Government of recipient country or its designated authority.

9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.

(ANNEX-4)

Major Undertakings to be Taken by Each Government

NO	Items	To be covered by Grant Aid	To be covered by Recipient side
1	To Secure land (including temporary yard)		●
2	To clear, level and reclaim the site		●
3	To construct gates and fences in and around the site.		●*1
4	To construct the parking lot in the site	●	
5	To construct roads within the site	●	
6	To construct the buildings of K3 substation	●	
7	To provide facilities for the distribution of electricity, water, drainage and other incidental facilities		
	1) Electricity		
	a. The main circuit breaker and transformer	●	
	b. The drop wiring and internal wiring within the site	●	
	2) Water supply		
	a. The city water distribution to the site		●
	b. The supply system within the site (receiving and elevated tank)	●	
	3) Drainage		
	a. The city drainage pipe (for storm, sewer and others) from the site		●
	b. The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site.	●	
	4) Telephone system		
	a. The telephone trunk line to the distribution system frame/panel (MDF) of the building		●
	b. The MDF and the extension after the frame/panel	●	
	5) Furniture and Equipment		
	a. General furniture		●
	b. Project equipment	●	
8	To improve and/or repair of feeder from the K3 substation to customers when needed.		●
9	To bear the following commissions to a bank in Japan for the banking services based upon the B/A		
	1) Advising Commission of A/P		●
	2) Payment commission		●
10	To ensure prompt unloading and customs clearance at the port of disembarkation		
	1) Marine (Air) transportation of the products from Japan to the port of disembarkation	●	
	2) Tax exemption and customs clearance of the products at the port of disembarkation		●
	3) Inland transportation from the port of disembarkation to the project site	●	
11	To accord Japanese nationals, whose services may be required in connection with the supply of the products and the services under the verified contract, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
12	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		●
13	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
14	To bear all the expense, other than those to be borne by the Grant Aid, necessary for construction of the facilities		●

(B/A: Banking Arrangement, A/P: Authorization to pay)

*1. The fences and gates are already existing around the site.

6

Minutes of Discussions
on the Basic Design Study
on the Project for Extension and Reinforcement
of Power Transmission and
Distribution System in Kathmandu Valley (Phase-3)
in the Kingdom of Nepal.
(EXPLANATION OF DRAFT REPORT)

In April 2002, the Japan International Cooperation Agency (JICA) dispatched a Basic Design Study Team on the Project for Extension and Reinforcement of Power Transmission and Distribution System in Kathmandu Valley (Phase-3) (the Project) to the Kingdom of Nepal, and through discussion, field survey, and technical examination of the results in Japan, JICA prepared a draft report of the study.

In order to explain and to consult with the officials concerned of His Majesty's Government of Nepal (HMG/N) on the components of the draft report, JICA sent to the Kingdom of Nepal the Explanation Team (the Team), which is headed by Mr. Eitaro Mitoma, Resident Representative of the JICA Nepal Office, from September 1 to 11, 2002.

As a result of discussions between the Team and Nepal Electricity Authority (NEA), both sides confirmed the main items described on the attached sheets.

Kathmandu, September 5, 2002

Eitaro Mitoma
Leader
Basic Design Study Team
Japan International Cooperation Agency

Janak L. Karmacharya Ph.D
Managing Director
Nepal Electricity Authority

ATTACHMENT

1.Components of the Draft Report

NEA agreed and accepted in principle the components of the draft report, including the design of the building, and draft detailed specifications of the equipment explained by the Team.

2.Japan's Grant Aid Scheme

NEA shall take necessary measures as explained by the Team and described in Annex-3 and Annex-4 of the Minutes of Discussions signed by both parties on April 19, 2002.

3.Schedule of the Study

JICA will complete the final report taking into consideration of the discussions between the Team and NEA, and send it to HMG/N and NEA by the end of December, 2002.

4. Tax Exemption

NEA shall take necessary procedure for the tax exemption for the import of the equipment procured by the Project based on Exchange of Notes, signed between the Government of Japan and HMG/N, and the prevailing rules and regulations of HMG/N.

5. Other Relevant Issues

5-1. The Team handed one copy of the draft detailed specifications of the equipment to Mr. Balaram Shrestha, Director of Transmission Line/Substation Construction Department, NEA. Both sides agreed that this draft specifications were confidential and should not be duplicated or released to any outside parties.

5-2. NEA shall implement the transmission line between the 11kV cubicles in the K3 substation and the existing 11kV transmission line abreast with the implementation of the Project; this work includes the connection to the 11kV cubicles.

5-3. NEA shall submit the application for Initial Environment Evaluation (IEE) to the Ministry of Water Resources (MOWR) by September 10, 2002. And NEA shall endeavor to complete the necessary procedure to implement IEE by the end of November, 2002.

5-4. NEA shall take necessary procedure to obtain permissions for the excavation of roads and approval of the building design for the K3 substation, based on the implementation schedule.

5-5. NEA shall haul earth and carry out the initial leveling of the K3 substation by the end of March, 2003.

5-6. NEA shall ensure smooth implementation of the Project by undertaking necessary activities in timely manner.

5-7. NEA shall secure an oil purifier necessary for the installation of 66/11kV transformer, and lend it gratis to the contractor for the installation work.

5-8. NEA shall secure enough budget and personnel necessary for the operation and maintenance, including the periodical maintenance, after the completion of the Project.

2.9a.

資料６　事前評価表

事業事前評価表

1. 協力対象事業名

ネパール王国第 3 次カトマンズ地区配電網拡張整備計画

2. 我が国が援助することの必要性・妥当性

(1) 我が国が当該国に対し援助することの必要性・妥当性

我が国とネパールとの関係は、伝統的に極めて友好裡に推移してきている。ネパールは南西アジアで最も所得水準の低い LLDC 国である上に内陸国としての厳しい条件の下で社会・経済開発に努めており、援助需要は高い。民主主義の定着と経済の自由化をすすめつつ経済開発に取り組んでいること等を踏まえ、我が国は積極的に開発援助に協力している。

(2) 当該プロジェクトを実施することの必要性・妥当性

ネパール国の電力事情は、発電側の開発の遅れにより慢性的な電力不足が続いてきた。しかし、2002 年現在、下記 4 箇所（Khimti Khola, Upper Bhote Koshi, Modi Khola, Kali Gandaki A）の発電所の完成により現時点では発電側の問題はほぼ解決されつつある。

一方、カトマンズ中心部への電力供給は、カトマンズ郊外に形成された 66 kV および 132 kV 外輪線の電力を外輪線周辺の変電所にて 11 kV に下げ、それら変電所から 11 kV 供給線によって行われている。当座の電力不足は解消されたものの、近年カトマンズ中心部の電力供給において、供給線および変電所変圧器の容量不足が電力不足に代わる障害となりつつある。

そこでカトマンズ中心部への電力供給能力増強を実現する手段として、新たな変電所をカトマンズ中心部に建設することが必要とされている。

3. 協力対象事業の目的（プロジェクト目標）

カトマンズ地区、特にその中心部において、送配変電設備を整備・拡張し、市民に安定した電力を供給することを目的とする。

4. 協力対象事業の内容

(1) 対象地域

カトマンズ中心街

(2) アウトプット

カトマンズ中心部の合同庁舎内に、新規に配電用変電所が建設され、その変電所まで近隣の既設 Teku 変電所から高圧地中送電線が公道に沿って敷設される。

(3) インプット

【日本側】
① K3 変電所建屋の建設
② 66 kV 地中送電線の敷設（K3 - Teku）
③ Teku 変電所の改修工事
④ Siuchatar 変電所への 66 kV 開閉機器据付
⑤ RTU（Remote Terminal Unit）の K3 変電所への据付
⑥ 光通信端末装置据付および送電線保護用光ファイバー・ケーブルの敷設（K3 - Siuchatar）

【相手国側】
① K3 変電所建屋敷地の確保と埋立て
② K3 変電所塀工事
③ 11kV 配電線・給電線接続（材料調達と工事）
④ 電話・水道接続、家具類調達

(4) 総事業費

概算総事業費 14.17 億円（日本側 13.97 億円、ネパール国側 0.2 億円）

(5) スケジュール

詳細設計期間を含め約 20 ヶ月の工期を予定

(6) 実施体制

監督機関：水資源省
実施機関：ネパール電力公社（NEA）

5.　プロジェクトの成果

(1) プロジェクトの裨益対象の範囲及び規模

裨益範囲：カトマンズ中心部（北は現王宮から、南は Tripureswor 付近まで、西は旧王宮から東は Dillibazar・Maitidevi 付近まで）

裨益対象人口：約 26 万人

(2) 事業の目的（プロジェクト目標）達成を示す成果指標

本事業の目的は、前述の通りカトマンズ中心部への電力供給能力増強である。本事業を実施しなかった場合、電力供給能力不足による計画停電を実施せざるを得なくなる。この計画停電を減少させることが本事業の目的達成を示す成果指標となる。

以下に、本事業を実施しなかった場合に予想される計画停電の影響を、一般需要家数とその人口、および年間計画停電実施日数の算定値により示す。

また、最右列には本事業を実施した場合の予想計画停電実施日数を示す。

本事業なしの場合				本事業実施の場合
ネパール会計年度	影響を受ける一般需要家数（戸）	影響を受ける一般需要家の人口（人）	年間計画停電実施日数（日）	年間計画停電実施日数（日）
2005/06	2,700	14,100	9	0
2006/07	6,600	34,300	21	0
2007/08	**10,600**	**55,300**	**47**	**0**
2008/09	14,900	77,300	76	0
2009/10	19,300	100,300	103	0
2010/11	23,900	124,300	153	0

本事業なしと、本事業実施の場合との相違が顕著となるネパール会計年度 2007/08 年初頭、すなわち 2007 年以降を評価のタイミングとする。

6.　外部要因リスク（事業の目的の達成に関するもの）
保守点検の的確な実施、即ち、設備の性能維持、設備障害の早期発見、事故の未然防止を目的として NEA が保守点検を計画的に実施することが必要である。
7.　今後の評価計画
(1) 事後評価に用いる成果指標 ① 年間計画停電実施日数（日／年） ② 計画停電の影響を受ける一般需要家数（戸） ③ 計画停電の影響を受ける一般需要家人口（人） (2) 評価のタイミング 2007 年以降

資料７　収集資料リスト

様　式

主管部長	文書管理課長	主管課長

情報管理課長	図書資料室受付印

収　集　資　料　リ　ス　ト

平　成 14 年 12 月 18 日　　作成

地　域	アジア	調査団等名称	第 3 次カトマンズ地区配電網拡張整備計画	調査の種類	基本設計調査	作成部課	
国　名	ネパール			現地調査期間	2002 年 4 月 9 日 ～ 2002 年 5 月 2 日	担当者氏名	

番号	資料の名称	形態	版型	ページ数	オリジナルコピーの別	部数	収集先名称又は発行機関	寄贈・購入（価格）の	取扱区分	利用表示	利用者所属氏名	納入予定日	納入確認欄
1	NEA のログシートの集計記録		A4	2	コピー	1	NEA	寄贈					
2	A Report on the Proposed Substation K3	ﾎﾁｷｽ留め	A4,A3	12	コピー	1	NEA	寄贈					
3	Electricity Regulation	ﾎﾁｷｽ留め	A4	63	コピー	1	NEA	寄贈					
4	Drawings of Siuchatar S/S												
	Plan of 66kV Buses		A3	1	コピー	1	NEA	寄贈					
	Equipment Support and Foundation Layout Plan		A3	1	コピー	1	NEA	寄贈					
5	Drawings of Teku S/S												
	Layout Plan		A3	1	コピー	1	NEA	寄贈					
	Ground Floor Plan		A3	1	コピー	1	NEA	寄贈					
	First Floor Plan		A3	1	コピー	1	NEA	寄贈					
	Layout of GIS		A3	1	コピー	1	NEA	寄贈					
6	Working Drawing for Master Plan of UN Park（A1 のｵﾘｼﾞﾅﾙを A2 に縮小ｺﾋﾟｰ）		A2	1	コピー	1	NEA	寄贈					
7	Labor Act	ﾎﾁｷｽ留め	A4	36	コピー	1	Regmi Research (P) Ltd.	購入					
8	Labor Rules	ﾎﾁｷｽ留め	A4	28	コピー	1	Regmi Research (P) Ltd.	購入					
9	Wage and Bonus	ﾎﾁｷｽ留め	A4	22	コピー	1	Regmi Research (P) Ltd.	購入					
10	List of Public Holiday		A4	1	コピー	1	Regmi Research (P) Ltd.	購入					

国　際　協　力　事　業　団

資料 7　収集資料リスト

資料８　K3 変電所建設予定地の
土地収用にかかる完了証明書

Singh Durbar Secretariat
Reconstruction Board

His Majesty's Government of Nepal
Ministry of Physical Planning and Works

SINGHA DURBAR SECRETARIATE RECONSTRUCTION PROJECT

Ref. No.: 058/59 Cha.no. 754

Date: 2059/1/4
(2002/4/17)

Subject: Land Allocation for the Construction of the Substation at Singh Durbar

Nepal Electricity Authority
Generation and Transmission
Grid Operation Department
Bagmati Transmission Division

We acknowledge the receipt of your letter with Ref. No. 2058/059 Cha. No. 727 dated 2058/12/26 on the captioned subject. In this regard, a land area of 2-0-0, (Two Ropanis, about 1000 m^2) has been allocated in the northwest corner of Singh Durbar premises as shown in the map, for the construction of the required Electrical Substation, without affecting the approved Master Plan of Singh Durbar Secretariat. The map with allocated site is attached herewith. You are requested to construct the Substation by demarcating the land in the presence of the technician from this project office.

Signed by
Ram Prasad Belbase
Administrative Officer

C.C:

Ministry of Physical Planning and Works
Singh Durbar

Ministry of Water Resources
Sigh Durbar

Department of Urban Development and Housing
Babarmahal

Nepal Electricity Authority
Durbar Marg

सिंहदरवार सचिवालय
पुनः निर्माण समिति

श्री ५ को सरकार
भौतिक योजना तथा निर्माण मन्त्रालय

सिंहदरवार सचिवालय पुनः निर्माण प्रोजेक्ट

पत्र संख्या :- ०५८\४९-च-२.६४८

प्राप्त पत्र संख्या र मिति :-

मितिः २०५९/१/४

विषय :- सिंहदरवार सब स्टेशन निर्माणको लागि साइट उपलब्ध गराएको ।

श्री नेपाल विद्युत प्राधिकरण
उत्पादन तथा प्रशारण, ग्रीड सन्चालन विभाग
वागमती प्रशारण महाशाखा, नयाँ बानेश्वर ।

उपर्यूक्त विषय ताहाँको प.स..२०५८।०५९ च.नं.७२७ मिति ०५८।१२।२६ को पत्र प्राप्त भै व्यहोरा अवगत भायो । तत्सम्बन्धमा पेश हुँदा सिंहदरवार क्षेत्रको स्वीकृत गुरुयोजना बमोजिम यस क्षेत्रलाई आवश्यक पर्ने विद्युत सब स्टेशन निर्माण गर्न स्वीकृत गुरुयोजनामा असर नपर्ने गरी सिंहदरवार उत्तर पश्चिम कुनामा नक्सामा लोकेट गरीएको स्थानमा २.०.० (दुई रोपनी) जग्गा उपलब्ध गराइएको छ । लोकेट गरीएको नक्सा थान १ एक यसैसाथ छ । उक्त जग्गा यस प्रोजेक्ट कार्यालयका प्राविधिकको रोहवरमा छुट्याई सब स्टेशन निर्माण गर्नु हुन अनुरोध छ ।

(रास प्रसाद बेल्वासे)
प्रशासकीय अधिकृत

प्रशासकिय अधिकृत

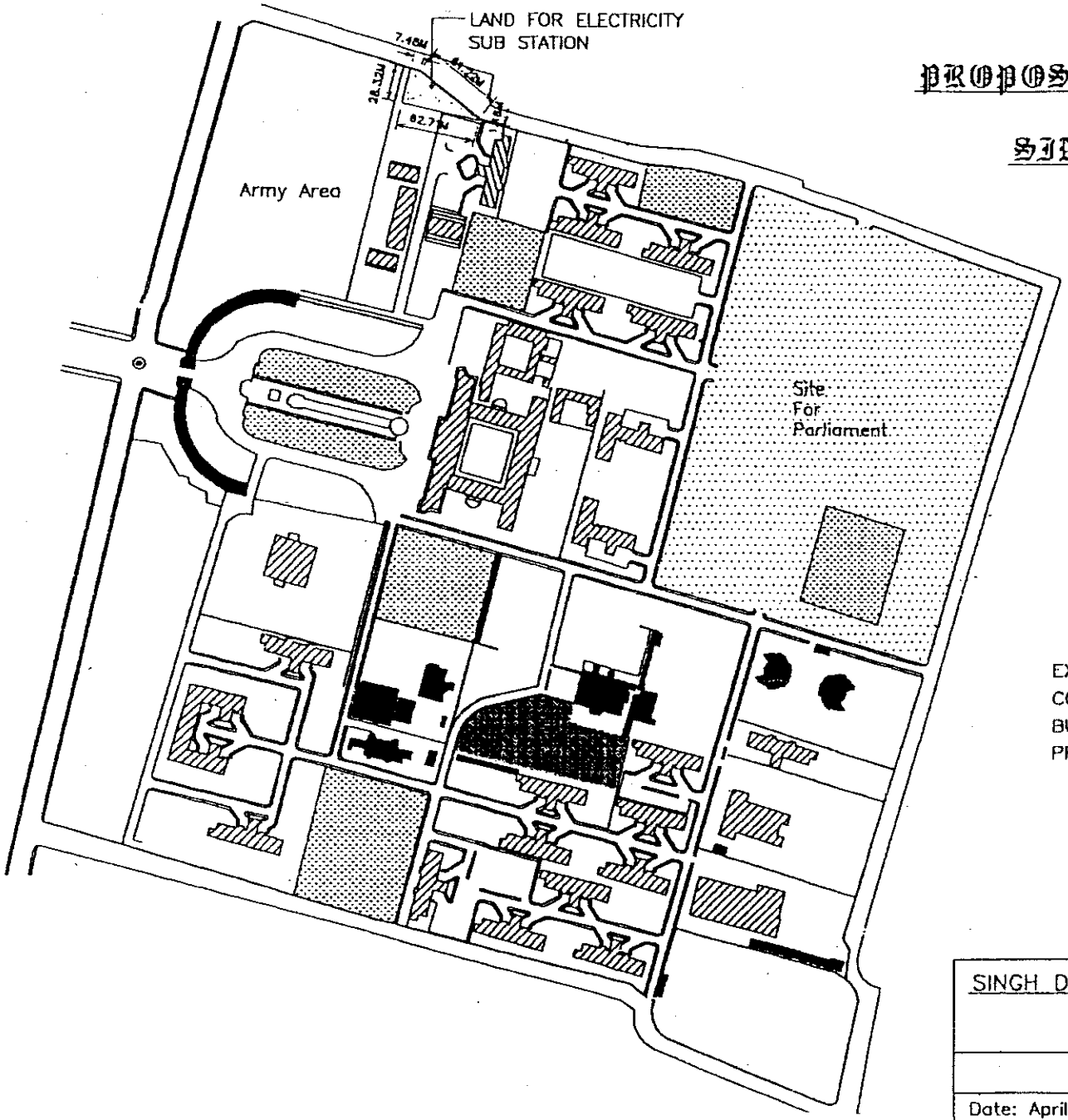
बोधार्थ :
श्री भौतिक योजना तथा निर्माण मन्त्रालय

सिंहदरवार ।
श्री जलश्रोत मन्त्रालय
सिंहदरवार ।

श्री सहरी विकास तथा भवन निर्माण विभाग
बबरमहल ।

श्री नेपाल विद्युत प्राधिकरण
दरबार मार्ग ।

टेलिफोन नं. २-२२७९८, २-४१८९९, फ्याक्स नं. (००९७७-१) २-४१९०७, E-mail: ssrcp@mos.com.np



PROPOSED MASTER PLAN
OF
SINGH DURBAR

EXISTING BUILDING
CONSTRUCTED BUILDING
BUILD. UNDER CONSTRUCTION
PROPOSED BUILDING

इन्जिनीयर

प्रशासकिय अधिकृत

SINGH DURBAR SECRETARIAT RE-CONSTRUCTION PROJECT SINGH DURBAR,KATHMANDU,NEPAL	
	PROJECT MANAGER: P.K.ACHARYA
Date: April, 2002	SENIOR ARCHITECT: J.TAMRAKAR

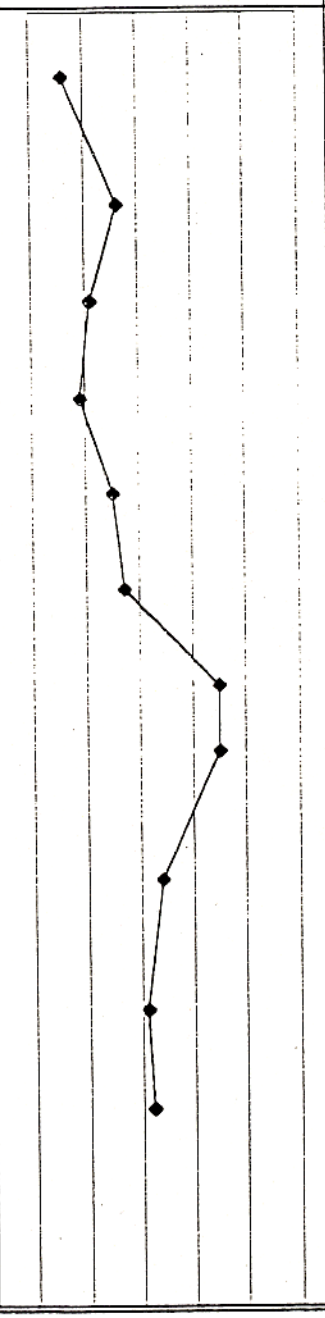
資料９　現地再委託による地質調査結果

BORE HOLE LOG

PROJECT: Soil Investigation for Sub-Station Site
LOCATION: Singhdurbar, Kathmandu

Bore Hole No.: BH1

ELEVATION	DEPTH	THICKNESS	SYMBOL	SOIL DESCRIPTION	CUMMULATIVE SPT in blows for penetration of (cm)	REMARKS
0					0 10 20 30 40 50	
1	1.25	1.25		Top soil with broken brick followed by fine to medium sand		
2	2.5	1.25		Matrix of medium sand & layers of sandy silt		
3	3.5	1		Coarse sand, pieces of brick & silty sand		
4	4.75	1.25		Coarse to fine sand with silt		
5	6.0	1.25		Medium to fine sand		
6	7.5	1.5		Coarse to medium sand		
8	9.0	1.5		Black sandy medium plastic clay		
9	9.5	0.5		Fine sandy silt		
10	11.0	1.5		Fine to coarse sand		
11	13.5	9.0		Black plastic clay		
14	15.5					
16	17.0					
19	20.0			End of Bore Hole		



BORE HOLE LOG

PROJECT: Soil Investigation for Sub-Station Site
LOCATION: Singhdurbar, Kathmandu

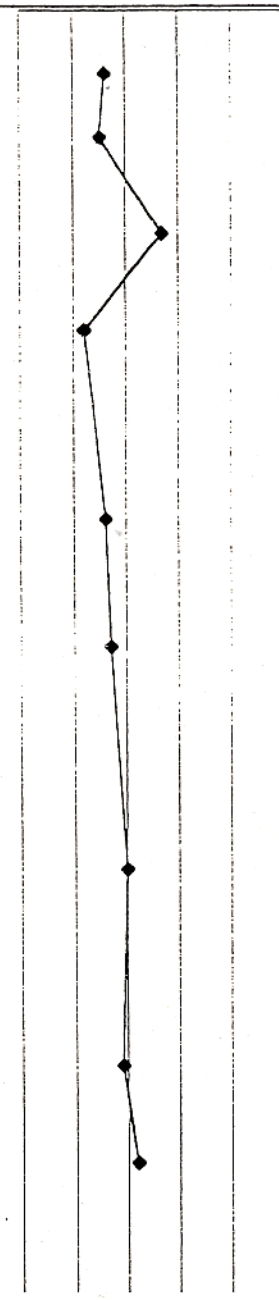
Bore Hole No.: BH2

ELEVATION	DEPTH	THICKNESS	SYMBOL	SOIL DESCRIPTION	REMARKS
0					
		2.0		Top soil with borken brick deposition followed by clayey sand, fine to medium	
2	2.0				
	3.25	1.25		Matrix of silty sand & black clay	
		1.25		Coarse to medium sand	
4	4.5				
	5.0	0.5		Fine sand	
		1.8		Medium to fine sand	
6	6.8				
		1.2		Silty sand with clay	
8	8.0				
	9.0	1		Coarse to medium sand	
	9.5	0.5		Silty sand	
10					
		3.9		Black silty clay of medium plasticity	
12					
	13.4				
14					
16	16.5				
		6.6		Black plastic clay	
18	18.0				
	20.0			End of Bore Hole	

CUMMULATIVE SPT

in blows for penetration of (cm)

0 10 20 30 40 50



TEST RESULT SUMMARY SHEET

Bore Hole No.: **1**

Project **Soil Investigation for Sub-Station Site**

Location: **Singh Durbar, Kathmandu**

Nippon Koei

S.No.	Depth m	Soil Classification	Sieve analysis % passing ASTM					Atterberg Limits			Natural Moisture Content	Density		PT blow	Sp. Gr.	Quit	Direct Shear	
			Gravel	Sand		Silt	Clay	L.L.	P.L.	P.I.		Yw	Yd			kg/cm^2	C kg/cm	ϕ (^{0})
				Coarse to Medium	Fine													
1	2 - 4	SW	13.00	38.00	35.00	14.00	-	-	-	-	16.40	1.90	1.60	-	2.63	-	0.09	30
2	11 - 13	ML	-	-	9.00	42.20	48.13	24.50	19.22	5.28	40.50	1.80	1.31	-	2.69	-	0.16	10

TEST RESULT SUMMARY SHEET

Bore Hole No.: **2**

Project **Soil Investigation for Sub-Station Site**

Location: **Singh Durbar, Kathmandu**

Nippon Koei

S.No.	Depth m	Soil Classification	Sieve analysis % passing ASTM					Atterberg Limits			Natural Moisture Content	Density		PT blow	Sp. Gr.	Quit	Direct Shear	
			Gravel	Sand		Silt	Clay	L.L.	P.L.	P.I.		Yw	Yd			kg/cm^2	C kg/cm^2	ϕ (^{0})
				Coarse to Medium	Fine													
1	2 - 4	SW	15.00	55.00	19.00	11.00	-	18.00	-	-	12.20	1.92	1.71	-	2.63	-	0.14	31
2	9.5 - 11.5	ML	-	2.00	10.00	53.00	35.00	31.40	23.69	7.71	44.00	1.85	1.35	-	2.66	-	0.14	10

Direct Shear Test

Project: **Soil Investigation of Sub-Station Site**
Location: **Singhadurbar kathmandu**

Nippon Koei Co. Ltd.

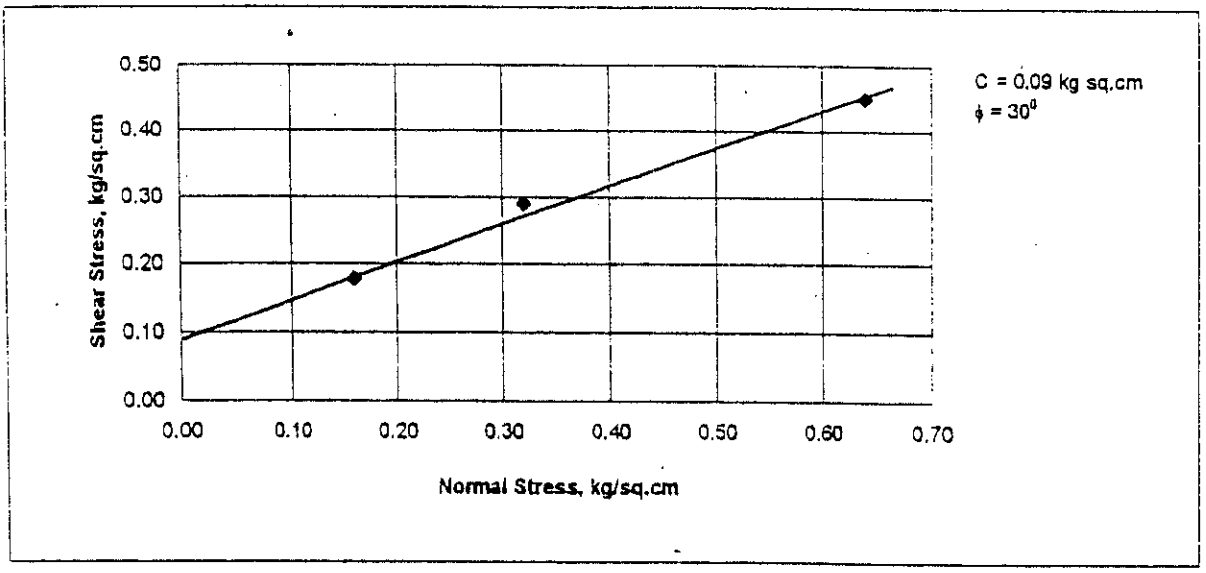
Bore Hole No. 1
Depth, m **2.5**

PRG Factor, kg/Div.: **0.17**
Area cm^2: **25**

Moisture Content: **16.40 %**

Date: 10th May 2002

SDT	Test No. 1		Test No. 2		Test No. 3	
	Normal stress 0.16 kg/cm^2		Normal stress 0.32 kg/cm^2		Normal stress 0.64 kg/cm^2	
mm	PRDRg	SST kg/cm^2	PRDRg	SST kg/cm^2	PRDRg	SST kg/cm^2
0.40	5.00	0.034	7.00	0.048	11.00	0.075
0.80	7.00	0.048	10.00	0.068	14.00	0.096
1.20	10.00	0.068	13.00	0.089	19.00	0.130
1.60	11.00	0.075	18.00	0.123	24.00	0.164
2.00	14.00	0.096	21.00	0.144	28.00	0.191
2.40	16.00	0.109	25.00	0.171	34.00	0.232
2.80	19.00	0.130	28.00	0.191	39.00	0.267
3.20	22.00	0.150	31.00	0.212	43.00	0.294
3.60	23.00	0.157	33.00	0.226	48.00	0.328
4.00	24.50	0.167	35.00	0.239	52.00	0.355
4.40	26.00	0.178	38.00	0.260	55.00	0.376
4.80	26.00	0.178	41.00	0.280	59.00	0.403
5.20	24.00	0.164	43.00	0.294	63.00	0.431
5.60			42.00	0.287	66.00	0.451
6.00					65.00	0.44



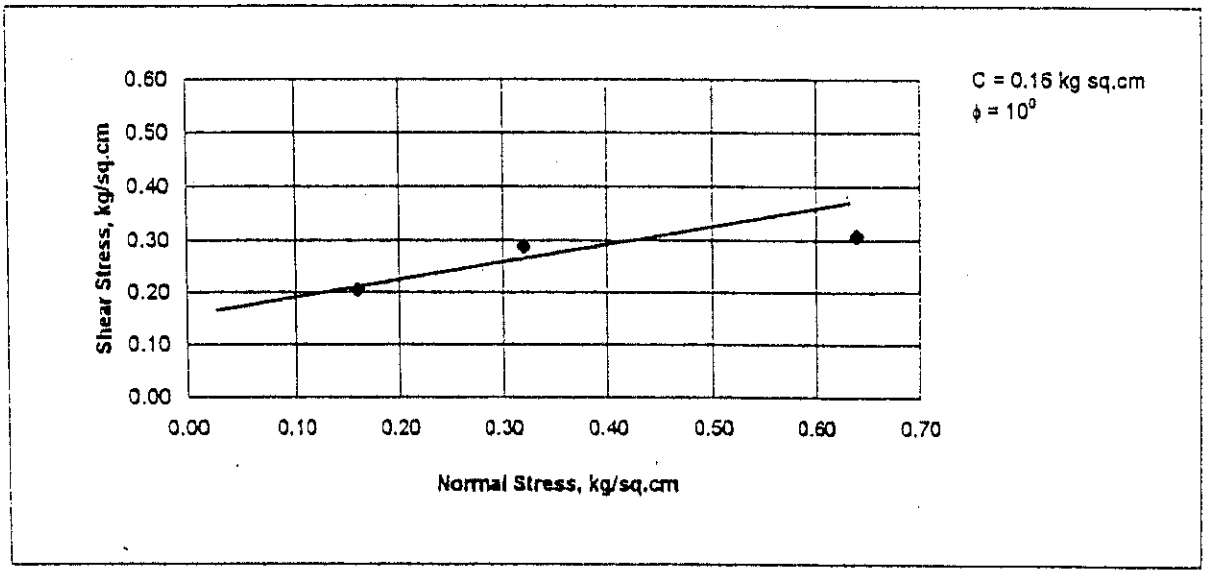
Direct Shear Test

Project: **soil investigation for Sub-Station Site**
Location: **Singhadurbar ,kathmandu** **Nippon Koei Co. Ltd.**

Bore Hole No. **1** PRG Factor, kg/Div.: **0.17**
Depth, m 11 Area cm^2: **25**

Moisture Content: **40.50 %** Date: 10th May 2002

SDT	Test No. 1		Test No. 2		Test No. 3	
	Normal stress 0.16 kg/cm^2		Normal stress 0.32 kg/cm^2		Normal stress 0.64 kg/cm^2	
mm	PRDRg	SST kg/cm^2	PRDRg	SST kg/cm^2	PRDRg	SST kg/cm^2
0.40	6.00	0.041	6.00	0.041	8.00	0.055
0.80	7.00	0.048	10.00	0.068	12.00	0.082
1.20	9.00	0.062	12.00	0.082	14.00	0.096
1.60	10.00	0.068	15.00	0.103	16.00	0.109
2.00	12.00	0.082	20.00	0.137	22.00	0.150
2.40	14.00	0.096	22.00	0.150	26.00	0.178
2.80	17.00	0.116	27.00	0.185	31.00	0.212
3.20	21.00	0.144	28.00	0.191	36.00	0.246
3.60	24.00	0.164	34.00	0.232	40.00	0.273
4.00	28.00	0.191	38.00	0.260	45.00	0.308
4.40	25.00	0.171	40.00	0.273	30.00	0.205
4.80	28.00	0.191	42.00	0.287		
5.20	30.00	0.205	40.00	0.273		
5.60			30.00	0.205		
6.00						



Direct Shear Test

Project: **Soil Investigation of Sub-Station Site**
Location: **Singhadurbar, Kathmandu**

Nippon Koei Co. Ltd.

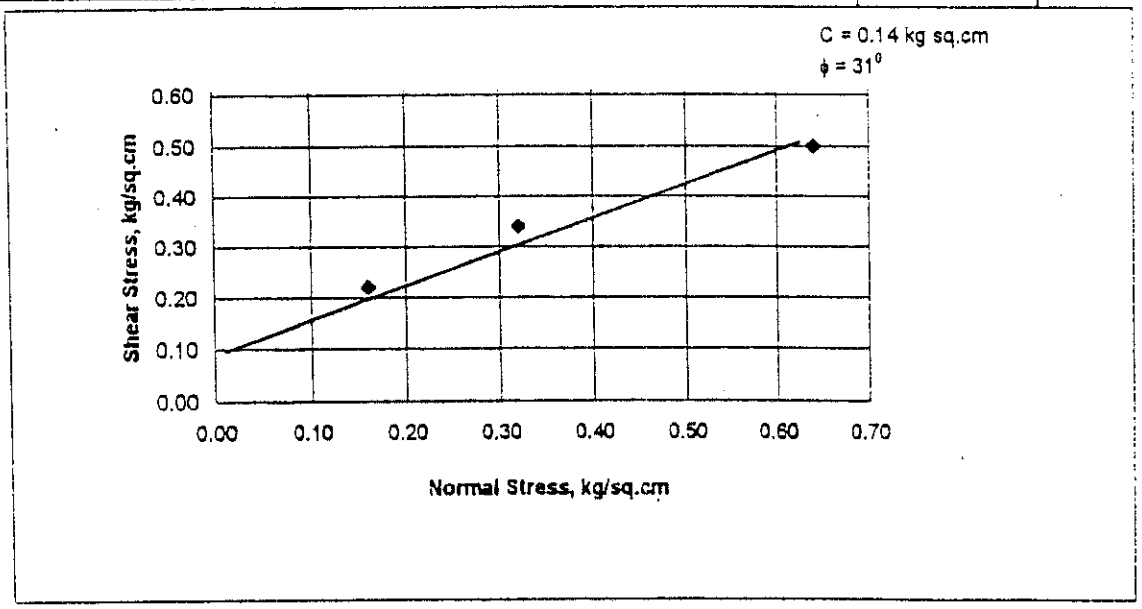
Bore Hole No. **2**
Depth, m **2**

PRG Factor, kg/Div.: **0.17**
Area cm^2: **25**

Moisture Content: **12.2 %**

Date: 10th May 2002

SDT	Test No. 1		Test No. 2		Test No. 3	
	Normal stress 0.16 kg/cm^2		Normal stress 0.32 kg/cm^2		Normal stress 0.64 kg/cm^2	
mm	PRDRg	SST kg/cm^2	PRDRg	SST kg/cm^2	PRDRg	SST kg/cm^2
0.40	5.00	0.054	12.00	0.082	16.00	0.109
0.80	7.00	0.048	14.00	0.095	21.00	0.143
1.20	9.00	0.061	18.00	0.122	24.00	0.163
1.60	12.00	0.082	23.00	0.156	29.00	0.197
2.00	13.00	0.088	25.00	0.170	33.00	0.224
2.40	15.00	0.102	29.00	0.197	37.00	0.252
2.80	17.00	0.116	33.00	0.224	43.00	0.292
3.20	20.00	0.136	38.00	0.258	47.00	0.320
3.60	24.00	0.163	41.00	0.279	51.00	0.347
4.00	27.00	0.184	43.00	0.292	54.00	0.367
4.40	30.00	0.204	45.00	0.306	59.00	0.401
4.80	33.00	0.224	47.00	0.320	65.00	0.442
5.20	32.00	0.218	50.00	0.340	70.00	0.476
5.60			48.00	0.326	74.00	0.503
6.00					73.00	0.496



Direct Shear Test

Project: **Soil Investigation for Sub-Station Site**
Location: **Singhadurbar,Kathmandu**

Nippon Koei Co. Ltd.

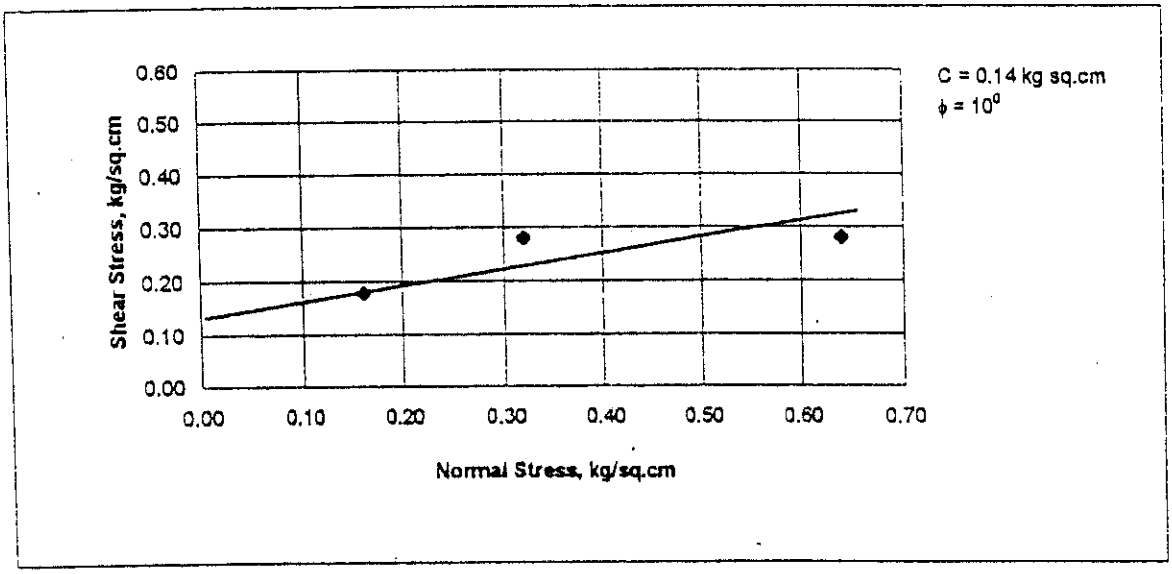
Bore Hole **2**
Depth, m **9.5**

PRG Factor, kg/Div.: **0.17**
Area cm^2: **25**

Moisture Content: **44.0 %**

Date: 10th May 2002

SDT	Test No. 1		Test No. 2		Test No. 3	
	Normal stress 0.16 kg/cm^2		Normal stress 0.32 kg/cm^2		Normal stress 0.64 kg/cm^2	
mm	PRDRg	SST kg/cm^2	PRDRg	SST kg/cm^2	PRDRg	SST kg/cm^2
0.40	6.00	0.041	6.00	0.041	9.00	0.062
0.80	7.00	0.048	10.00	0.068	11.00	0.075
1.20	9.00	0.062	12.00	0.082	14.00	0.096
1.60	11.00	0.075	18.00	0.123	18.00	0.123
2.00	13.00	0.089	22.00	0.150	22.00	0.150
2.40	17.00	0.116	28.00	0.191	30.00	0.205
2.80	19.00	0.130	31.00	0.212	33.00	0.226
3.20	22.00	0.150	34.00	0.232	38.00	0.260
3.60	23.00	0.157	36.00	0.246	40.00	0.273
4.00	24.50	0.167	40.00	0.273	41.00	0.280
4.40	26.00	0.178	41.00	0.280	37.00	0.253
4.80	26.00	0.178	38.00	0.260	32.00	0.219
5.20	24.00	0.164	32.00	0.219		
5.60			32.00	0.219		
6.00						

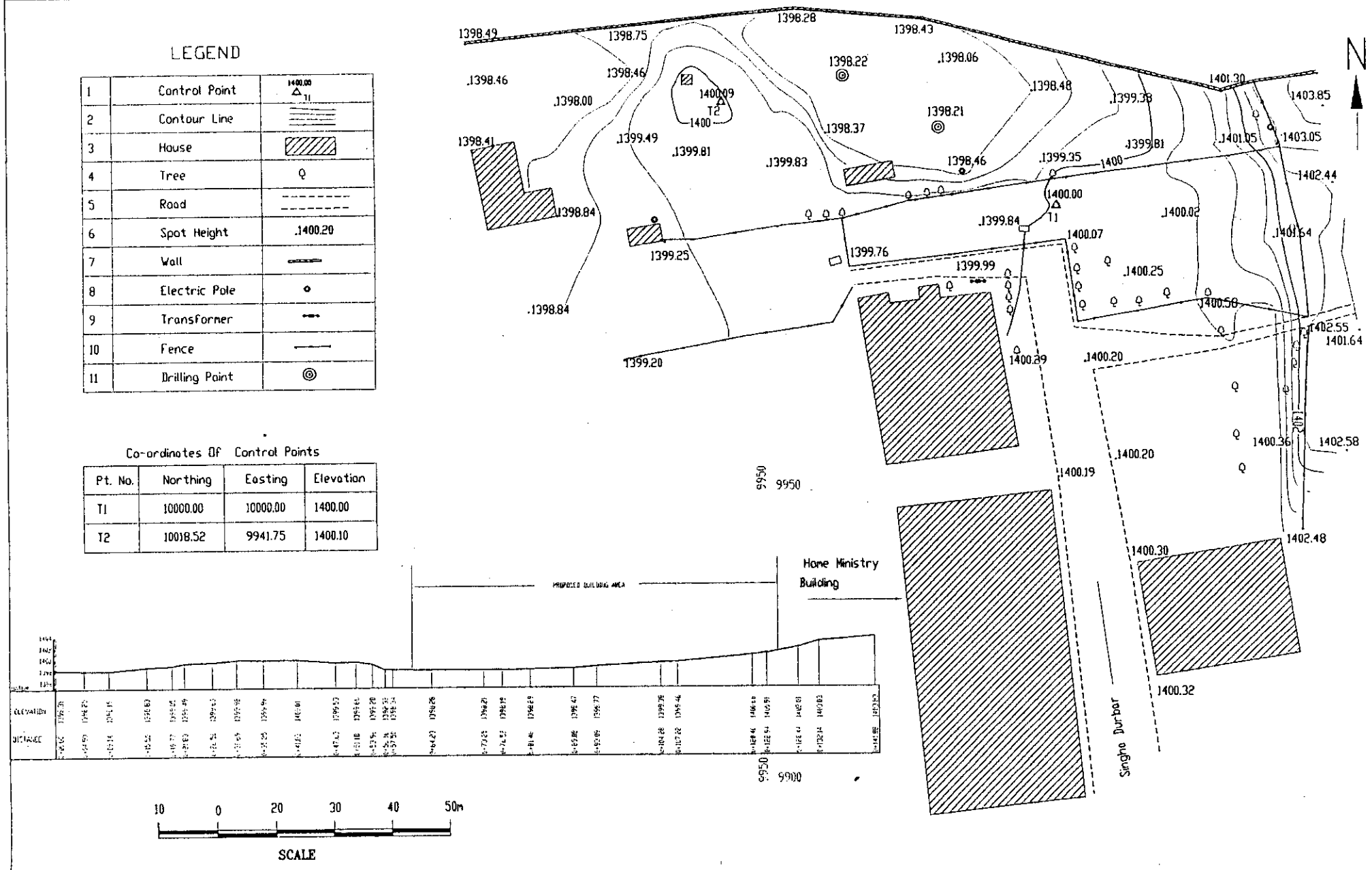


LEGEND

1	Control Point	1400.00 T1
2	Contour Line	
3	House	
4	Tree	
5	Road	
6	Spot Height	1400.20
7	Wall	
8	Electric Pole	
9	Transformer	
10	Fence	
11	Drilling Point	

Co-ordinates Of Control Points

Pt. No.	Northing	Easting	Elevation
T1	10000.00	10000.00	1400.00
T2	10018.52	9941.75	1400.10



K-3, SUBSTATION SINGH DURBAR	TOPOGRAPHICAL MAP (PLAN AND PROFILE)	PARTICULAR	DESIGN BY:	CHECKED BY:	APPROVED BY:
		NAME	Mr.	Mr.	Mr.
		DESIGNATION			
		SIGNATURE			
		DATE:			
	NIPPON KOEI CO. LTD. CONSULTING ENGINEER, TOKYO, JAPAN				Fig : K3-1