第５章

プロジェクトの評価と提言

第５章　プロジェクトの評価と提言

5-1 妥当性にかかる実証・検証及び裨益効果

我が国の無償資金協力によって整備されたレーダー管制施設は、既設機器の老朽化のために管制システム全体としての信頼性が低下しており、円滑な航空管制業務に支障を及ぼす状態に陥っている。かかる状況は、トリブバン国際空港を利用する年間約 150 万人の航空旅客の安全が脅かされていることに他ならない。

本計画の実施によって、トリブバン国際空港におけるレーダー管制上の安全性は格段に向上する。計画の実施による効果を表 5-1 に示す。

表 5-1 計画の実施による効果 (1/2)

現状と問題点	本計画での対応策	計画の効果
1. 進入レーダー管制卓とそれら以外の管制卓とのインターフェースがとれず、管制官同士の一元的な音声通信が出来ない。	既設飛行場管制卓および既設航空路管制卓を更新する。それに伴い、管制卓に接続されている通信制御装置と VHF 対空無線機も更新する。	進入レーダー管制業務の支障となっていた、管制卓間同士の一元的な音声連絡不能状態が解消し、連絡可能となる。これにより、進入レーダー管制空域に隣接する空域間の航空機移管の確認が確実に行われるので、進入レーダー管制機能のより効果的発現が可能となる。
2. 進入レーダー管制卓に管制に必要な気象データ（風向・風速、視程、雲高等）が表示されない。	風向・風速計については離着陸地点の気象状態を正確に把握できるように、滑走路両端に新設する。また、視程および雲高に関しては機器自体を更新する。	進入レーダー管制に必要な気象データが入手可能となり、気象状況を確認した状態で、本来あるべき管制業務が行えるので、現進入レーダー管制施設の効果的発現が可能となる。
3. 電源関係 3-1 トリブバン国際空港の電源 ・空港内 400V 低圧母線の電圧変動が-9%～+1%（資料 6-6-1 参照)と大きく、管制システム機器に悪影響を及ぼしている。 （11kV 商用電源は NEA が空港を重要負荷と位置づけているため、11kV 2 回線受電であり信頼性は高い。）	空港内の 11kV 母線分岐し管制関連負荷専用変圧器を設ける。また専用非常用発電機を新設する。 <分岐対象負荷> ・レーダー運用ビル航空管制機器 ・レーダー運用ビル建築設備 ・既設管理棟航空管制機器 ・既設管理棟建築設備	既設変圧器は、空港ターミナルビル負荷および管制塔を含む管制関連電源の双方に供給しており、ターミナルビルの負荷変動の影響を直接受けている。 11kV で分岐することにより、専用変圧器を設けることにより、安定した電力を管制機器に送ることができ、空港管制機器の信頼性向上に大きく寄与する。
3-2 サノティミ訓練所の電源 ・商用電源の停電が年間 256 回、計 272 時間発生（資料 6-4 参照）している。訓練中の停電により、訓練の中断が頻発し、またコンピューターのハードディスクの損傷も発生している。	現在、非常用発電機および無停電電源装置が設置されていないこと原因であるので、非常用発電機の新設、および、発電機への切替時間を補償するための無停電電源装置を設置する。	停電による訓練の中断が無くなり連続的な訓練が可能。 コンピューターハードディスクの損傷の危険性も無くなる。

表 5-1 計画の実施による効果 (2/2)

現状と問題点	本計画での対応策	計画の効果
3-3 プルチョキ山の電源 ・商用電源の停電が年間 311 回、計 276 時間発生（資料 6-5 参照）している。電圧変動も −15.5%～+1.5%（資料 6-6-6 参照）と極めて大きい。 ・雷発生時、既設 VHF 対空無線器の損傷を恐れ、電源を人為的に切り、VHF が使用できない状況にある。	＜商用電源停電対策＞ 非常用発電機の更新、および、直流電源装置の更新により解決。 ＜電圧変動対策＞ 自動電圧調整器（AVR）の更新により解決。 ＜雷対策＞ 耐雷変圧器の新設、アレスター の更新により解決。	頻繁な停電、異常な電圧変動に対して、安定した電源が得られる。 プルチョキ山に雷発生時においても、連続的に VHF 対空無線機が使用可能。
4. 進入レーダー管制に必要な飛行計画情報が得られないことがある。	自動情報交換システム（AMSS）を更新。	航空管制に必要な飛行計画情報が空港内に自動配信され、この飛行計画に基づいたレーダー管制業務が可能となる。
5. レーダー管制方式の導入による空域の変化に伴う飛行場情報放送業務（ATIS）施設の整備がなされていなかったため、進入管制官の負荷が増大している。	ATIS 装置を更新することで、故障問題の解決と管制官の負荷軽減を図る。	進入レーダー管制官が ATIS 業務に携わる必要がなくなり、本来の管制業務に専念することができるので人為的ミスの発生が抑えられ、現進入レーダー管制機能のより効果的な発現が可能となる。

5-2 技術協力・他ドナーとの連携

我が国が実施している技術協力として、長期及び短期専門家の派遣が実施されており管制官及び管制技官の育成に携わっている。なお、現在、アジア開発銀行(ADB)からの援助としてトリブバン国際空港地上設備の改修が実施されているが、これはターミナルビル、格納庫、貨物施設等を対象としたものであり、航空管制機材改修を対象とする本計画と直接的な関係はない。

5-3 課題

本計画は、我が国の無償資金協力で導入した進入レーダー管制施設の機能の効果的発現が図られるとともに、前述のように、人命を担う航空の安全性向上に多大な効果が期待されるため、本計画が実施されることの意義は大であると判断される。しかしながら、本計画の円滑な実施・運営に当たっては、以下の事項が確保されることが必要である。

(1)本計画完了後に施設の運用を円滑に行うためには、維持管理に係わるネパール側の自助努力が必要不可欠である。

(2)本計画の実施に於いては、早急に信頼性のある管制業務を行う必要性から、その工程計画を最短期間で見込んでいる。そのためにはネパール側からの協力が、プロジェクトの実施期間中スムースに得られることが不可欠である。

(3)本計画はトリブバン国際空港の航空の安全性を向上させるものであるが、本計画の対象外としたトリブバン国際空港の航空保安無線施設(通信、航法、監視、電源等)にも老朽化等の問題が見受けられる。トリブバン国際空港の航空管制保安施設全体の信頼性を高めて更なる安全性の向上を図るためには、これら残りの部分の整備をネパール側の努力で実施される必要がある。

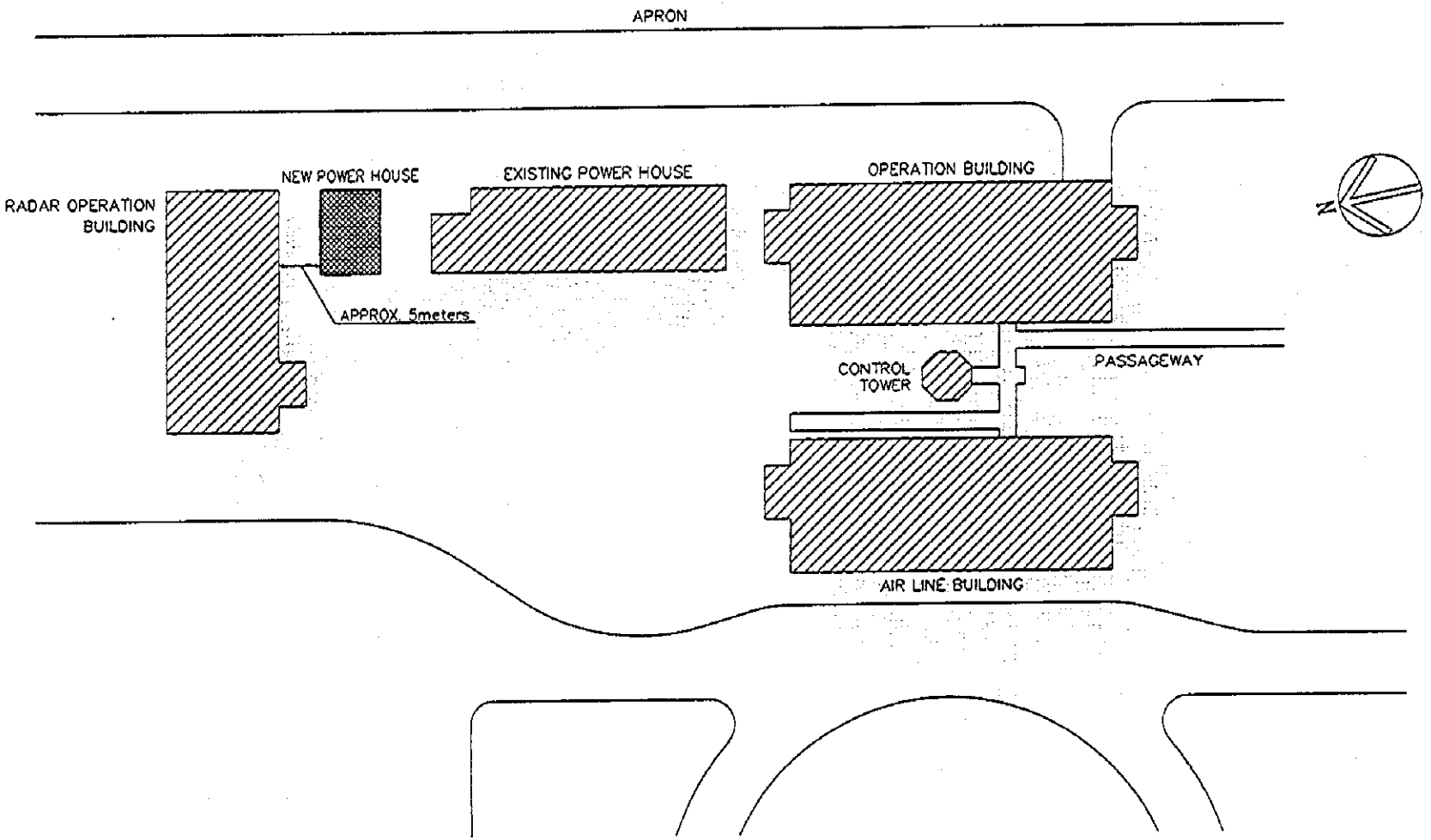
図面

図 面 リ ス ト

図面番号	図面名称	備考
TIA-1	TIA 全体配置図	TIA-A-01
TIA-2	VHF対空無線装置システムブロックダイアグラム(1/2)	TIA-A-02
TIA-3	VHF対空無線装置システムブロックダイアグラム(2/2)	TIA-A-03
TIA-4	AMSSシステムブロックダイアグラム	TIA-A-04
TIA-5	ATISシステムブロックダイアグラム	TIA-A-05
TIA-6	気象機器配置図	TIA-A-06
TIA-7	気象機器システムブロックダイアグラム	TIA-A-07
TIA-8	TIA VFR室平面図	TIA-A-08
TIA-9	TIA レーダー管理棟GF EQ室平面図	TIA-A-09
TIA-10	TIA レーダー管理棟1F 新ACC室平面図	TIA-A-10
TIA-11	TIA 管理棟1F 新EQ室平面図	TIA-A-11
TIA-12	TIA 既設11kV開閉器室平面図	TIA-A-12
TIA-13	TIA 新設電気棟配置図	TIA-A-13
TIA-14	TIA アンテナ取付図(1/2)	TIA-A-14
TIA-15	TIA アンテナ取付図(2/2)	TIA-A-15
TIA-16	TIA 11kV分岐ブロックダイアグラム	TIA-A-16
TIA-17	TIA 電源系統図	TIA-A-17
TIA-18	TIA 単線結線図	TIA-A-18
TIA-19	TIA 新設電気棟 平面、屋根伏図	TIA-C-01
TIA-20	TIA 新設電気棟 立面図	TIA-C-02
TIA-21	TIA 新設電気棟 平面詳細図	TIA-C-03
TIA-22	TIA 新設電気棟 断面詳細図	TIA-C-04
TIA-23	TIA 新設電気棟 展開図	TIA-C-05
TIA-24	TIA 新設電気棟 建具表	TIA-C-06
TIA-25	TIA 新設電気棟 詳細図1	TIA-C-07
TIA-26	TIA 新設電気棟 詳細図2	TIA-C-08
TIA-27	TIA 新設電気棟 詳細図3	TIA-C-09
TIA-28	TIA 新設電気棟 基礎伏図	TIA-C-10
TIA-29	TIA 新設電気棟 屋根構造図	TIA-C-11
TIA-30	TIA 新設電気棟 基礎配筋図	TIA-C-12
TIA-31	TIA 新設電気棟 構造詳細図	TIA-C-13
TIA-32	TIA 新設電気棟 梁詳細図	TIA-C-14

図面番号	図面名称	備考
SANO-1	サノティミ訓練所 全体配置図	SANO-A-01
SANO-2	サノティミ訓練所 平面図(1/2)	SANO-A-02
SANO-3	サノティミ訓練所 平面図(2/2)	SANO-A-03
SANO-4	サノティミ訓練所 電源系統図	SANO-A-04
SANO-5	サノティミ訓練所 単線結線図	SANO-A-05
SANO-6	サノティミ訓練所 新設発電機小屋 平面、立面図	SANO-C-01
SANO-7	サノティミ訓練所 新設発電機小屋 基礎伏図	SANO-C-02
SANO-8	サノティミ訓練所 新設発電機小屋 基礎配筋図	SANO-C-03
PHU-1	プルチョキ山 全体配置図	PHU-A-01
PHU-2	プルチョキ山 機器室平面図	PHU-A-02
PHU-3	プルチョキ山 電気室平面図	PHU-A-03
PHU-4	プルチョキ山 アンテナ取付図	PHU-A-04
PHU-5	プルチョキ山 電源系統図	PHU-A-05
PHU-6	プルチョキ山 単線結線図	PHU-A-06

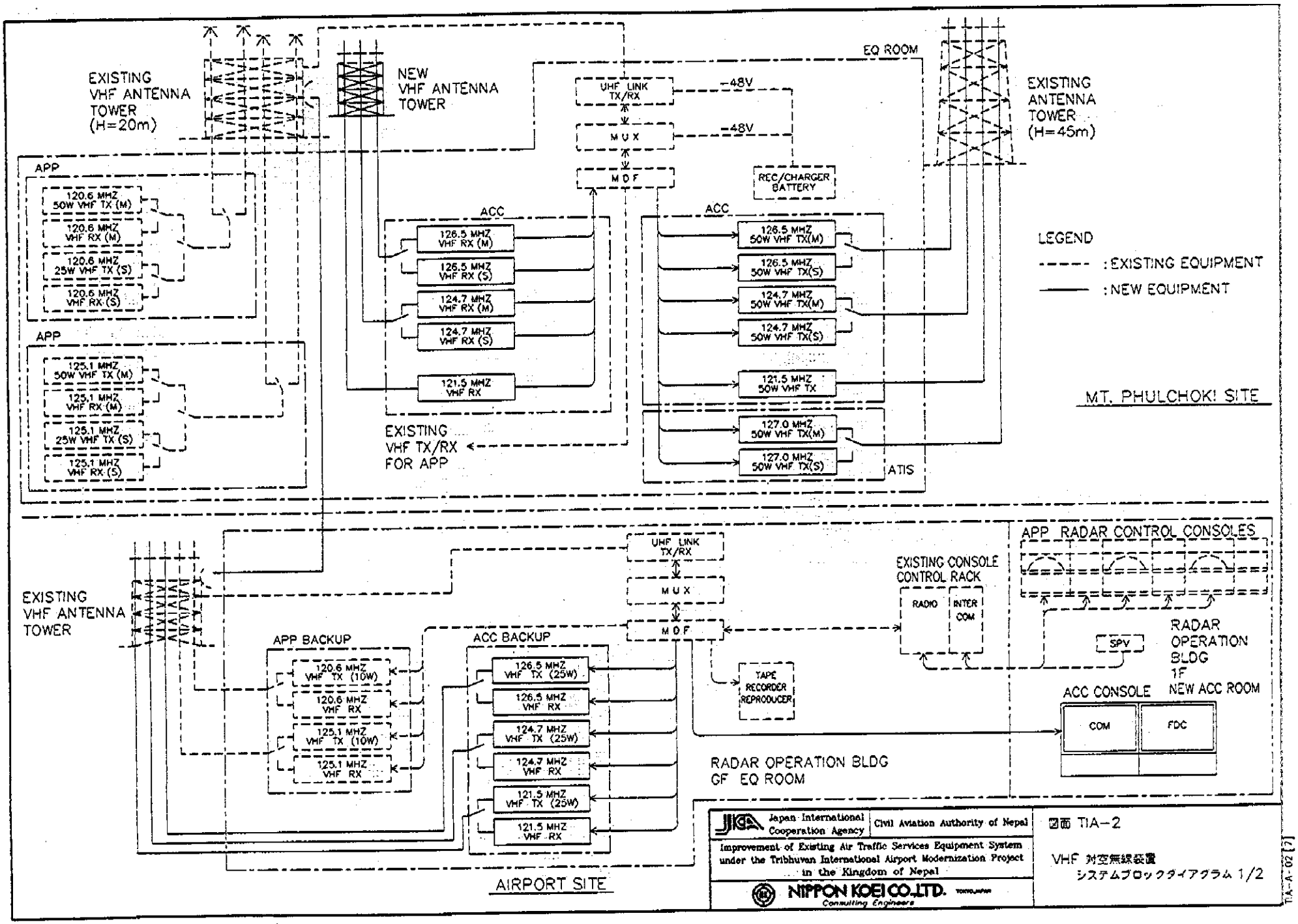
注)建物の階数表示は英国式で示している



TIA OVERALL LAYOUT DRAWING

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA－1
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 全体配置図
NIPPON KOEI CO.,LTD. Consulting Engineers		

TIA-A-01 [4]



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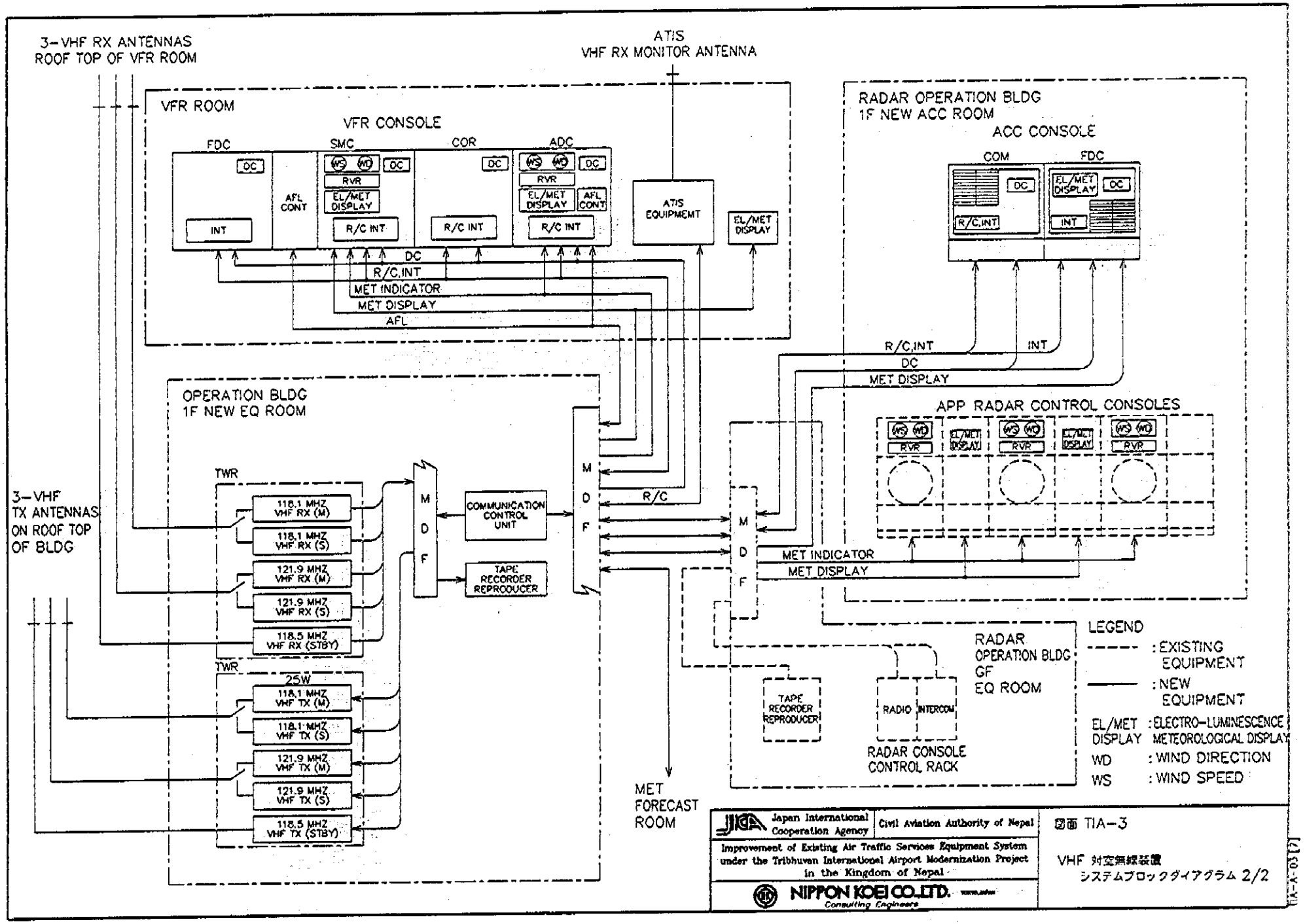
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal

NIPPON KOEI CO.,LTD. Consulting Engineers

図面 TIA-2

VHF 対空無線装置
システムブロックダイアグラム 1/2

TIA-A-02 [7]



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Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal

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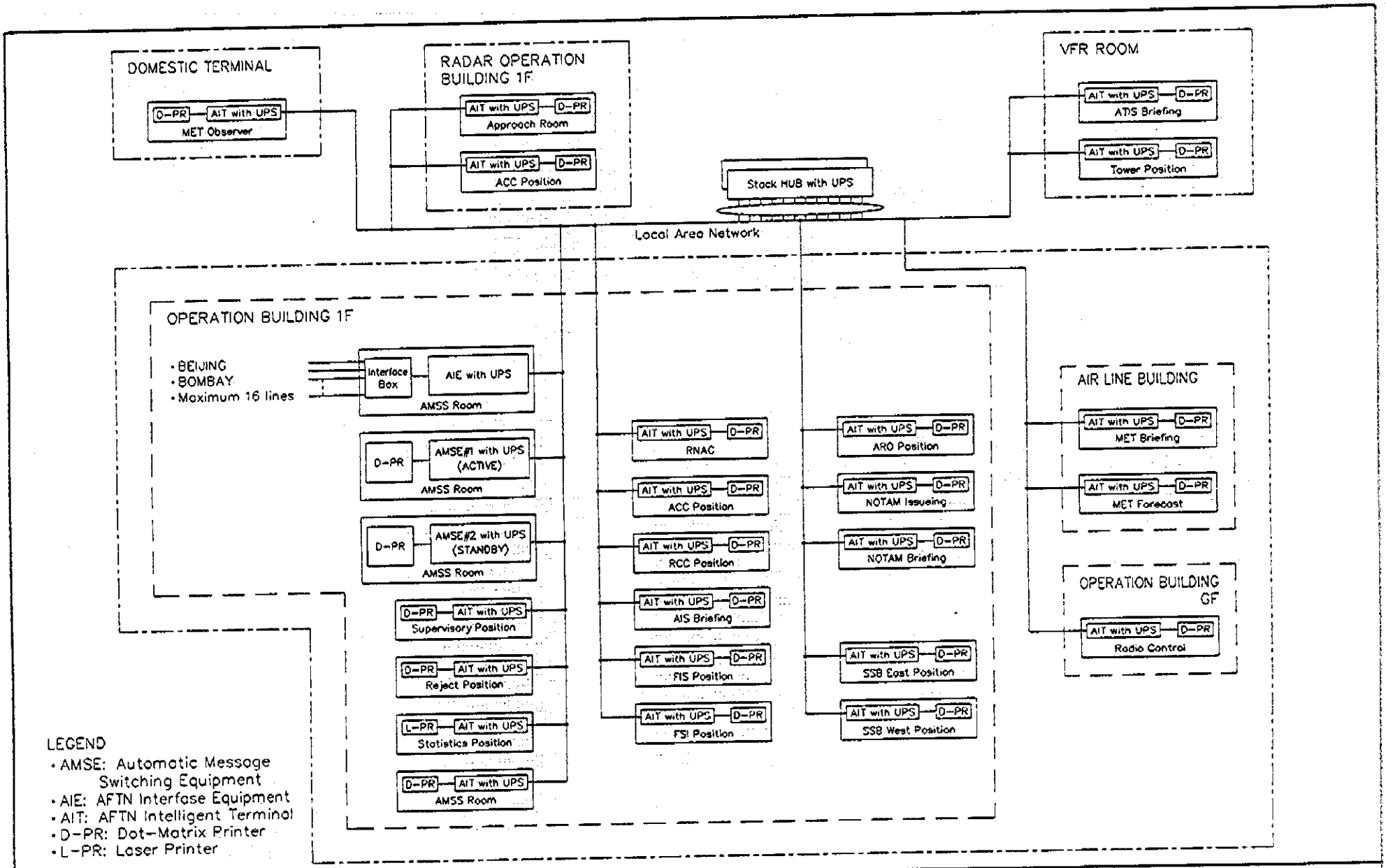
図面 TIA-3

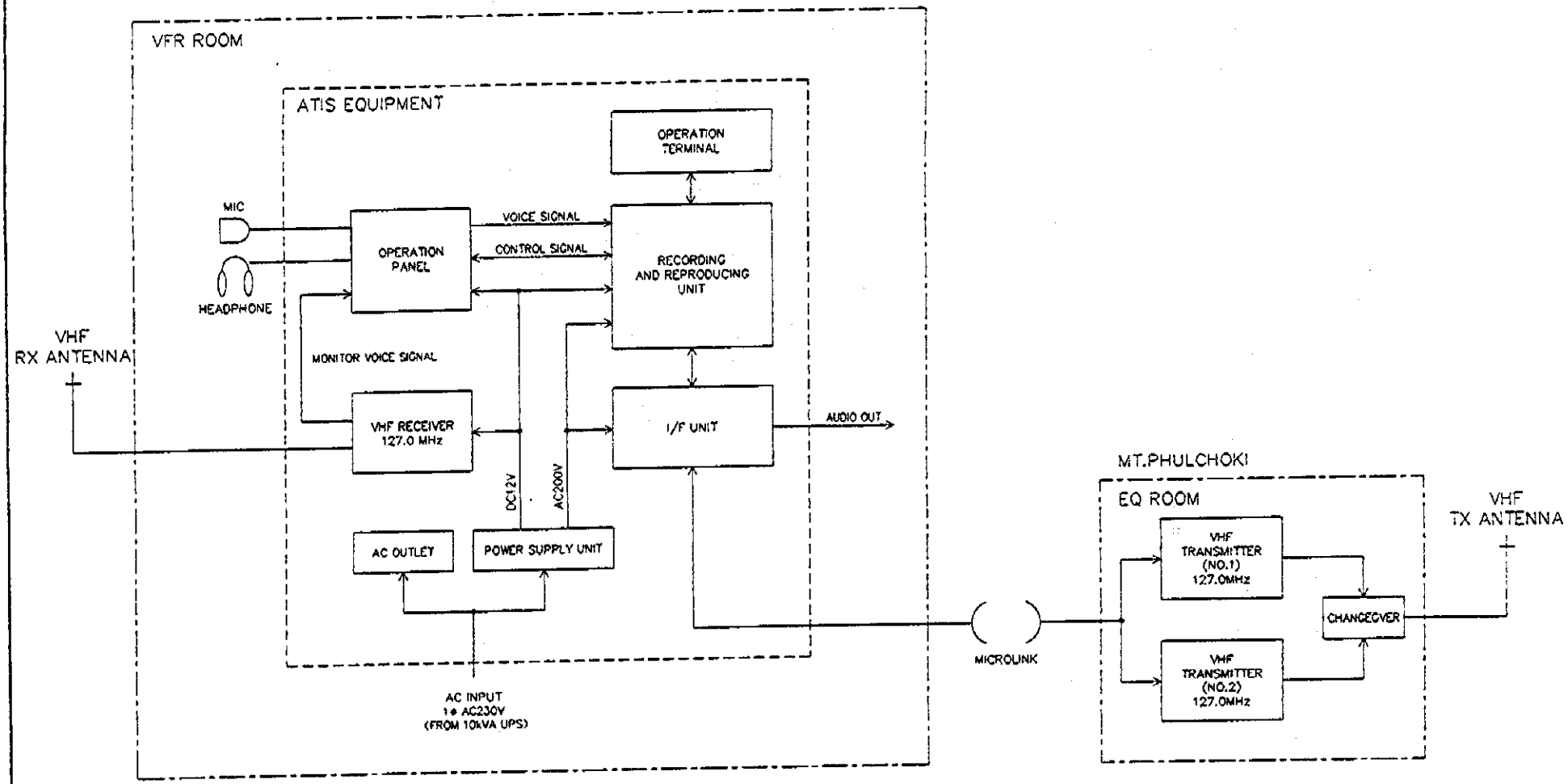
VHF 対空無線装置
システムブロックダイアグラム 2/2

[1]-X-03



SYSTEM BLOCK DIAGARAM OF AMSS

JICA Japan International Cooperation Agency / Civil Aviation Authority of Nepal	図面 TIA-4
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal	AMSS システムブロックダイアグラム
NIPPON KOEI CO.,LTD. Consulting Engineers	TIA-A-04 [3]

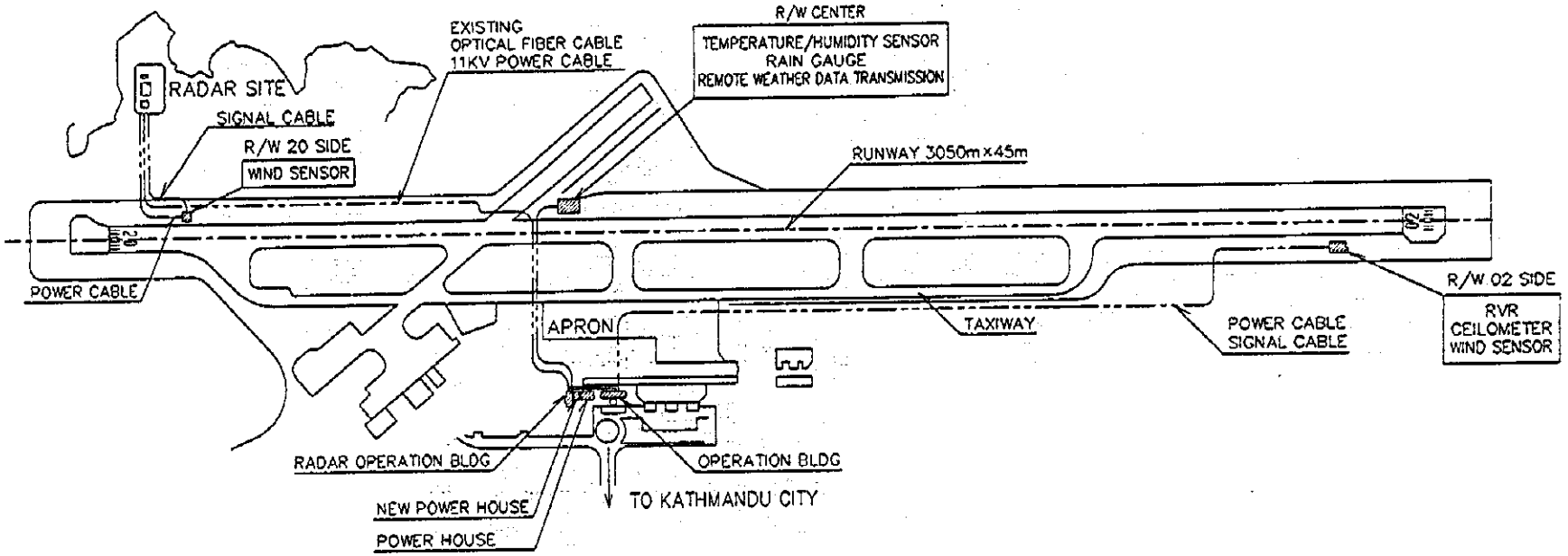


SYSTEM BLOCK DIAGRAM OF ATIS SYSTEM

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-5
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		ATIS システムブロックダイアグラム
NIPPON KOEI CO.,LTD. Consulting Engineers		

TIA-A-05(1)

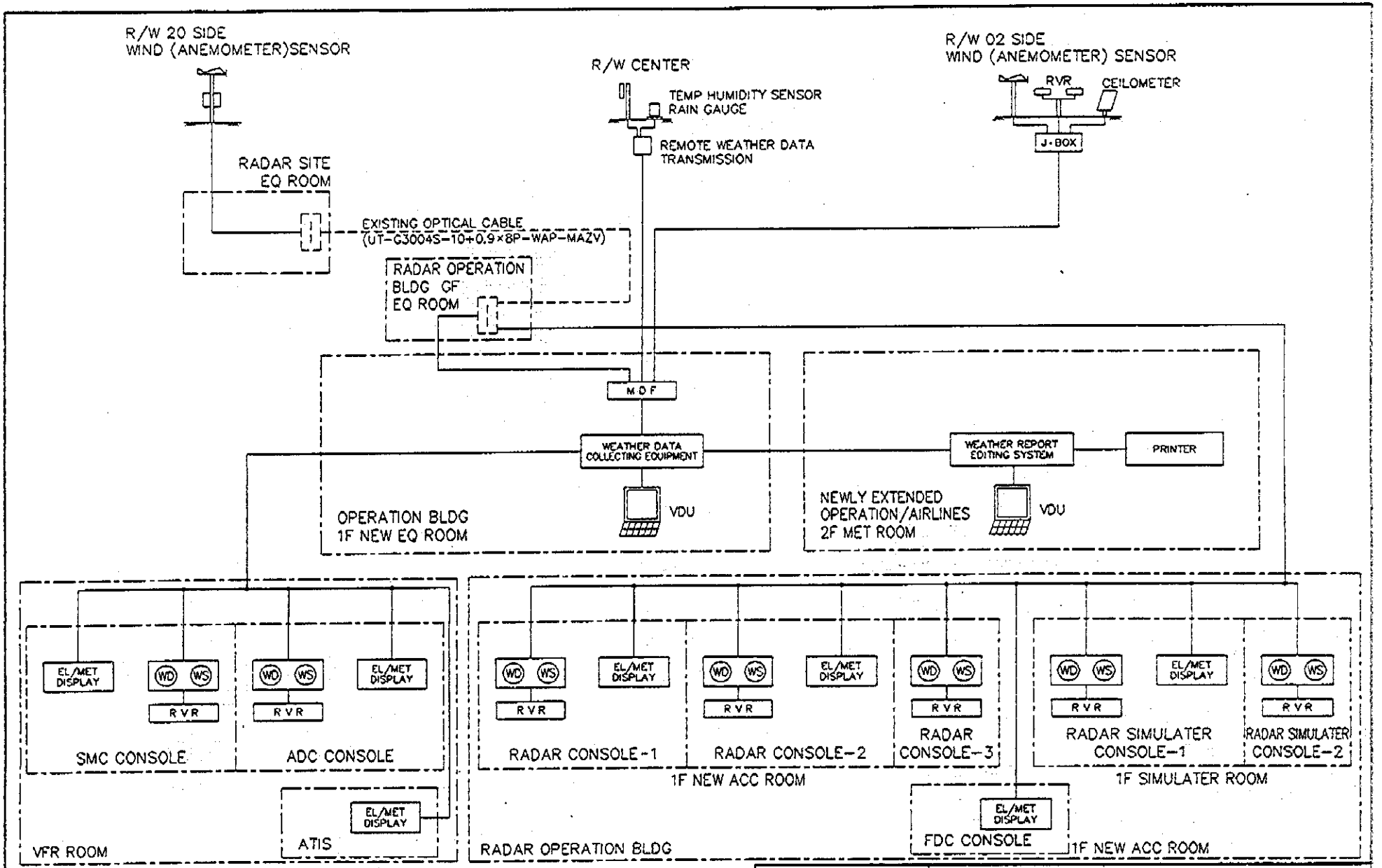
NOTE:
POWER TO THE WIND SENSOR AT R/W 20 SIDE IS PROVIDED FROM THE RADAR SITE.
DATA DETECTED FROM THE WIND SENSOR AT R/W 20 SIDE IS TRANSMITTED TO THE RADAR SITE THROUGH NEW SIGNAL CABLE.
THEN THE DATA IS TRANSMITTED TO THE RADAR OPERATION BUILDING THROUGH THE EXISTING OPTICAL FIBER CABLE.



LAYOUT DRAWING OF METEOROLOGICAL FACILITY

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA−6
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		気象機器配置図
NIPPON KOEI CO.,LTD. Consulting Engineers		

TIA-A-06 [4]

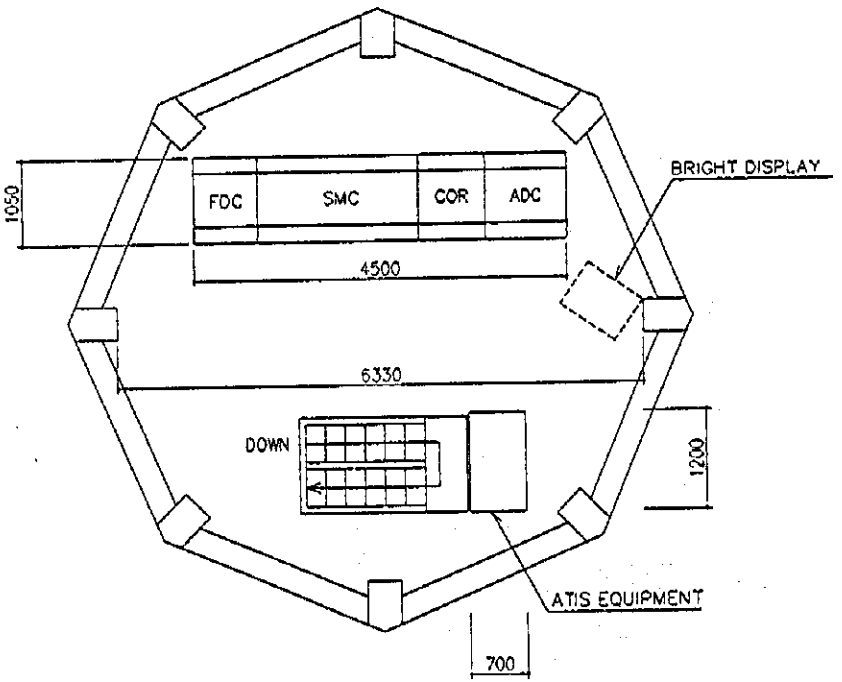


LEGEND

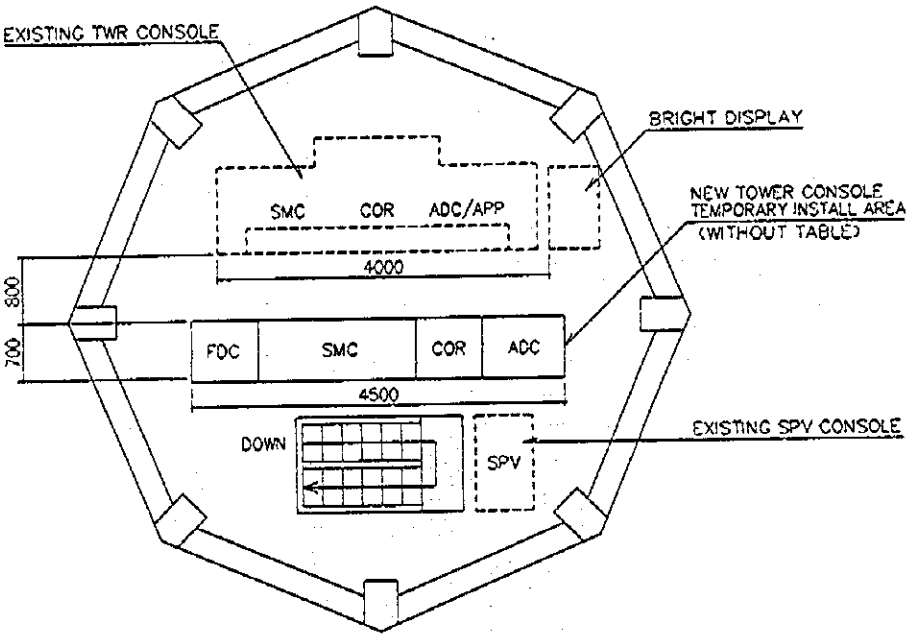
-----	: EXISTING EQUIPMENT	WD	: WIND DIRECTION
———	: NEW EQUIPMENT	WS	: WIND SPEED
VDU	: VISUAL DISPLAY UNIT	EL/MET DISPLAY	: ELECTRO-LUMINESCENCE METEOROLOGICAL DISPLAY

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-7
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		気象機器システムブロックダイアグラム
NIPPON KOEI CO.,LTD. Consulting Engineers		

TIA-A-07[3]



FIX INSTALLATION



TEMPORARY INSTALLATION

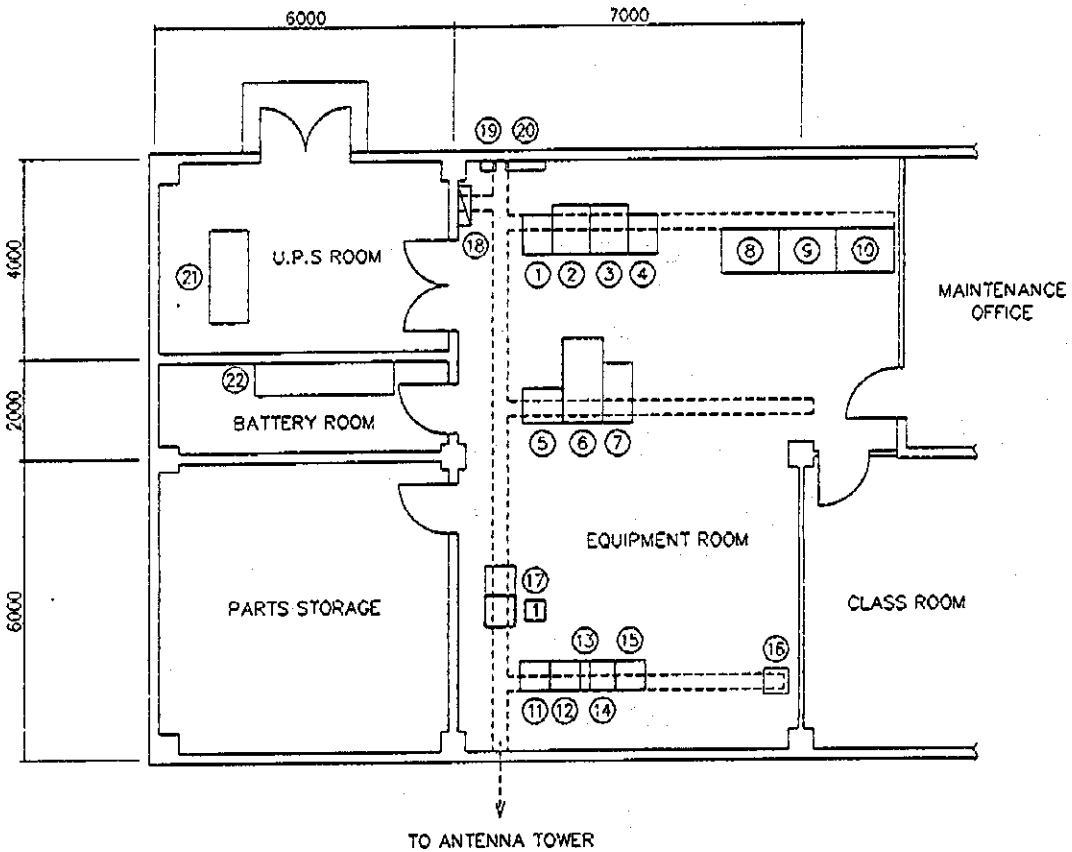
LEGEND

------- : EXISTING EQUIPMENT

——— : NEW EQUIPMENT

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-8
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA VFR室 平面図
NIPPON KOEI CO.,LTD. Consulting Engineers		

TIA-A-08 [7]



NO.	NEW EQUIPMENT
1	VHF TRANSCEIVER RACK (FOR ACC BACKUP)

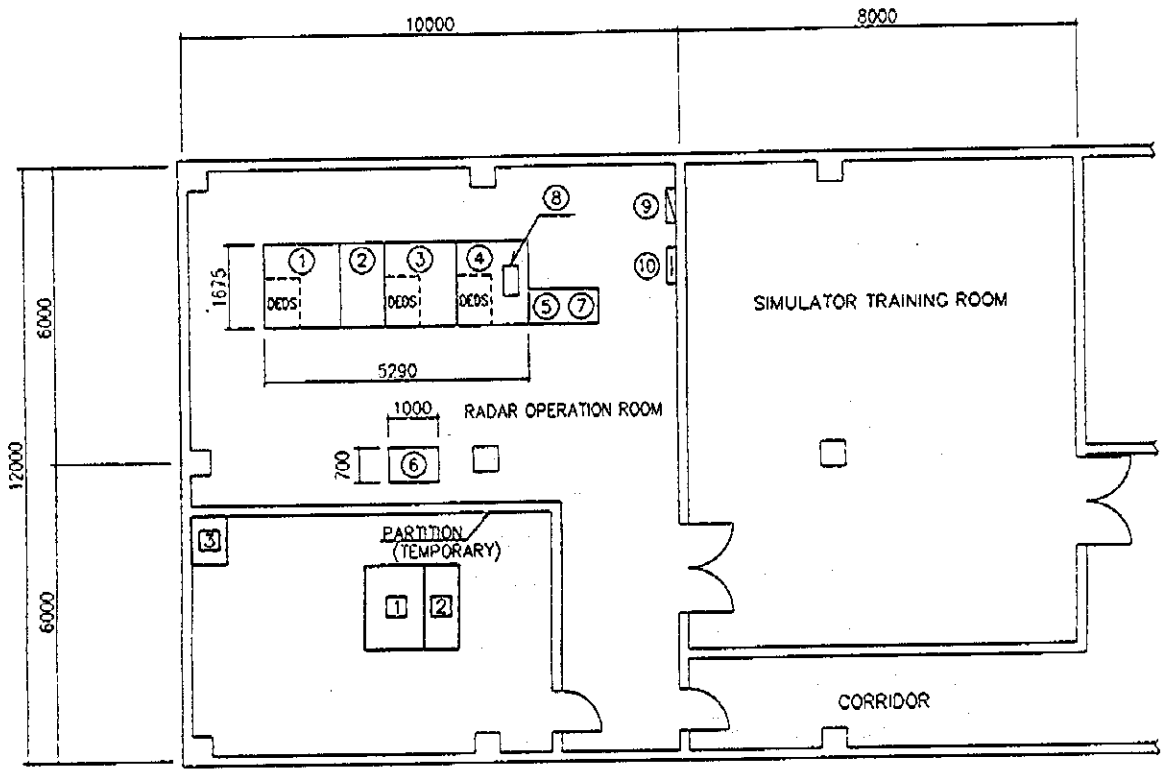
NO.	EXISTING EQUIPMENT
①	SYSTEM MONITOR AND SWITCHES
②	TRACK CONTROL UNIT
③	CENTRAL PROCESSING SUBSYSTEM
④	DISPLAY CONTROL AND TARGET VIDEO GENERATOR
⑤	REMOTE CONTROL EQUIPMENT
⑥	DATA ENTRY AND DISPLAY SUBSYSTEM
⑦	DIGITAL SCAN CONVERTER
⑧	SYSTEM CONSOLE NO.1
⑨	SYSTEM CONSOLE NO.2
⑩	PRINTER
⑪	COMMUNICATION CONTROL RACK B
⑫	COMMUNICATION CONTROL RACK A
⑬	MULTIPLEX
⑭	UHF RADIO RACK
⑮	INTERCOM/REMOTE CONT RACK
⑯	MDF
⑰	VOICE LOGGING RECORDER
⑱	RADAR EQUIPMENT ROOM P.D.B
⑲	IDF
⑳	TERMINAL BOX
㉑	UPS 30kVA
㉒	BATTERY

LAYOUT DRAWING OF EQ ROOM

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-9
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA レーダー管理棟 GF EQ室 平面図
NIPPON KOEI CO.,LTD. Consulting Engineers		TIA-A-09 [4]

NO.	NEW EQUIPMENT
1	FDC CONSOLE
2	COM CONSOLE
3	AIR CONDITIONER

NO.	EXISTING EQUIPMENT
①	RADAR CONTROL CONSOLE/DEDS NO.1
②	COORDINATOR CONSOLE
③	RADAR CONTROL CONSOLE/DEDS NO.2
④	RADAR CONTROL CONSOLE/DEDS NO.3
⑤	VDU/PRINTER
⑥	DESK
⑦	SVC CONSOLE
⑧	VHF TRANSCEIVER (DUAL)
⑨	RADAR OPERATION ROOM P.D.B
⑩	TERMINAL BOARD



LAYOUT DRAWING OF NEW ACC ROOM

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Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal

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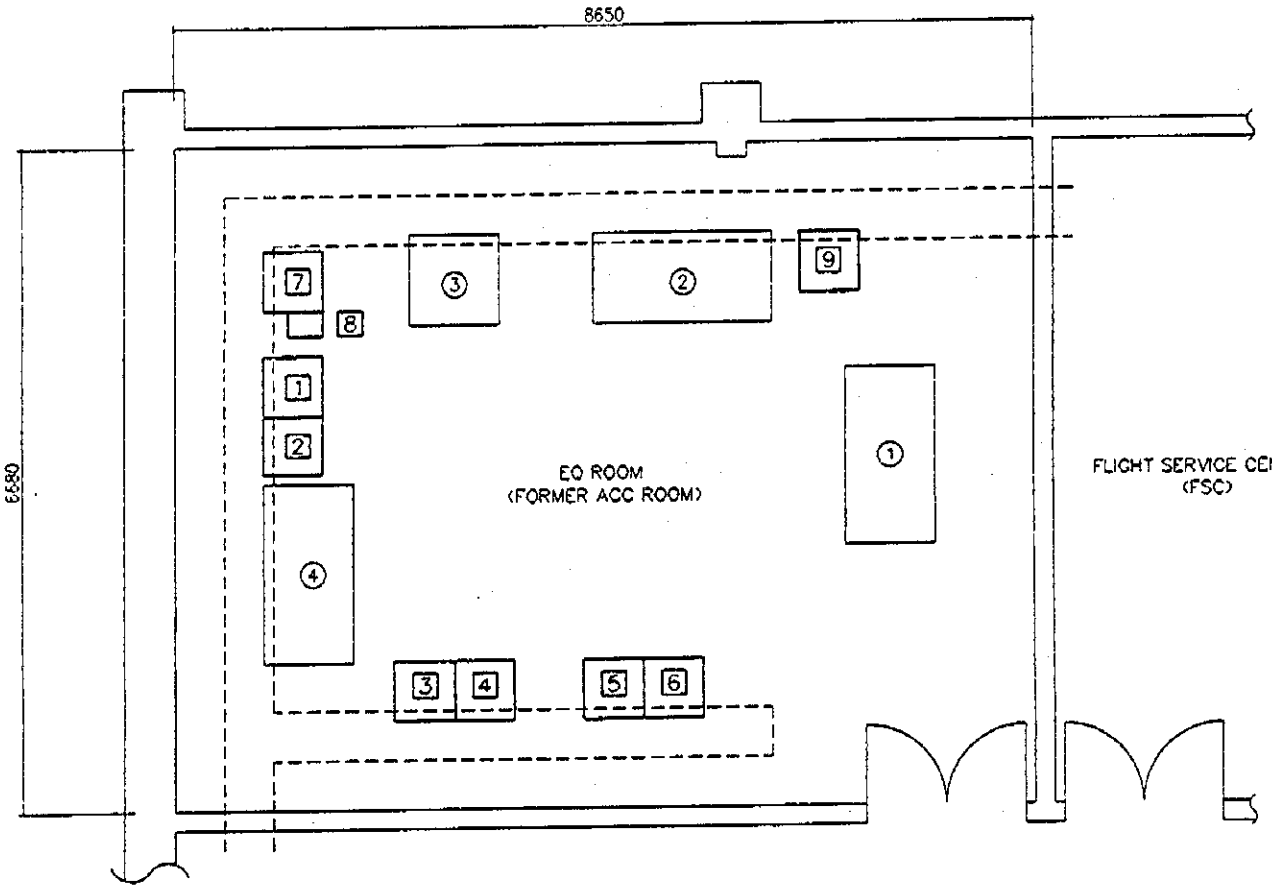
図面 TIA-10

TIA レーダー管理棟 1F
新ACC室 平面図

(5)01-24-TIA



NO.	NEW EQUIPMENT
1	MDF
2	TAPE RECORDER
3	VHF TX RACK (FOR TWR)
4	VHF RX RACK (FOR TWR)
5	RADIO CONTROL RACK (CCU)
6	INTERCOM CONTROL RACK (CCU)
7	MET DATA COLLECTING RACK
8	MET VDU
9	UPS 10kVA

NO.	EXISTING EQUIPMENT LIST
①	SPV CONSOLE
②	ACC (WEST) CONSOLE
③	FDC CONSOLE
④	ACC (EAST) CONSOLE

LAYOUT DRAWING OF NEW EQ ROOM

JICA Japan International Cooperation Agency | Civil Aviation Authority of Nepal

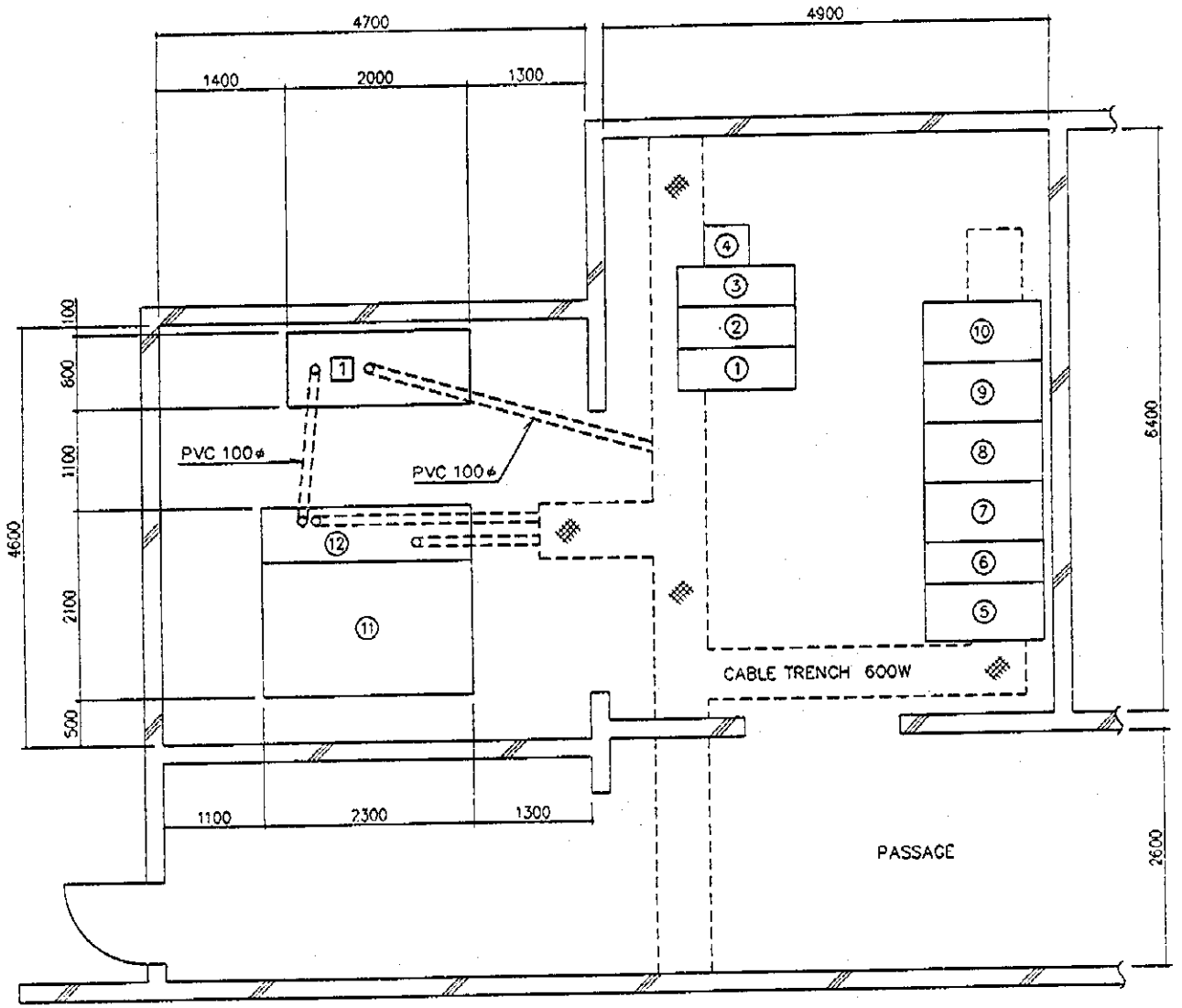
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal

NIPPON KOEI CO.,LTD. Consulting Engineers

図面 TIA-11

TIA 管理棟 1F
新EQ室 平面図

TIA-A-11 (S)



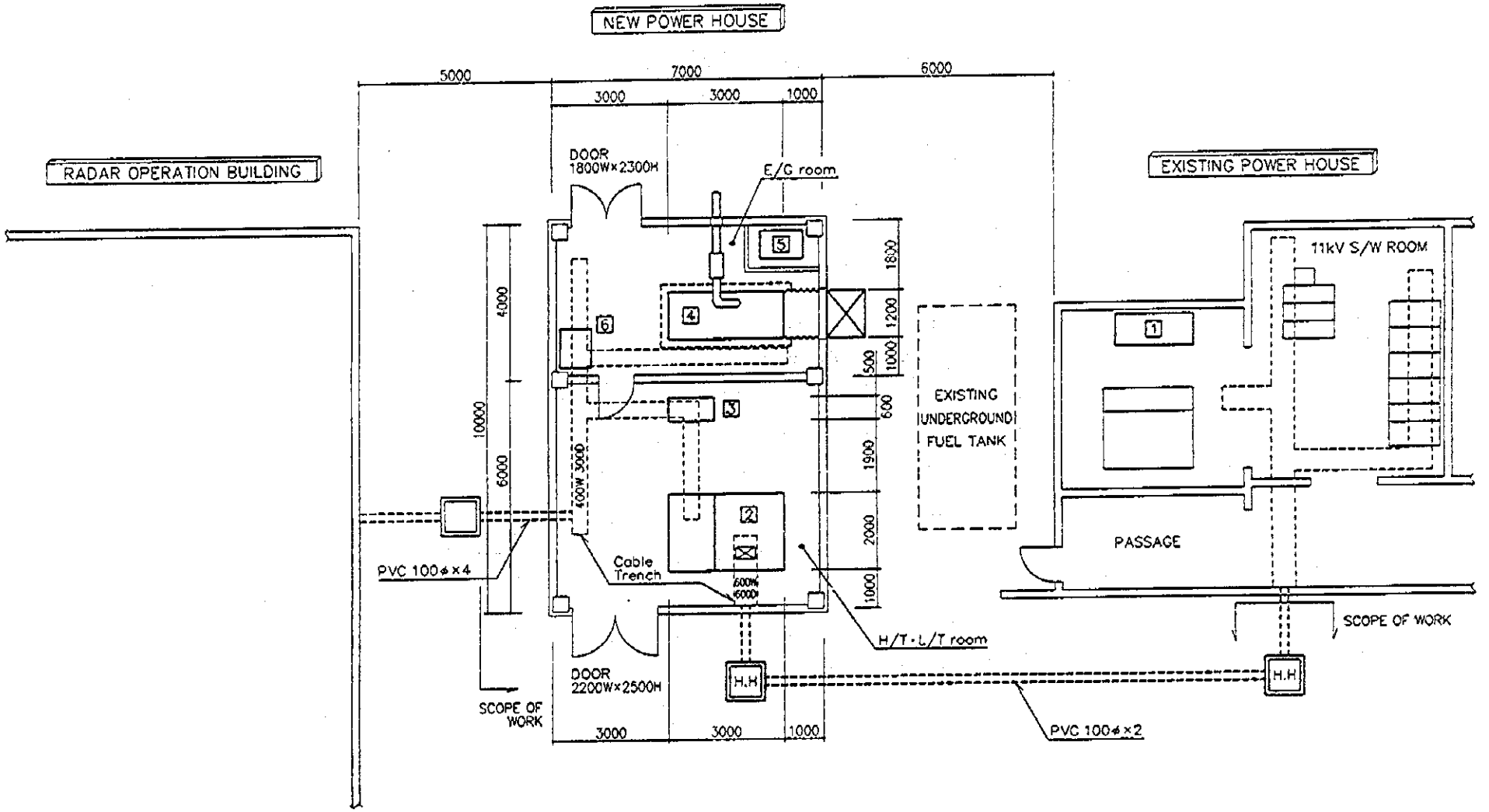
NO.	NEW EQUIPMENT
1	11kV VCB PANEL TO NEW POWER HOUSE

NO.	EXISTING EQUIPMENT LIST
①	11kV OCB PANEL INCOMING
②	11kV OCB PANEL INCOMING
③	11kV OCB PANEL OUTGOING
④	METERING PANEL
⑤	11kV LBS PANEL TO REGURATOR
⑥	CABLING PANEL
⑦	11kV LBS PANEL BY PASS
⑧	11kV LBS PANEL FROM REGURATOR
⑨	11kV LBS PANEL TO Tr NO.2
⑩	11kV LBS PANEL TO Tr NO.1
⑪	11kV GCB PANEL TO RADAR SITE
⑫	CABLING PANEL

LAYOUT DRAWING OF 11kV CUBICLE ROOM

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-12
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 既設11kV開閉器室平面図
NIPPON KOEI CO.,LTD. Consulting Engineers		

TIA-A-12 (5)



NO.	NEW EQUIPMENT
1	11kV VCB PANEL
2	11kV Tr. PANEL (300kVA)
3	LOW VOLTAGE PANEL
4	EMERGENCY GENERATOR (250kVA)
5	DAILY SERVICE TANK 400ℓ
6	E/G CONTROL PANEL

LAYOUT DRAWING OF NEW POWER HOUSE

JICA Japan International Cooperation Agency | Civil Aviation Authority of Nepal

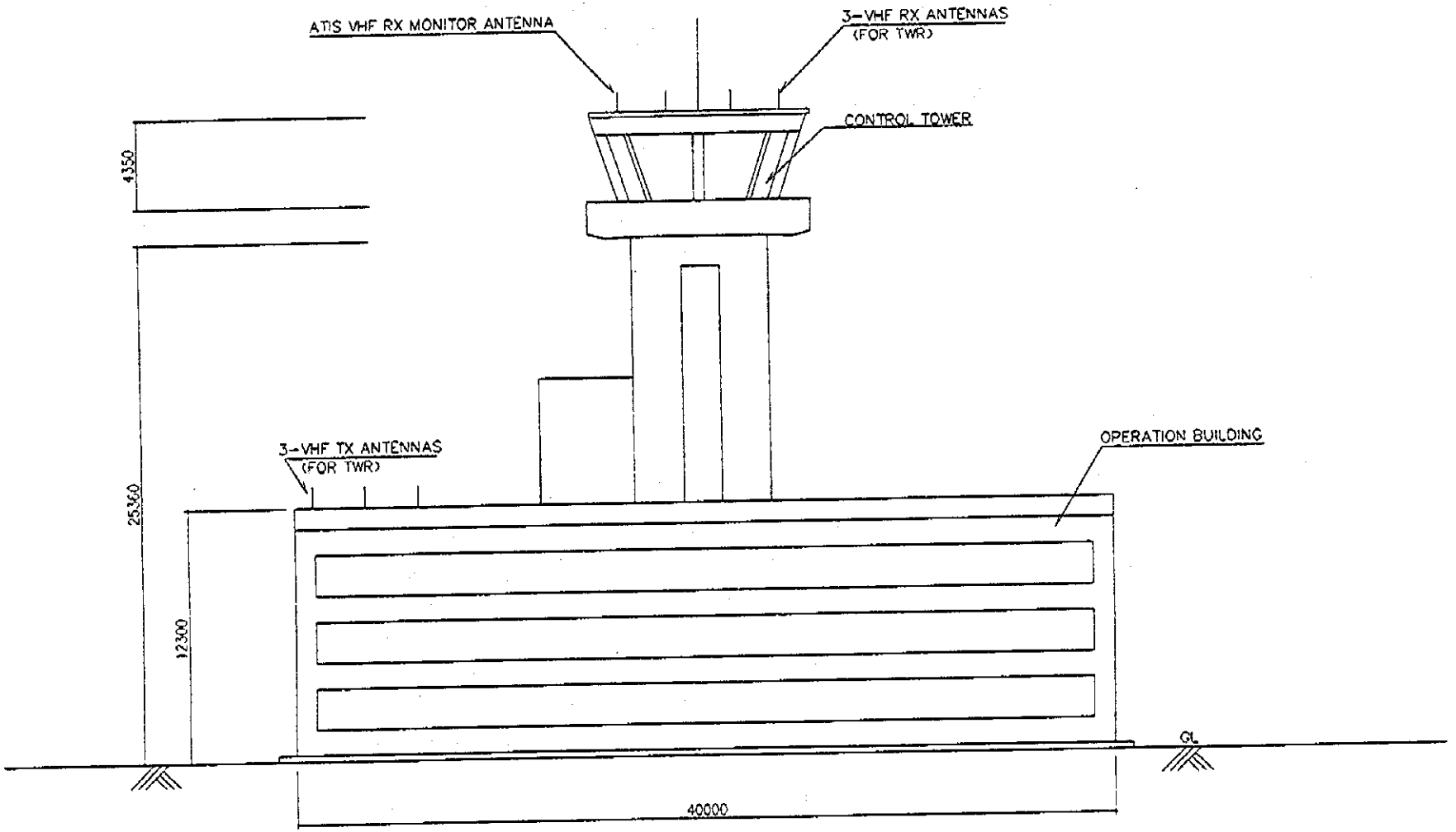
Improvement of Existing Air Traffic Services Equipment System under the Tribhuwan International Airport Modernization Project in the Kingdom of Nepal

NIPPON KOEI CO.,LTD. Consulting Engineers

図面 TIA-13

TIA 新設電気棟 配置図

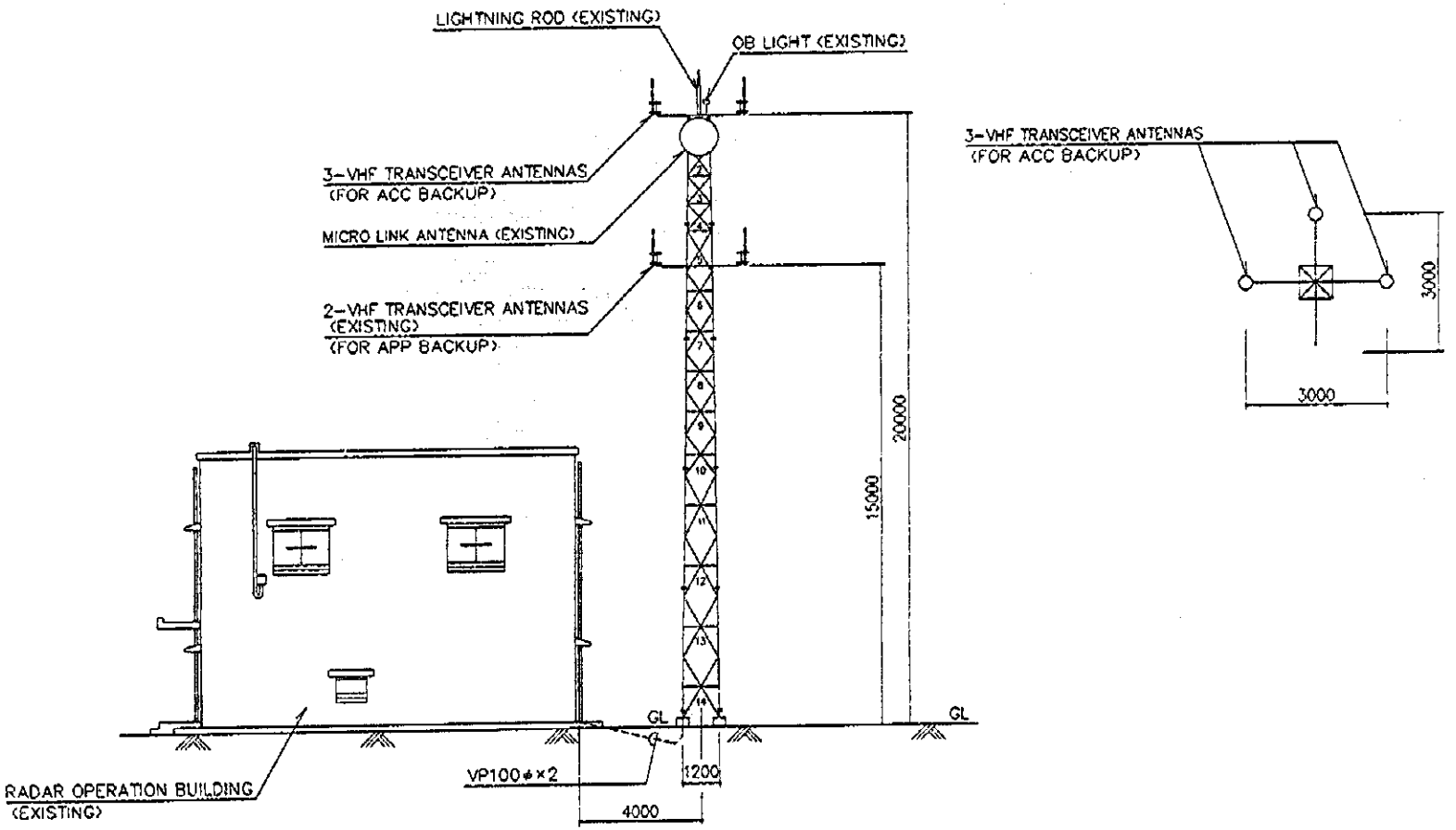
TIA-A-13(5)



MOUNTING DRAWING OF ANTENNAS (1/2)

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-14
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA アンテナ取付図 1/2
NIPPON KOEI CO.,LTD. Consulting Engineers		

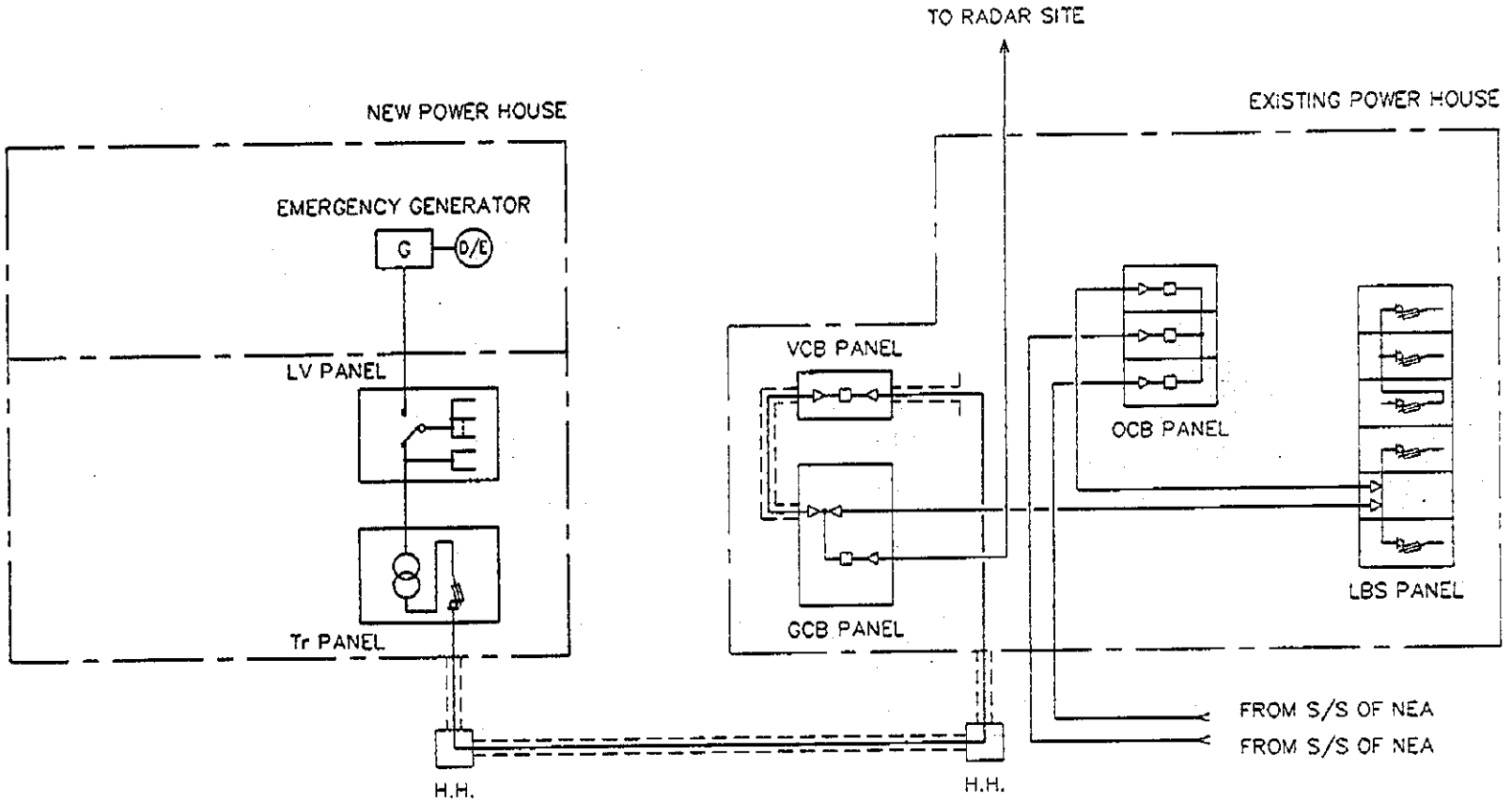
TIA-A-14 (5)



MOUNTING DRAWING OF ANTENNAS (2/2)

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-15
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA アンテナ取付図 2/2
NIPPON KOEI CO.,LTD. Consulting Engineers		

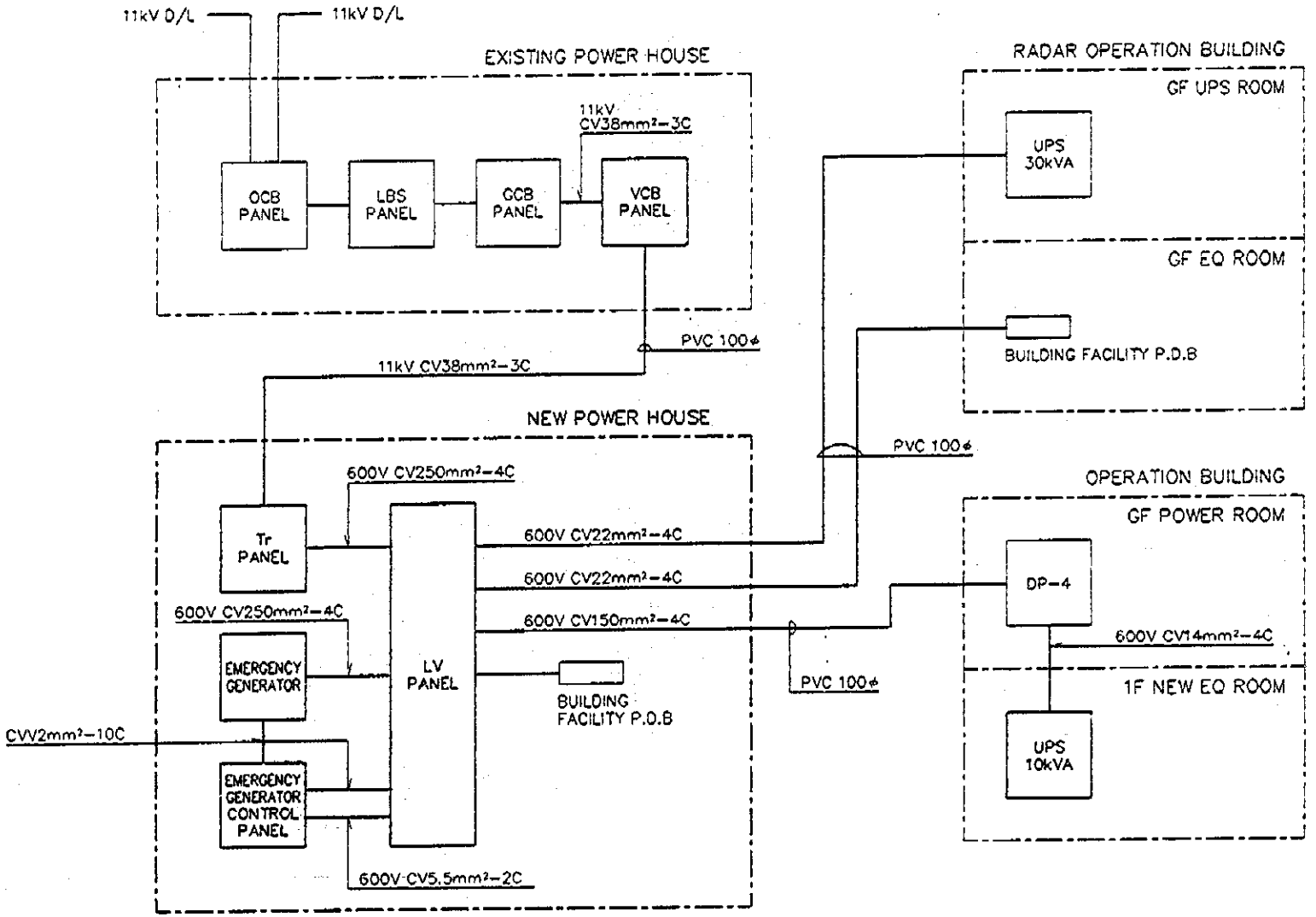
TIA-A-15(5)



BLOCK DIAGRAM OF 11kV T-BRANCH

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-16
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 11kV 分岐ブロックダイアグラム
NIPPON KOEI CO.,LTD. Consulting Engineers		

TIA-A-16 (5)



SYSTEM DIAGRAM OF POWER SUPPLY

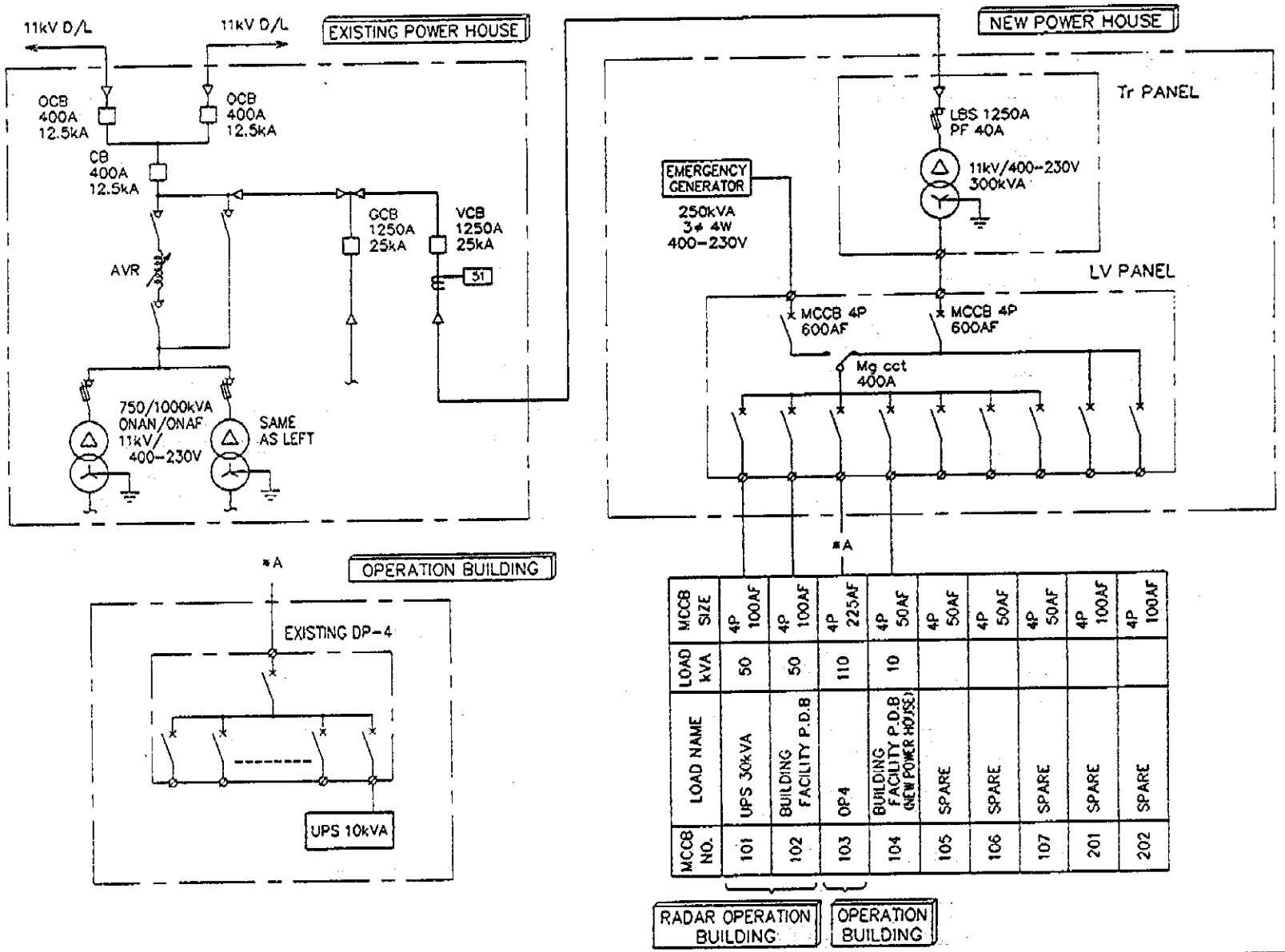
LEGEND

——— : EXISTING EQUIPMENT

——— : NEW EQUIPMENT

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-17
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 電源系統図
NIPPON KOEI CO.,LTD. Consulting Engineers		

TIA-A-17 [3]



MCCB NO.	LOAD NAME	LOAD kVA	MCCB SIZE
101	UPS 30kVA	50	4P 100AF
102	BUILDING FACILITY P.D.B	50	4P 100AF
103	OP4	110	4P 225AF
104	BUILDING FACILITY P.D.B (NEW POWER HOUSE)	10	4P 50AF
105	SPARE		4P 50AF
106	SPARE		4P 50AF
107	SPARE		4P 50AF
201	SPARE		4P 100AF
202	SPARE		4P 100AF

SINGLE LINE DIAGRAM

JICA Japan International Cooperation Agency

Civil Aviation Authority of Nepal

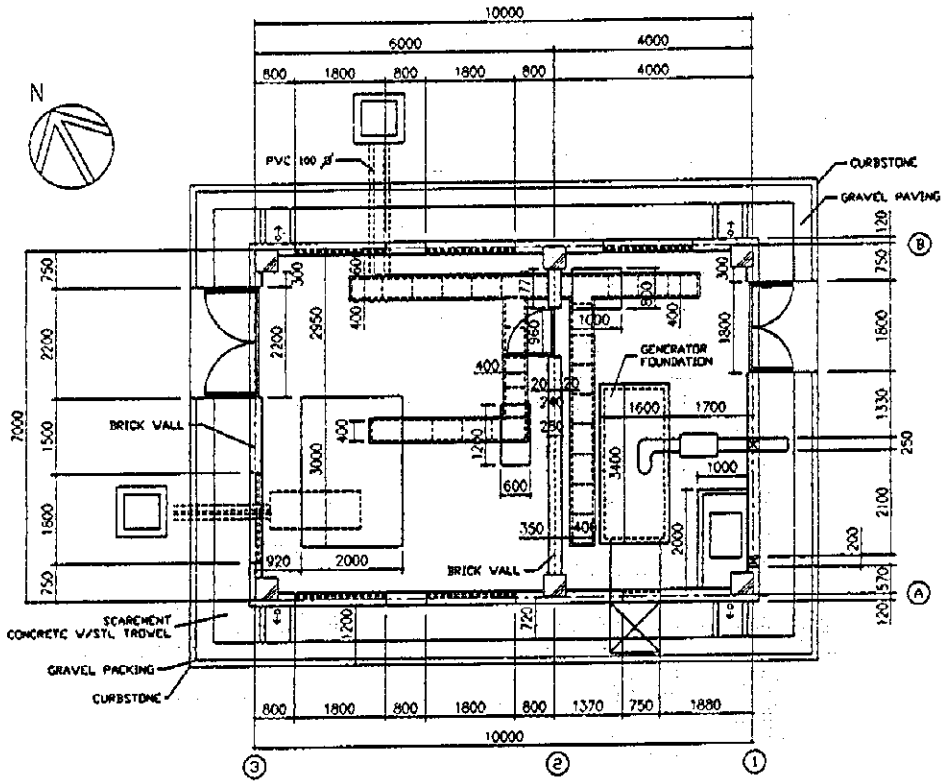
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal

NIPPON KOEI CO.,LTD. Consulting Engineers

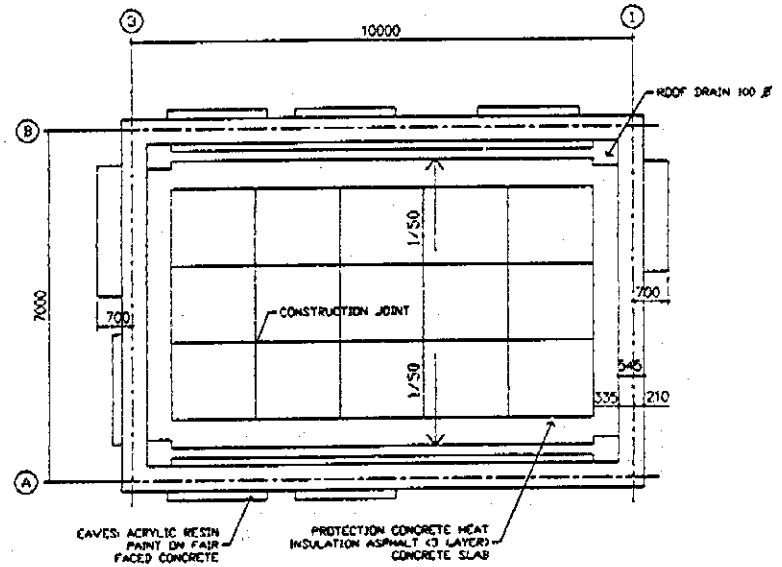
図面 TIA-18

T I A 単線結線図

11A-A-18 (5)



PLAN

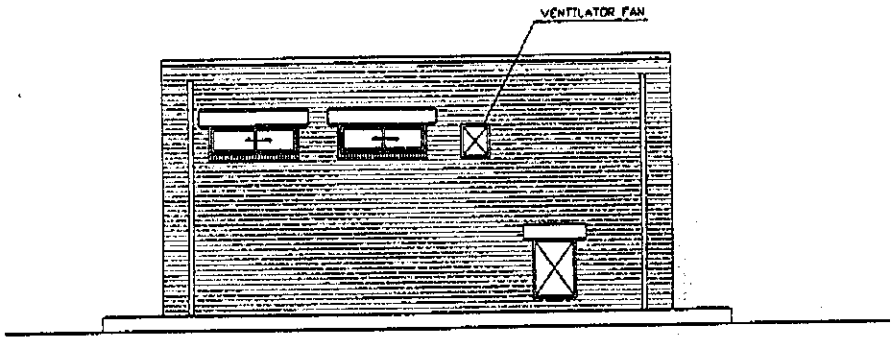


ROOF PLAN

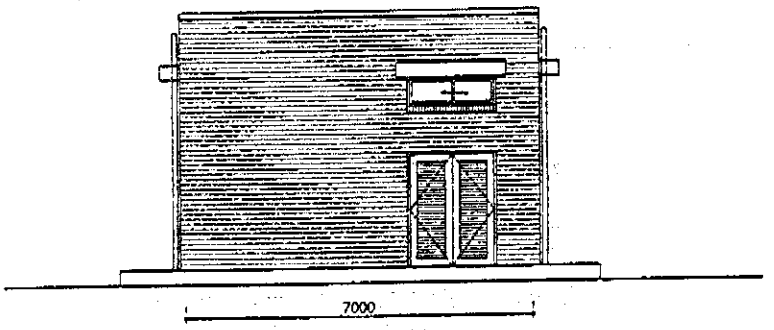
PLAN AND ROOF PLAN

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA−19
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 新設電気棟 平面,屋根伏図
NIPPON KOEI CO.,LTD. Consulting Engineers		

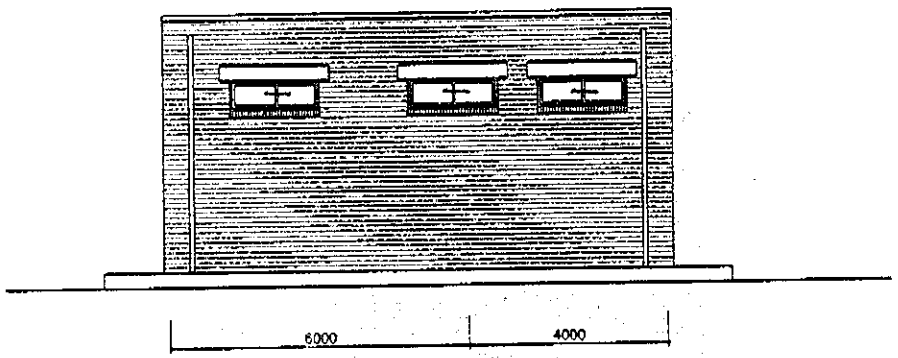
[11-3-14]



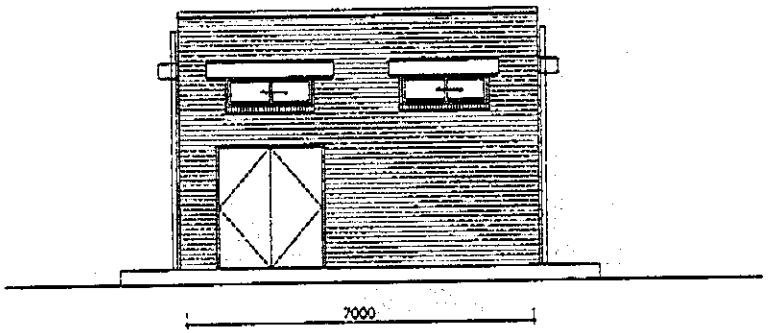
SOUTH ELEVATION



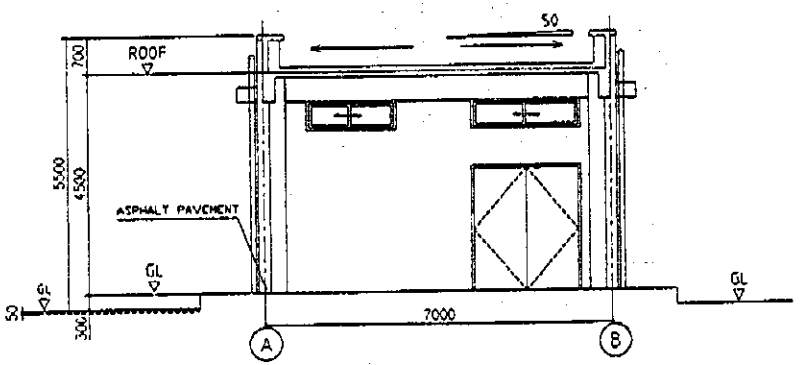
EAST ELEVATION



NORTH ELEVATION



WEST ELEVATION



SECTION

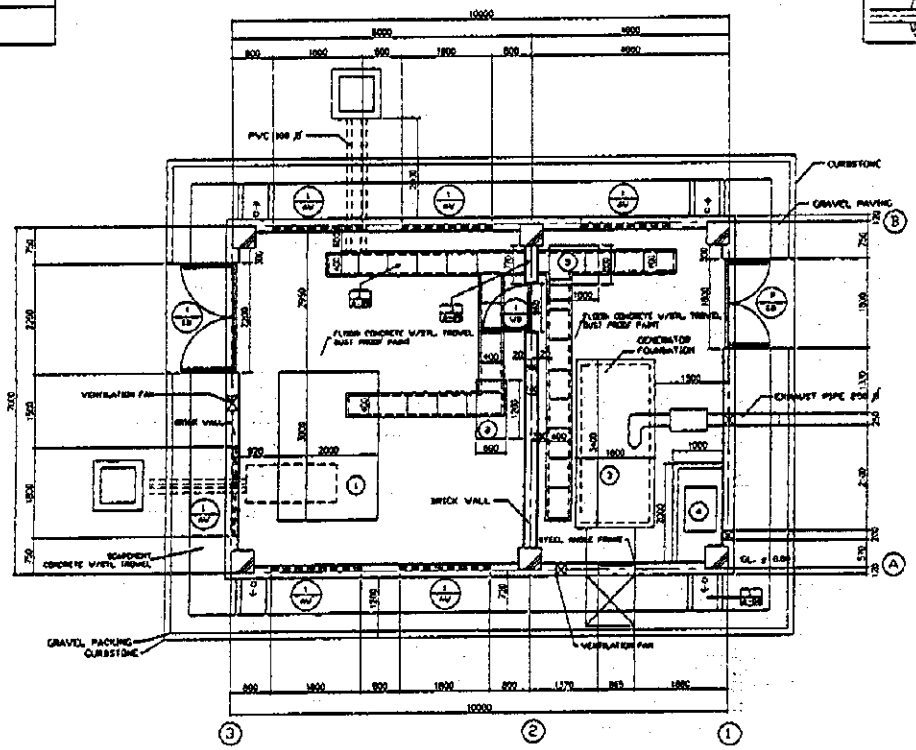
ELEVATIONS AND SECTION

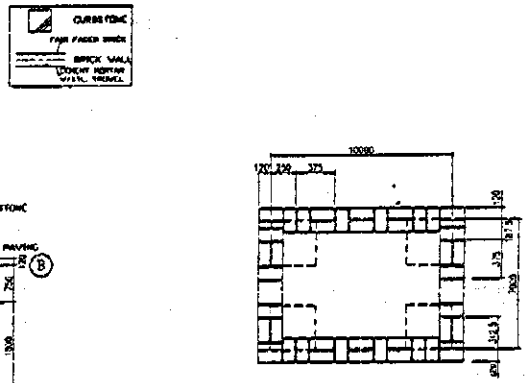
JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA−20
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 所設電気機 立面図
NIPPON KOEI CO.,LTD. Consulting Engineers		

TIA-C-02 [3]

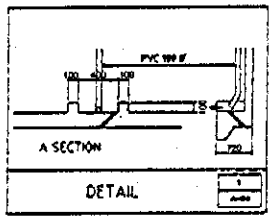
1. 11 KV Tr.PANEL (300 kVA)
2. LOW VOLTAGE PANEL
3. EMERGENCY GENERATOR
4. DAILY SERVICE TANK
5. E/G CONTROL PANEL

N





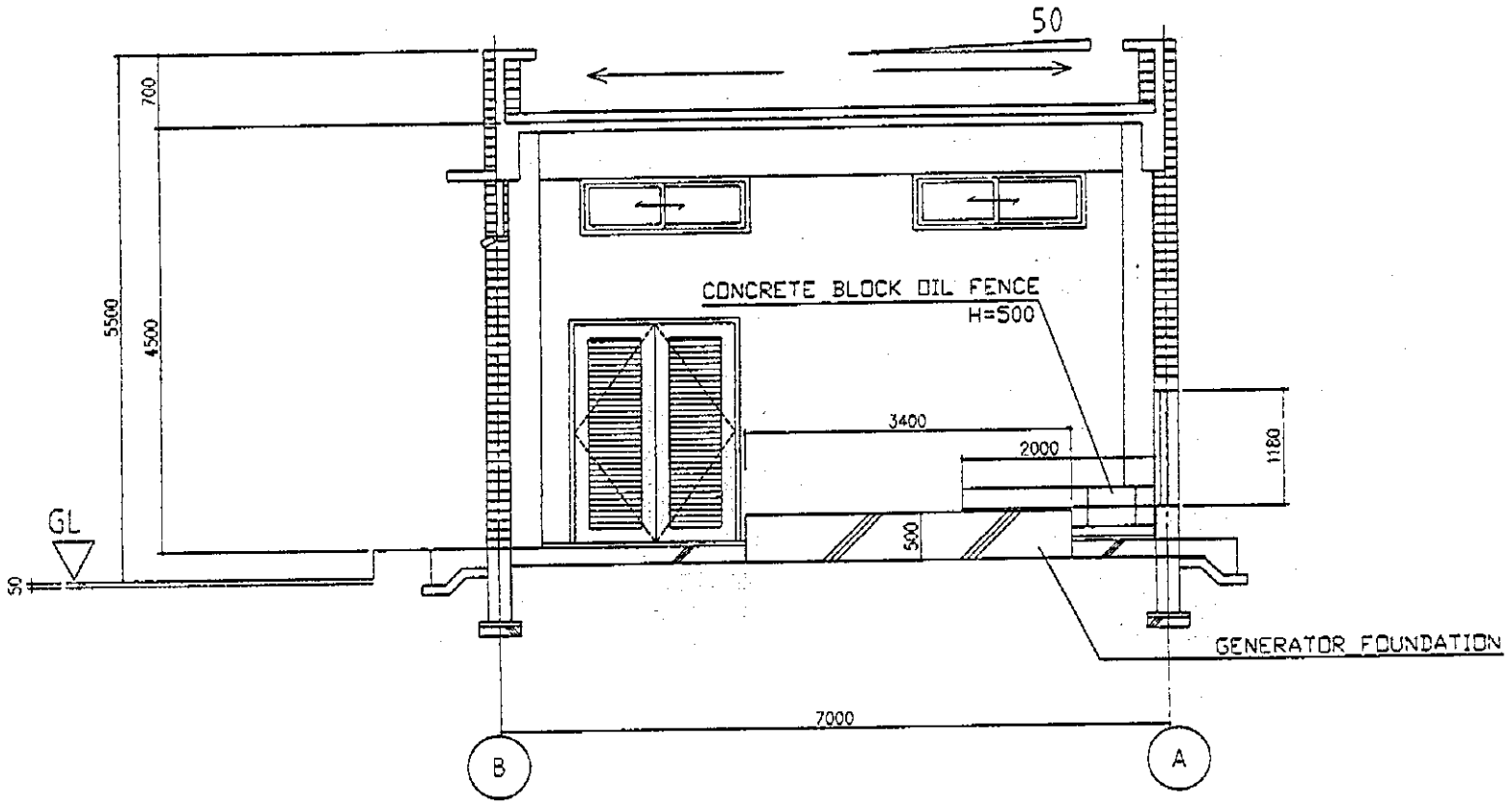
BRICK LAYING DETAIL



DETAILED PLAN

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-21
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		T.I.A 新設電気機 平面詳細図
NIPPON KOEI CO.,LTD. Consulting Engineers		

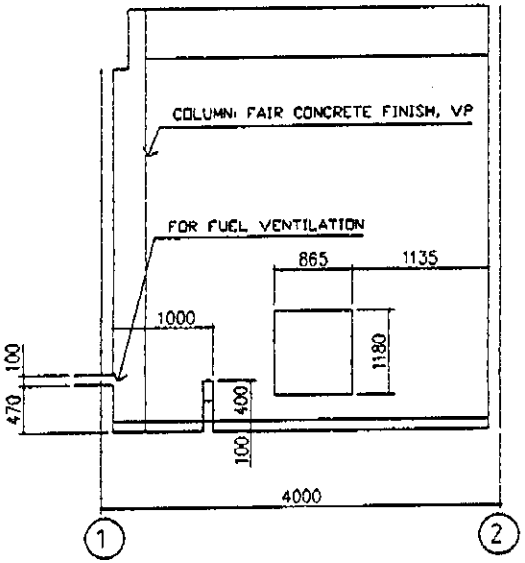
TIA-E-03(1)

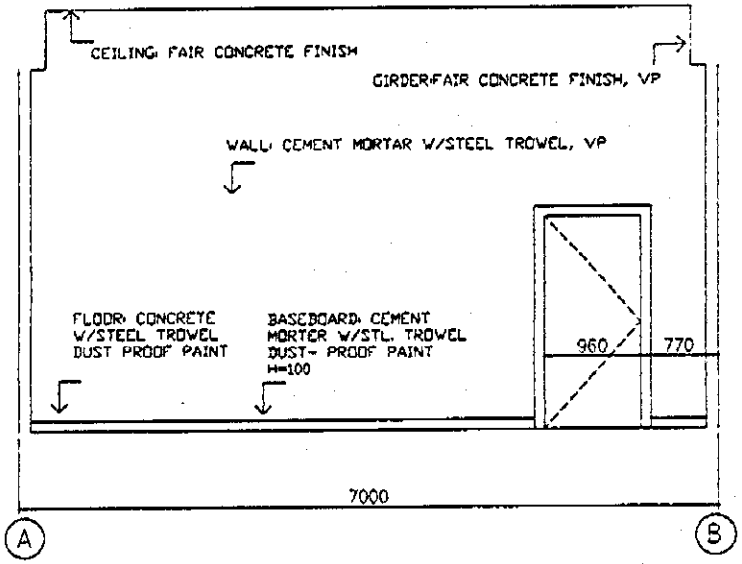


WALL SECTION

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA−22
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 新設電気棟 断面詳細図
NIPPON KOEI CO.,LTD. Consulting Engineers		

TA-C-04(1)





INTERIOR ELEVATIONS

Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-23
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 新設電気棟 展開図
NIPPON KOEI CO.,LTD. Consulting Engineers		

TIA-C-05 [1]

POWER HOUSE BUILDING

MARK	QTY. TOTAL QUANTITY	DIMENSION WIDTH	DIMENSION HEIGHT	DIMENSION THICKNESS	DOOR & WINDOW MATERIAL	DOOR & WINDOW THICKNESS	GLAZING THICKNESS	LOUVER TYPE	LOUVER WIDTH	LOUVER HEIGHT	LOUVER MATERIAL	FRAME	SILL	FIGURE REMARK
SD-1	1	2200	2500	100	S	40					S	S	1	
SD-2	1	1800	2300	100	S	40			609	1975	S	S	2	
AW-3	1	960	2140	100	W	40					W		3	
WD-4	8	1800	525	70	A	70	4				W	W	4	

FIG. 4 (1/WD)

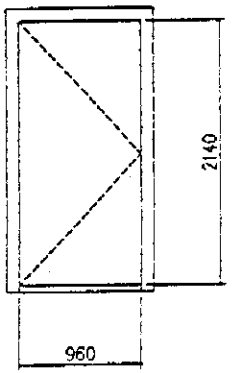


FIG. 1 (1/SD)

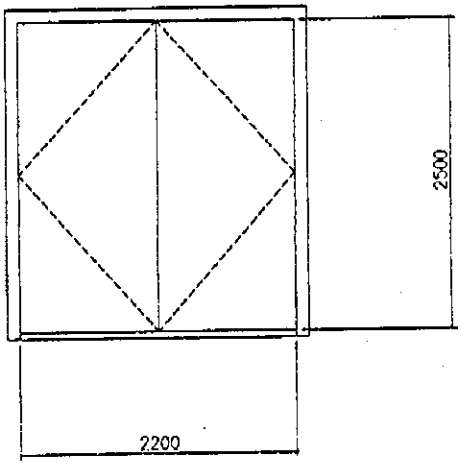


FIG. 2 (2/SD)

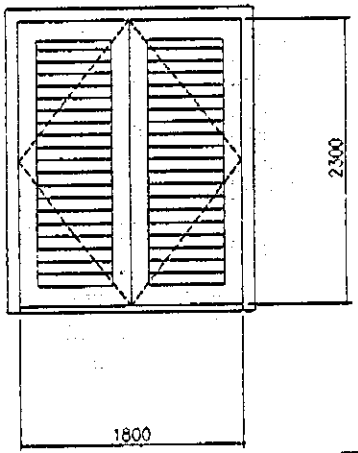
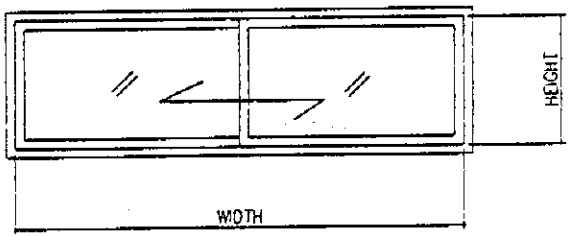


FIG. 3 (1/AW)



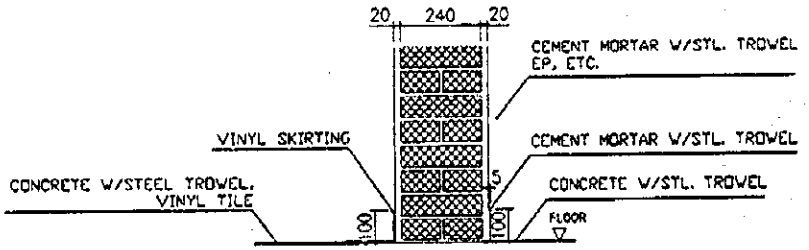
DOOR AND WINDOW SCHEDULE

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA−24
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 新設電気機 建具表
NIPPON KOEI CO.,LTD. Consulting Engineers		

TIA-C-06 (2)

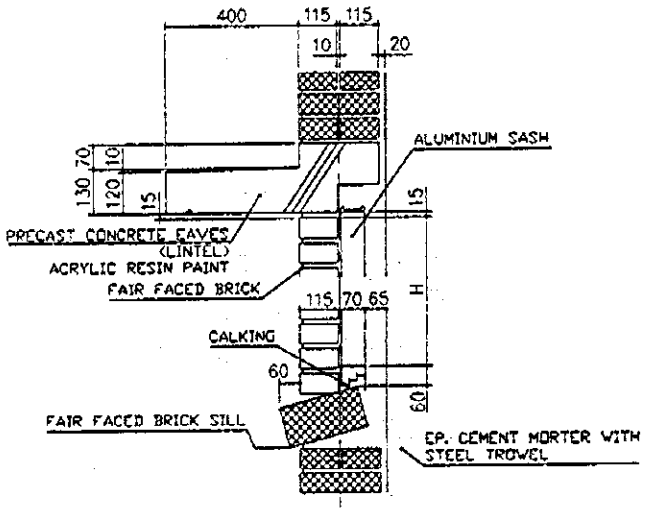
1
A-08

WALL & FLOOR



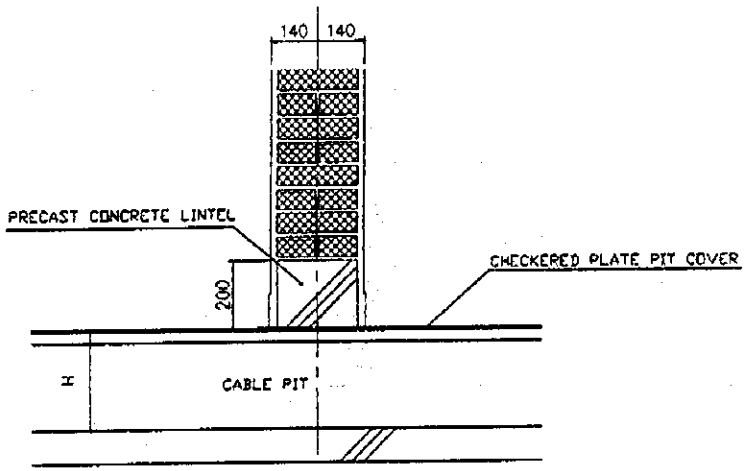
2
A-08

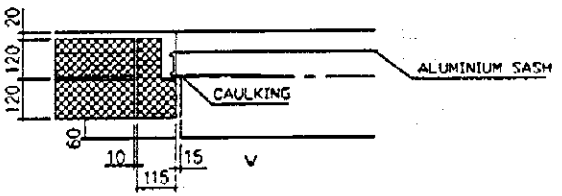
ALUMINIUM WINDOW



3
A-08

CABLE PIT UNDER THE WALL



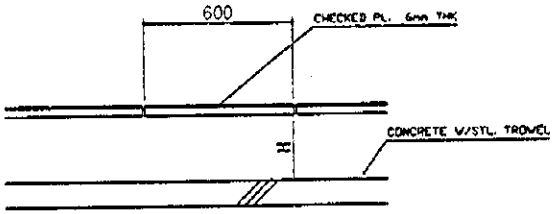


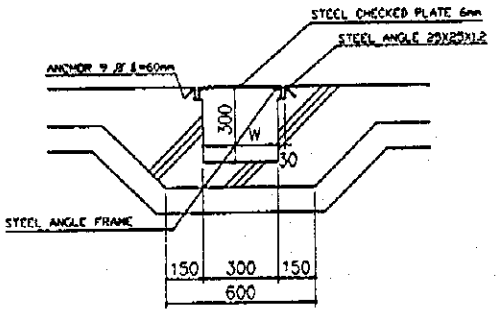
JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-25
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 新設電気棟 詳細図 1
NIPPON KOEI CO.,LTD. Consulting Engineers		

(1)69-3-34

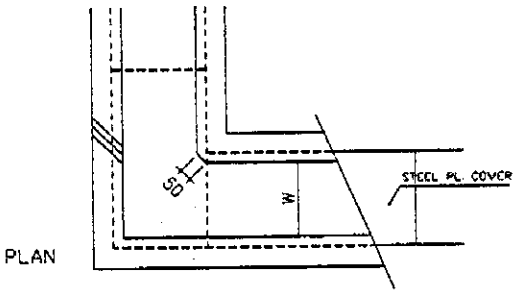
1
A-09

CABLE PIT





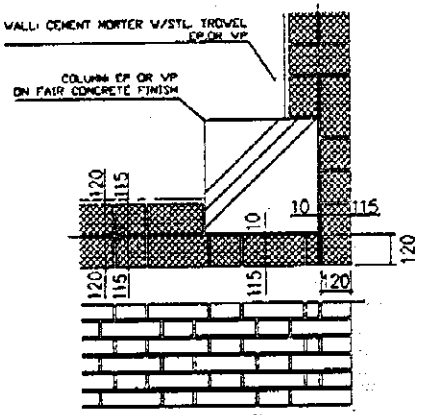
W= 400 POWER HOUSE



PLAN

2
A-09

COULMN & BRICK WALL

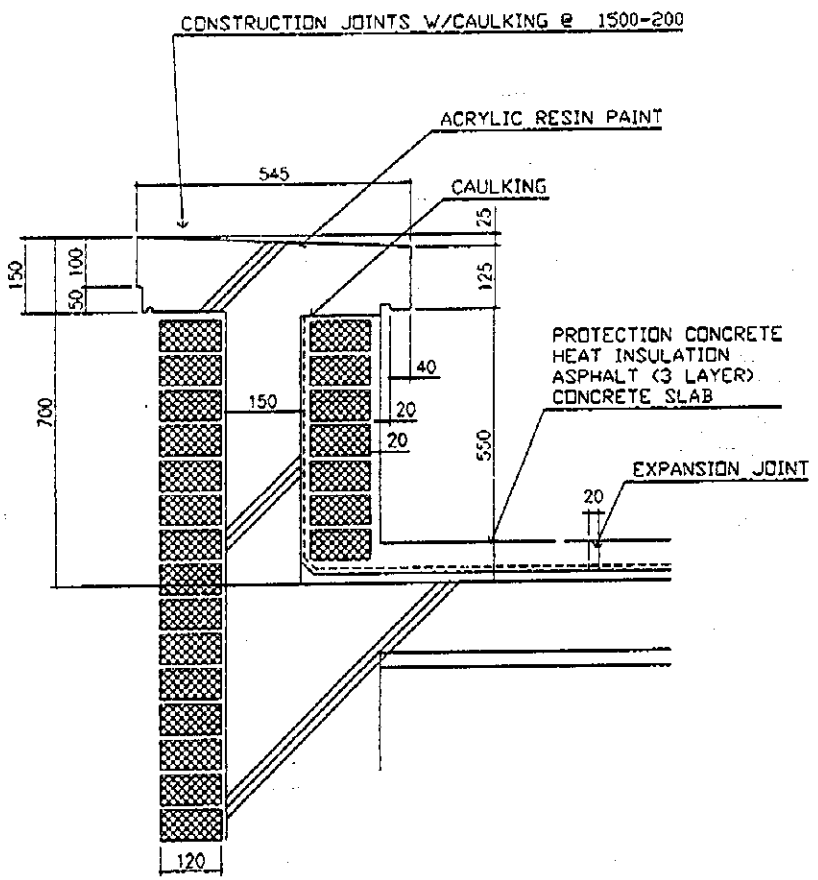


JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-26
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 新設電気線 詳細図 2
NIPPON KOEI CO.,LTD. Consulting Engineers		

TIA-C-68 [1]

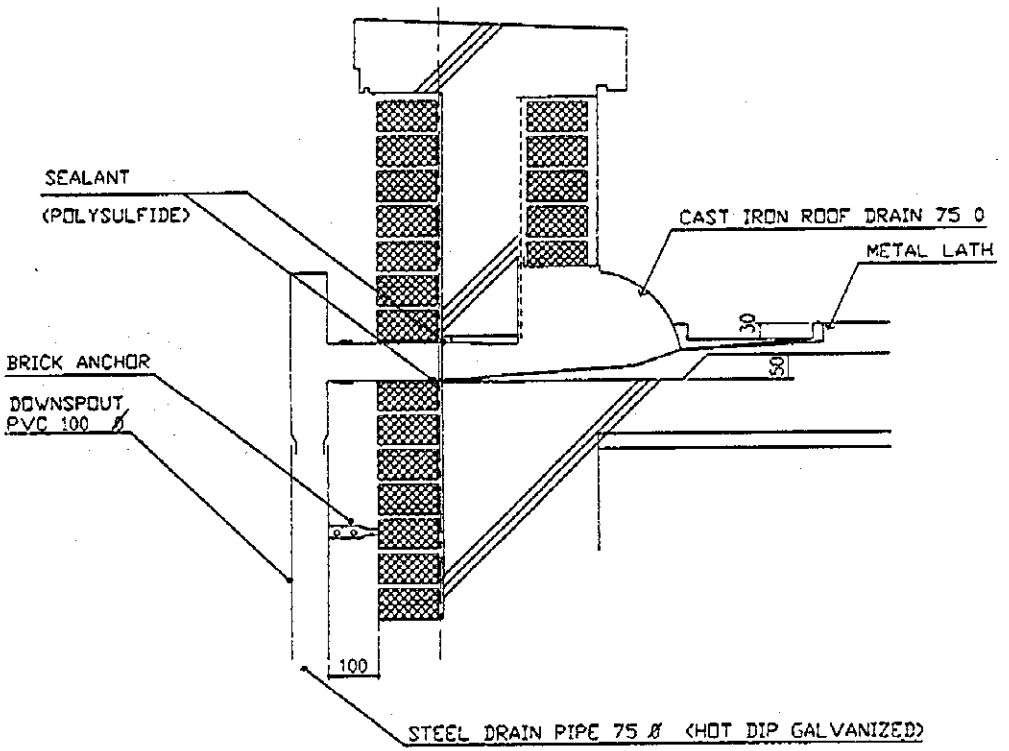
1
A-10

PARAPET



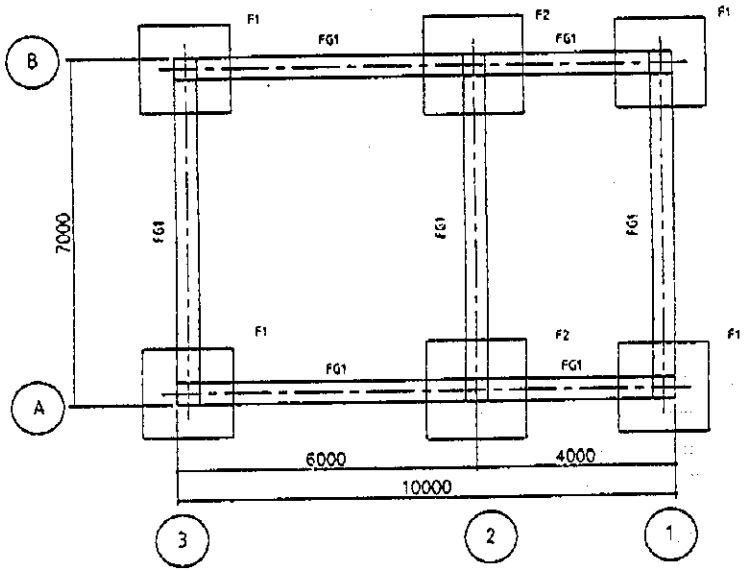
2
A-10

ROOF DRAIN

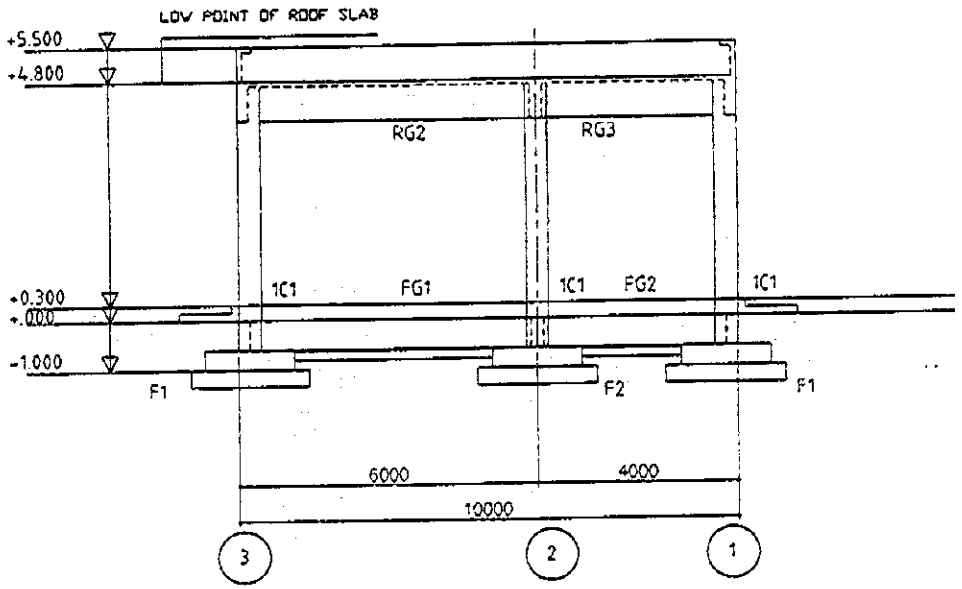


JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-27
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 新設電気線 詳細図 3
NIPPON KOEI CO.,LTD. Consulting Engineers		

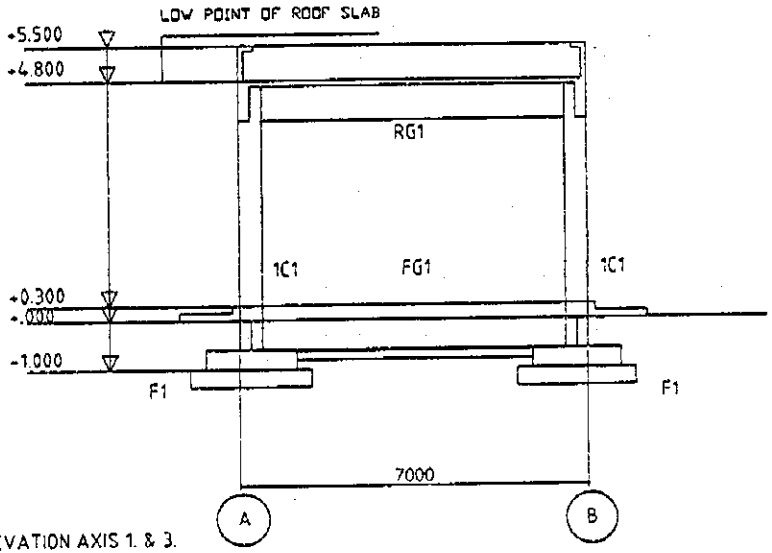
[1] 60-3-VII



FOUNDATION PLAN 1



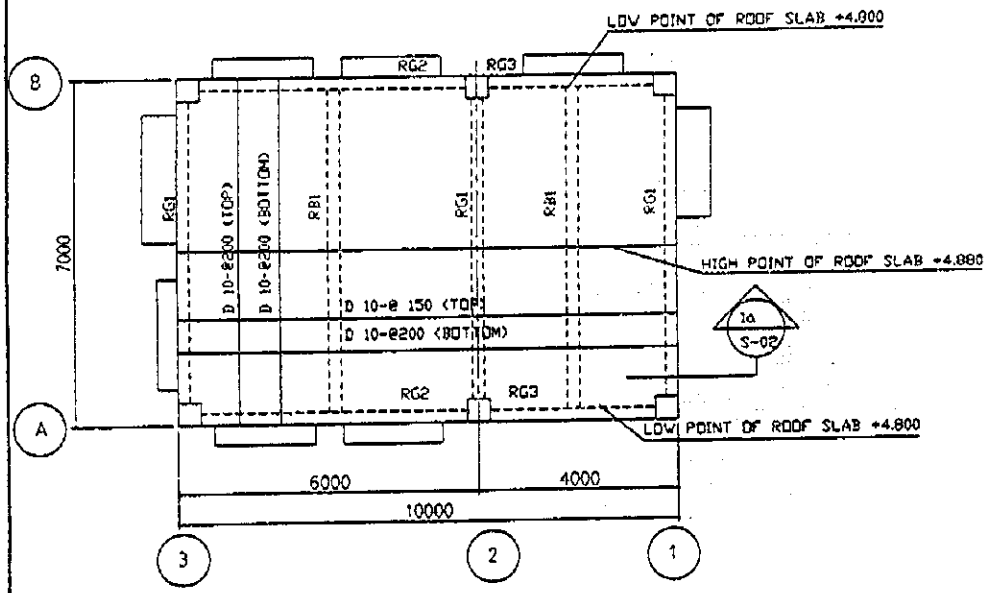
FRAMING ELEVATION AXIS A



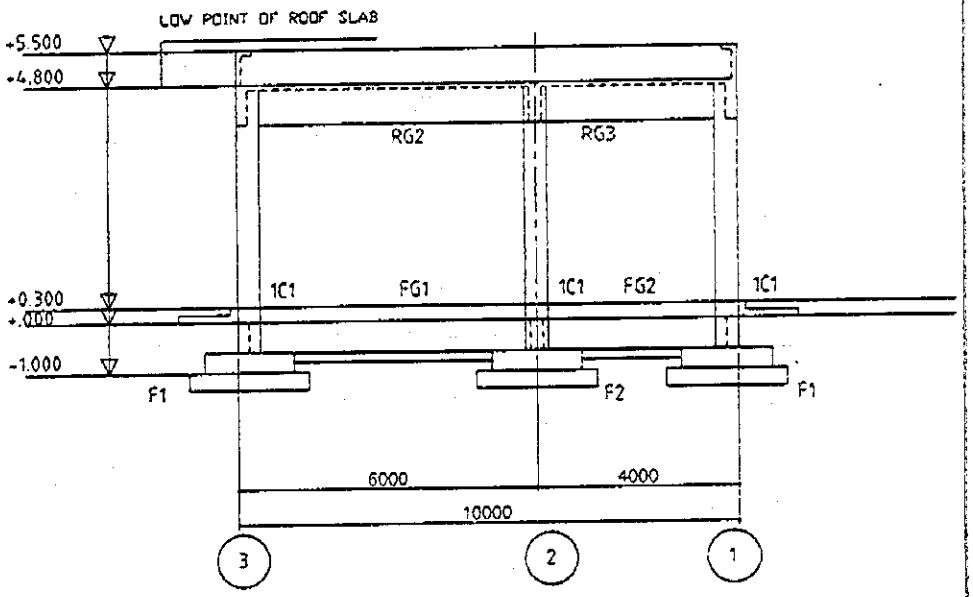
FRAMING ELEVATION AXIS 1. & 3.

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-28
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 新設電気線 基礎伏図
NIPPON KOEI CO.,LTD. Consulting Engineers		

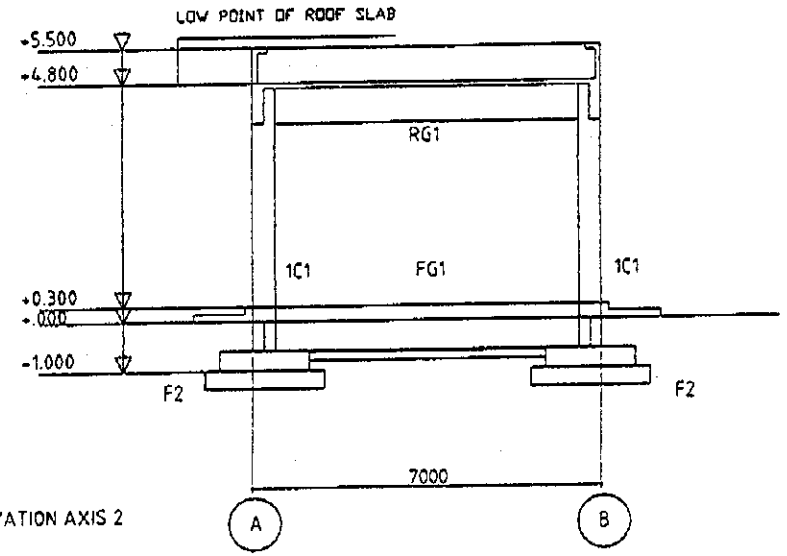
TIA-C-10 (1)



ROOF FRAMING PLAN 1



FRAMING ELEVATION AXIS B

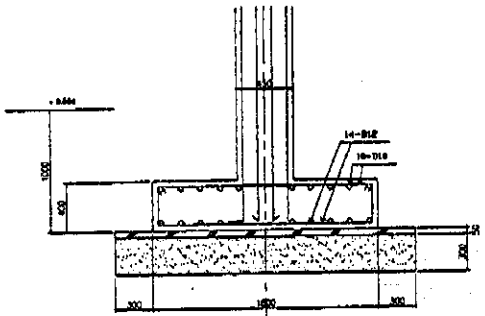


FRAMING ELEVATION AXIS 2

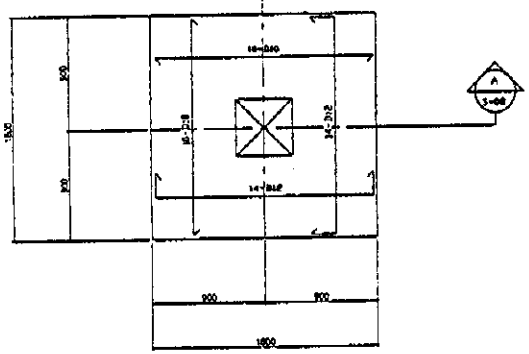
JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-29
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 新設電気棟 屋根構造図
NIPPON KOEI CO.,LTD. Consulting Engineers		

TIA-C-111-[1]

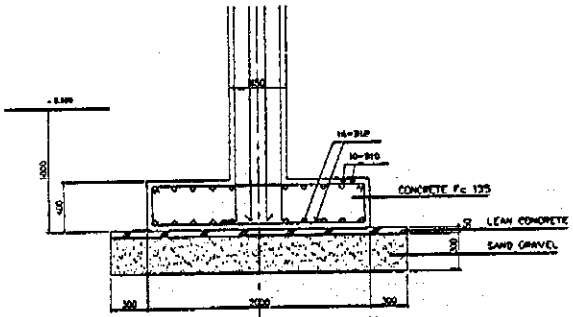
FOOTING SCHEDULE ③



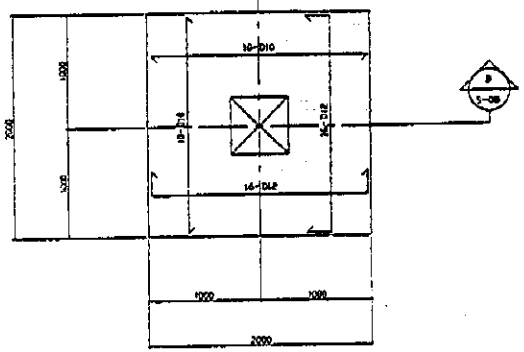
SECTION A / S-08



FOUNDATION TYPE F1

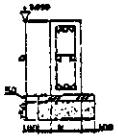


SECTION B / S-08



FOUNDATION TYPE F2

TIE BEAM SCHEDULE ①

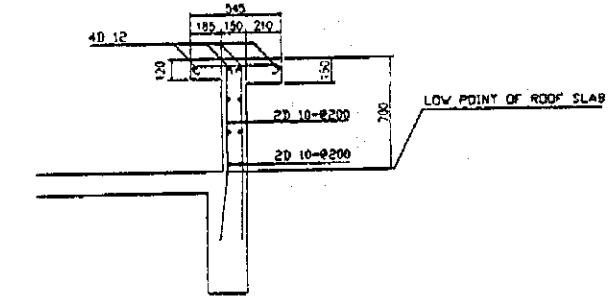
MARK		FG1
POSITION		
SECTION		
B X D		240 X 600
MAIN BAR	TOP	3-D20
	BOTTOM	3-D20
STIRRUP		-D10-@200
TIE BAR		2-D10

COLUMN SCHEDULE ②

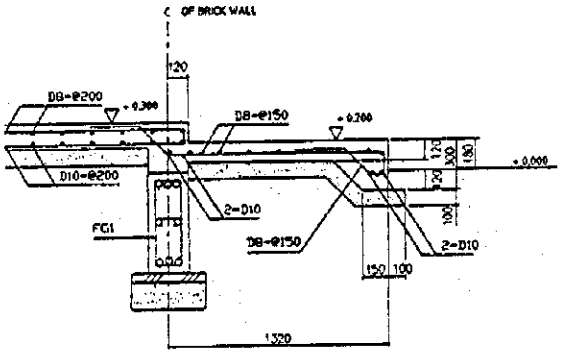
MARK		1C1
POSITION		
SECTION		
DIMENSION		450 X 450
VERTICAL REINF		12-D20
HOOPS		-D10-@100

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-30
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 新設気象庁 基礎配筋図
NIPPON KOEI CO.,LTD. Consulting Engineers		

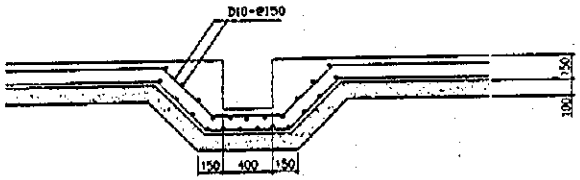
TIA-C-12[1]



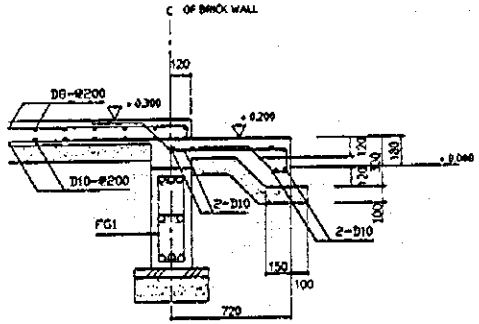
SECTION 1b S=1/6



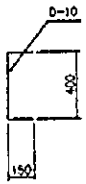
SECTION 2a S=1/1



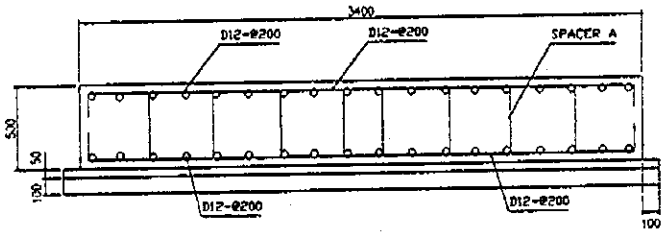
SECTION 2c S=1/1



SECTION 2b S=1/1



DETAIL OF SPACER A

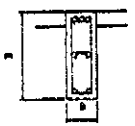
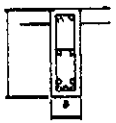
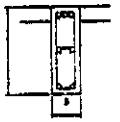
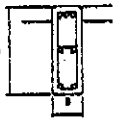
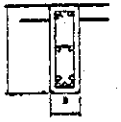
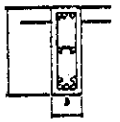
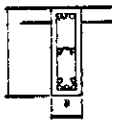
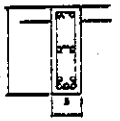
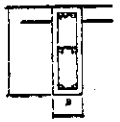


GENERATOR FOUNDATION DETAIL

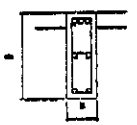
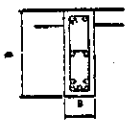
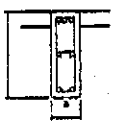
JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-31
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 新設電気棟 構造詳細図
NIPPON KOEI CO.,LTD. Consulting Engineers		

TIA-C-13 [1]

GIRDER SCHEDULE ①

MARK		RG1			RG2			RG3		
POSITION		LEFT END	MIDSPAN	RIGHT END	LEFT END	MIDSPAN	RIGHT END	LEFT END	MIDSPAN	RIGHT END
SECTION										
B X D		240 X 700			240 X 700			240 X 700		
MAIN BAR	TOP	3-D20	2-D20	3-D20	3-D20	2-D20	3-D20	3-D20	2-D20	3-D20
	BOTTOM	2-D20	5-D20	2-D20	2-D20	5-D20	5-D20	5-D20	5-D20	2-D20
STIRRUP		-D10-@200			-D10-@200			-D10-@200		
TIE BAR		2-D10			2-D10			2-D10		

BEAM SCHEDULE ②

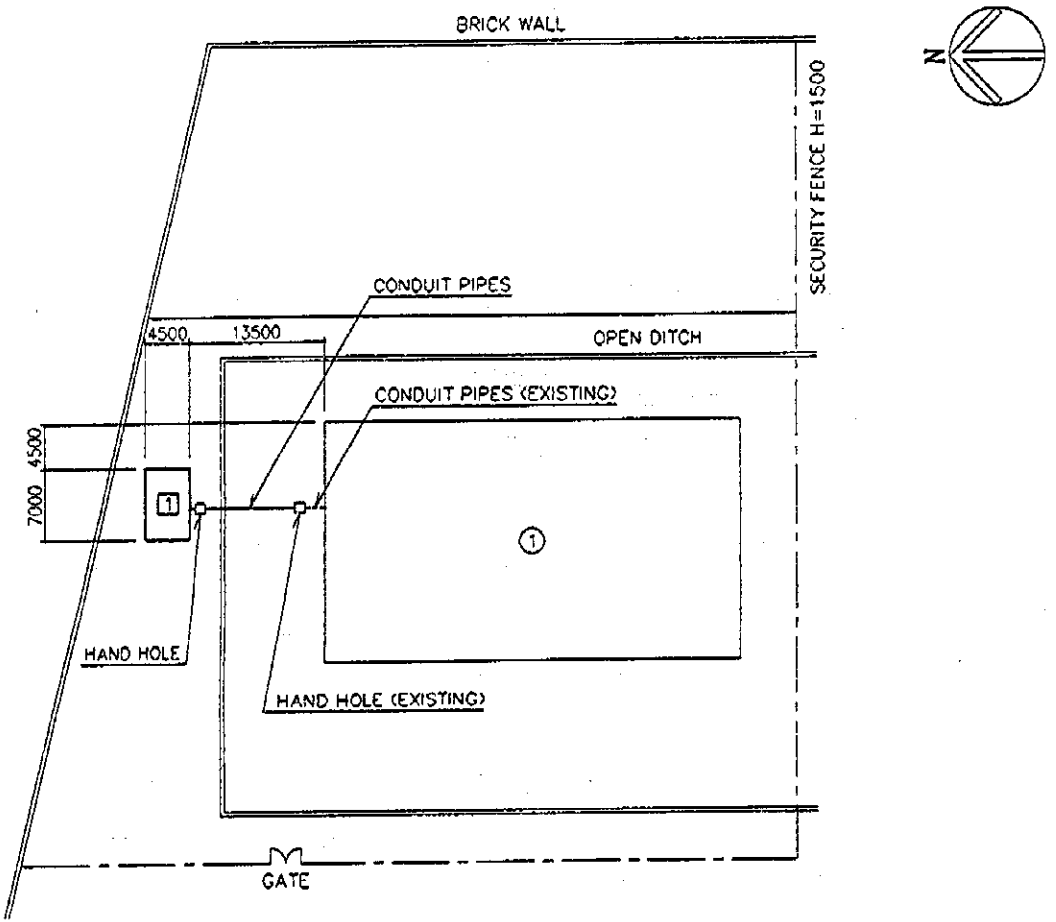
MARK		RB1		
POSITION		LEFT END	MIDSPAN	RIGHT END
SECTION				
B X D		240 X 700		
MAIN BAR	TOP	3-D20	2-D20	3-D20
	BOTTOM	2-D20	5-D20	2-D20
STIRRUP		-D10-@200		
TIE BAR		2-D10		

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 TIA-32
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		TIA 新設電気棟 架詳細図
NIPPON KOEI CO.,LTD. Consulting Engineers		

TIA-C-14(1)

NO.	EXISTING BUILDING
①	TRAINING CENTER BUILDING

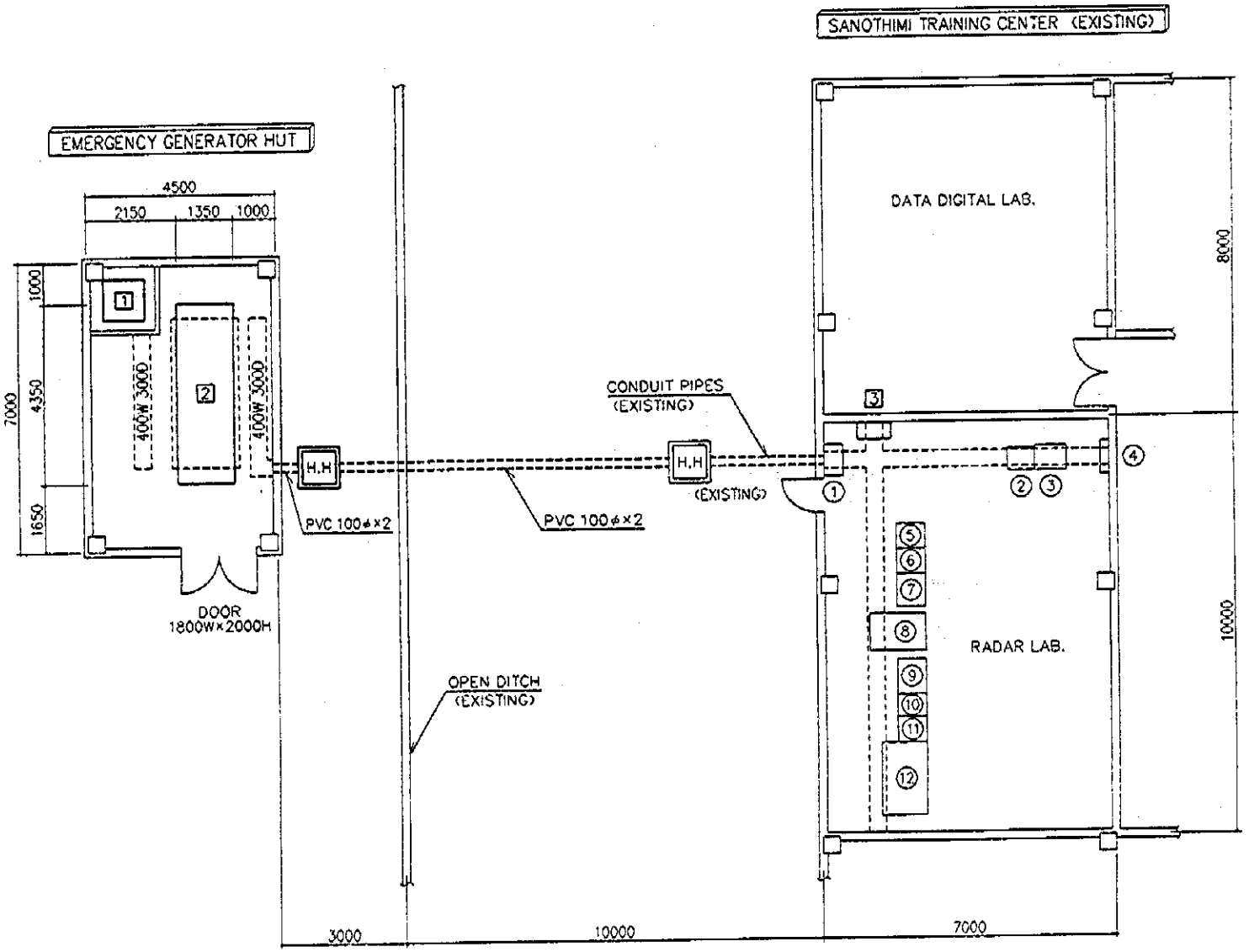
NO.	NEW BUILDING
1	EMERGENCY GENERATOR HUT



SANOTHIMI TRAINING CENTER OVERALL LAYOUT DRAWING

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	SANO-1
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		サノティミ訓練所 全体配置図
NIPPON KOEI CO.,LTD. Consulting Engineers		

SANO-A-01 [2]



NO.	NEW EQUIPMENT
1	DAILY SERVICE TANK (1000ℓ)
2	EMERGENCY GENERATOR (150kVA)
3	AUTOMATIC CHANGE PANEL

NO.	EXISTING EQUIPMENT
①	POWER METER PANEL
②	DEHYDRATOR
③	POWER DISTRIBUTOR
④	TERMINAL BORAD
⑤	SSR EXTRACTOR
⑥	SSR TRANSMITTER/RECEIVER
⑦	TARGET GENERATOR EQUIPMENT
⑧	MONITOR DISPLAY
⑨	LOCAL CONTROL EQUIPMENT
⑩	SIGNAL PROCESSOR EQUIPMENT
⑪	RECEIVER EQUIPMENT
⑫	TRANSMITTER EQUIPMENT

LAYOUT DRAWING (1/2)

JICA Japan International Cooperation Agency | Civil Aviation Authority of Nepal

Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal

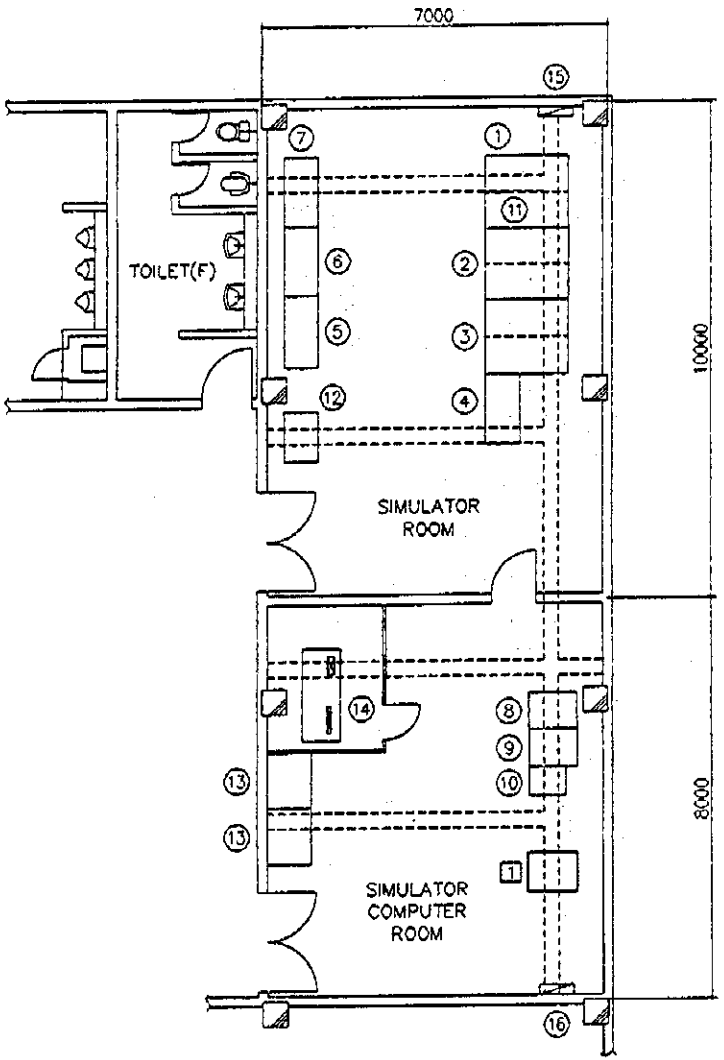
NIPPON KOEI CO.,LTD. Consulting Engineers

図面 SANO-2

サノティミ訓練所 平面図 1/2

SANO-A-02[5]

SANOTHIMI TRAINING CENTER (EXISTING)



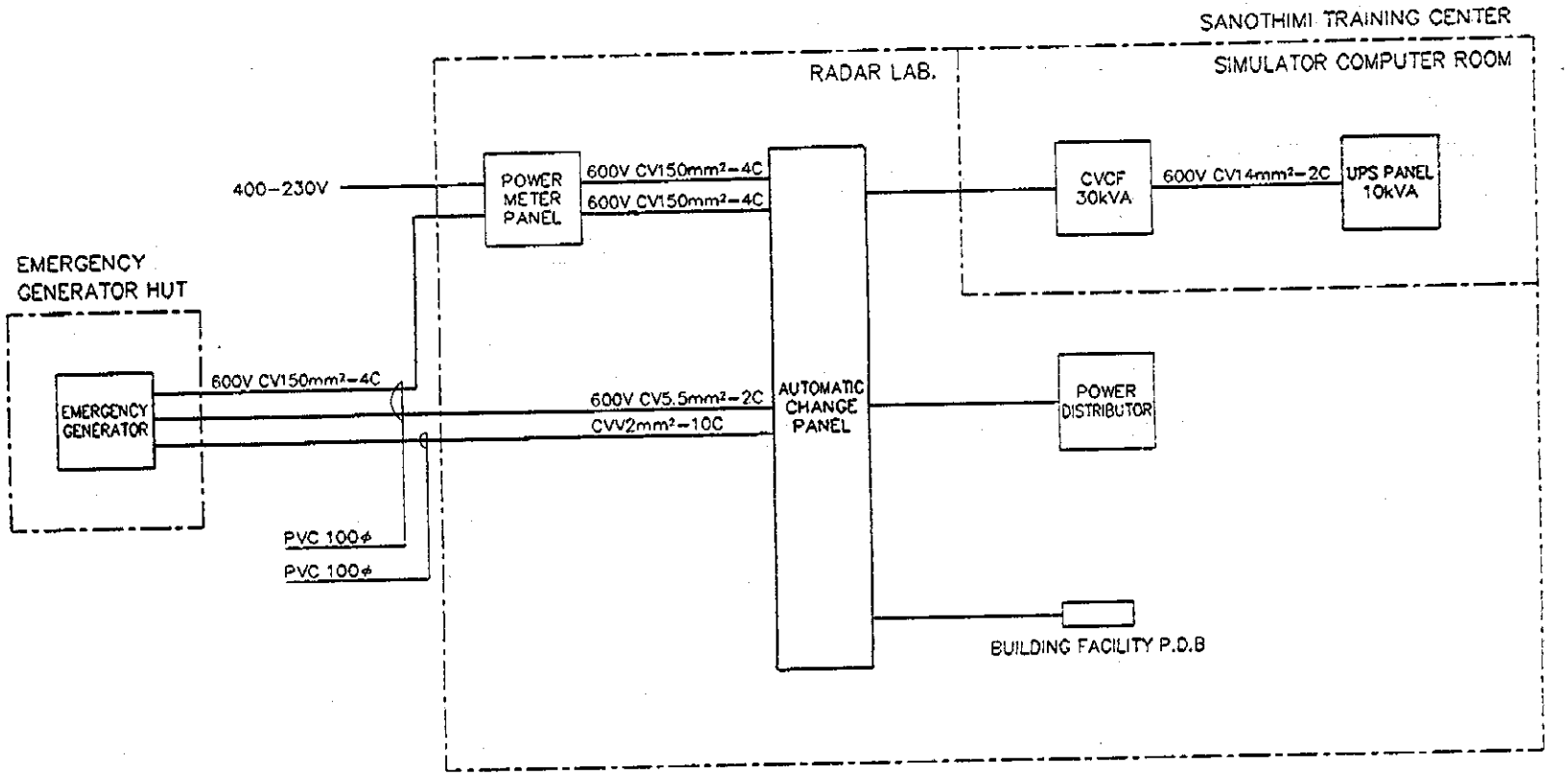
NO.	NEW EQUIPMENT
1	UPS PANEL (10kVA)

NO.	EXISTING EQUIPMENT
①	RADAR CONTROL CONSOLE/DEDS NO.1
②	RADAR CONTROL CONSOLE/DEDS NO.2
③	RADAR CONTROL CONSOLE/DEDS NO.3
④	VDU/HARDCOPY
⑤	PILOT CONSOLE NO.1
⑥	PILOT CONSOLE NO.2
⑦	INSTRUCTOR/SUPERVISOR CONSOLE
⑧	SYSTEM MANAGEMENT PROCESSOR
⑨	SYSTEM MANAGEMENT PROCESSOR
⑩	TVG/DCU/CVG
⑪	COMMUNICATION CONTROL EQUIPMENT
⑫	SYSTEM MANAGEMENT TERMINAL
⑬	SYSTEM CONSOLE/PRINTER
⑭	CVCF 30kVA
⑮	SIMULATOR ROOM P.D.B.
⑯	SIMULATOR COMPUTER ROOM P.D.B.

LAYOUT DRAWING (2/2)

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 SANO-3
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		サノティミ訓練所 平面図 2/2
NIPPON KOEI CO.,LTD. Consulting Engineers		

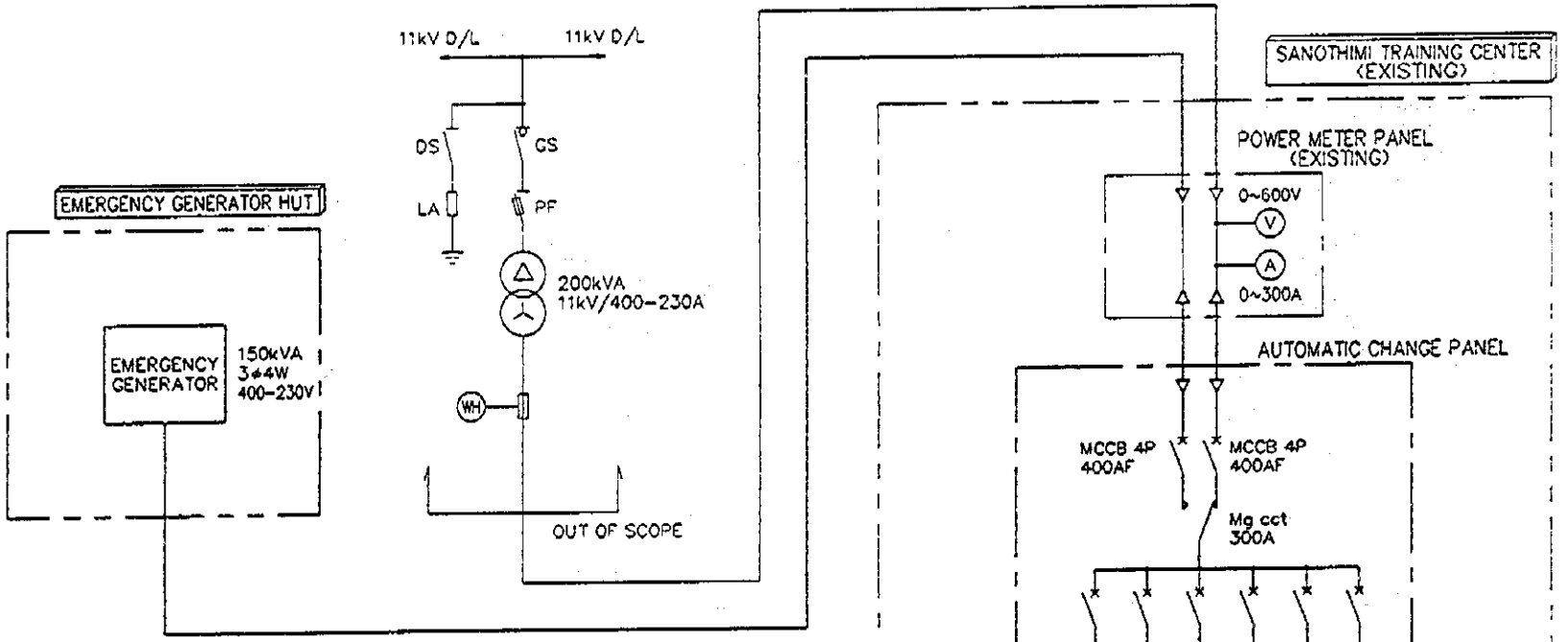
SANO-A-03 [6]

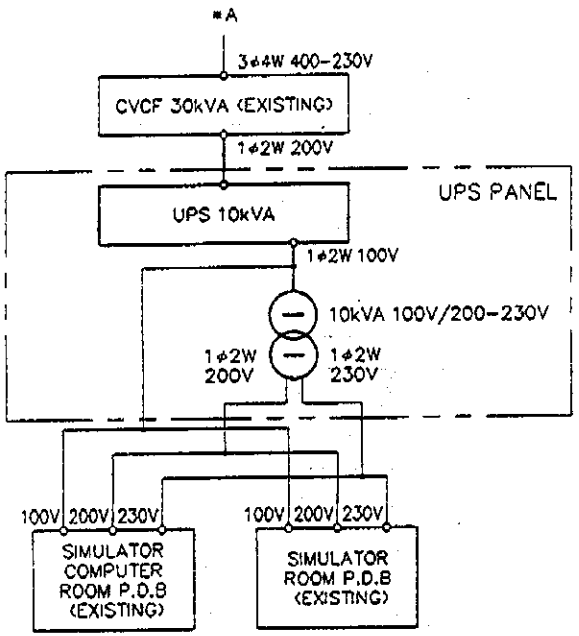


SYSTEM DIAGRAM OF POWER SUPPLY

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 SANO-4
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		サノティミ訓練所 電源系統図
NIPPON KOEI CO.,LTD. Consulting Engineers		

SANO-A01-[4]





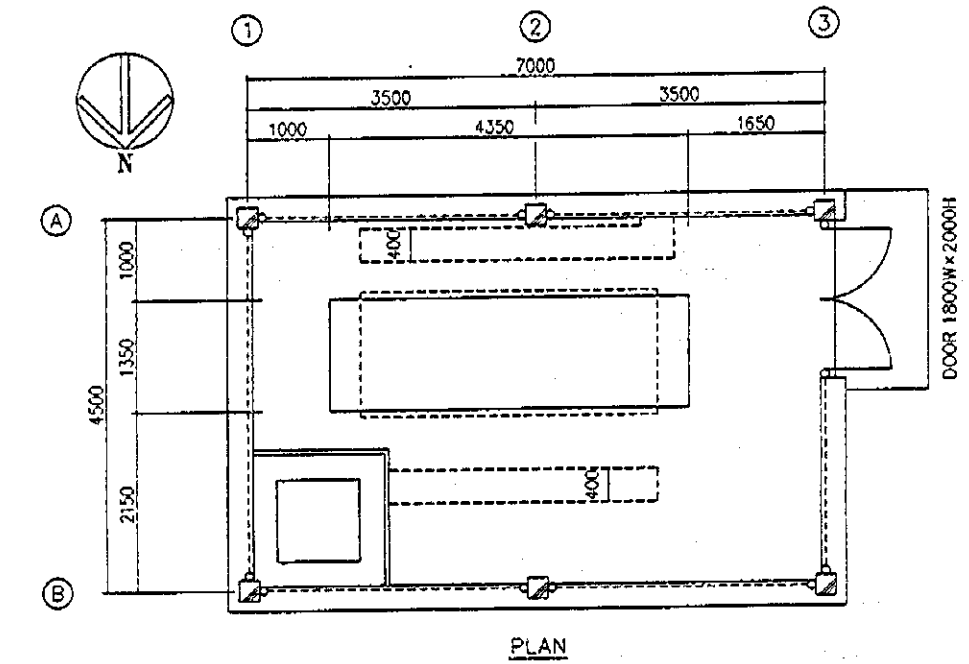
SINGLE LINE DIAGRAM

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal	
NIPPON KOEI CO.,LTD. Consulting Engineers	

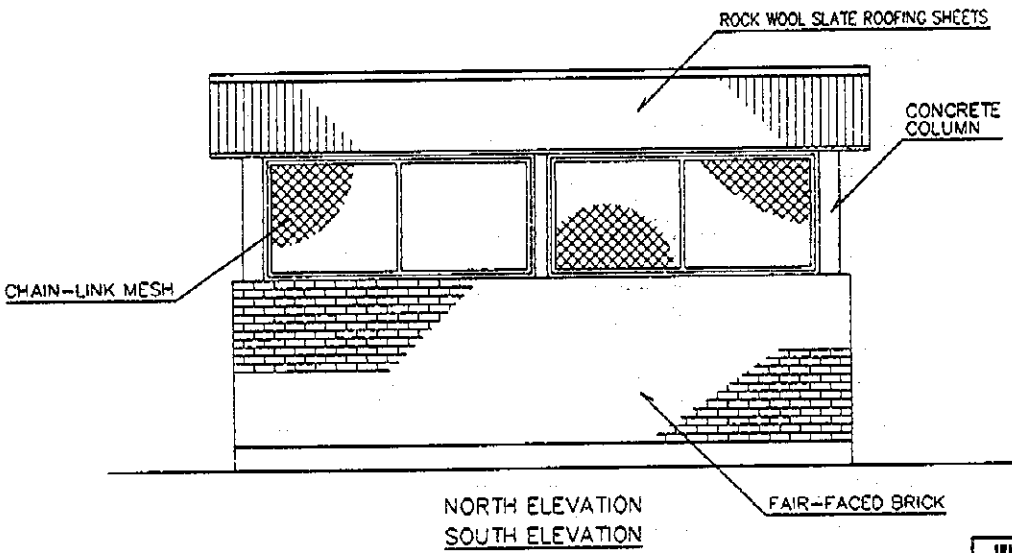
図面 SANO-5

サノティミ訓練所 単線結線図

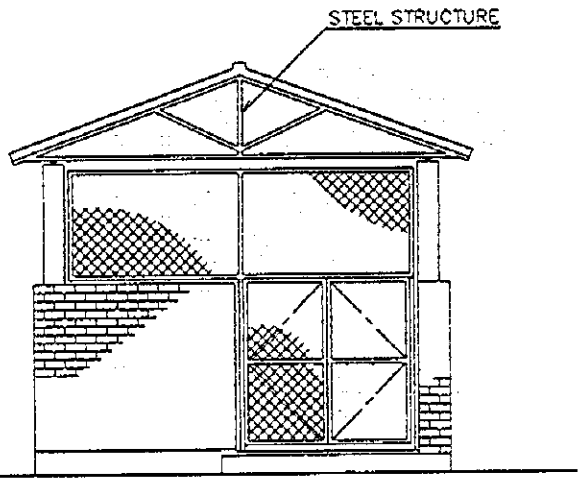
SANA-A-05 [7]



PLAN



NORTH ELEVATION
SOUTH ELEVATION

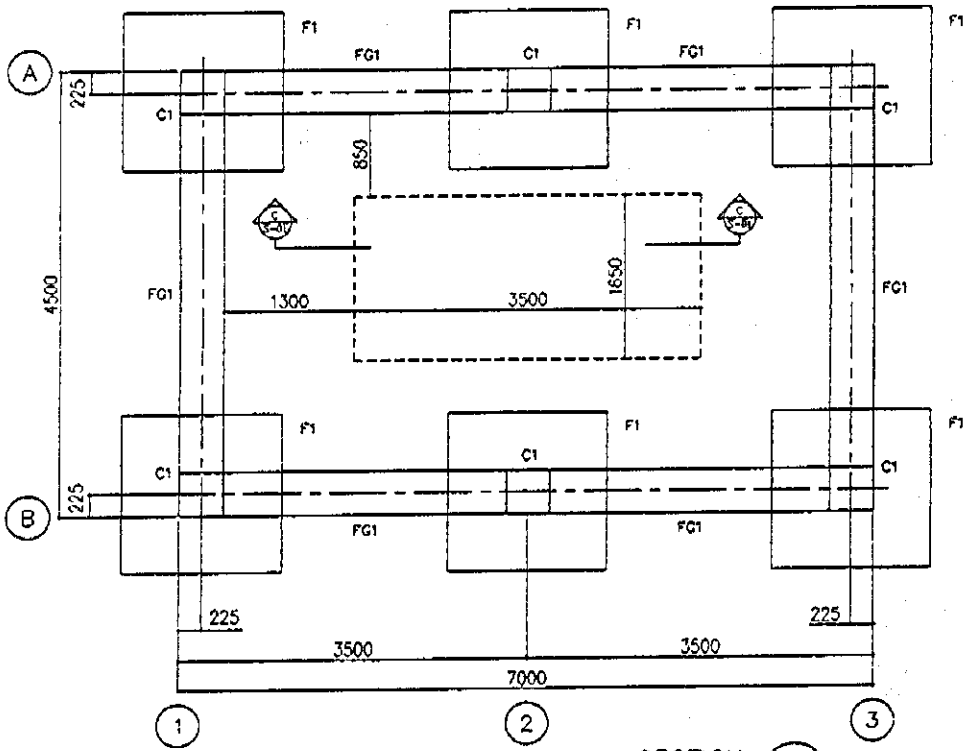


WEST ELEVATION

PLAN AND ELEVATIONS

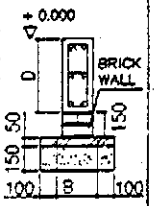
JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 SANO-6
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		サノティミ気象所 新設発電機小屋 平面、立面図
NIPPON KOEI CO.,LTD. Consulting Engineers		

SANO-C-01[3]

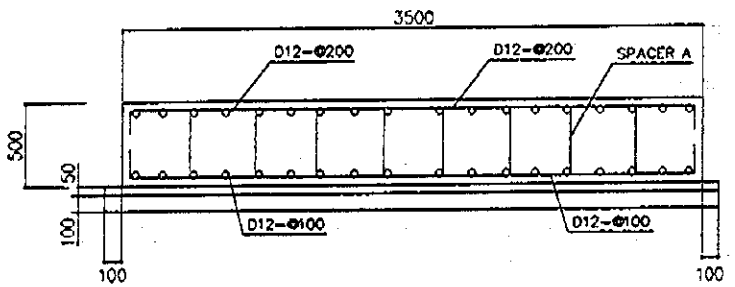


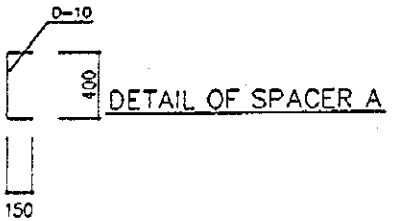
FOUNDATION PLAN

TIE BEAM SCHEDULE (FG1 S-01)

MARK		FG1	C1
POSITION			
SECTION			
B X D		240 X 600	240 X 600
MAIN BAR	TOP	2-D20	3-D20
	BOTTOM	2-D20	3-D20
STIRRUP		□-D10-@200	□-D10-@200
TIE BAR		2-D10	2-D10

SECTION (C S-01)



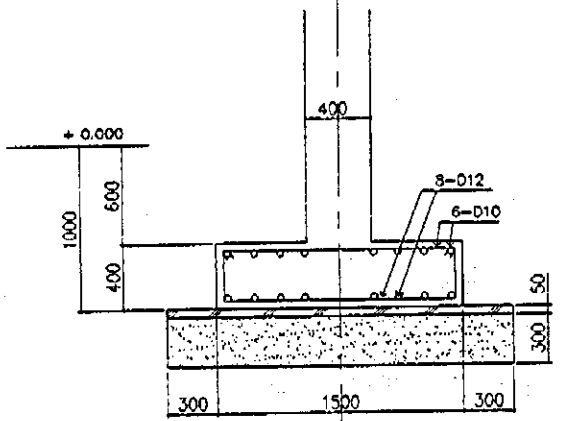


DETAIL OF SPACER A

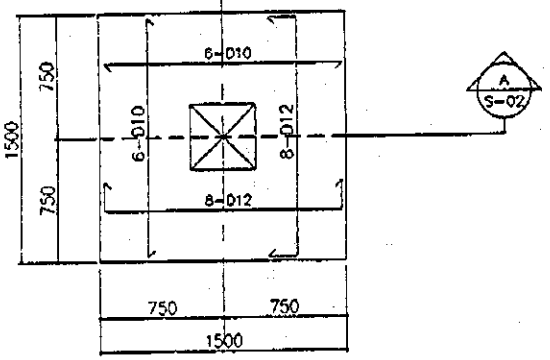
JICA Japan International Cooperation Agency / Civil Aviation Authority of Nepal	図面 SANO-7
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal	サノティミ訓練所 新設発電機小屋 基礎伏図
NIPPON KOEI CO.,LTD. Consulting Engineers	

SANO-C-02 [2]

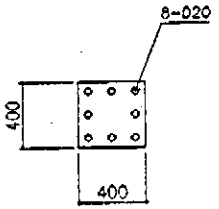
FOOTING SCHEDULE F1 S-01



SECTION A S-02



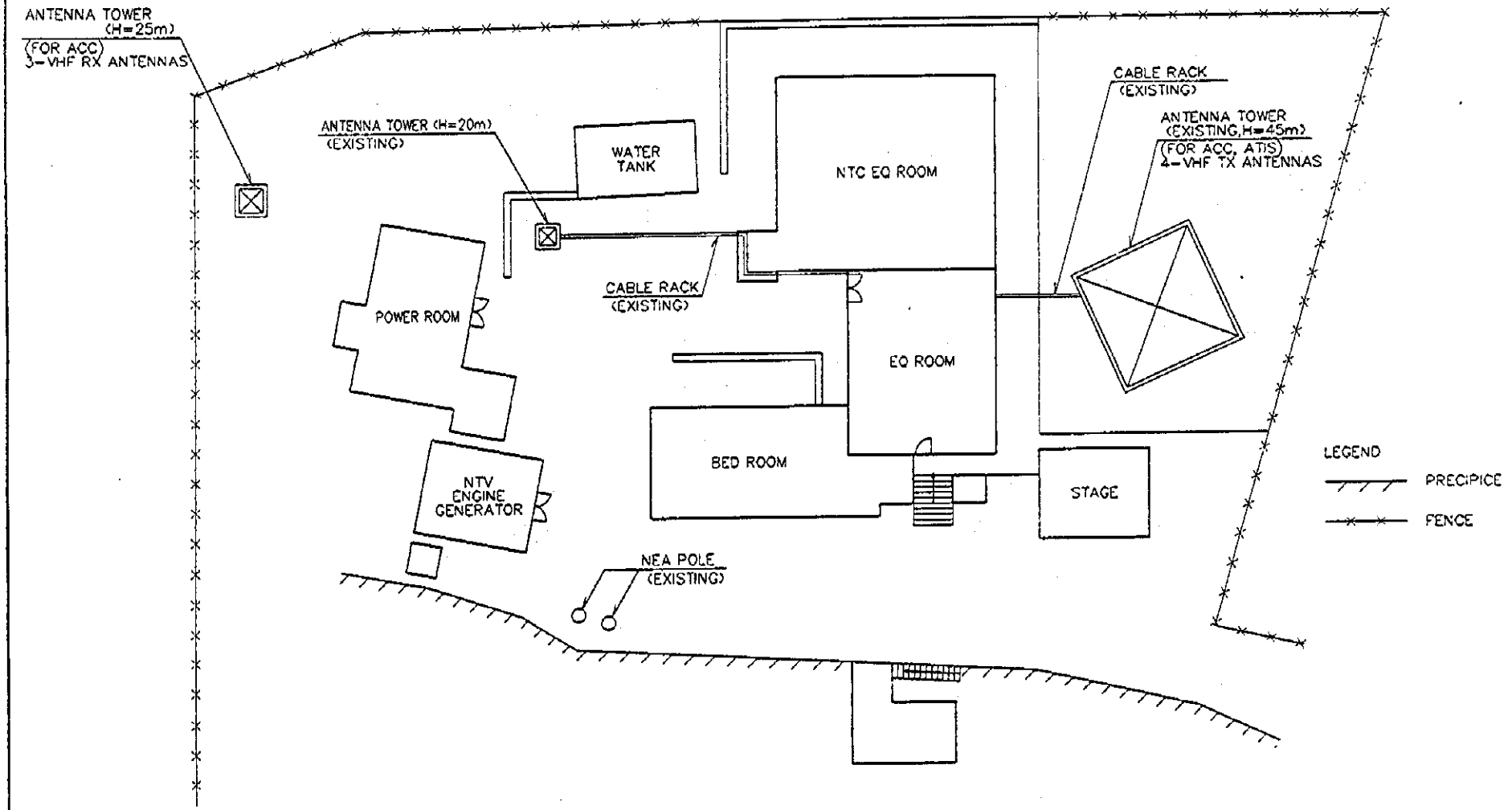
FOUNDATION TYPE F1



C1 DETAIL

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 SANO-8
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		サノティミ訓練所 新設発電機小屋 基礎配筋図
NIPPON KOEI CO.,LTD. Consulting Engineers		

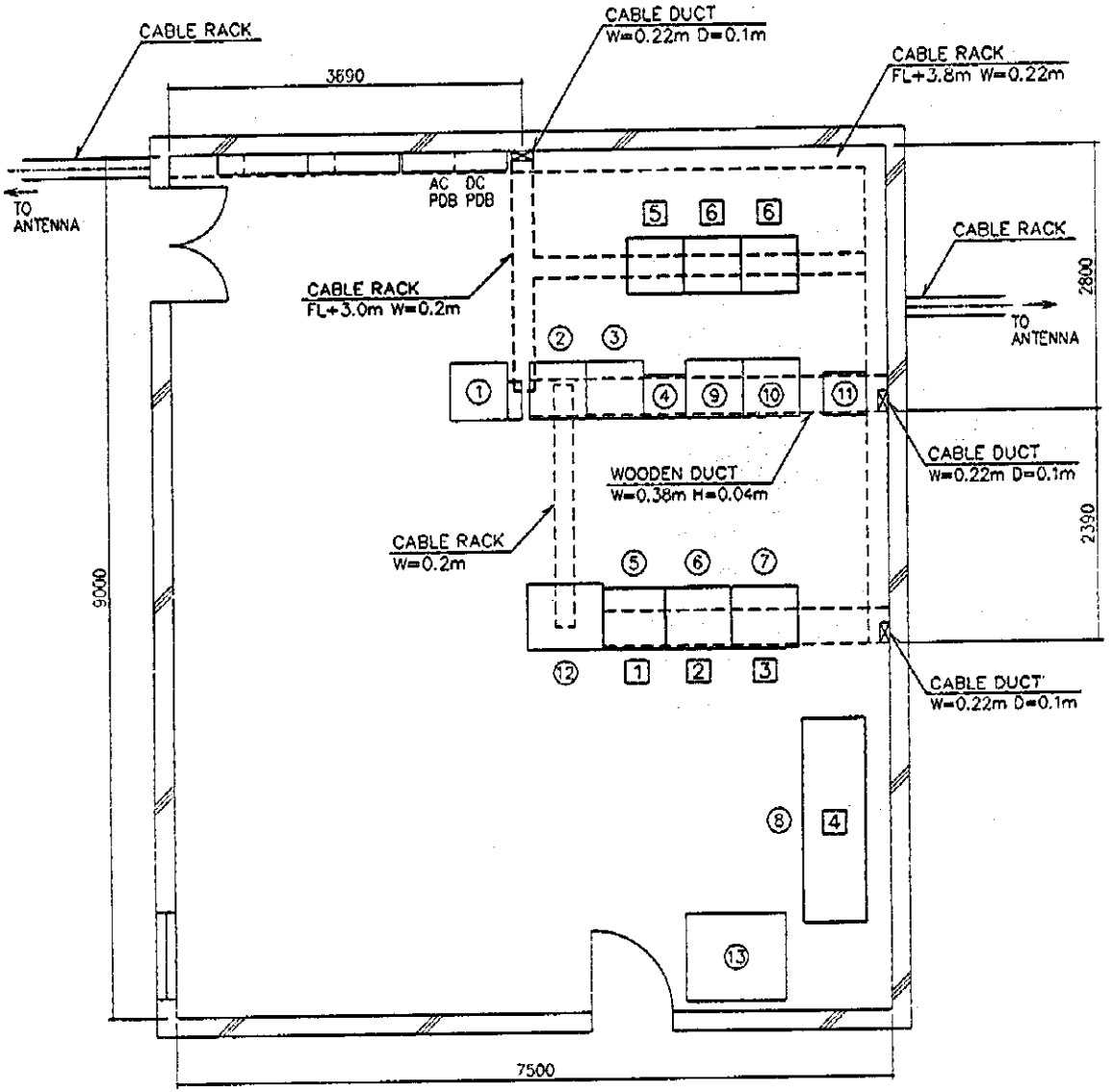
[2] CO-C-SANO



MT.PHULCHOKI OVERALL LAYOUT DRAWING

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 PHU-1
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		プルチョキ山 全体配置図
NIPPON KOEI CO.,LTD. Consulting Engineers		

(S10-X-JHS)



LAYOUT DRAWING OF EQ ROOM

NO.	NEW EQUIPMENT	
1	SURGE SUPPRESSION TR. PANEL	※1
2	DC POWER SUPPLY MAIN (FOR VHF/+24V)	※1
3	DC POWER SUPPLY STAND BY (FOR VHF/+24V)	※1
4	BATTERY (FOR VHF/+24V 400Ah×2)	※1
5	VHF RX RACK (FOR ACC)	
6	VHF TX RACK (FOR ACC,ATIS)	

NO.	EXISTING EQUIPMENT LIST
①	UHK LINK (INSTALLED IN 1999)
②	VHF TRANSMITTER
③	VHF RECEIVER
④	UHF LINK
⑤	SURGE SUPPRESSION TRANSFORMER
⑥	DC POWER SUPPLY (+24V)
⑦	DC POWER SUPPLY (+24V)
⑧	BATTERY (+24V 800Ah)
⑨	VHF TRANSMITTER/RECEIVER
⑩	VHF TRANSMITTER/RECEIVER
⑪	MDF
⑫	DC POWER SUPPLY (FOR UHF/−48V)
⑬	BATTERY (FOR UHF/−48V 600Ah)

※1 NEW EQUIPMENT IS INSTALLED AFTER REMOVED EXISTING EQUIPMENT

JICA Japan International Cooperation Agency | Civil Aviation Authority of Nepal

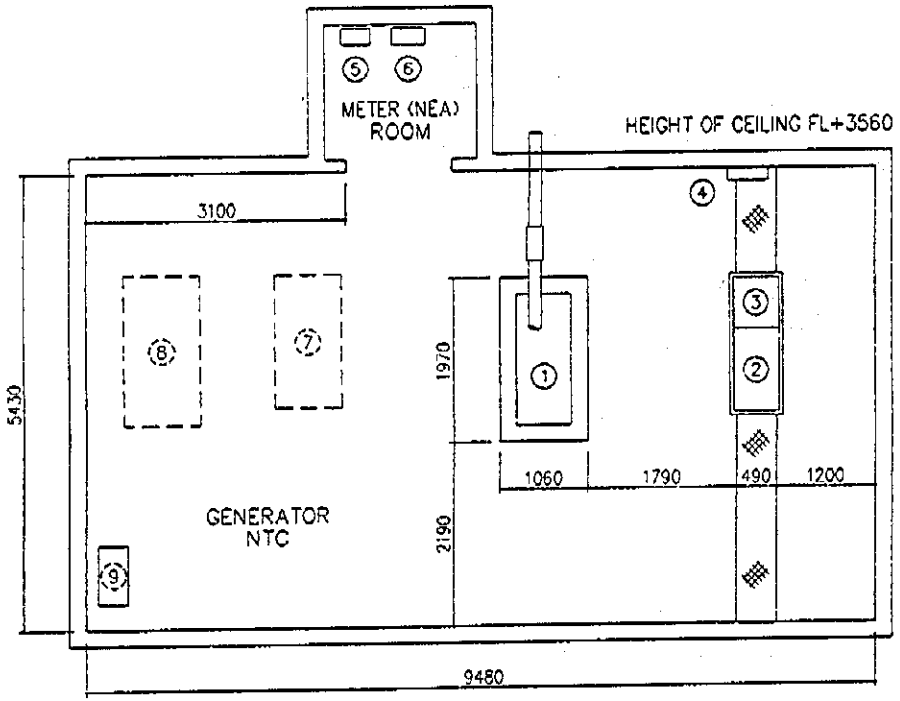
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal

NIPPON KOEI CO.,LTD. Consulting Engineers

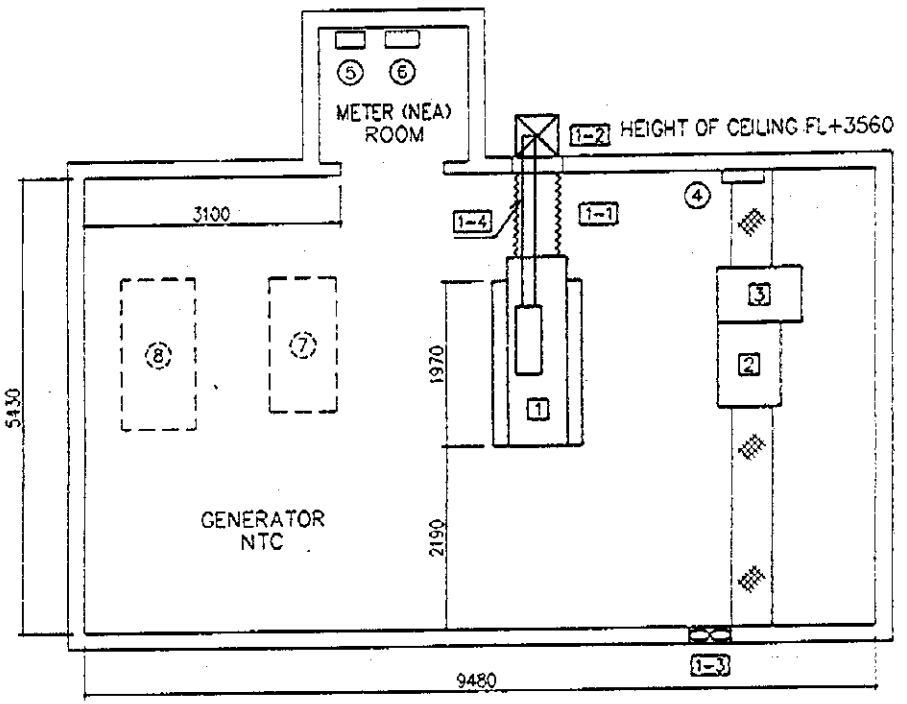
図面 PHU−2

プルチョキ山 機器室平面図

PHU-A-021(J)



EXISTING LAYOUT (POWER ROOM)



NEW LAYOUT (POWER ROOM)

NO.	EXISTING EQUIPMENT
①	EMERGENCY GENERATOR 25kVA
②	LOW VOLTAGE PANEL
③	AVR 30kVA (out of order)
④	TELECOMMUNICATION BOX
⑤	WHM (CAAN)
⑥	WHM (NTC)
⑦	EMERGENCY GENERATOR 28kVA (NTC)
⑧	EMERGENCY GENERATOR 53kVA (NTC)
⑨	LOW VOLTAGE PANEL (NTC)

NO.	NEW EQUIPMENT
1	EMERGENCY GENERATOR
1-1	RADIATOR FAN DUCT
1-2	WEATHER COVER
1-3	AIR INTAKE FAN
1-4	EXHAUST PIPE
2	LOW VOLTAGE PANEL
3	AVR PANEL

NO.	EXISTING EQUIPMENT
④	TELECOMMUNICATION BOX
⑤	WHM (CAAN)
⑥	WHM (NTC)
⑦	EMERGENCY GENERATOR 28kVA (NTC)
⑧	EMERGENCY GENERATOR 53kVA (NTC)
⑨	LOW VOLTAGE PANEL (NTC)

JICA Japan International Cooperation Agency | Civil Aviation Authority of Nepal

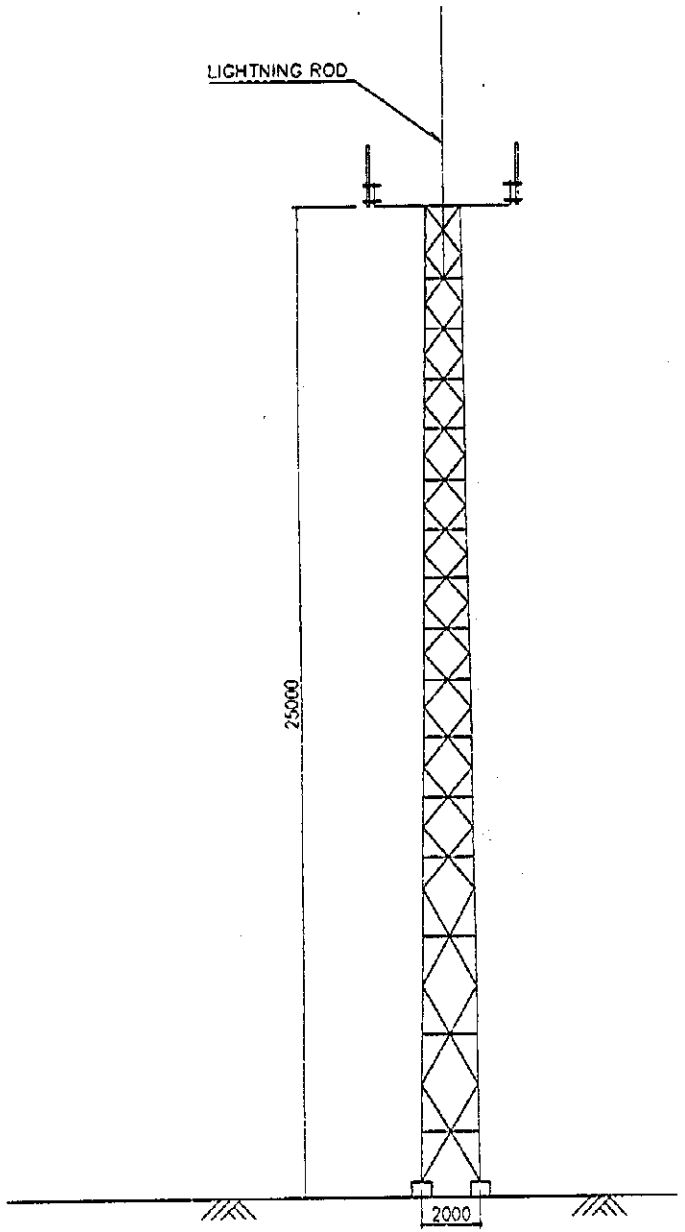
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal

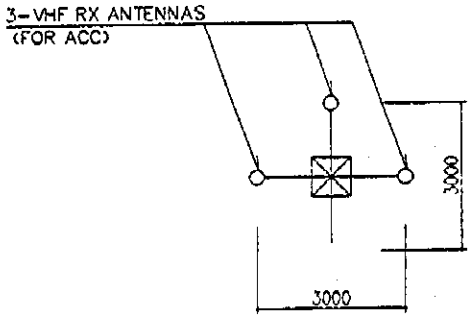
NIPPON KOEI CO.,LTD. Consulting Engineers

図面 PHU-3

プルチョキ山 電気室平面図

PHU-A-03 [4]

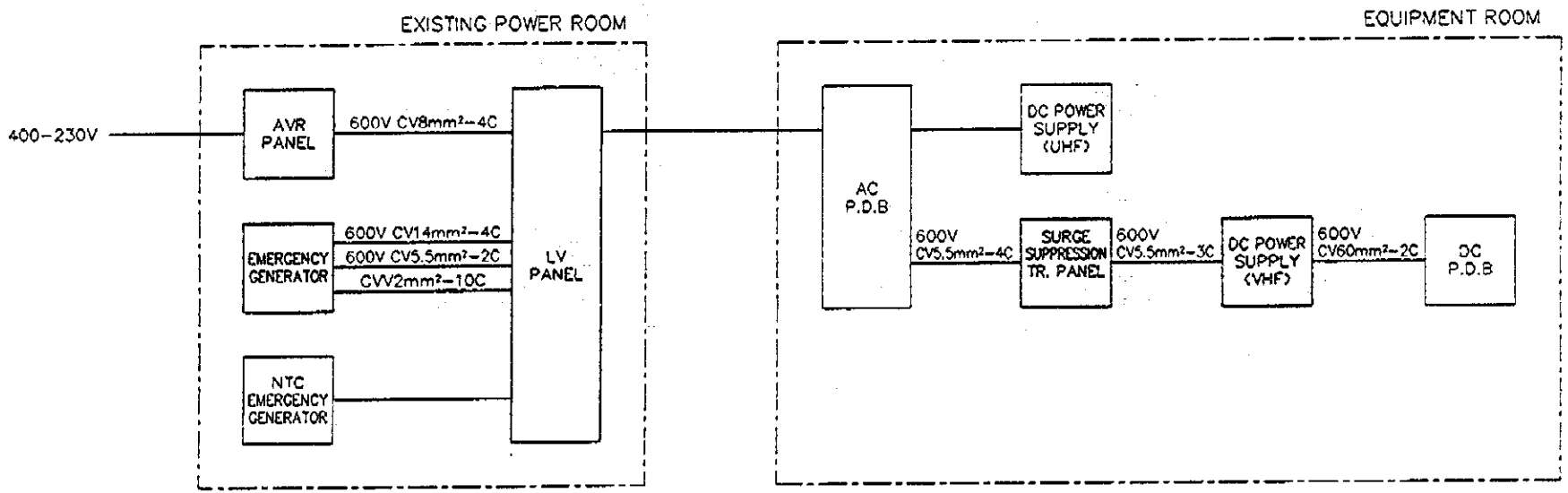




MOUNTING DRAWING OF ANTENNAS

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 PHU-4
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		プルチョキ山 アンテナ取付図
NIPPON KOEI CO.,LTD. Consulting Engineers		

PHU-A-04 [4]



LEGEND

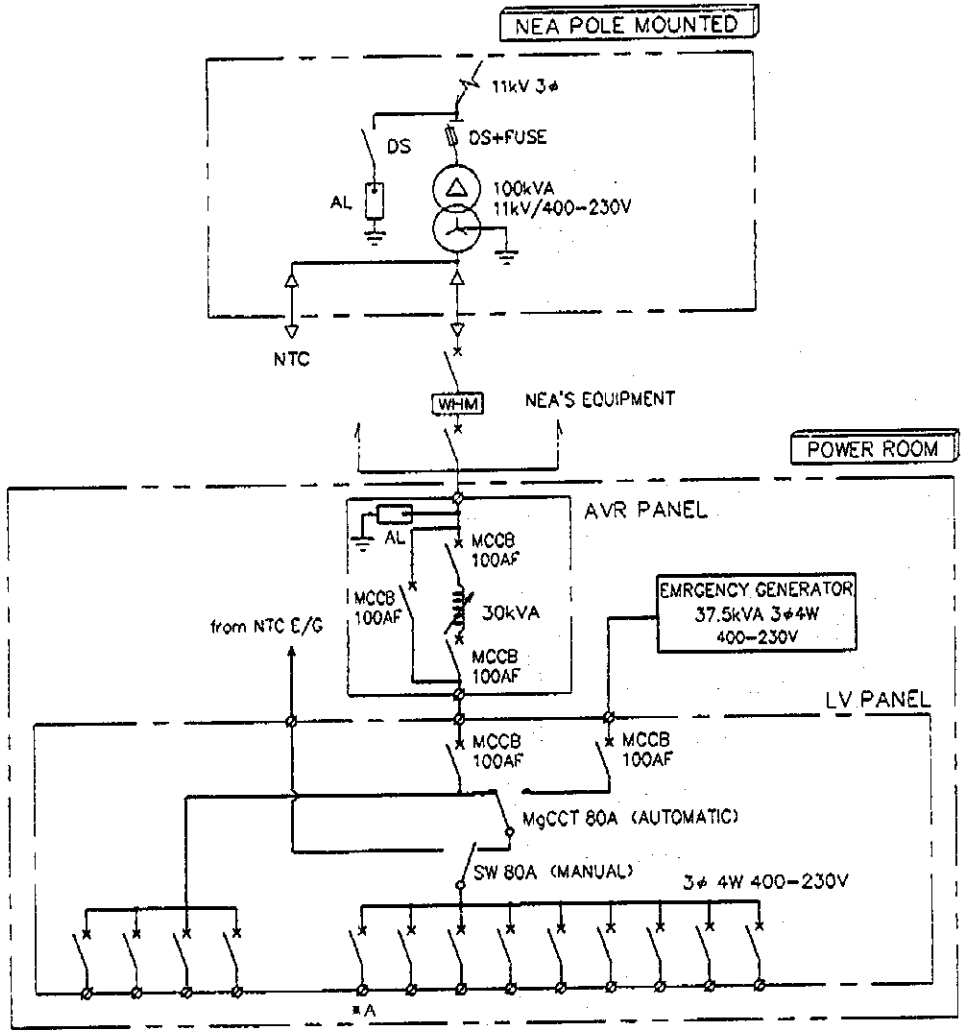
——— : EXISTING EQUIPMENT

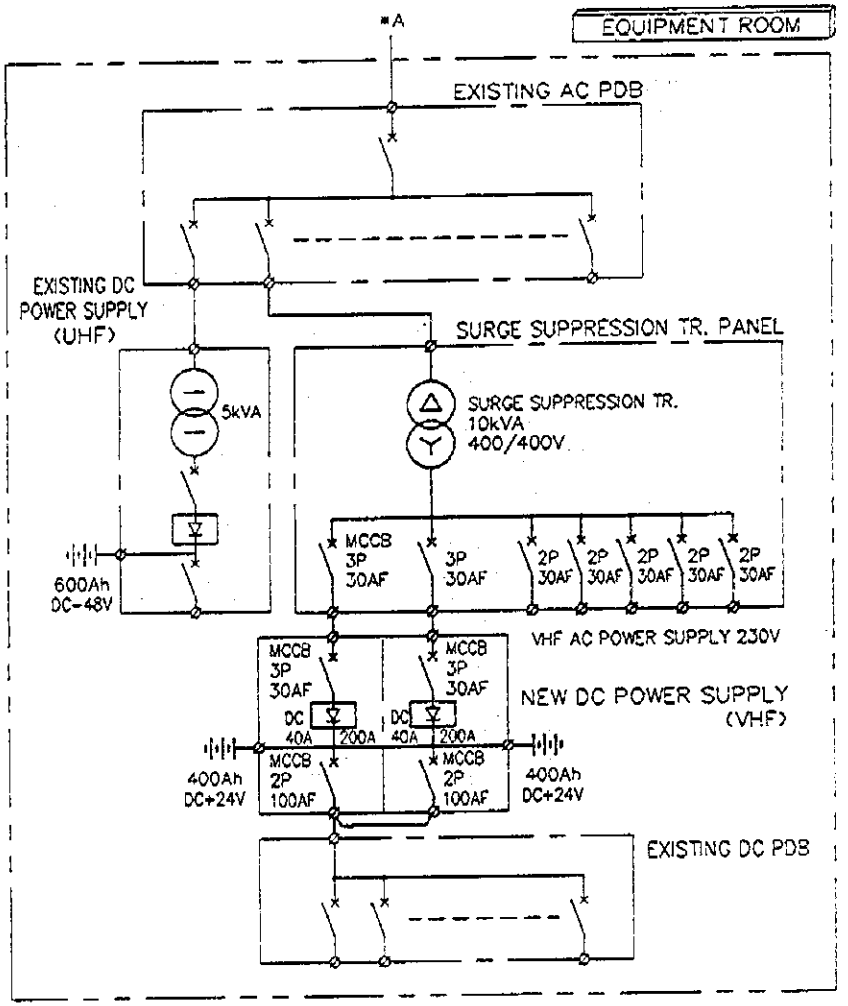
——— : NEW EQUIPMENT

SYSTEM DIAGRAM OF POWER SUPPLY

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 PHU-5
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		プルチョキ山 電源系統図
NIPPON KOEI CO.,LTD. Consulting Engineers		

PHU-A-05 (5)





MCCB NO.	LOAD NAME	LOAD kVA	MCCB SIZE
N101			4P 30AF
N102			4P 30AF
N103			2P 30AF
N104			2P 30AF

4P 30AF	4P 30AF	4P 30AF	4P 30AF	2P 30AF	2P 30AF	2P 30AF	2P 30AF	2P 30AF	
10.0									
E101	E102	E103	E104	E105	E106	E107	E108	E109	

SINGLE LINE DIAGRAM

JICA Japan International Cooperation Agency	Civil Aviation Authority of Nepal	図面 PHU-6
Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project in the Kingdom of Nepal		アルチョキ山 単線結線図
NIPPON KOEI CO.,LTD. Consulting Engineers		

PHU-A-06(7)

資料

資料1　調査団員氏名、所属　(1/2)

＜現地調査＞

1．総括：梅永　哲
Leader : Mr. Satoshi UMENAGA
JICA 無償資金協力調査部調査第二課
Second Project Study Division,
Grant Aid Project Study Department,
Japan International Cooperation Agency (JICA)

2．技術参与（電源設備）：藤川　恭治
Technical Advisor (Power Supply Facilities) : Mr. Kyoji FUJIKAWA
運輸省航空局管制保安部保安企画課航行視覚援助業務室専門官
Special Assistant to the Director, Visual Aid Office,
Air Traffic Services Department,
Civil Aviation Bureau, Ministry of Transport

3．技術参与（通信システム）：高師　章爾
Technical Advisor (Communications System) : Mr. Shoji TAKASHI
運輸省航空局管制保安部無線課施設第一係長
Chief, Aeronautical Radio Facilities Section,
Radio Engineering Division,
Air Traffic Services Department,
Civil Aviation Bureau, Ministry of Transport

4．業務主任／通信システム／運営維持管理計画：谷口　友孝
Chief Consultant / Communications System
/ Operation and Maintenance Planning : Dr. Tomotaka TANIGUCHI
日本工営㈱　NIPPON KOEI CO., LTD.

5．電源設備：長谷川　理雄
Power Supply Facilities : Mr. Michio HASEGAWA
日本工営㈱　NIPPON KOEI CO., LTD.

6．施設設計／施工計画：森山　勝廣
Facilities Design / Construction Planning : Mr. Katsuhiro MORIYAMA
日本工営㈱　NIPPON KOEI CO., LTD.

7．調達計画／積算：亀田　昌明
Procurement Planning / Cost Estimate : Mr. Masaaki KAMEDA
日本工営㈱　NIPPON KOEI CO., LTD.

資料１　調査団員氏名、所属　(2/2)

＜ドラフト説明調査＞

１．総括：渡辺　正夫
Leader : Mr. Masao WATANABE
JICA 筑波国際センター
Deputy Managing Director,
Tsukuba International Center,
Japan International Cooperation Agency (JICA)

２．技術参与（電源設備）：藤川　恭治
Technical Advisor (Power Supply Facilities) : Mr. Kyoji FUJIKAWA
運輸省航空局管制保安部保安企画課航行視覚援助業務室専門官
Special Assistant to the Director, Visual Aid Office,
Air Traffic Services Department,
Civil Aviation Bureau, Ministry of Transport

３．技術参与（通信システム）：高師　章爾
Technical Advisor (Communications System) : Mr. Shoji TAKASHI
運輸省航空局管制保安部無線課施設第一係長
Chief, Aeronautical Radio Facilities Section,
Radio Engineering Division,
Air Traffic Services Department,
Civil Aviation Bureau, Ministry of Transport

４．業務主任／通信システム／運営維持管理計画：谷口　友孝
Chief Consultant / Communications System
/ Operation and Maintenance Planning : Dr. Tomotaka TANIGUCHI
日本工営㈱　NIPPON KOEI CO., LTD.

５．電源設備：長谷川　理雄
Power Supply Facilities : Mr. Michio HASEGAWA
日本工営㈱　NIPPON KOEI CO., LTD.

資料2　調査日程　(1/2)

日順	日付	曜日	現地調査行程		宿泊地
			官ベース調査団	コンサルタント	
1	1/31	sun	TG641便にてバンコクへ移動。		バンコク
2	2/1	mon	TG319便にてカトマンズへ移動、JICAネパール事務所にて打合せ。		カトマンズ
3	2/2	tue	am:TIA施設概要調査。pm:インセプションレポートの説明・協議。		カトマンズ
4	2/3	wed	空港長面談。空港施設調査。サノティミ訓練所調査。		カトマンズ
5	2/4	thu	プルチョキ山頂無線中継所調査。 (Aチーム) 空港内気象機器調査。 (Bチーム)ネパール電力系統調査。		カトマンズ
6	2/5	fri	am:団内打合せ。pm:調査範囲に関するネパール航空公社との協議。		カトマンズ
7	2/6	sat	藤川/高師技術参与はTG320便にてバンコクへ移動。 第二レーダサイト候補地 (ナガルジュン) 調査。		カトマンズ
8	2/7	sun	(Aチーム) 調査範囲およびシステム構成に関するネパール航空公社との協議。 (Bチーム)TIA電源調査。		カトマンズ
9	2/8	mon	同上。		カトマンズ
10	2/9	tue	(Aチーム)ミニッツ案の提示ならびに説明。 (Bチーム)プルチョキ山電源調査。		カトマンズ
11	2/10	wed	(Aチーム)ミニッツ案に関する協議。 (Bチーム)サノティミ訓練所電源調査。		カトマンズ
12	2/11	thu	ミニッツ案の協議。ミニッツの調印。		カトマンズ
13	2/12	fri	JICAネパール事務所へ報告後、梅永調査団長はTG320便にてバンコクへ移動。	谷口業務主任は団長とJICAへ報告。	カトマンズ
14	2/13	sat	JL718便にて成田着。	フォローアップ調査団との協議。	カトマンズ
15	2/14	sun		資料整理。	カトマンズ
16	2/15	mon		空港既設施設調査。	カトマンズ
17	2/16	tue		将来計画、維持管理に関する調査。	カトマンズ
18	2/17	wed		空港既設施設調査。	カトマンズ
19	2/18	thu		大使館およびJICAへ挨拶。 第二レーダサイト候補地 (ナガルコット)調査。	カトマンズ
20	2/19	fri		フォローアップ調査団との協議後、TG320便にてバンコクへ移動。	バンコク
21	2/20	sat		JL708便にて成田着。	

資料2　調査日程　(2/2)

日順	日付	曜日	ドラフト説明調査行程		宿泊地
			官ベース調査団	コンサルタント	
1	5/27	thu	TG641便にてバンコクへ移動。		バンコク
2	5/28	fri	TG319便にてカトマンズへ移動、JICAネパール事務所にて打合せ。		カトマンズ
3	5/29	sat	TIA現地確認調査。		カトマンズ
4	5/30	sun	基本設計内容についてネパール航空公社との協議。 サノティミ訓練所調査。		カトマンズ
5	5/31	mon	基本設計内容についてネパール航空公社との協議。		カトマンズ
6	6/1	tue	同上。		カトマンズ
7	6/2	wed	基本設計内容についてネパール航空公社との協議。 TIA管制塔、ACC室他現地確認調査。		カトマンズ
8	6/3	thu	ミニッツ案についてネパール航空公社との協議。		カトマンズ
9	6/4	fri	ミニッツ案の協議。JICA報告、挨拶。		カトマンズ
10	6/5	sat	渡辺調査団長、藤川/高師技術参与、長谷川団員はTG320便にてバンコクへ移動。	谷口業務主任はミニッツ案の協議。	カトマンズ
11	6/6	sun	JL708便にて成田着。	同上。	カトマンズ
12	6/7	mon		TG320便にてバンコクへ移動。	バンコク
13	6/8	tue		JL708便にて成田着。	

資料３　相手国関係者リスト（1/2）

＜現地調査＞

１）航空公社（ＣＡＡＮ）

	面談者	役職　担当	備考
1.	N.P.Ghimire	Director General	
2.	P.Adhikari	Manager, Com&Nav.Aid Div,CAAN	
3.	N.B.S.Dongol	Senior ATCO,CAANHQ	
4.	L.M.Shakya	Chief, Electric section, TICAO,CAAN	
5.	M.K.Pokhrel	Chief, Flight Operation Div, TICAO,CAAN	
6.	A.P.Baskota	Chief Mechanical Section, TICAO,CAAN	
7.	S.B.Raut	Project Chief, TIA Modernization Project	
8.	M.S.Rawal	Senior Technical Officer, CAAN HQ	
9.	T.R.Manandhar	Senior ATCO,TIACAO,CAAN	
10.	K.S.Aryal	Chief, Radio Com Section TIACAO,CAAN	
11.	P.N.Sharma	Technical Officer, TIACAO,CAAN	
12.	B.Shresta	Manager of Finance Div., CAAN	

２）トリブバン空港（TIA）

	面談者	役職　担当	備考
1.	R.M.Joshi	General Manager	

３）ネパール電力庁（NEA）

	面談者	役職　担当	備考
1.	G. P. Raj	Deputy Manager of Kathmandu East Branch	
2.	B.P. Sharm	Manager of Patan Div.	
3.	M. P. Pradhan	Manager of Load Dispatching Center	
4.	S. S. Bhat	Manager of Bagmati Transmission Div.	

４）気象庁

	面談者	役職　担当	備考
1.	B.K.Vaidya	Manager Department of Hydrology and Meteorology	

資料３　相手国関係者リスト（2/2）

＜ドラフト説明調査＞

１）航空公社（ＣＡＡＮ）

	面談者	役職　担当	備考
1.	N.P.Ghimire	Director General	
2.	P.Adhikari	Manager, Com&Nav.Aid Div,CAAN	
3.	N.B.S.Dongol	Senior ATCO,CAANHQ	
4.	L.M.Shakya	Chief, Electric section, TICAO,CAAN	
5.	A.P.Baskota	Chief Mechanical Section, TICAO,CAAN	
6.	S.B.Raut	Project Chief, TIA Modernization Project	
7.	M.S.Rawal	Senior Technical Officer, CAAN HQ	
8.	T.R.Manandhar	Senior ATCO,TIACAO,CAAN	
9.	K.S.Aryal	Chief, Radio Com Section TIACAO,CAAN	
10.	P.N.Sharma	Technical Officer, TIACAO,CAAN	
11.	K.S.Lama	Manager, Flight Operation Div.	
12.	D.B.Thapa	Chief, CATC	
13.	L.B.Bhujel	Senior Divisional Engineer, CATC	

資料4　ミニッツ

Minutes of Discussions
on
the Basic Design Study
on
the Project for Improvement of Existing Air Traffic Services Equipment System
under
the Tribhuvan International Airport Modernization Project
in
the Kingdom of Nepal

In response to a request from His Majesty's 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 Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project (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 a Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Satoshi UMENAGA, Second Project Study Division, Grant Aid Project Study Department, JICA, and is scheduled to stay in the country from February 1 to 19, 1999.

The Team held discussions with the concerned officials of the Government of Nepal, and conducted a field survey at the project site.

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

Kathmandu, February 11, 1999

梅永 悟

Mr. Satoshi UMENAGA
Leader
Basic Design Study Team
Japan International Cooperation Agency

Mr. Prabhaker Adhikari
Manager, Communication and Navigation
Aid Division, Tribhuvan International Airport
Civil Aviation Office
Civil Aviation Authority of Nepal

ATTACHMENT

1. OBJECTIVE

The objective of the Project is to improve the existing air traffic services equipment system including the power supply system in order to ensure complete performance of the equipment which were procured under the Japanese grant aid assistance conforming the provision for the future technical compatibility in air traffic equipment system operation.

2. PROJECT SITES

The sites of the Project are the Tribhuvan International Airport (TIA), Sano Thimi Training Center, and the Repeater Station at Mt. Phulchoki.

3. RESPONSIBLE AND IMPLEMENTING AGENCY

The Civil Aviation Authority of Nepal (CAAN), established on December 31,1998 after the dissolution of the Department of Civil Aviation (DCA), is responsible for the administration and execution of the Project.

The proposed organization chart (Draft) of the CAAN is shown in Annex-1. The final organization structure of the CAAN is under formulation and it will be established before the next fiscal year that begins from July 16, 1999.

4. THE NECESSARY ITEMS FOR THE REALIZATION OF THE PROJECT REQUESTED BY THE GOVERNMENT OF NEPAL

After a series of discussions, the items of the Project as requested are shown in Annex-2. However, the final components of the Project will be decided after further studies.

5. JAPAN'S GRANT AID SYSTEM

The Team explained in detail the Japan's Grant Aid System and the Nepalese side has understood it as shown in Annex-3.

6. NECESSARY MEASURES TO BE TAKEN BY THE GOVERNMENT OF NEPAL

The Government of Nepal will take necessary measures described in Annex-4 for smooth implementation of the Project, on condition that Grant Aid assistance by the Government of Japan is extended to the Project.

7.FURTHER SCHEDULE OF THE STUDY

(1) The Team will proceed to further studies in Nepal until February 19, 1999.

(2) Based on the results of the Field Survey, JICA will prepare the Draft Basic Design Report and dispatch a team in latter half of May, 1999 in order to explain the Nepalese side on the outline of the Draft Basic Design.

8. OTHER RELEVANT ISSUES

(1) Technical Issues

1a) The Nepalese side presented the information sheet as their original request which is in Annex-5. In response to the presentation by the Nepalese side, both sides had a series of discussions and reached the conclusion shown in Annex-2 keeping in view of the Inception Report..

1b) The Automatic Message Switching System (AMSS) is the essential equipment for ensuring the normal Airport Operation for aeronautical fixed telecommunications. The Team will convey the strong request for the replacement of the AMSS in the Project, because of its importance. Since the AMSS should be in operation without interruption, the CAAN shall surely submit the maintenance plan of the AMSS to the Japanese side.

1c) The Nepalese side requested that the Project design should take care of integration and inter-operationability of the air traffic operations and expandability of the communication system of the Project.

1d) On the proposal by the Team to rehabilitate and replace Control Tower Console, Approach Control Center, Area Control Center including extended range VHF A/G equipment, the Nepalese side drew the attention of the Team to include other integral operational centers such as FSC, AMSS, RCC, RFFS etc. The Team expressed to consider this matter to be renovated by the CAAN and to consider the relevant design drawing and equipment specifications submitted by the Nepalese side for the confirmation of technical compatibility and interfacing.

1e) The exact schedule for installation of the equipment to be provided by the CAAN shall be decided during the explanation of the Draft Basic Design Report.

(2) Administration and management issues

2a) The team emphasized the importance of the maintenance work for ensuring the equipment in good condition. The Nepalese side promised the improvement of present situation.

2b) The hand-over of the equipment procured under the grant aid assistance from the CAAN to the TIACAO (TIA Civil Aviation Office) is of concern for the Japanese side because of the principle of the grant aid assistance in point of "Proper Use". The Nepalese side is proceeding the necessary procedure for hand-over and it should be done immediately.

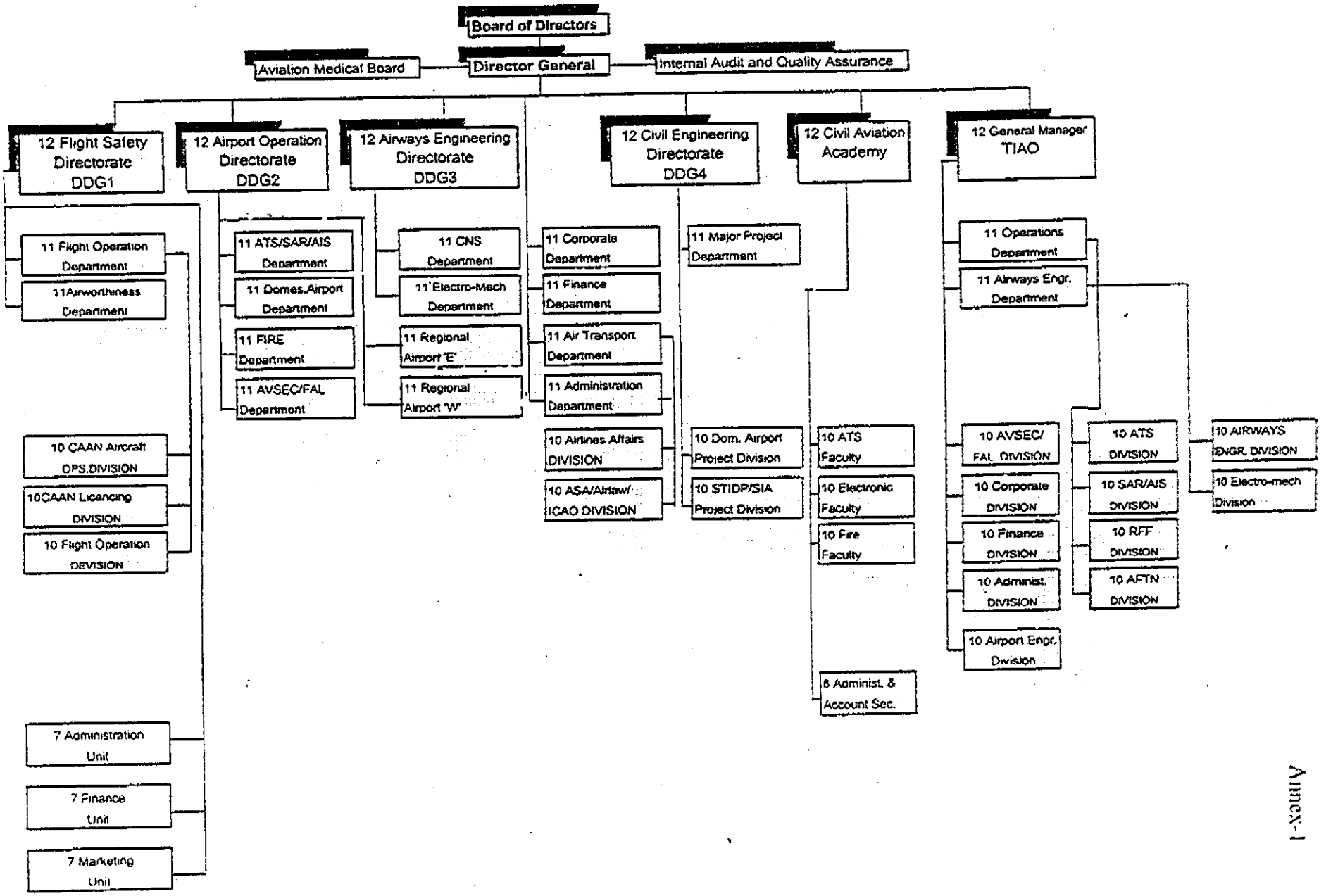
2c) The team requested the assignment of the Project Chief of CAAN as the counterpart of the Project by the occasion of the implementation stage. The Nepalese side promised that the person who has the technical background will be assigned as soon as possible.

9. THE ATTENDANTS OF THE DISCUSSIONS

The attendants of the discussions are show in Annex-6.

Proposed (Draft) Feb. 7, 1999

CAAN - Organisational Structure



App.4-5

Annex-1

THE NECESSARY ITEMS FOR THE REALIZATION OF THE PROJECT REQUESTED BY THE GOVERNMENT OF NEPAL

Equipment	Location
1. Tower Control	
(1) Consoles - COORD - ADC - SMC - FDC	VFR room (Tower)
(2) CCU	New EQ room (Existing ACC room)
(3) Tape Recorder	New EQ room (Existing ACC room)
(4) VHF Air to Ground Radios - 118.1 MHz (M, for ADC) - 118.1 MHz (S, for ADC) - 121.9 MHz (M, for SMC) - 121.9 MHz (S, for SMC) - 118.5 MHz (for stand-by) - 127.0 MHz (M, for ATIS) * - 127.0 MHz (S, for ATIS) *	New EQ room (Existing ACC room) - ditto - - ditto - - ditto - - ditto - Mt. Phulchoki - ditto -
(5) Meteorological Facilities - RVR - Ceilo Meter - Met Sensors	02 side of runway - ditto - Both sides of runway
(6) Intercom **	-
2. Area Control	
(1) Console - ACC	Radar building
(2) VHF Air to Ground Radios (at TIA) - 126.5 MHz (Main) - 124.7 MHz (Secondary) - 121.5 MHz (Emergency)	Radar building
(3) VHF Air to Ground Radios (at Mt. Phulchoki) - 126.5 MHz (M, for ACC) - 126.5 MHz (S, for ACC) - 124.7 MHz (M, for ACC for stand-by) - 124.7 MHz (S, for ACC for stand-by) - 121.5 MHz (Emergency)	Mt. Phulchoki

* : These items are strongly requested in addition by the Government of Nepal.

** : Concerning the installation of the intercom system, the Team proposed the separated system with existing centers which shall be renovated by the CAAN. However, interfacing will be considered depending on the progress of implementation by the CAAN.

Equipment	Location
3. Power Supply	
(1) TIA - Transformer (11kV/400-230V) - Emergency generator - UPS - Construction of the new power house	New power house and existing battery room at TIA
(2) Sano Thimi Training Center - Emergency generator (outdoor type) - Battery for existing CVCF	Sano Thimi Training Center
(3) Mt. Phulchoki - Emergency generator - AVR	Mt. Phulchoki

JAPAN'S GRANT AID SCHEME

1. Grant Aid Procedures

1) Japan's Grant Aid Program 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)

2) 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 (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study), using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Program, 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 signed by the Governments of Japan and the recipient country.

Finally, for the 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 (hereafter referred to as "the Study"), conducted by JICA on a requested project (hereafter 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 :

a) 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.

b) Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.

c) Confirmation of items agreed on by both parties concerning the basic concept of the Project.

d) Preparation of a basic design of the Project.

e) Estimation of costs 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 the 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 though 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 (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA. The consulting firm(s) used for the Study is(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) What is Grant Aid?

The Grant Aid Program 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. Grant Aid is not supplied through the donation of materials as such.

2) 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.

3) "The period of the Grant Aid" means the one fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consulting firm(s) and (a) contractor(s) and final payment to them must be completed. However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, 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.

4) Under the Grant Aid, 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 constructing 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.)

5) Necessity of "Verification"

The Government of 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.

6) Undertakings required of 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:

(1) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction.

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

(3) To secure buildings prior to the procurement in case the installation of the equipment.

(4) To ensure all the expenses and prompt excursion for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid.

(5) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts.

(6) To accord Japanese nationals whose services may be required in connection with the 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.

7) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and the 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.

8) "Re-export"

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

9) Banking Arrangements (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 the recipient country or its designated authority.

NECESSARY MEASURES TO BE TAKEN BY THE GOVERNMENT OF NEPAL

The following necessary measures should be taken by the Government of Nepal on condition that the Grant Aid by the Government of Japan is extended to the Project:

1. To provide data and information necessary for the Project.
2. To secure land necessary for the site of the Project and clear, level and reclaim the land prior to commencement of the construction.
3. To provide the following facilities:
    1) Power distribution line to the site boundary
    2) Provision of water supply to the site
    3) Provision of drainage
    4) Telephone trunk line and the main distribution frame/panel of building
    5) Temporary storage yard (at least 50m x 50m)
    6) Provision of gas, if any
4. To remove unused equipment and facilities required for the Project.
5. To bear commissions to the Japanese foreign exchange bank for its banking services based upon the Banking Arrangement, namely the advising commission of the "Authorization to Pay" and payment commission.
6. To ensure tax exemption, customs clearance at the port of disembarkation in Nepal.
7. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts.
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 Nepal and stay therein for the performance of their work.
9. To provide necessary permissions, licenses and other authorizations for implementing the Project, if necessary.
10. To maintain and use properly and effectively the equipment procured under the Project.
11. To bear all the expenses other than those to be borne by the Grant.
12. To coordinate and solve any issues related to the Project which may be raised by third parties during the implementation of the Project.

ANNEX - 5

AIR TRAFFIC CONTROL EQUIPMENT IMPROVEMENT PROJECT (INFORMATION SHEET)

1. Establishment of integrated voice communication switching system with suitable controlling, monitoring, recording, intercom facilities and other related equipment & accessories for Air Traffic Services . The existing operation centres are as follows :
   - Control Tower
   - Approach control Centre
   - Area Control Centre
   - Flight Service Centre
   - Automatic Message Switching Centre
   - Rescue Co-ordination Centre
   - Rescue & Fire Fighting Centre
   - Proposed enroute Radar Operation Centre

2. Improvement of power supply system . Provision of UPS/CVCF for the operation / control Centres. Including at Sanothimi training Centre.

3. a) Improvement of air ground, point to point communications system.
   b) ATIS (both terminal & enroute) on VHF/extended VHF range.

4. a) Replacement of the existing Automatic Message Switching System (AMSS) capable of flight data automation and interfacing with the existing RDPS also with provision for VSAT voice and data links with Domestic Airports and between Kathmandu, Calcutta and Dhaka.
   b) Future provision for satellite based ADS

5. Rehabilitation and replacement of existing PABX system.

6. Installation of an automatic weather data acquisition system along with required met equipments/with multiple sensors inputs and the provision for interfacing with the AMSS system.

7. Establishment of an alternative VHF repeater stations.

8. Rehabilitation of existing Phulchoki Repeater Station including power supply improvement.

9. Counter part Project Manager Co-ordinator and counter - parts parficipation in basic and detailed design phase and also during equipment & system testing in factory.

10. Both in-country and out of country training in the proposed equipment and system.

11. Dedicated maintenance vehicle equipped with maintenance tools and communication facilities.

NEED OF ATIS FOR IMPROVEMENT OF EXISTING AIR TRAFFIC CONTROL SYSTEM IN TRIBHUVAN INTERNATIONAL AIRPORT (TIA)

BEFORE THE INSTALLATION OF RADAR

The AIR TRAFFIC CONTROL system in TIA was established as follows :

1. KATHMANDU TOWER : Jurisdiction within TMA Boundary (Laterally 25 NM Radius of the Airport and vertically up to 11500 feet AMSL)

2. KATHMANDU CONTROL WEST : Looking after western sector of the FIR outside TMA boundary.

3. KATHMANDU CONTROL EAST : Looking after eastern sector of the KATHMANDU FIR outside TMA boundary.

AFTER THE INSTALLATION OF RADAR

1. Jurisdiction of KATHMANDU TOWER reduced laterally to 5 NM and vertically 6500 feet AMSL

2. KATHMANDU CONTROL WEST and KATHMANDU CONTROL EAST is combined as a single unit - KATHMANDU CONTROL .

3. A new ATC unit RADAR APPROACH CONTROL is established. For the maximum utilization of the newly installed RADAR APPROACH CONTROL jurisdiction is established within the newly extended TMA boundary i.e. Laterally 50 NM Radius and vertically 20,000 feet AMSL

With this newly established area of jurisdiction RADAR APPROACH CONTROLLER has to look after almost 100 NM (50 NM WEST & 50 NM EAST) . So the Radar controller is over-burdened i.e. only one controller has to respond many many Aircraft. The result is excessive communication load on the approach control frequency.

SOLUTION FOR THIS PROBLEM

Reduce the communication load. This is possible if some of the repetitive type of information is not required to be passed to the aircraft individually. Those informations are as follows :

a) Met Information
b) Type of Approach - in - use
c) Runway - in - use
d) Expected delay or no delay
e) Runway condition
f) Status of NAVAIDS
g) Airport operation status etc.

So for the best performance of radar approach control in TIA. ATIS IS VERY VERY IMPORTANT

CONCLUSION :

For the **maximum utilisation** of the newly installed **Radar Facility** & for the optimum performance of existing AIR TRAFFIC CONTROL system. ATIS is to be transmitted on the V.H. frequency with extended range VHF installed at Mt. Phulchoki using the microwave link.

LIST OF ATTNDANTS

1. Nepalese Side

No.	Name	Field in Charge	Present Position
1	P. Adhikari	Coordinator	Manager, Com & Nav. Aid Div, TIACAO, CAAN
2	N.B.S. Dongol	Member	Senior ATCO, CAAN HQ
3	L.M. Shakya	Member	Chief, Electric Section, TIACAO, CAAN
4	M.K. Pokhrel	Member	Chief, Flight Operation Div, TIACAO, CAAN
5	A.P. Baskota	Member	Chief, Mechanical Section, TIACAO, CAAN
6	S.B. Raut	Member	Project Chief, TIA Modernization Project
7	M.S. Rawal	Member	Senior Technical Officer, CAAN HQ
8	T.R. Manandhar	Member	Senior ATCO, TIACAO, CAAN
9	K.S. Aryal	Member	Chief, Radio Com Section, TIACAO, CAAN
10	P.N. Sharma	Member Secretary	Technical Officer, TIACAO, CAAN

2. Japanese Side

No.	Name	Field in Charge	Present Position
1	S. Umenaga	Leader	Second Project Study Div., Grant Aid Project Study Dept. JICA
2	K. Fujikawa	Technical Advisor (Power Supply Facilities)	Special Assistant to the Director, Visual Aid Office, Air Traffic Services Dept, Civil Aviation Bureau, Ministry of Transport (MOT)
3	S. Takashi	Technical Advisor (Communications System)	Chief, Aeronautical Radio Facilities Section, Radio Engineering Div., Air Traffic Services Dept., Civil Aviation Bureau, MOT
4	T. Taniguchi	Chief Consultant /Communications System /O&M Planning	Nippon Koei Co., Ltd.
5	M. Hasegawa	Power Supply Facilities	Nippon Koei Co., Ltd.
6	K. Moriyama	Facilities Design / Construction Planning	Nippon Koei Co., Ltd.
7	M. Kameda	Procurement Planning /Cost Estimate	Nippon Koei Co., Ltd.
8	C. Ota	JICA Expert	JICA Expert to CAAN

Minutes of Discussions

on

the Basic Design Study

on

the Project for Improvement of Existing Air Traffic Services Equipment System

under

the Tribhuvan International Airport Modernization Project

in

the Kingdom of Nepal

(EXPLANATION ON DRAFT REPORT)

In February 1999, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Basic Design Study Team on the Project for Improvement of Existing Air Traffic Services Equipment System under the Tribhuvan International Airport Modernization Project (hereinafter referred to the "the Project") to His Majesty's Government of the Kingdom of Nepal (hereinafter referred to as "Nepal"), and through discussion, field survey and technical examination of the result in Japan, JICA prepared a draft of the Study.

In order to explain and consult the contents on the Draft Report, JICA sent to Nepal the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Masao Watanabe, Deputy Managing Director, Tsukuba International Center, JICA, from May 28 to June 5, 1999.

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

Kathmandu, June 21, 1999

Mr. Ken Hasegaawa
Resident Representative
JICA Nepal Office
Japan International Cooperation Agency

Mr. Prabhaker Adhikari
Manager
Communication and Navigation
Aid Division, TIACAO
Civil Aviation Authority of Nepal

ATTACHMENT

1. Basic Concept of this Study

This Project aims at complete arrival of the effect from approach radar control system granted by Japan's Phase 1 project.

2. Components of the Draft Report

The Civil Aviation Authority of Nepal (CAAN) accepted in principle the components of the draft report explained by the Team.

The Major components are shown in Annex-1.

3. Responsible and Implementing Agency

The Civil Aviation Authority of Nepal (CAAN) is responsible for the administration and execution of the Project. The implementation sites of the Project covers Tribhuvan International Airport and CATC (Sanothimi). The organization chart of the CAAN is shown in Annex-2.

4. Japan's Grant Aid Scheme

Nepal side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of Nepal as explained by the Team and described in Annex-3 and Annex-4 of the Minutes of Discussions signed by both parties on February 11, 1999.

5. Schedule of the Study

JICA will complete the final report in accordance with the confirmed item and send it to the Government of Nepal by end of July, 1999.

6. Other relevant issues

(1) The monitoring and control equipment for navigation facilities, air field lighting and so on are designed to be set on new consoles. Nepalese side agreed and accepted that the restoring to each original function is subject to the normal functioning of the existing interface equipment.

(2) Nepal side agreed that new antenna tower for area control on Mt. Phulchoki repeater station shall be as exclusive use only for air traffic control. Other antennas except for VHF air to ground radios of 118 to 136MHz shall not be mounted on the tower.

(3) Nepal side agreed that CAAN shall clear the existing radios which are out of order on Mt. Phulchoki before the commencement of the Project.

(4) Japanese side explained that the quantities of spares shall be considered to secure 2 years operations

of the equipment. Nepalese side accepted this matter in principle.

(5) The frequency of 127.0MHz (not 120.7MHz) has been already assigned for ATIS in TIA, and the use of the frequency has already approved by the relevant Authority in Nepal.

(6) It was confirmed that the training schedule of Sanothimi Training Center to be planned to improve the power supply system.

7. Comments on the Draft Report

The proposed comments and suggestions on the Basic Design Study Report (Draft) by the Nepalese side during consultation is attached as Annex-3. This is subject for adoption by Japanese side. Final Basic Design Study Report mentioned in item 5. "Schedule of the Study" in this minutes shall be finalized with due consideration on these comments and suggestions.

Table 1-2 Quantity and Location of Equipment

(a) Air Traffic Control and Communication Facilities

Equipment	Q'ty	Location
Tower Control Facilities		
25W VHF dual transmitter	2sets	TIA Operation Building 1F New Equipment Room
25W VHF single transmitter	1set	TIA Operation Building 1F New Equipment Room
VHF Tx antenna with antenna mast	3sets	The Roof of TIA Operation Building
Wired rack for VHF transmitters	1set	TIA Operation Building 1F New Equipment Room
Dual VHF receiver	2sets	TIA Operation Building 1F New Equipment Room
Single VHF receiver	1set	TIA Operation Building 1F New Equipment Room
VHF Rx antenna with antenna mast	3sets	The Roof of TIA Control Tower
Wired rack for VHF receivers	1set	TIA Operation Building 1F New Equipment Room
Multi-channel tape recorder	1set	TIA Operation Building 1F New Equipment Room
Multi-channel tape reproducer	1set	TIA Operation Building 1F New Equipment Room
Area Control Facilities		
50W VHF dual transmitter	2sets	Mt. Phulchoki Equipment Room
50W VHF single transmitter	1set	Mt. Phulchoki Equipment Room
VHF Tx antenna with antenna mount	3sets	Mt. Phulchoki Existing Antenna Tower
Wired rack for VHF transmitters	1set	Mt. Phulchoki Equipment Room
Dual VHF receiver	2sets	Mt. Phulchoki Equipment Room
Single VHF receiver	1set	Mt. Phulchoki Equipment Room
VHF Rx antenna with antenna mount	3sets	Mt. Phulchoki New Antenna Tower
Wired rack for VHF receivers	1set	Mt. Phulchoki Equipment Room
25W VHF single transmitter for Phulchoki back-up	3sets	TIA Radar Operation Building GF Equipment Room
VHF Tx/Rx antenna with antenna mast for Phulchoki back-up	3sets	TIA Existing Antenna Tower
Wired rack for VHF transmitters for Phulchoki back-up	1set	TIA Radar Operation Building GF Equipment Room
Single VHF receiver for Phulchoki back-up	3sets	TIA Radar Operation Building GF Equipment Room
25m tower with arrester and observation light for Phulchoki back-up	1set	Mt. Phulchoki
Wired rack for VHF receivers for Phulchoki back-up	1set	TIA Radar Operation Building GF Equipment Room
Interface unit for existing UHF link	2sets	TIA Radar Operation Building GF Equipment Room Mt. Phulchoki Equipment Room

Equipment	Q'ty	Location
Tower Control Console		
Aerodrome console	1set	TIA VFR (Control Tower) Room
Coordinator console	1set	TIA VFR (Control Tower) Room
Surface movement console	1set	TIA VFR (Control Tower) Room
Flight data console	1set	TIA VFR (Control Tower) Room
Area Control Console		
Flight data console	1set	TIA Radar Operation Building 1F New ACC Room
Communication console	1set	TIA Radar Operation Building 1F New ACC Room
Communication Control		
Communication control unit	1set	TIA Operation Building 1F New Equipment Room
Aeronautical Telecommunication Facilities		
ATIS System	1set	TIA VFR Room, Mt. Phulchoki
AMSS	1set	TIA Operation Building 1F AMSS Room and others

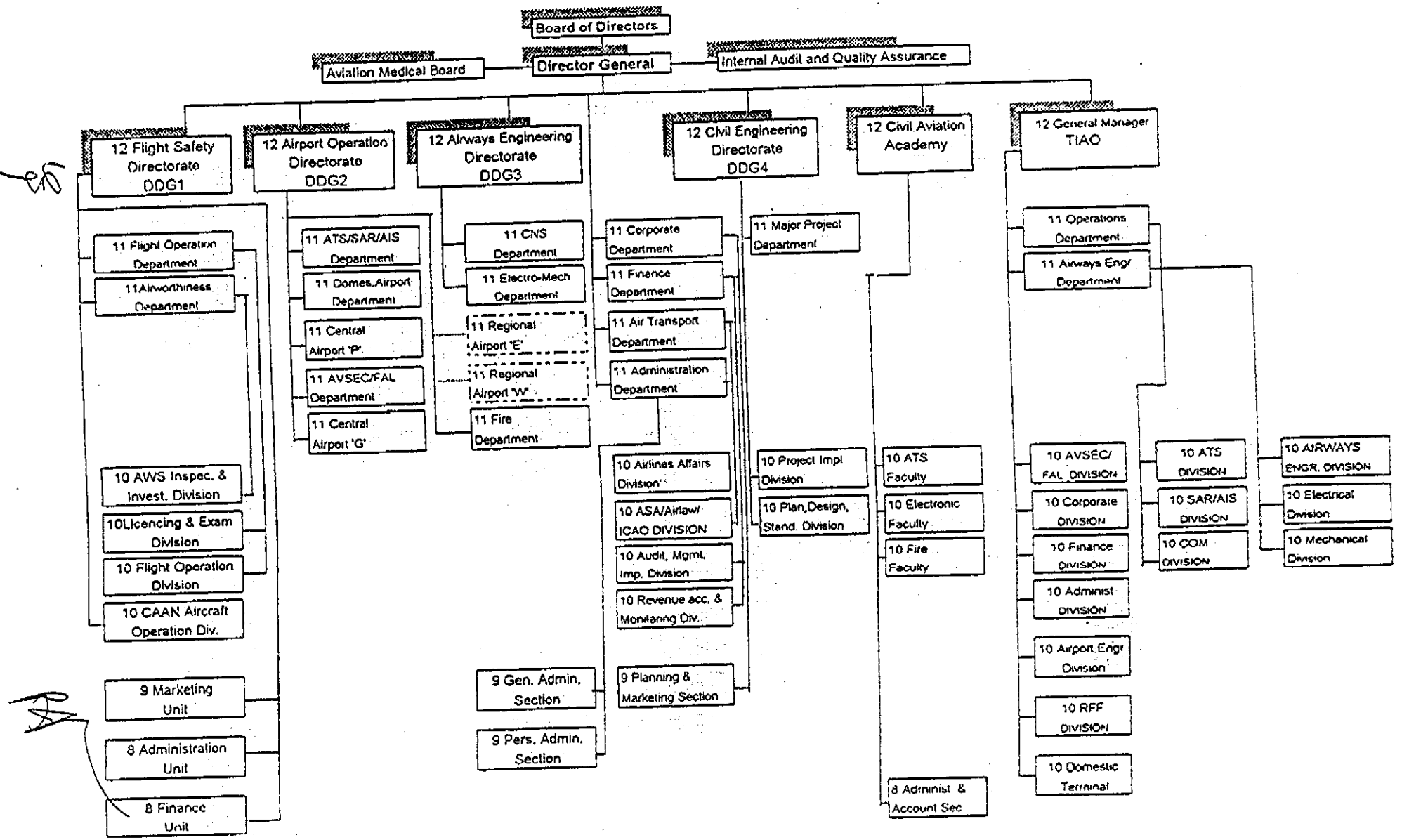
(b) Meteorological Facilities

Equipment	Q'ty	Location
RVR	1set	TIA Runway
Ceilometer	1set	TIA Runway
Wind sensor	2sets	TIA Runway
Temperature and humidity meter	1set	TIA Runway
Rainfall gauge sensor	1set	TIA Runway
Remote weather data transmission	1set	TIA Runway
Weather data collecting equipment	1set	TIA Operation Building 1F New Equipment Room
Weather report editing system	1set	TIA Operation Building 2F MET Room
Visual display unit	2sets	TIA Operation Building 1F New Equipment Room and 2F MET Room (newly extended operation air line building)
Printer	1set	TIA Operation Building 2F MET Room
Wind display	7sets	TIA SMC, ADC, RCC1, RCC2, RCC3, SIM1, SIM2
RVR display	7sets	TIA SMC, ADC, RCC1, RCC2, RCC3, SIM1, SIM2
EL/MET display	7sets	TIA SMC, ADC, RCC1, RCC2, SIM1, ATIS, FDC

(c) Power Facilities

Equipment	Q'ty	Location
Power Facilities for TIA		
11kV VCB panel	1set	TIA Existing Power House
11kV Transformer panel	1set	TIA New Power House
Low voltage panel	1set	TIA New Power House
250kV Emergency diesel generator	1set	TIA New Power House
10kVA UPS	1set	TIA Operation Building 1F New Equipment Room
Power Facilities for Sanothimi Training Center		
150kVA Emergency diesel generator	1set	Sanothimi Training Center Emergency Generator Hut
Low voltage panel	1set	Sanothimi Training Center Radar Laboratory
10kVA UPS	1set	Sanothimi Training Center Simulator Computer Room
Power Facilities for Phulchoki Repeater Station		
37.5kVA Emergency diesel generator	1set	Mt. Phulchoki Power Room
Low voltage panel	1set	Mt. Phulchoki Power Room
30kVA AVR	1set	Mt. Phulchoki Power Room
10kVA Surge suppression transformer	1set	Mt. Phulchoki Equipment Room
DC power supply unit with battery charger	1set	Mt. Phulchoki Equipment Room

CAAN - Organisational Structure



App.4-21

Proposed Comments & Suggestions on Basic Design Study Report (Draft), May 1999 on the Project for Improvement of existing Air Traffic Services Equipment System under the TIA Modernization Project in the Kingdom of Nepal by the Nepalese Side based on the consultation from 30th May-3rd June,1999

Chapter 1,

Page 1-1;

1-1 Objective of the Project

No concurrence with the objectives of the Minutes signed on 11th February 1999. So, proposed to the team to incorporate accordingly.

1-2(1) In first line replace words "items below" by as mentioned in and delete from "shows ... measures."

In 3rd line delete words "which are", replace words 'by beyond' by due to and replace 'Plan ... Plan' by project as this doesn't match with the objective of the Project.

In the 7th line replace word 'by' with due. In next line delete 's' of the word mountains, replace 'at ' by in the and replace 'at' by of.

In 9th line rewrite as Limitation in reliability of air to ground communication systems

Last para, 3rd line delete 'in' and read as damaged, for instance, by lightening. Last line add at before the word 'Nagarjun'.

Page 1-2

1-2(3) Rewrite the title as Equipment list for the design study.

Page 1-3

1-2(4) In 1st line replace words 'operational manual' by operation and maintenance manuals.

In the 7th line delete words 'For this study' and start with Therefore...

In the 8th line replace the word 'two' by five. Start with a new sentence after 'supplied', as A ten years supply of spare parts will be guaranteed. Replace the last sentence by An indicative items are described in table 2-4 and 2-5 in chapter 2.

1-2(5) Rewrite the title as Required items to be met by Nepalese side

In 1st sentence, replace word 'Plan' by Project.

Page 1-6 Table 1-2 Multi-channel tape recorder should be dual (main and standby)

Page 1-7

In 3rd column; read TIA VFR room as TIA VFR (Control Tower) Room.

In table (b) Meteorological Facilities under column location in 8th line add word (newly extended Operation / Airlines) after word '2F'

Page 1-8

In table (c) column Equipment, 2nd line read 'CB' as VCB

Column Location, 3rd line replace 'Existing' by New

Page 1-9

1-3-1(1) In 1st line after the word 'Radio' add communication & and replace 'for' by at

In second para. first line after the word 'radio' add Communication & and replace word 'for' by at,

In the 9th line add the scope of after words 'out of'

1-3-1(2), (a), in 4th line delete word 'are'

And in (b) 1st line replace word 'the' by be

Page 1-10

1-3-1(3) In 3rd line Phase1 work : After word 'trading' add and construction and in 2nd line delete ○ 'Japanese construction company'

In 3rd line add s on the word 'sub-contractor'.

1-3-1(4), Rewrite first two lines as The availability of the market for materials procurement are mentioned below. There is no available procurement market besides Japan and Nepal.

In (a) Rewrite as 'The maintenance staffs are familiar with the existing radar equipment system.'

In (c) Rewrite as Interfacing with the existing facilities are coordinated.

Page 1-11

1-3-1(6) In 2nd line replace the word 'Grand' by Grant

In 3rd line replace words 'applied to policies' by guided, remove 's' from the word 'following' and add policies

In (b) 2nd line delete from 'which may ...side.'

1-3-2(1) Rewrite the 1st sentence of 1st line as 'The improvement works in this project is expected to facilitate for the smooth operation radar system.'

Page 1-12

1-3-2(3) In title line after word 'Facilities' add and Technical specifications.

Page 1-24 Replace the last sentence 'But some unworkable ...original function' by But restoring to its original function is subjected to the normal functioning of the existing interfaced equipment

Page 1-25 on 1st line add of between 'comparison' and 'new'
Under (a) Aerodrome Control Console
Delete 12th line 'Operation...communication'
On 14th line replace 'ACC' by APP

On 16th line Add /SFL after 'REILS'
At the bottom add Monitoring of APP Control Frequencies

Page 1-26 on 4th line add Obstruction light/ ABN/ IWS/ Warning Sirens
(b) 'Communication Console' to be replaced by Area Controller Console

Page 1-27 3rd line is to be deleted
At the bottom add Monitoring APP Control Frequencies
Page 1-28 Under (a) ATIS Transmitter (dual) missing, Refer to Drawing-2.

Page 1-43/1-46 existing diesel tanks at TIA and Repeater Station at Mt. Phulchoki shall be used for refilling proposed service tanks for new emergency generator and automatic pumping system including pumps and piping etc. shall be installed by the Project. Fuel used in Nepal is heavy duty diesel oil.

Proposed modifications/ changes in the drawings:

Drawing No.1: Request the confirmation of possible impact of the proposed new power house to be built within 5m distance from radar Operation Building.

Drawing No.2: Layout of existing APP backup (VHF Transceivers) is missing at Airport site.
Request to utilize the existing 45m Antenna Tower for three RXS frequencies which are proposed to install at new VHF tower.

Drawing No.3: Location confirmation is required for 3VHF TX Antenna proposed
& to install at roof-top of existing operation building and location of
Drawing No.14 ATIS VHF Rx Mon. Antenna.

Also suggested to show AFL control, Nav. Aids Mon. and VHF Rxs Monitor for APP, ACC, Control Tower etc. on the system Block Diagram.

Drawing No.4 AMSE shall comply with the present ICAO requirements and shall be upgradable to meet transitional requirements to connect with the future ATN system.
Drawing shows the input channels only 8 where as existing AMSS system at TIA consists of 16 channels. Japanese team mentioned that the increase of other 8 channels will double the cost of the system. However, the team agreed to verify the cost in this regard.

Drawing No.6: Signal cable route of R/ W 20 side Wind Sensor should be separated from Existing radar site facility and advised to reroute to R/W Center to minimize the complexity.

Drawing No.8: FDC position is proposed at the leftmost side after SMC.
Request to consider a small console which will be utilized as a temporary console during installation work and as a emergency console in the future.

Drawing No.10 Requested to show detail layout of the ACC console with proposed dimensions. Also to consider about the partition requirements.

Drawing No.11 Suggested the arrangement of racks in row/ column basis with the provision of sufficient space for future expansion. Suggested for separate housing arrangements for UPS/ batteries.

Drawing No.21-26, Sànothimi, Training Center

Requested to upgrade the existing CVCF to UPS. If it is not possible then please consider separate UPS system for Simulator as well as radar equipment.

Consider some space for maintenance work as well as for spare holding in Generator hut. Also it is suggested Automatic Power Supply Changeover unit to be located in generator hut.

Alternate arrangement required for corrugated asbestos sheet (prohibited the use in Nepal) for roofing.

Chapter 2

Page No

2-1-1. 2-1 In 4th line replace 'is set up' by falls under
In (b) 6th line replace 'and' by / after word controllers and insert
And maintenance engineers/ technicians on after word operators
In (c) insert CAAN/ before the word 'TIA'

Comments on **(1) works by Japanese Consultant**

Notes: Consultant in view of the sensitivity of the project shall as far as possible involve CAAN personnel while carrying out the works.
For items g & h of site work, the consultant shall recommend to CAAN for approval

Page 2-3 Para.2 on 1st line replace 'according to ' by based on
Para.2-1-3 2nd line replace 'operation' by commissioning

Page 2-4 1st line to be read as 'the following shall be conducted by Nepal side'
3rd line 'removal of' to be read remove
5th line add remove before the word 'existing' and add not in use now after the word receivers
Para.2-1-4 line 4th to be read as 'In ithe execution of design and the construction, the consultant shall take in to account full understanding of the on:
delete 'to understand' on (a), (b),(c),(d)
on (e) delete 'to fully...the'

Page 2-7 Para.2-1-6 on 2nd line make 'complete' to read as completed

Page 2-8 Add (Japan) after 'domestic work'

Page 2-9 Para.2-2 on 2nd line 'county' to read as country and delete 'the' before 'any'
Para.2-3 sub. Para.1 1st line replace ' novel ' by new
On 2nd and 3rd line delete 'and almost ...seems that'
On 3rd line delete the word 'accurately'
On 11th line replace 'the budget ...spare parts' by The estimated annual

maintenancebudget for consumable parts & spare parts are shown in table 2-2

On the table 2-2 replace 'Air control installation' by Air Traffic Control Equipment and replace 'Power sources installation, by Power Supply Equipment

The last line to be amended as The TIA budget for the past 3years are shown in table 2-3

Page 2-10 The sentence 'The application ...as follows' to be amended as The application for TIA budget is submitted to the CAAN for approval. The members of CAAN Board are as follows

Page 2-11 The last sentence is to be corrected as The indicative lists are shown in table 2-4 and table 2-5

Other relevant issues

1. **System Integration**
   Japanese Side shall include details on the equipment system as per the paragraph 8 (1.c) of the signed Minutes on 11th Feb., 1999. This will be in the form of information annexed to the Basic Design Study report and detailed design Report whenever relevant requiring CAAN to make necessary arrangements to implement in concurrence with the Project. For tentative identification of the equipment and system;
   Refer to- Annex-5 of the Minutes signed on 11th Feb., 1999
   - and Appendix 2-1 system Block Diagram of Basic Design study Report (draft), May 19, 1999
2. **Power Supply Autonomy**
   The existing power supply system in TIA has 8 hours autonomy for equipment particularly used for Air Traffic Control. Therefore, the Team is strongly requested to ensure that the Project design should essentially and compulsorily include atleast 8 hours autonomy for equipment particularly used for air traffic control and related system.

3. **Second Repeater Station**
   The present VHF Repeater Station at Mt. Phulchoki is the only station for extended range to provide the radar & area control service. This location is very much prone to lightening and access to the site is very time consuming and critical. So in order to increase the reliability of the service to be provided, there is an urgent requirement to establish a second repeater station on top of other mountain.

   Therefore the Project design should make some provision for the future in the ACC and APP Console for selection, monitoring and control of remote facilities.

4. **Existing 45m Antenna tower at Mt. Phulchoki**
   Existing antennae used for ACC, and Emergency VHF TXS and RXS can be removed from the upper portion of the 45m Antenna Tower and it can be utilized for the installation of the proposed new VHF antennae. Therefore the Team is requested to consider that erection of new antenna tower is not advisable in view of the redundant expenditure.

5. **Installation of RVR on RWY 20**

In TIA during the periods of winter season in the morning, the ground visibility gets reduced to less than even 1500m due fog thereby causing the airport closed for the movement of flights. Also during the pre-monsoon periods the visibility becomes less than 1500m due haze. The weather minima for the existing SIDS for departing aircraft is 800m. The majority of departing aircraft prefer to make use of RWY 20 due to its down slope towards the south and also close to the appron. With the help of RVR which indicates the accurate visibility along the RWY (where as MET visibility does not indicate the visibility along the RWY) Tower Controller can easily make the decision to let the departing aircraft take-off whenever RVR indicates 800m or more. Therefore RVR needs to be installed at RWY 20 also. In case of budget constraint it is preferred to have RVR at RWY 20 instead of proposed Ceilometer for RWY 02.

6. **Partition Work**

The team is requested to establish appropriate partition to separate between the APP & new ACC after finalizing the detail layout of the console.

7. **System Specification**

- All monitoring and control facilities and provision for spare buttons available including AFL system in the existing Control Tower Console should be maintained in the proposed new Control Tower Console. Status monitoring facilities of the proposed New Power House shall be installed at Electrical Room (2F O/A Complex)
- Specifications of the proposed equipment & systems haven't been provided in detail. This matter will be finalized during the detail design phase.
- Spare parts and consumable parts lists shall be as per the manufacturer's recommendation.
- Training required for operation and maintenance of the given system & equipment for Operators, Engineers and technicians to be provided.