

Appendix 4 Minutes of Discussions  
on  
Basic Design Study  
on  
The Project for Expansion of Construction Machinery Training Institute  
in  
The Islamic Republic of Pakistan  
(Explanation on Draft Basic Design)

In October, 1995, the Japan International Cooperation Agency (JICA) dispatched a Basic Design Study Team on the Project for Expansion of Construction Machinery Training Institute in the Islamic Republic of Pakistan, (hereinafter referred to as "the Project"), to the Islamic Republic of Pakistan, and through discussions, field survey and technical examination of the results in Japan, JICA has prepared the Draft Basic Design on the study.

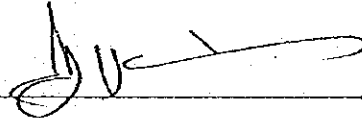
In order to explain and to consult Pakistan side on the components of the draft report, JICA sent to Pakistan a study team, which is headed by Mr. Toshio Hinoshita, Deputy Director, Second Maintenance Department, Second Operation Bureau, HONSHU-SHIKOKU BRIDGE AUTHORITY, which is scheduled to stay in the country from 11th to 21st of December, 1995.

In the course of discussions, both parties have confirmed the main items described on the attached sheets.

Islamabad, 18th December, 1995

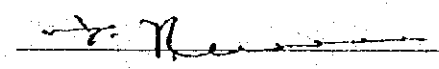
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Mr. Toshio Hinoshita  
Leader,  
Basic Design Study Team  
JICA



Mr. Masud Hussain  
Director CMTI,  
Ministry of Communications

Mr. Shahid Hamayun  
Deputy Secretary,  
Ministry of Economic Affairs Division



Mr. Ghulam Yazdani  
Joint Secretary,  
Ministry of Communications

## ATTACHMENT

### 1. Objective

The objective of the Project is to expand and strengthen training capacity of the Construction Machinery Training Institute (CMTI) by strengthening and introducing training equipment for CMTI.

### 2. Project Implementing Agency

The Ministry of Communications is the Implementing Agency.

### 3. Components of Draft Basic Design

The Government of Pakistan has agreed and accepted in principle the components of the Draft Basic Design proposed by the Team, as shown in ANNEX 1.

### 4. Japan's Grant Aid System

The Government of Pakistan have understood the system of Japanese Grant Aid explained by the Team as attached in ANNEX 2.

### 5. Necessary Measures to be taken by the Pakistan side

The Government of Pakistan will take the necessary measures, described in ANNEX 3, for smooth implementation of the Project on condition that the Grant Aid assistance by the Government of Japan is extended to the Project.

### 6. Provision of Micro Bus under the Project

Since the Micro Buses have been excluded from examination of the equipment schedule in the draft B/D report, the CMTI/Ministry of Communications have again requested through the discussions that at least one unit of Micro Bus be provided under the Project on the grounds attached hereto. The study team sent by JICA recognizes the necessity, then will convey the request to the authorities of the Government of Japan.

### 7. Future Schedule

JICA will complete the Basic Design Report and forward it to the Government of Pakistan by March, 1996.

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Construction Machinery Training Institute  
Post Box Number : 145, Shaigan  
Islamabad  
Telephone : 862649  
60701/Trg/Expansion

13 December 1995

To: Mr Tosio HINOSITA  
Deputy Director  
Second Maintenance Department,  
Second Operation Bureau  
HONSHU-SHIKOKU BRIDGE AUTHORITY

Subject: Justification for Micro Bus

As per the draft basic design study report on the project for expansion of Construction Machinery Training Institute and discussion held between the Japanese Team members and CMTI officials, it reveals that the provision of micro bus has not been agreed by Government of Japan. But CMTI strongly recommends the inclusion of at least one micro bus in expansion plan because of the following reasons:-

1. For successful functioning of any training institute, the transport is an essential requirement that is why, the Government of Japan in phase-I of CMTI included two micro buses. These two micro buses played a significant role for training the skilled manpower which is obvious from the total running of the micro buses. The approximate total mileage, covered by both the buses is 160000 KM. These buses have been utilized for transportation of trainees on following occasions:-

- 1.1 Visit to different construction sites and heavy industries. The training programme of different courses of last six month is attached as appendix I for your reference.

- 1.2 At present the capacity of Dormitory is only 100 trainees against 260 so as a result about 160 trainees live outside the premises of CMTI for which these buses are utilized for pick and drop services also.
2. After the expansion plan the annual output of trainees is going to increase from 260 to 840 therefore the utilization/need of micro buses has further increased.
3. The successful functioning of CMTI has always been appreciated by all Pakistani/Japanese evaluation teams/visits time to time during last nine years. All equipment and machinery provided under grant aid to the institute is being used only for the training purpose. Therefore this micro bus will also be used for training purpose. This will further enhance our transportation capacity for trainees which is particularly required for international course on operation and maintenance of construction machinery under "Third Country Training Programme (TCTP)".
4. The existing two micro buses are of old vintage (1986 model) and have covered approximately 160000 KM mileage. If additional/new transport is not catered for in the expansion plan, it is expected that these two buses would come to stand still within next one and half year and without transport the practical/field training of this institute would greatly be affected.

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*MBT*

  
Director  
(Masud Hussain)

CONSTRUCTION MACHINERY TRAINING INSTITUTE (CMTI)

ROADWORKS OPERATOR COURSE SERIAL-29

PROGRAMME FOR THE WEEK ENDING 14 DECEMBER 1965

DATE	TIME	SUBJECT	METHOD	PLACE	INSTRUCTORS
SAT 09-12-95	0600-0900	Religious Motivation	L	LH	Muhammad Naseer
	0905-1245	Excavator, Road Roller, Dump Truck, Motor Scraper & Truck Crane Op	L	TA	Sher Bat (Op B)
	0800-1345	Visit to Dina Sector (Road Construction site about 100 KM from CMTI)	V	(Op-A)	Asifur Rehman & Allah Raza
SUN 10-12-95	0600-1245	Visit to Mandra Sector (Road Construction site about 40 KM from CMTI)	V	(Op-B)	Asifur Rehman & Allah Raza
	0815-1345	Excavator, Road Roller, Dump Truck, Motor Scraper & Truck Crane Op	L	TA	Sher Bat (Op A)
MON 11-12-95	0815-1135	Asphalt Finisher, General, Structure, Function Operation & Maint Work	L	LH	Sher Bat
	1200-1345	Asphalt Finisher, Name, Location, Function of Machine Components	L	PS	Sher Bat
TUE 12-12-95	0815-1345	Excavator, Road Roller, Dump Truck, Motor Scraper, Truck Crane, and Asphalt Finisher Operation	L	TA	Sher Bat
	0915-1345	Excavator, Road Roller, Dump Truck, Motor Scraper, Truck Crane and Asphalt Finisher Operation	L	TA	Allah Raza
WED 13-12-95	0815-1100	Road Stabilizer, General, Structure, Function Operation Maint & Work	L	LH	Allah Raza
	1105-1155	Road Stabilizer, Name, Location, Function of Machine Components	L	PS	Allah Raza

NOTES

- Morning assembly for recitation of the HOLY QURAN would be at 0800 hours daily.
- After every period, 5 minutes would be short break.
- Tea Break. From 1040 to 1100 hours.
- Sports. Sat, Sun and Wed from 1500 to 1645 hours.
- ~~...~~ Sat & Mon from 1600 to 1645 hours.  
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CONSTRUCTION MACHINERY TRAINING INSTITUTE (CMTI)

15TH WEEK

MICRO-11 COURSE SERIAL-19

PROGRAMME FOR THE WEEK ENDING ON NOVEMBER 1995

DAYS/DATE	TIME	SUBJECT	INSTRUCTOR
SAT	0730-0835	Religious Motivation	Mr. Muhammad Baseer
	0840-1325	Structure & Function of Hydraulic Control Valve	CR-1/ Sub Instr
		D-55 A-18, D-55 A-18	Sub Instr
SUN	0745-1325	Visit to Heavy Industries Textile (HIT) (40 KM from CMTI)	Sub Instr
MON	0745-1325	Disassembling & Assembly of Hydraulic Control Valves D-55, D-55	Sub Instr
TUE	0745-0835	Revision	Sub Instr
	0840-1325	Theory Test I/ (Leaking System)	Sub Instr
WED	0745-1325	Introduction to Overhauling of Hydraulic Pump	Sub Instr
	1330-1345	Structure & Function of Hydraulic Pump	Sub Instr
THU	09-11-95	CLOSED HOLIDAY	

NOTES

- Morning assembly for recitation of the HOLY QURAN would be at 0730 hours.
- After every 30, 5 minutes would be short break.
- Tea Break. From 1025 to 1045 hours.
- Sports. Sat, Sun and Wed from 1420 to 1705 hours.
- Library. Sat from 1120 to 1705 hours.

DATE

- Lecture Hall
- Class Room
- Sub Instructors
- Observation
- Revision
- Visit

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CONSTRUCTION MACHINERY TRAINING INSTITUTE (CMTI)

13TH WEEK

MECHANIC II COURSE SERIAL-10

PROGRAMME FOR THE WEEK ENDING ON NOVEMBER 1995

DAYS/DATE	TIME	SUBJECT	METHOD	PLACES	INSTRUMENT
SAT	0730-0825 0840-1325	Religious Motivation Structure & Function of Hydraulic Control Valve D-55 A-12, D-55 A-18	L L/Cos	CR-1/ Shop	Mubammad Naseer Ammer Fakher Bokhari/Sub Instr
SUN	0745-1325	Visit to Heavy Industries Textile (HIT) (40 KM from CMTI)	Field	Shop	Ammer Fakher Bokhari/Sub Instr
MON	0745-1325	Disassembling & Assembling of Hydraulic Control Valves D-55, D-85	P	Shop	Ammer Fakher Bokhari/Sub Instr
TUE	0745-0825 0840-1325	Revision Theory Test I/II (steering system)	P P	CR M	Ammer Fakher Bokhari/Sub Instr Mubammad Naseer
WED	0745-1325 1330-1345	Introduction to Construction of Hydraulic Pump Structure & Function of Hydraulic Pump	L L/Cos	CR-1/ Shop	Ammer Fakher Bokhari Mubammad Naseer
THU	09-11-95	CLOSED HOLIDAY			

NOTES

- Morning assembly for recitation of the HOLY QURAN. would be at 0730 hours.
- After every 90, 5 minutes would be short break.
- Tea Break. from 1025 to 1045 hours.
- Sports. Sat, Sun and Wed from 1620 to 1705 hours.
- Library. Sat from 1620 to 1705 hours.

- Lecture Hall
- Class Room
- Sub Instructors
- Observation
- Revision
- Visit

1. M  
2. CR  
3. Sub Instrs  
4. Obs  
5. R  
6. V

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CONSTRUCTION MACHINERY TRAINING INSTITUTE (CMTI)

MECHANIC II ENGINE COURSE SERIAL - 19

PROGRAMME FOR THE WEEK ENDING 09 NOVEMBER 1995

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DAYS/DATES	TIME	SUBJECT	MODULI	PLACE	INSTRUCTORS
SAT					
04-11-95	0730-0835	Disassembly	L	LH	Muhammad Naseer
	0840-1325	Reassembling/assembling of P.T. Pump	P	FIR	Iftikhar Hussain/Sub Instr
SUN					
05-11-95	0745-1325	Visit to (HIT) Heavy Industries Taxila (40 KM from CMTI)	-	-	Iftikhar Hussain/Sub Instr
MON					
06-11-95	0745-1325	Assembling/calibration of PT Pump	F	FIR	Iftikhar Hussain/Sub Instr
TUE					
07-11-95	0745-1325	Structure and function of Bosch Pump	L	CR-2	Iftikhar Hussain/Sub Instr
WED					
08-11-95	0745-1325	Structure and function of Bosch Pump	L	CR-2	Iftikhar Hussain/Sub Instr
THU					
09-11-95	-	SHARED HOLIDAY	-	-	-

NOTE

- Morning assembly and identification of the Mill wheel would be at 0730 hours.
- After every 20, 5 minutes would be short break.
- Tea Break. From 1025 to 1045 hours.
- Sports. Sat, sun and wed from 1620 to 1705 hours.
- Library. Sat from 1620 to 1705 hours.

- Lecture Hall
- Class Room
- Sub Instructors
- Fuel Injection Room
- Lecture
- Practice

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Weekly Training Programme for Mechanic II Chassis Course Serial-19  
for the Week Ending 19 October 1995.

Subject:

WED  
19 Oct 95 FOR : 0745-1325 Visit to 501 Central Wksp EME CKL Visit CKL Ammar Haider Bok

READ: 0745-1325 Steering System of Wheel Loader WA-200 L/Obsn CR-1 Ammar Haider Bok

THU  
19 Oct 95 FOR 0745-1135 Steering System of Wheel Loader WA-200 L/Obsn CR-1 Ammar Haider Bok

READ 0745-1135 Visit to 501 Central Wksp EME CKL Visit CKL  
(30 XM from CMTI)

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C M T J  
(TRC WING)

Subject: Weekly Training Programme for Mechanic II Engine Course Serial-19  
for the Week Ending 19 October 1995

WED									
19 Oct 95	FOR:	0745-1325	Visit to 501 Central Wksp EME	Visit	OKI	If+Ikhar Hussain/Sub Inst			
	READ:	0745-1325	Disassembling/Assembling of gasoline Engine	P	Wsp	If+Ikhar Hussain/Sub Inst			
THU									
19 Oct 95	FOR:	0745-1135	Disassembling/Assembling of gasoline Engine	P	Wsp	If+Ikhar Hussain/Sub Inst			
	READ:	0745-1135	Visit to 501 Central Wksp EME, (50 KM from CMTI)	Visit	OKI	If+Ikhar Hussain/Sub Inst			

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CONSTRUCTION MACHINERY TRAINING INSTITUTE (CMTI)  
TECH-II ENGINE COURSE SERIAL-19  
PROGRAMME FOR THE WEEK ENDING 12 OCT 1995

9TH WEEK

DAYS/DATE	TIME	SUBJECT	METHOD	PLACE	INSTRUCTORS
CLOSED HOLIDAY					
SAT					
07 Oct 95					
SUN	0745-1325	Visit to 803 Comb Wksp (35 KW from CMTI)	V	Wksp	Iftikhar Hussain/Sub Instr
08 Oct 95					
MON					
09 Oct 95	0745-1345	Disassembling/Assembling NT 855 C Engine	P	Wksp	Iftikhar Hussain/Sub Instr
TUE					
10 Oct 95	0745-1345	Disassembling/Assembling NT 855 C Engine and Measurement and Adjustment of different Parts	P	Wksp	Iftikhar Hussain/Sub Instr
WED					
11 Oct 95	0745-1345	Disassembling/Assembling NT 855 C Engine and	P	Wksp	Iftikhar Hussain/Sub Instr
THU					
12 Oct 95	0745-1345	Revision Theoretical Test No-3	T	LH	Iftikhar Hussain/Sub Instr

NOTE

- Morning assembly for recitation of the HOLY QURAN would be at 0730 hours daily.
- After every period, 5 minutes would be short break.
- Tea Break. From 1025 to 1045 hours.
- Sports. Sat, Mon and Wed from 1750 to 1830 hours.
- Library. Sat from 1600 to 1645 hours.

KEYS

- Visit - V
- Practical - P
- Test - T
- Lecture Hall - LH
- Workshop - Wksp

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Construction Machinery Training Institute (CMTI)  
Operator Course Serial - 28  
Programme for the week ending 07 September 1995

10th Week

METHOD/PLACE OF INSTRUCTORS

<u>DAYS/DATE</u>	<u>TIME</u>	<u>SUBJECT</u>	<u>METHOD</u>	<u>PLACE</u>	<u>INSTRUCTORS</u>
SAT	02 Sep 95	Closed Holiday			
SUN	03 Sep 95	0730-1325	Visit to FECO Cement Factory (50 KM from CMTI)	V	Instr/Sub Instr (Gp A)
		0730-1325	Truck Crane, Motor Scraper, Asphalt Finisher & Bulldozer Operation.	P	Instr/Sub Instr (Gp B)
MON	04 Sep 95	0730-1325	Visit to FECO Cement Factory (50 KM from CMTI)	V	Instr/Sub Instr (Gp B)
		0730-1325	Truck Crane, Motor Scraper, Asphalt Finisher &	P	Instr/Sub Instr (Gp A)
TUE	05 Sep 95	0730-1325	Truck Crane, Motor Scraper & Asphalt Finisher Practical Test No.4	F	Instr/Sub Instr
WED	06 Sep 95	Closed Holiday			
THU	07 Sep 95	0730-1100	Road Stabilizer, General Structure, Function Operation Maintenance and Work.	L	LH Anjum Mejid
		1100-1135	Road Stabilizer, Name Location, Function of Machine Components.	P	PS Instr/Sub Instr

NOTES

- Morning assembly for recitation of the HOLY Quran would be at 0730 hours daily.
- After every pd, 5 minutes would be short break.
- Lib Break. From 1025 to 1045 hours.
- Lib. Tue and Wed from 1750 to 1830 hours.
- Library, Sat and Mon from 1750 to 1830 hours.
- Last ten minutes of first four period would be short break except period.5 and 6.

KEYS

1. Visit
2. Sub.Instructor
3. Training Area
4. Lecture Hall
5. Practica
6. Parking Shed
7. Group

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CONSTRUCTION MACHINERY TRAINING INSTITUTE (CMTI)  
 MECHANIC - II ENGINE COURSE SERIAL-16  
 PROGRAMME FOR THE WEEK ENDING 18 MAY 1995

METHOD/PLACE/INSTRUCTION

DATE/TIME SUBJECT

CLOSED, WEDDAY

SUN 14-5-95	0745-1325	Disassembling/assembly of P.T P	P	F.I.R Iftikhar Hussain/Sub Inst
MON 15-5-95	0745-1325	Disassembling/assembly of P.T Pum	P	F.I.R Iftikhar Hussain/Sub Inst
TUE 16-5-95	0745-1325	Disassembling/assembly of P.T Pump	P	F.I.R Iftikhar Hussain/Sub Inst
WED 17-5-95	0745-1325	Visit to (HIT) Heavy Industries Taxila(40 KM from CMTI)	V	- Inst/Sub Inst
THU 18-5-95	0745-1135	Disassembling/assembly of P.T Pump	P	F.I.R Iftikhar Hussain/Sub Inst

NOTES

1. Morning assembly for recitation of the HOLY QURAN would be at 0730 hours daily.
2. After every pd, 5 minutes would be short break.
3. Sports. Sun, Tue and Wed from 1750 to 1830 hours.
4. Tea Break. From 1025 to 1045 hours.
5. Library. Sat from 1600 to 1645 hours.

KEYS

1. Practical - P
2. Visit - V
3. Sub Instructor - Sub Inst

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CONSTRUCTION MACHINERY TRAINING INSTITUTE (CMTI)  
 MECHANIC II CHASSIS COURSE SERIAL-18  
 PROGRAMME FOR THE WEEK ENDING 18 MAY 1995

NAME OF INSTRUCTOR

CLOSED HOLIDAY

DAY	TIME	SUBJECT	CR	INSTRUCTOR
SUN	0745-1325	Disassembling/Assembling of Inter Axle differential	L CR-1	Anjum Rafiq Malik/
MON	0745-1325	Structure and Function of hydraulic Brake	L CR-1	Muhammad Shafique :
TUE	0745-1325	Observation to Brake system in Construction Machinery	Obsn TA	Sub Instr
WED	0745-1325	Visit to (HIT) Taxila (40 KM from CMTI)	V -	Anjum Rafiq Malik/
THU	0745-0900	Revision	R CR-1	
	0905-1135	Theory Test No V	T LH	Anjum Rafiq Malik/

NOTES

- Morning assembly for recitation of the HOLY QURAN would be at 0730 hours daily.
- After every pd, 5 minutes would be short break.
- Sports. Sun, Tue and Wed from 1730 to 1830 hours.
- Tea Break. From 1025 to 1045 hours.
- Library. Sat from 1600 to 1645 hours.

KEYS

- Lecture - L
- Class Room - CR
- Training Area - TA
- Lecture Hall - LH
- Observation - Obs
- Visit - V
- Sub Instructor - S

C M S I  
( IRC WING )

Subject: Amendment - Weekly Training Programme for the Week Ending 04 Mar 1995  
for Mechanic II Engine Course Serial - 18

SUN	FOR	0745-1325	Electricity	L/P	RTR	Iftikhar Hussain/Sub Instr
30-4-95	READ	0745-1325	VISIT TO 805 COES WOSP CHANDALA (35 KM from CMTH)	F	Chaidola	Instr/Sub Instr

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CONSTRUCTION MACHINERY TRAINING INSTITUTE (CMTI)  
MECHANIC II CHASSIS COURSE SERIAL-18  
PROGRAMME FOR THE WEEK ENDING 13 APRIL 1995

10TH WEEK

<u>DAYS/DATE</u>	<u>TIME</u>	<u>SUBJECT</u>	<u>METHOD</u>	<u>PLACE</u>	<u>INSTRUCTOR</u>
SAT 06 Apr 95	0730-0740 0745-1325	Assy Structure and function of steering system of wheeled Vehicles	L/Demo	CR-2/ TA	Talib Hussain
SUN 09 Apr 95	0730-1325	VISIT TO 501 CENTRAL WSP EME (30 KM from CMTI)	V	-	Anjum Rafiq Malik/Sub Inst:
MON 10 Apr 95	0730-1325	Structure and function of control valve of wheel loader WA-200	L/Demo	CR-2/ WKSPP	Anjum Rafiq Malik/Sub Inst:
TUE 11 Apr 95	0730-1325	OR Tires care and maintenance steering geometry	L/Film	CR-2/ AVR	Anjum Rafiq Malik/Sub Inst:
WED 12 Apr 95	0730-1325	Structure and function of steering system of Motor Grader	L	CR-1	Muhammad Shafique
THU 15 Apr 95	0730-1125	Steering system of pneumatic Tired Roller	L/Demo	CR-1	Muhammad Shafique

NOTES

1. Morning assembly for recitation of the HOLY QURAN would be at 0730 hours daily.
- After every pg, 5 minutes would be short break.
- Sports. Sun, Tue and Wed from 1715 to 1800 hours.
- Tea Break. From 1025 to 1045 hours.
- Library. Sat from 1500 to 1545 hours.

KEYS

1. Class Room - CR
2. Training Area - TA
3. Audio Visual Room - AVR
4. Demonstration - Demo
5. Workshop - Wksp

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## ANNEX I EQUIPMENT UNDER THE PROJECT

### I Construction Equipment and Spare Parts

#### (I) Construction Equipment (Operator Course)

No	Item	Approximate Specification	Unit
1.1	Bulldozer	285-305 HP	1
1.2	Bulldozer	200-250 HP	2
1.3	Dump Truck	Off-the Road, Loading capacity: 20-23 ton	1
1.4	Hydraulic Excavator	Bucket capacity: 0.7m <sup>3</sup>	2
1.5	Hydraulic Excavator	Bucket capacity: 0.5m <sup>3</sup>	1
1.6	Pneumatic Tire Roller	Operating weight: 10-12 ton	1
1.7	Asphalt Finisher	Paving width: Max. 6m	1
1.8	Wheel Loader	Bucket capacity: 3.5m <sup>3</sup>	1
1.9	Motor Grader	130-140 HP	1
1.10	Vibration Roller	Operating weight: 9.5-11 ton, Sheep's foot type	1
1.11	Mobile Hammer	attached to Hydraulic Excavator, 125- 135 HP	1
1.12	Smooth Drum Vibration Compactor	5 HP	1
1.13	Automatic Curber	Construction volume: 4-5 m <sup>3</sup> /h	1
1.14	Power Splitter	145-155 HP	1
1.15	Landfill Compactor	200-250 HP	1
1.16	Rough Terrain Crane	Lifting capacity: 30 ton	1

#### (Mechanic III Course)

No	Item	Approximate Specification	Unit
2.1	Bulldozer	200-250HP	1
2.2	Wheel Loader	Bucket capacity: 3.5m <sup>3</sup>	1
2.3	Motor Grader	130-140 HP	1
2.4	Dump Truck	On-the-Road, 6X4, Loading capacity: 13-14 ton	1
2.5	Hydraulic Excavator	Bucket capacity: 0.5m <sup>3</sup>	1
2.6	Air Compressor	Air delivery: 3.5m <sup>3</sup> /min	1
2.7	Generator	5 KVA	1

#### (Diploma of Associate Engineer Course)

No	Item	Approximate Specification	Unit
3.1	Bulldozer	200-250 HP	2
3.2	Wheel Loader	Bucket capacity: 3.5m <sup>3</sup>	1
3.3	Motor Grader	with Scarifier, 140-155 HP	1
3.4	Wheel Loader	Bucket capacity: 1.7m <sup>3</sup>	1
3.5	Hydraulic Excavator	Bucket capacity: 0.09-0.36m <sup>3</sup>	1

#### (Construction Machinery Planning and Employment Course)

No	Item	Approximate Specification	Unit
4.1	Pipe Layer	300-350 HP	1
4.2	Hydraulic Excavator	with Super Long Boom, 125-135 HP, Bucket capacity: 0.4-0.5 m <sup>3</sup>	1

(Construction Machinery Supervision Course)

No	Item	Approximate Specification	Unit
5.1	Pile Driver	mounted on Hydraulic Excavator, 125-135 HP	1

(2) Spare Parts for Construction Equipment

No	Item	Approximate Specification	Unit
6.1	Periodical maintenance Parts	Considered for approx. 5 years use	1 set
6.2	Repair Kits	Considered for approx. 5 years use	1 set
6.3	Consumable Parts	Considered for approx. 5 years use	1 set

II Workshop Equipment and Spare Parts

(1) Workshop Equipment  
(Fuel Injection Test Room)

No	Item	Approximate Specification	Unit
7.1	Fuel Injection Pump Test Stand	Bosch type	1
7.2	PT-Pump Test Stand	Cummins type	1
7.3	Injection Flaw Comparator	Cummins type	1
7.4	Nozzle Tester	Bosch type	1
7.5	Inspection Instrument Set	for Fuel Injection Test, Bosch type and Cummins type	1
7.6	Air Compressor	11 kW	1
7.7	Reconstruction of Hydraulic Test Stand	with additional horse power, testing accessory, new controllers, etc., 125 HP	1

(Welding Equipment for Welding Course)

No	Item	Approximate Specification	unit
8.1	Air - Carbon Arc Gouging Equipment		1
8.2	Gas Welding Equipment	Oxygen and Acetylen, with connection	9
8.3	Gas Regulator	Oxygen and Acetylen, with connection	7
8.4	Flashback Arrestor		10
8.5	Welding and Cutting Torch		
	(1) Welding Nozzle	max. 35mm	8
	(2) Cutting Tip	max. 100mm	8
8.6	MAG Welding Machine	with wires	1
8.7	MIG Welding Machine	with wires	1
8.8	High Speed Abrasive Cutting Machine		1
8.9	Spot Welding Gun	Portable type	1

8.10	Pipe Cutting Machine		1
8.11	TIG Welding Machine	AC/DC 100A	1
8.12	Ultrasonic Flaw Detector		1
8.13	Grinding Machine with Spare Wheels	(1) 300X50X25mm (2) 200X25X20mm	1 1
8.14	Pillar Drill	dia.30mm	1
8.15	Power Hacksaw	with connection	2
8.16	Accessory Set of Welding	Gas Cylinder, Hose, Electrode, Gas Welding Rod, Tools, etc	1 set
8.17	Hand Type Circular Shear Machine	thickness: 2 mm	1
8.18	Hand Lever Shearing Machine	thickness: 2 mm	1
8.19	Shearing Machine	thickness: 6 mm	1

(Repairing Equipment for Mechanic II and III Courses)

No	Item	Approximate Specification	Unit
9.1	Mobile Floor Crane	2 ton	2
9.2	Hydraulic Tire Removing Tool	10 ton	1
9.3	Gasoline Engine Analyzer	for 8 cylinders	1
9.4	Spark Plug Cleaner	with Tester, plug: 12 / 14mm	1
9.5	Wheel Balancer	10-23", with Tool and Weight Set	1
9.6	Wheel Alignment Tester		1
9.7	Injector Reconditioning Machine		1
9.8	Distributor Test Bench		1
9.9	Miscellaneous	Parts Rack, Parts Cleaner, Tool Cabinet, Tool Locker and Fire Extinguisher	1 set

(2) Spare Parts for Workshop Equipment

No	Item	Approximate Specification	Unit
10.1	Consumable part	Considered for approx. 5 years use	1 set

III Training Aid Equipment, Vehicles and Spare Parts

(1) Training Aid Equipment

(Basic Course/Mechanics II and Construction Machinery Electrician Courses)

No	Item	Approximate Specification	Unit
	(Cutaway Model)		
11.1	Starter Motor	for Construction Machine	1
11.2	Alternator	for Construction Machine	1
11.3	Gasoline Engine		1
	(Electric System Boards)		
11.4	Electric System Board	Crawler type	1
11.5	Electric System Board	Wheel type	1

(Electrical Component)			
11.6	Starter Motor	7.5-11kW	2
11.7	Alternator	24V,25A	2
11.8	Generator	24V,25A	2
11.9	Regulator	24V,20A	10
(DC Generator)			
11.10	DC Generator	2 kW	1
11.11	DC Generator	3 kW	1

(Cutaway Model for All Courses)

No	Item	Approximate Specification	Unit
12.1	Pre-Cleaner	for Construction Machine	1
12.2	Air Cleaner	for Construction Machine	1
12.3	Muffler Assembly	for Dozer	1
12.4	After Cooler	for Dozer	1
12.5	Steering Clutch	for Dozer	1
12.6	Transmission	Sliding selection type for Dozer	1
12.7	Swing Motor	for Excavator	1
12.8	Transmission Control Valve	for Dozer	1
12.9	Hydraulic Tank	for Dozer	1
12.10	Hydraulic Cylinder		1
12.11	Torque Converter	for Dozer	1
12.12	Steering System	for Vehicle	1
12.13	Transmission	for Dozer	1
12.14	Steering Assembly	for Motor Grader	1
12.15	Universal Joint		1
12.16	Propeller Shaft	Hollow type and Soil type	1 set
12.17	Turbo-Charger		1

(Video Film for All Courses)

No	Item	Approximate Specification	Unit
13.1	Trouble Shooting for Gasoline Engine		1 set
13.2	Function of Calibrator		1 set
13.3	Trouble Shooting for Electrical Component		1 set
13.4	Transmission	for Planetary Gear	1 set
13.5	Multi Disc Clutch	for Dozer	1 set
13.6	Hydraulic Control Valve	for Dozer	1 set
13.7	Differential		1 set
13.8	Torque Converter	for Dozer	1 set
13.9	Hydro Shift Transmission	for Dozer	1 set
13.10	Steering Control	for Dozer	1 set

(Mechatronics Simulator for All Courses)

No	Item	Approximate Specification	Unit
14.1	Mechatronics Simulator	for Hydraulic Excavator	1
14.2	Electronics Governor Controlling System	for Hydraulic Excavator	1
14.3	Automatic Idling Controlling System	for Hydraulic Excavator	1

14.4	Hydraulic Pump Controlling System	for Hydraulic Excavator	1
14.5	Mechtronics Function Checker		1 set
14.6	Mechatronics Device Parts and Cutaway Model	for Construction Machine	1 set
14.7	Function Assessment Tool		1 set
14.8	Electric Measuring Implement	table type	1 set

(Miscellaneous for All Courses)

NO	Item	Aproximate Specification	unit
	(Audio Visual Equipment)		
15.1	Overhead Projector	common type	5
15.2	Overhead Projector	direct type	10
	(Reproduction Equipment)		
15.3	Photo Copier		4
15.4	LCD Display Pannel		1
15.5	Multimedia Products for Technical Training	with video and computer simulation program for Diesel engine, Electric system and Hydraulic system	4

(2) Vehicles

No	Item	Approximate Specification	Unit
16.1	Service car	with machine and diagnostic tools	2
16.2	Mobile Workshop Lorry	with Crane and Winch 6 ton	1
16.3	Water Bowzer	8 - 10 kl	1
16.4	Fuel Tanker	8 - 10 kl	1

(3) Spare Parts for Training Aid Equipment and Vehicles

No	Item	Approximate Specification	Unit
17.1	Periodcal Maintenance Parts	Considered for approx. 5 years use	1 set
17.2	Repair Kits	Considered for approx. 5 years use	1 set
17.3	Consumable Parts	Considered for approx. 5 years use	1 set

## ANNEX 2 JAPAN'S GRANT AID SYSTEM

### 1. Grant Aid Procedures

1) Japan's Grant Aid Programme is executed through the following procedures.

Application Study	(Request made by a recipient country) (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 Programme, 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 Japanese Government. The contents of the Study are as follows:

- a) Confirmation of the background, objectives, and benefits of the requested 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 the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

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

## 2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA selects (a) firm(s) based on proposal 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 and also to avoid any undue delay in implementation should the selection process be repeated.

## 3. Japan's Grant Aid Scheme

### 1) What is Grant Aid?

The Grant Aid programme 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 executions, 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 Notes, concluding contracts with (a) consultant 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 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 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:

- fe* (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.
- KB*



- (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 execution 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 Contract.
- (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 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 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 Arrangement (B/A)

- a) The Government of recipient country or its designated authority should open an account in the name of the Government of the recipient country in an authorised foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by 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 authorisation to pay issued by the Government of the recipient country or its designated authority.

### ANNEX 3 Necessary Measures to be taken by the Pakistan side

Following necessary measures should be taken by the Pakistan side on condition that the Japan's Grant Aid is extended to the Project:

1. To secure the sites for the Project.
2. To undertake every construction works programmed under the CMTI Expansion Plan and incidental outdoor works such as grading, fencing, gates and lighting in and around the site.
3. To secure the sites for stockyard and storage facilities prior to delivery of the equipment to be supplied.
4. To provide facilities for distribution of electricity, water supply, telephone, drainage, sewage and other incidental facilities to and within the Project site, which include but not limited to:
  - 1) Electricity distributing line
  - 2) Water distribution line
  - 3) Drainage line
  - 4) Telephone line and the main distribution panel
  - 5) General furnitures such as carpets, curtains, tables, chairs and others
5. To ensure prompt unloading and customs clearance of the equipment supplied under the Project at port of disembarkation in Pakistan.
6. To bear the following commissions to the Japanese exchange bank for the banking services based upon the Banking Arrangement.
  - 1) Advising commissions of Authorization to Pay (A/P)
  - 2) Commission for the Payment
7. To exempt Japanese nationals involved in the Project from custom duties, international taxes and other fiscal levies which may be imposed in Pakistan with respect to the supply of the products and services under the verified contract .
8. To accord Japanese nationals whose services may be required in connection with the supply of products and services under the verified contract, such facilities as may be necessary for their entry into Pakistan and stay therein for the performance of their work.
9. To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid.
10. To bear all the expenses other than those to be borne by the Japan's Grant Aid, necessary for construction of facilities.

## Appendix 5 Cost Estimation Borne by Pakistan Side

The costs for facility construction under CMTI Expansion Plan have been financed from the Public Sector Development Programme (PSDP). The total project cost is as follows:

Unit: thousand Rs

No.	Name of Work	Qty	Unit	Amount
1.	Clearance and levelling of site	153,776	m <sup>3</sup>	1,711
2.	Construction of boundary wall	1,108	m	513
3.	Gate	2	Nos.	24
4.	Provision of security lights	8	Nos.	52
5.	External electric supply			399
6.	Gas supply external			255
7.	Telephone connection (Five lines)			78
8.	Unloading/transportation of machinery from Karachi to the site		LS	55
9.	Construction of road outside area (approach to residence etc.) including main approach road	1,540	m	956
10.	General purpose furniture		LS	750
11.	Administrative Building	1,589	m <sup>2</sup>	8,906
12.	Training Building	3,471	m <sup>2</sup>	18,019
13.	Canteen	347	m <sup>2</sup>	1,509
14.	Dormitory	1,785	m <sup>2</sup>	7,764
15.	Covered Walk Way	272	m <sup>2</sup>	1,010
16.	Project Engineer establishment (Two years) Details attached as Approx. I to Appex. A	99	m <sup>2</sup>	415
Total				43,737

Of which, construction of training building, dormitory and canteen for trainees and their related facilities are in progress. The final cost is estimated at 20 million Rs as was described in the Section 2.2.2.

## Appendix 6 Road Development Programmes by the Federal Government

Road development programmes for national highways and main provincial roads carried out by the National Highway Authority (NHA) are as follows:

Name of Project	Complete km	On-going km	To be started km	Total km
(1) Dualisation of N5 (Karachi-Lahore-Peshawar Torkham)				
Sections completed				
1. Peshawar - Nowshera	60			60
2. Chabalat - Rawalpindi	50			50
3. Kharian - Chenab Bridge	44			44
4. Gujranwala - Lahore	57			57
5. Sahiwal - Mian Channu	82			82
6. Hala - Hyderabad	46			46
7. Hyderabad - Karachi	135			135
Sections on-going				0
8. Nowshera - Chablat		72		72
9. Rawalpindi - Kharian		125		125
10. Gujranwala - Chenab Bridge		49		49
11. Lahore Bypass		28		28
12. Lahore - Okara - Sahiwal		148		148
13. Mian Channu - Multan		86		86
14. Multan - Bahawalpur		81		81
15. Rahim Yar Khan - Ubaro		82		82
16. Ubaro - Ghotki - Baberlo		122		122
17. Baberlo - Kotri Kabir - Moro		155		155
18. Moro - Hala		112		112
Sections to be started				0
19. Torkham - Peshawar			57	57
20. Bahawalpur - Rahim Yar Khan			171	171
21. Lahore Bypass				0
Njaz Beg - Babu Sabu -		70		70
Rabi bridge - Jaranwala road				0
Lahore/Islamabad Motorway				0
Jaranwala road - Kala Shah Kaku				11
22. Hyderabad Bypass	14			14
<b>Sub Total</b>	<b>488</b>	<b>1,130</b>	<b>239</b>	<b>1,857</b>

Name of Project	Complete km	On-going km	To be started km	Total km
<b>(2) Indus Highway (N55) Project</b>				
Sections completed (Phase 1)				
1. Jamshore - Manjand	65			65
2. Manjand - Sehwan	79			79
3. Peshawar - Karapha	54			54
Section on-going (Phase 2)				
4. Ratoder - Gauspur	9			99
5. Gauspur - Shoori Nullah	76			76
6. Shori Nullah - Rajanpur	95			95
7. D.G. Khan - Retra Junction	108			108
8. Retra Junction - Malana	98			98
9. Sarai Gambila - Karak	59			59
10. Karak - Karrappa	34			34
Sections to be started (Phase 3)				
11. Sehwan - Pakho			100	100
12. Pakho - Ratodero			100	100
13. Rajanpur - D.G. Khan			110	110
14. Malana Junction - Sarai Gambila			112	112
15. Kohat Tunnel			1.8	2
Approach road			24	24
	767	0	448	1,215
<b>(3) Karachi - Quetta - Chaman Highway (N25)</b>				
1. Karachi - Uthal	100			100
2. Uthal - Bela		68		68
3. Bela - Wad				0
4. Wad - Surab		160		160
5. Surab - Kalat		80		80
6.			229	229
	100	308	229	637
<b>(4) Quetta - Nokundi - Taftan (N40)</b>				
1. Nokundi - Taftan	124			124
2. Dalbandin - Nokundi			176	176
3. Nokundi - Quetta		302		302
	124	302	176	602
<b>(5) D.I. Khan - Zhob - Quetta (N50)</b>				
1. Zhot - Mughalkot	80			80
2. Mughalkot - Darazinda - D.I. Khan			132	132
	80	0	132	212

Name of Project	Complete km	On-going km	To be started km	Total km
(6) Improvement of Karakoram Highway (N35)				
1. Hassanabdal - Abbottabad	70			70
2. Abbottabad - Manshra	27			27
3. Manshra - China border			709	709
	97	0	709	806
(7) Lahore - Islamabad Motorway		339		339
(8) Sukkur Bypass (N65)		8		8
Sub Total	1,656	2,087	1,933	5,676
(9) Other Projects				
1. Chiniot Bridge				0
2. Thal - Parachinar Bridge				0
3. Barian - Nathiagali - Abbottabad				0
4. Ratodero - Shahdad Kot - Khuzdar		64		64
5. Lassan Nawab - Tanhaka				0
6. Gharo - Keti Bandar				0
7. Ghari Habib Ullah bridge (Kunhar river)				0
8. Kohala bridge (Jhelum river)				0
9. Kuliari bridge (Jhelum river)				0
10. Azad Pattan (Jhelum river)				0
11. Karot bridge (Jhelum river)				0
12. Mangla bridge (Jhelum river)				0
(10) World Bank Fifth Highway Project				
1. Improvement of N5			1,200	1,200
2. Improvement from junction N5 to N55				0
3. Improvement of Quetta - Chaman				0

Name of Project	Complete km	On-going km	To be started km	Total km
(11) Other future projects				
1. Lowari tunnel			8.6	9
2. Gawadar - Khuzdar highway				0
3. Hassanabadal - Abbottabad				0
4. Abbottabad - Thakot				0
5. Makran Coastal road				0
6. Multan - D.G. Khan - Loralai Qila Saifullah (N50)				0
7. Karachi Northern Bypass				0
8. Zam Tower - Mughal Kot (N50)				0
9. Khairpur - Larkana bridge (Indus river)				0
10. Nishtar Ghat bridge (Indus river)				0
11. Syed Wala (Ravi river)				0
12. Pakpattan - Minchinabad (Sutlej river)				0
13. Garh Mehraja (Chenab river)				0

## Appendix 7 Estimates of Required Manpower for Road Works

### (1) High Type Road Works

1) Earth works		Per 100 m <sup>3</sup>	Working hours per year	Work capacity per year	Manpower required
Work loads required per year	20,000,000 m <sup>3</sup>				
Bulldozer	21 t	11.52 h	680	5,903	3,388
Hydraulic Excavator	0.6 m <sup>3</sup>	14.10 h	980	6,950	2,878
Dump Truck	10 t	32.10 h	1,330	4,143	4,827
Bulldozer (embankment)	15 t	7.74 h	680	8,786	2,276
Bulldozer (subgrade)	15 t	8.64 h	680	7,870	2,541
Tire Roller (embankment)	8 - 20 t	3.96 h	620	15,657	1,277
Tire Roller (subgrade)	8 - 20 t	8.34 h	620	7,434	2,690
Operator					15,051
Drivers					4,827
Common workers					99,391
Mechanics					6,020
2) Ripping Excavation		Per 100 m <sup>3</sup>	Working hours per year	Work capacity per year	Manpower required
Work loads required per year	500,000 m <sup>3</sup>				
Bulldozer	32 t	11.52 h	690	599	835
Dump Truck	10 t	3.21 h	1,330	4,143	121
Operator					835
Drivers					121
Common workers					4,777
Mechanics					334
3) Scarifying and grading works		Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m-d	Manpower required
Work loads required per year	60,000,000 m <sup>2</sup>				
Common Workers		1.56 m-d	240	15,385	3,900
Motor Grader	3.1 m	1.56 h	600	38,462	1,560
Common workers					3,900
Operators					1,560
Mechanics					624
4) Slope training works		Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m-d	Manpower required
Work loads required per year	5,000,000 m <sup>2</sup>				
Foremen		6.00 m-d	240	4,000	1,250
Common Workers		25.20 m-d	240	952	5,250
Hydraulic Excavator	0.6 m <sup>3</sup>	25.20 h	980	3,889	1,286
Common Workers					5,250
Operators					1,286
Mechanics					514



5) Sub Base Course Works					
Work loads required per year	30,000,000 m <sup>2</sup>	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m·d	Manpower required
Common Workers		2.04 m·d	240	11,765	2,550
Motor Grader	3.1 m	1.86 h	600	32,258	930
Compaction Roller	10 - 12 t	1.56 h	600	38,462	780
Tire Roller	8 - 20 t	1.56 h	680	43,590	688
Water Bowzer	5.5 - 6.5 kl	1.02 h	790	77,451	387
Dump Truck	10 t	8.03 h	1,330	16,573	1,810
Common Workers					2,550
Operators					2,398
Drivers					2,197
Mechanics					959
6) Base Course Works					
Work loads required per year	30,000,000 m <sup>2</sup>	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m·d	Manpower required
Common Workers		2.64 m·d	240	9,091	3,300
Motor Grader	3.1 m	1.86 h	600	32,258	930
Compaction Roller	10 - 12 t	1.98 h	600	30,303	990
Tire Roller	8 - 20 t	1.98 h	680	34,343	874
Water Bowzer	5.5 - 6.5 kl	1.26 h	790	62,698	478
Dump Truck	10 t	4.82 h	1,330	27,622	1,086
Common Workers					3,300
Operators					2,398
Drivers					2,197
Mechanics					959
7) Asphalt Concrete Paving Works					
Work loads required per year	30,000,000 m <sup>2</sup>	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m·d	Manpower required
Foremen		0.48 m·d	240	50,000	600
Skilled Workers		2.52 m·d	240	9,524	3,150
Common Workers		2.52 m·d	240	9,524	3,150
Asphalt Finisher	2.4 - 5 m	1.98 h	530	26,768	1,121
Common Roller	10 - 12 t	1.98 h	600	30,303	990
Tire Roller	8 - 20 t	1.98 h	680	34,343	874
Dump Truck	10 t	1.61 h	1,330	82,866	362
Foremen					600
Skilled Workers					3,150
Common Workers					3,150
Operators					2,984
Mechanics					1,194
Drivers					362

8) Structure Works	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m·d	Manpower required
Work loads required per year 1,000,000 m				
Foremen	4.00 m·d	240	600	1,667
Skilled Workers	4.80 m·d	240	500	2,000
Common Workers	13.20 m·d	240	182	5,500
Truck Transport	4.00 h	1,330	3,325	301
			Foremen	1,667
			Skilled Workers	2,000
			Common Workers	5,500
			Drivers	301
9) Concrete Works	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m·d	Manpower required
Work loads required per year 500,000 m <sup>3</sup>				
Foremen	7.20 m·d	240	333	1,500
Skilled Workers	10.08 m·d	240	238	2,100
Common Workers	36.72 m·d	240	65	7,650
Trade Transport	4.00 h	1,330	3,325	150
			Foremen	1,500
			Skilled Workers	2,100
			Common Workers	7,650
			Drivers	150
<b>Total of High Type Road Works</b>				
	Foremen		3,767	2%
	Skilled Workers		7,250	4%
	Common Workers		135,469	67%
	Operators		26,908	13%
	Mechanics		10,763	5%
	Drivers		9,523	5%
	Sub Total		193,679	95%
	Engineers		1,937	1%
	Sub Engineers		3,874	2%
	Others		3,874	2%
	Total		203,363	100%

(2) Low Type Road Works

1) Earth works					
Work loads required per year	12,000,000 m <sup>3</sup>	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per year	Manpower required
Bulldozer	21 t	11.52 h	680	5,903	2,033
Hydraulic Excavator	0.6 m <sup>3</sup>	14.10 h	980	6,950	1,727
Dump Truck	10 t	32.10 h	1,330	4,143	2,896
Bulldozer (embankment)	15t	7.74 h	680	8,786	1,366
Bulldozer (subgrade)	15 t	8.64 h	680	7,870	1,525
Tire Roller (embankment)	8 - 20 t	3.96 h	620	15,657	767
Tire Roller (subgrade)	8 - 20 t	8.34 h	620	7,434	1,614
Operator					9,031
Drivers					2,896
Common workers					59,635
Mechanics					3,612
2) Ripping Excavation					
Work loads required per year	200,000 m <sup>3</sup>	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per year	Manpower required
Bulldozer	32 t	11.52 h	690	599	334
Dump Truck	10 t	3.21 h	1,330	4,143	48
Operator					334
Drivers					48
Common workers					1,911
Mechanics					134
3) Scarifying and grading works					
Work loads required per year	45,000,000 m <sup>2</sup>	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m-d	Manpower required
Common Workers		3.12 m-d	240	7,692	5,850
Motor Grader	3.1 m	1.56 h	600	38,462	1,170
Common workers					5,850
Operators					1,170
Mechanics					1,170
4) Slope training works					
Work loads required per year	4,000,000 m <sup>2</sup>	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m-d	Manpower required
Foremen		6.00 m-d	240	2,000	2,000
Common Workers		25.20 m-d	240	476	8,400
Hydraulic Excavator	0.6 m <sup>3</sup>	25.20 h	980	3,889	1,029
Common Workers					8,400
Operators					1,029
Mechanics					411

5) Sub Base Course Works					
Work loads required per year	22,500,000 m <sup>2</sup>	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m-d	Manpower required
Common Workers		4.08 m-d	240	11,765	3,825
Motor Grader	3.1 m	1.86 h	600	32,258	698
Compaction Roller	10 - 12 t	1.56 h	600	38,462	585
Tire Roller	8 - 20 t	1.56 h	680	43,590	516
Water Bowzer	5.5 - 6.5 kl	1.02 h	790	77,451	291
Dump Truck	10 t	8.03 h	1,330	16,573	1,358
				Common Workers	3,825
				Operators	1,799
				Drivers	1,648
				Mechanics	719
6) Base Course Works					
Work loads required per year	22,500,000 m <sup>2</sup>	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m-d	Manpower required
Common Workers		2.64 m-d	240	9,091	2,475
Motor Grader	3.1 m	1.86 h	600	32,258	698
Compaction Roller	10 - 12 t	1.98 h	600	30,303	743
Tire Roller	8 - 20 t	1.98 h	680	34,343	655
Water Bowzer	5.5 - 6.5 kl	1.26 h	790	62,698	359
Dump Truck	10 t	4.82 h	1,330	27,622	815
				Common Workers	2,475
				Operators	2,095
				Drivers	1,173
				Mechanics	838
7) Structure Works					
Work loads required per year	750,000 m	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m-d	Manpower required
Foremen		4.80 m-d	240	500	1,500
Skilled Workers		6.40 m-d	240	375	2,000
Common Workers		33.00 m-d	240	73	10,313
Truck Transport		4.00 h	1,330	3,325	226
				Foremen	1,500
				Skilled Workers	2,000
				Common Workers	10,313
				Drivers	226

8) Concrete Works	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m <sup>3</sup> d	Manpower required
Work loads required per year	350,000 m <sup>3</sup>			
Foremen	8.64 m <sup>3</sup> d	240	278	1,260
Skilled Workers	13.44 m <sup>3</sup> d	240	179	1,960
Common Workers	85.68 m <sup>3</sup> d	240	28	12,495
Trade Transport	4.00 h	1,330	3,325	150
		Foremen		1,260
		Skilled Workers		1,960
		Common Workers		12,495
		Drivers		150
<b>Total of Low Type Road Works</b>		Foremen	2,760	2%
		Skilled Workers	3,960	3%
		Common Workers	104,903	73%
		Operators	13,362	9%
		Mechanics	6,047	4%
		Drivers	6,142	4%
		Sub Total	137,174	95%
		Engineers	1,372	1%
		Sub Engineers	2,743	2%
		Others	2,743	2%
		<b>Total</b>	<b>144,033</b>	<b>100%</b>

(3) Road Maintenance Works

1) High Type Roads 5% of Total Length

Base Course Works Work loads required per year	39,275,625 m <sup>2</sup>	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m-d	Manpower required	
Common Workers		4.40 m-d	240	5,455	7,201	
Motor Grader	3.1 m	0.31 h	600	193,548	203	
Compaction Roller	10 - 12 t	0.33 h	600	181,818	216	
Tire Roller	8 - 20 t	0.33 h	680	206,061	191	
Water Bowzer	5.5 - 6.5 kl	0.21 h	790	376,190	104	
Dump Truck	10 t	0.80 h	1,330	165,732	237	
					Common Workers	7,201
					Operators	610
					Drivers	341
					Mechanics	244
Asphalt Concrete Paving Works Work loads required per year	39,275,625 m <sup>2</sup>	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m-d	Manpower required	
Foremen		0.40 m-d	240	60,000	655	
Skilled Workers		2.10 m-d	240	11,429	3,437	
Common Workers		4.20 m-d	240	5,714	6,873	
Common Roller	10 - 12 t	0.99 h	680	60,606	648	
Tire Roller	8 - 20 t	1.98 h	680	68,687	572	
Dump Truck	10 t	1.61 h	1,330	82,866	474	
					Foremen	655
					Skilled Workers	3,437
					Common Workers	6,873
					Operators	1,220
					Mechanics	488
					Drivers	474
Maintenance Works Work loads required per year	104,735,000	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m-d	Manpower required	
Foremen		0.20 m-d	240	120,000	873	
Common Workers		12.00 m-d	240	2,000	52,368	
Truck Transport		2.00 h	1,330	66,500	1,575	
					Foremen	873
					Common Workers	52,368
					Drivers	1,575
<b>Total of High Type Road Maintenance Works</b>					Foremen	1,527
					Skilled Workers	3,437
					Common Workers	66,441
					Operators	1,829
					Mechanics	732
					Drivers	2,390

2) Low Type Roads 20% of Total Length

Base Course Works		Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m <sup>3</sup> d	Manpower required	
Work loads required per year	75,426,750 m <sup>2</sup>					
Common Workers		4.40 m-d	240	5,455	13,828	
Motor Grader	3.1 m	0.31 h	600	193,548	390	
Compaction Roller	10 - 12 t	0.33 h	600	181,818	415	
Tire Roller	8 - 20 t	0.33 h	680	206,061	366	
Water Bowzer	5.5 - 6.5 kl	0.21 h	790	376,190	201	
Dump Truck	10 t	0.80 h	1,330	165,732	455	
					Common Workers	13,828
					Operators	1,171
					Drivers	656
					Mechanics	468
<b>Maintenance Works</b>						
Work loads required per year	100,569,000	Per 100 m <sup>3</sup>	Working hours per year	Work capacity per m <sup>3</sup> d	Manpower required	
Foremen		0.20 m-d	240	120,000	838	
Common Workers		12.00 m-d	240	2,000	50,285	
Truck Transport		2.00 h	1,330	66,500	1,512	
					Foremen	838
					Common Workers	50,285
					Drivers	1,512
<b>Total of Low Type Road Maintenance Works</b>						
					Foremen	838
					Common Workers	64,113
					Operators	1,171
					Mechanics	468
					Drivers	2,168
<b>Total of Road Maintenance Works</b>						
			Foremen	2,365	2%	
			Skilled Workers	3,437	2%	
			Common Workers	130,554	87%	
			Operators	3,000	2%	
			Mechanics	1,200	1%	
			Drivers	4,558	3%	
			Sub Total	145,114	96%	
			Engineers	1,451	1%	
			Sub Engineers	1,451	1%	
			Others	2,902	2%	
			Total	150,919	100%	

## Appendix 8 Number of Vacancies and Applicants/Employment of Trainees

### (1) Number of Vacancies and Applicants

Course	No.	FWO	NLC	WARDS	Punjab	Sind	NWFP	Baluchistan	FATA
Basic Course									
Operator Course	40	20 (20)	2 (20)	3 (30)	8 (300)	3 (100)	2 (150)	1 (10)	1 (20)
Mechanic III Course	20	10 (10)	2 (2)	1 (10)	3 (70)	1 (15)	1 (20)	1 (5)	1 (10)
Mechanic II Course Engine Course	20	5 (5)	2 (2)	2 (10)	5 (50)	3 (15)	1 (20)	1 (5)	1 (5)
Mechanic II Course Chassis Course	20	5 (5)	2 (2)	2 (10)	5 (50)	3 (15)	1 (20)	1 (5)	1 (5)
Special Course									
DAB	40	5 (5)	5 (5)	5 (40)	12 (400)	5 (50)	4 (150)	2 (10)	2 (2)
CMPE	30	8 (8)	3 (3)	4 (4)	8 (40)	3 (15)	2 (20)	1 (2)	1 (3)
CMS	30	8 (8)	3 (3)	4 (4)	8 (40)	3 (15)	2 (20)	1 (2)	1 (3)
<b>Total</b>	<b>200</b>	<b>61 (61)</b>	<b>21 (21)</b>	<b>21 (108)</b>	<b>49 (990)</b>	<b>21 (230)</b>	<b>13 (410)</b>	<b>8 (39)</b>	<b>8 (48)</b>

Note 1) Figures in parentheses indicate the number of applicants

Note 2) FWO : Frontier Works Organization  
NLC : National Logistic Cell  
WARDS :  
Punjab : Punjab Province  
Sind : Sind Province  
NWFP : NWFP Province  
Baluchistan : Baluchistan Province  
FATA : Tribal Area



(2) Employment Situation of CMTI Graduates (1995)

The total trainees graduated from CMTI are 2,767 (1986-1995)

Sector	No. of persons
1. Public Sector	1,068
2. Private Sector	1,699
Total	2,767

1. The main organisations from public sector who have sent their personnel to CMTI for training are as follows:

Organisation	No. of persons
FWO	505
NLC	170
WAPDA	70
SNGPL	38
Irrigation Department	35
Public Works Department	40
Communication and Works Department	55
Others	155
Total	1,068

Note: FWO : Frontier Works Organisation  
NLC : National Logistic Cell  
WAPDA : Water and Power Development Authority  
SNGPL : Sui Northern Gas Pipeline Companies

2. Of a total of 1,699 graduates employed by the private sector, about 80% are employed by private companies in Pakistan and about 20% in Middle East countries. The main private companies who employ graduates are:

HAKAS, Hussain, Shah & Co., STFA, Marathon,  
I. J. International, Jeffer Brothers, DAEWOO

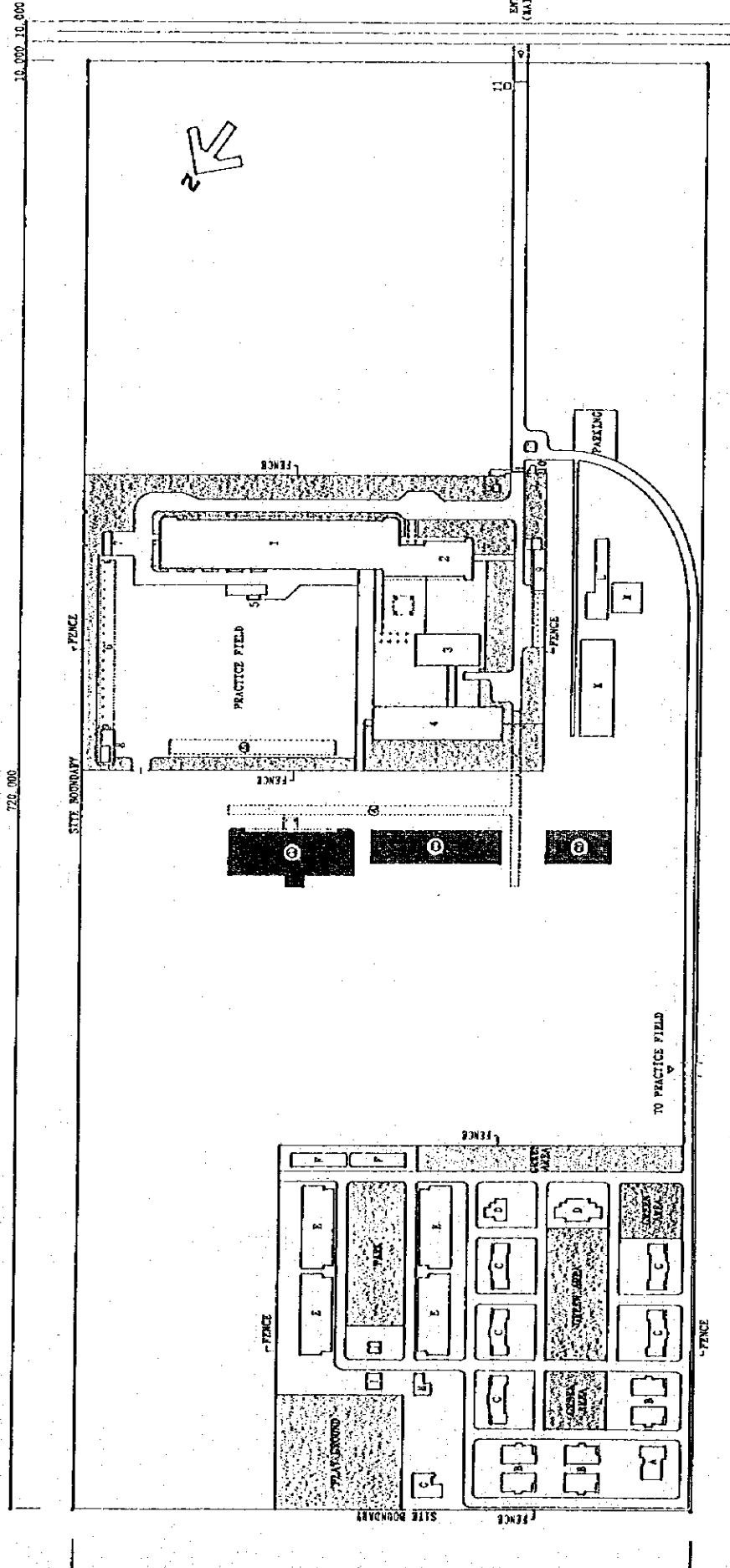
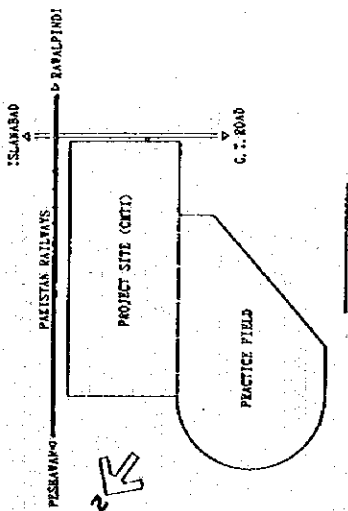
# Appendix 9

# Buildings and Facilities Expansion Plan

- FACILITIES BY JAPAN GRANT-AID (1984)**
- 1 TRAINING BLDG.
  - 2 ADMINISTRATIVE BLDG.
  - 3 CANTEN
  - 4 DOMITORY
  - 5 LOADING DECK & WASHING AREA
  - 6 GARAGE
  - 7 SCRAP YARD
  - 8 FUEL STATION
  - 9 MAINTENANCE OFFICE
  - 10 COAL BOUSE
  - 11 GATE HOUSE
  - 12 ELEVATED WATER TANK

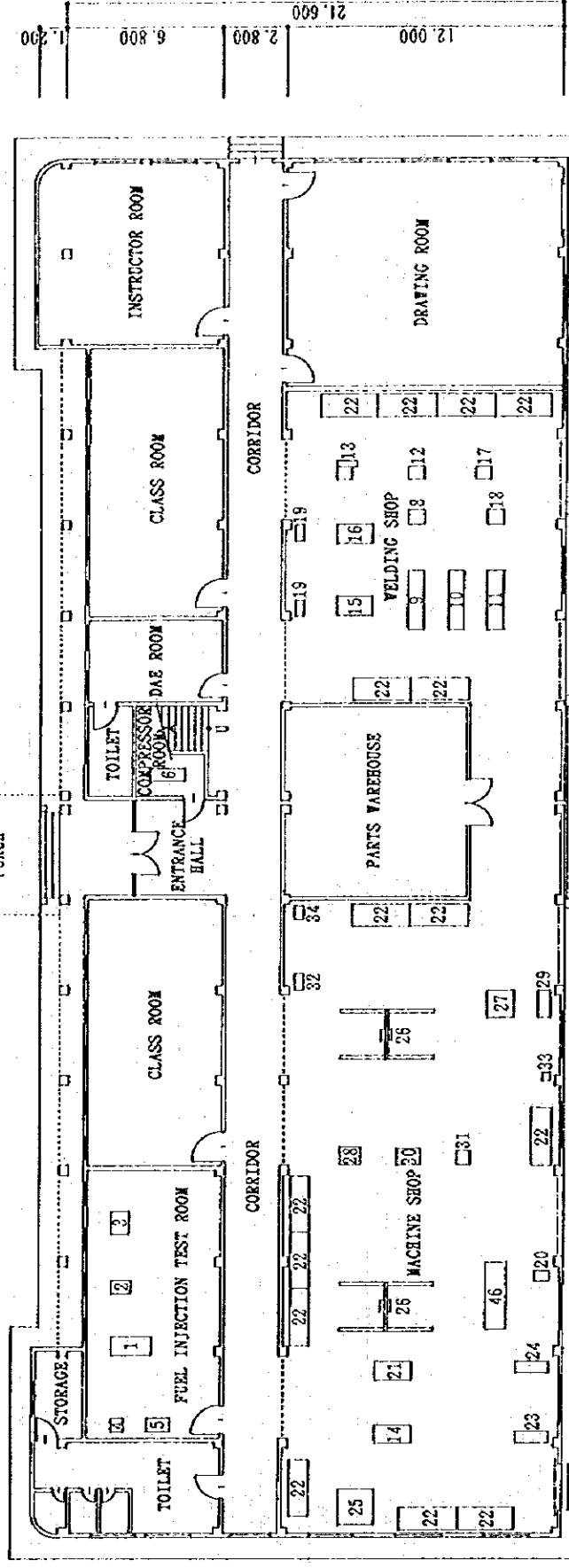
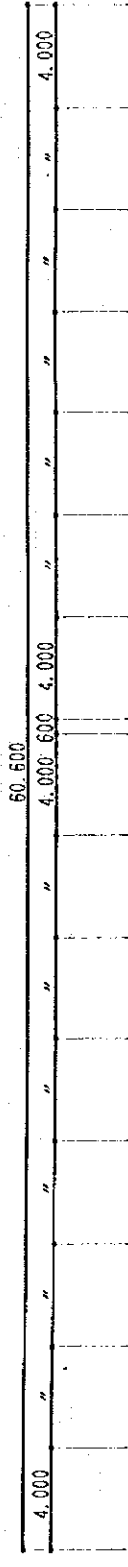
- FACILITIES BY PAKISTAN SIDE (UNDER CONSTRUCTION)**
- ⓐ DAE (TRAINING BLDG.)
  - ⓑ DOMITORY
  - ⓒ CANTEN
  - ⓓ ROAD
  - ⓔ GARAGE

- FACILITIES BY PAKISTAN SIDE (EXISTING)**
- A STAFF BOUSE TYPE A
  - B STAFF BOUSE TYPE B
  - C STAFF BOUSE TYPE C
  - D STAFF BOUSE TYPE D
  - E MARRIED QUARTERS
  - F FOLLOWERS QUARTERS
  - G MEETING PLACE
  - H DISPENSARY
  - I ELEC. SUB-STATION
  - J ELEVATED WATER TANK
  - K UNMARRIED QUARTERS
  - L VAREHOUSE
  - M HUSAGE



SCALE  
0 50 100

SITE PLAN 1:1500

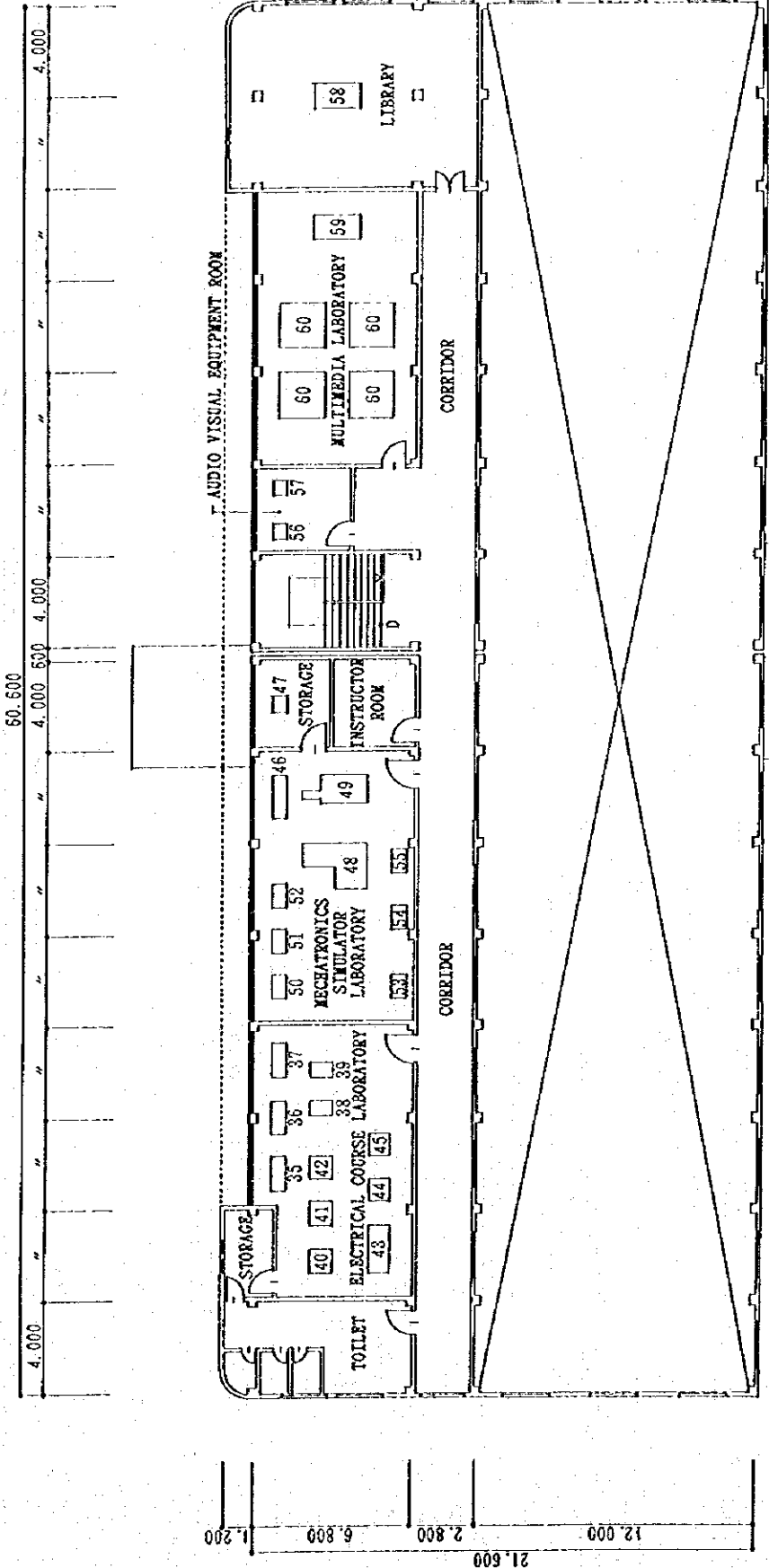


GROUND FLOOR TRAINING EQUIPMENT LAYOUT PLAN

No. ITEM No.	DESCRIPTION	Q'ty
1	6.1.1 Fuel Injection Pump Test Stand	1
2	6.1.2 PT-Pump Test Stand	1
3	6.1.3 Injection Flaw Comparator	1
4	6.1.4 Nozzle Tester	1
5	6.1.5 Inspection Instrument Set	1
6	6.1.6 Air Compressor	1
7	6.2.1 Reconstruction of Hydraulic Test Stand	1
8	7.1 Air-Carbon Arc Gouging Equipment	1
9	7.2 Gas Welding Equipment	9
10	7.3 Gas Regulator	7
11	7.4 Flashback Arrestor	10
12	7.5 Welding and Cutting Torch	8
13	7.6 Auto Welding Machine	1
14	7.7 High Speed Abrasive Cutting Machine	1

No. ITEM No.	DESCRIPTION	Q'ty
15	7.8 Spot Welding Gun	1
16	7.9 Pipe Cutting Machine	1
17	7.10 TIC Welder	1
18	7.11 Ultrasonic Flaw Detector	1
19	7.12 Grinding Machine	2
20	7.13 Pillar Drill	1
21	7.14 Power Hacksaw	1
22	7.15 Accessory Set of Welding	1
23	7.16 Hand Type Circular Shear Machine	1
24	7.17 Hand Lever Shearing Machine	1
25	7.18 Shearing Machine	1

No. ITEM No.	DESCRIPTION	Q'ty
26	8.1.1 Mobile Floor Crane	2
27	8.1.2 Hydraulic Tire Removing Tool	1
28	8.1.3 Gasoline Engine Analyzer	1
29	8.1.4 Spark Plug Cleaner and Tester	1
30	8.1.5 Wheel Balancer	1
31	8.1.6 Wheel Alignment Tester	1
32	8.1.7~11 Ancillaries	1
33	8.1.12 Distributor Test Bench	1
34	8.1.13 Injector Reconditioning Machine	1



FIRST FLOOR TRAINING EQUIPMENT LAYOUT PLAN

No. ITEM No.	DESCRIPTION	Q'ty
35 9.1.1	C. A. Model (Starter Motor)	1
36 9.1.2	C. A. Model (Alternator)	1
37 9.1.3	C. A. Model (Gasoline Engine)	1
38 9.2.1	Electric System Board (Crawler type)	1
39 9.2.2	Electric System Board (Wheeled type)	1
40 9.3.1	Starter Motor	2
41 9.3.2	Alternator	2
42 9.3.3	Generator	2
43 9.3.4	Regulator	10
44 9.4.1	DC Generator	1
45 9.4.2	DC Generator	1
46 10.1	Cut Away Model	1
47 11.1	Training Video Film	1

No. ITEM No.	DESCRIPTION	Q'ty
48 12.1.1	Mechatronics Simulator	1
49 12.1.2	Elec. Governor Controlling System	1
50 12.1.3	Auto. Idling Controlling System	1
51 12.1.4	Hydraulic Pump Controlling System	1
52 12.1.5-6	Mechatronics Function Checker	1
53 12.1.7-11	Mechatronics Device Parts	1
54 12.1.12-13	Function Assessment Tools	1
55 12.1.14-19	Table Type Elec. Measuring Inst.	1

No. ITEM No.	DESCRIPTION	Q'ty
56 13.1.1	Overhead Projector (common type)	5
57 13.1.2	Overhead Projector (direct type)	10
58 13.2.1	Photo Copier	4
59 13.2.2	L. C. D. Display Panel	1
60 13.2.3	Multimedia Products for Technical Training	4

## Appendix 10 Status of Training Courses

### Training Curriculum

#### 1. BASIC COURSE

Training Course	1-1.Operator	1-2.Mechanic III	1-3.Mechanic II (Engine)	1-4.Mechanic II (Chassis)	1-5.Diploma of Associate Engineer	Remarks
Training period(months)	3	3	5	5	32	
Number of Trainees	100	40	40	40	40	
Number of Courses (per year)	3	3	2	2	1	
Annual Output	240	120	80	80	40	
Trainees age (years)	18 - 28	Refer to 1-1	Refer to 1-1	Refer to 1-1	18 - 20	
Qualification	-Matric/Secondary School Certificate -1 year or more practical experience of construction operation is preferable -Some understanding of written English	Refer to 1-1	-Matric/Secondary School Certificate with 3 years experience as assistant mechanic or Higher Secondary School Certificate with 1 year experience as assistant mechanic -knowledge of written English	Refer to 1-3	-Matric/Secondary School Certificate with Science (Aggregate marks: less than 50%) -Passing marks (more than 50 %) include Physics, Chemistry, Electricity, Math and English	
Objective of Training	To provide trainees with knowledge and skill required for operation and daily maintenance of machinery	To provide trainees with knowledge and skill required for maintenance and repair of machinery in the field	To provide trainees with all round knowledge and skill required for maintenance, repair and testing of engines	To provide trainees with all round knowledge and skill required for maintenance, repair and testing of chassis	To train persons in management, employment, planning, operation, maintenance, repair, organization, etc	

Menu of Training Training Course	1-1. Operator Course	1-2. Mechanic III	1-3. Mechanic II (Engine)	1-4. Mechanic II (Chassis)	1-5. Diploma of Associate Engineer	Remarks
General knowledge of Construction Machinery and Component	○	○	○	○	○	
Practical training in Machine operation and Construction method	○	○			○	
Inspection and Maintenance	○	○			○	
Handling of Tools and Measuring Instruments		○	○	○	○	
Practical training in removal and Installation of Components		○			○	
Trouble shooting and Practical training on Repair		○			○	
Repair and Overhauling of Engine			○		○	
Testing, Troubleshooting and Adjustment of Engine			○		○	
Repair and Testing of Electric circuit and Fuel system			○		○	
Handling of Diagnostic Equipment			○		○	
Structure and Repair of Power train (Chassis)				○	○	
Structure and Repair of Hydraulic system (Chassis)				○	○	
Trouble-shooting of Chassis				○	○	
Operation of workshop equipment				○		
Special Welding Technology					○	
Project planning and Management					○	
Planning of Operation and Maintenance					○	
Science					○	

2. SPECIAL COURSE

Training Course	2-1. Construction Machinery Planning & Employment	2-2. Construction Machinery Supervision	2-3. Special Welding Techniques	2-4. Construction Machinery Electrician	Remarks
Training Period (months)	3	3	3	3	
Number of Trainees	40	40	20	20	
Number of Courses (per year)	3	3	3	3	
Annual Output	120	120	60	60	
Trainees' age (years)	20 and above	18 and above	18 and above	18 and above	
Qualification	-Diploma in Civil, Electrical and Mechanical engineering -Min.2 years experience in a recognized organization	-Diploma in Civil, Electrical and Mechanical engineering -Experience preferable but not essential -Knowledge of written English	-Secondary School Graduate -Knowledge of written English -1 year welding experience or qualified in Mechanic II or Mechanic III course	-Secondary School Graduate -Knowledge of written English -Diploma in Electrical system of various latest machines and equipment	
Objective	To train the Planning and Employment of Construction machinery at a construction project	To train the supervisory staff in managing and supervising a construction project	To train the personnel in latest welding techniques used in the field of construction machinery	To obtain the personnel in dealing with the electrical system of various latest machines and equipment	

## Menu of Training

### 2-1. Construction Machinery Planning & Employment

Introduction to Planning and Employment Methodology
Earth Moving Planning
Practical Training in Machine Operation and Construction Method
Inspection and Maintenance of Construction Equipment
Handling of Tools and Measuring Instruments for Construction Equipment
Selection and Working Capacity of Employment
Factors affecting the Selection of Equipment
Engineering Fundamentals of Earth Moving
Calculating the Productivity of Bulldozer, Dozer Shovel, Wheel Loader, Excavator, Motor Grader, etc.
Project Planning and Management

### 2-2. (Construction Machine Supervision)

Function of various Construction Machines
Practical Training in Machine Operation and Construction Method
Inspection and Maintenance of Construction Equipment
Handling of Tools and Measuring Instruments for Construction Equipment
Service Operation
Making of Work Reports and Records
Inspection of Maintenance
Machine Costs and Cycle Time
Selection of Construction Equipment
Introduction to Quality Control
Planning of Operation and Maintenance

### 2-3. (Special Welding Techniques)

Elementary Mathematics and Drawing
Safety Precautions
Welding Techniques
Property of Metals
Latest Welding Methods
Welding Practice
Modern Trends in Welding Techniques

### 2-4. (Construction Machinery Electrician)

Safety Precautions, Care and Maintenance of Common Hand Tools and Instruments
Interpretation of Common Symbols used for Wiring Diagrams
Circuit Reading
Connection and Reading of Voltmeter, OHM Meter and KWH meter
Ignition, Charging, Lightning, Gauges, Battery, Alternator, Dynamo and Starting circuit
Trouble Shooting in various electrical Circuits



## Appendix 11 Situation of Local Agents of Foreign Makers

Agents	Name of Maker	Equipment and Vehicles Dealt	Facilities of Maintenance	Spare Parts Stock	Technical Staff
JAFFER BROTHERS	KOMATSU SAKAI NIIGATA	Bulldozer	Workshop in Karachi (full scale) Overhaul Engine, Fuel, Hydraulic, Transmission, Electric, etc.	Periodic maintenance Consumable Under carriage	Engineers 4
		Motor grader			Mechanics 10
		Excavator			Electricians 2
		Wheel loader			Welding 1
		Compactor			Others 12
ASEL (Allied Engineering & Services Ltd.)	CAT	Bulldozer	Workshop in Karachi (full scale) Overhaul Engine, Fuel, Hydraulic, Transmission, Electric, etc.	Periodic maintenance Consumable Under carriage	Engineers 10
		Motor grader			Mechanics 40
		Excavator			Electricians 10
		Wheel loader			
		Dump truck			
SWEDISH MOTORS	DYNAPAC	Wheel loader	Workshop in Karachi (full scale) Overhaul Engine, Fuel, Hydraulic, Transmission, Electric, etc.	Periodic maintenance Consumable	Engineers 2
		Excavator			Mechanics 8
		Dump truck			Electrician 1
		Compactor			Welding 1
		Vehicles			
ACP (Automobile Corporation of Pakistan, Ltd.)	MITSUBISHI FUSO	Dump truck	Workshop in Karachi (full scale) Overhaul Engine, Fuel, Hydraulic, Transmission, Electric, etc.	Periodic maintenance Consumable	Engineers 2
		Truck			Mechanics 18
		Compactor			Electrician 4
		Vehicles			Welding 7
WWM (World Wide Motors)	MITSUBISHI MOTORS	Vehicles	Service network - Karachi, Lahore, Rawalpindi, Islamabad, Pesharwal Overhaul	Periodic maintenance Consumable	Engineers 26
					Mechanics 71
					Electrician 23
					Welding 10
FTC (Federal Trading Corporation)	No private services	Bulldozer	Workshop in Karachi Overhaul Engine, _____, Transmission	Periodic maintenance Consumable	Engineers 8
		Wheel Loader			Mechanics 24
		Motor Grader			Electrician 2
		Vehicles			Welding 2

## Appendix 12 Equipment Maintenance Proforma

### Appendix 12-1 Daily Check Record

GD605A-3 S/NO. 54104

Date	Working Hours	Total Hours	Nature of Work	Supply of Fuel	Consumed	Balance	HD30 Engine	HD10 Transmission	HYP90 Final Drive	Grease	Signature by Instructure (Operator's Course)
	BBF	224	Training			210					
1.12.86	3	227	"		18	192					
2.12.86	5	232	"		30	162					
3.12.86	9	236	"		24	138					
21.12.86	2	238	"		12	126					
22.12.86	4	292	"	ℓ	24	102					
31.12.86	5	247	"	100	30	172					
Total	23	247		100	130	172					
1.1.87	4	251	Training		24	148					
3.1.87	5	256	"		30	118					
4.1.87	5	261	"		30	88					
5.1.87	5	266	"		30	58					
6.1.87	5	271	"		30	28					
7.1.87	5	276	"	200	30	198					
8.1.87	4	280	"		24	174					
10.1.87	5	285	"		30	144					
11.1.87	5	290	"		30	114					
18.1.87	5	295	"		30	84					
19.1.87	5	300	"		30	54					
20.1.87	5	305	"		30	24					
21.1.87	5	310	"	200	30	194					
31.1.87	5	315	"		30	164					
Total	68	315		400	408	164					
24.2.87	1	316	Static Running		6	158					
Total	1	316			6	158					

Appendix 12-2

Work Order Sheet

GD605A-3 S/NO. 54104

CMTI

To: CMTI Workshop

Sta: Islamabad

Sta: Islamabad

W.O. No.: S1203/721 of 18.9.95

Job Card No.: \_\_\_\_\_

S/No.	BA No.	Make & Type	Q'ty	Nature of Work	Remarks
1	54104	Motor Grader GD605A	3	Blade Lifting Hydraulic	Pipe Leakage

Plant Officer

Construction Machinery Training Institute

Workshop Officer

Construction Machinery Training Institute

Appendix 12-3

Repair Card

GD605A-3 S/NO. 54104

REPAIR CARD

Card No.: CV/C-22/446  
 /Establish: C.M.T.I  
 Work Order No. & Date: 81203/72/RU  
 Date in Workshop: 18.9.95  
 Hours Meter Reading in \_\_\_\_\_

Regard No.: 54104  
 Nomenclature: Motor Grader  
 Make & Type: GD-605A.3  
 Date of Completion: 18.9.95  
 Hours Meter Reading Out: \_\_\_\_\_

S/No.	Fault/Defects	Rectified	Inspection
1	Blade Lifting Hydraulic Pipe	07102-20318	Hose New Fitted

Workshop Officer  
 Construction Machinery Training Institute

Signature by Associate Engineer

Appendix 12-4

Parts Order Sheet

PARTS AND MATERIAL ISSUED

Inv. No.	Date	Parts No.	Nomenclature	Q'ty	Issued by	Received by
IV/L-18106	18-9-95	07102-20318	Hourse	1	Signature by Stock house person	Signature by Mechanic

Workshop Officer  
Construction Machinery Training Institute



Appendix 13 Condition of the CMTI's Existing Equipment

PRESENT SITUATION OF CONSTRUCTION MACHINERY TRAINING INSTITUTE EQUIPMENT  
IN THE ISLAMIC REPUBLIC OF PAKISTAN (No.1: Construction Machinery)

(Note) Machine condition—O: Workable, Δ: Repairable, X: Unworkable in near future

No	Machine	Machine Model	Working Hr	Present situation	Results of the Study	Action to be taken	JICA Fund	Remarks
1	Bulldozer	Komatsu D155A-1	2,378 H	O	Out of problems			40 ton, 520 PS
2	ditto	Komatsu D85A-18	2,883 H	O	Out of problems			24 ton, 200PS
3	ditto	Komatsu D65A-8	2,824 H	Δ	Engine oil consumption is high due to engine blow-by. (Apr. 2nd, 1994 at 1,955 H)	This machine needs to change worn parts such as cylinder liners, pistons with piston rings, etc.		16 ton, 155 PS
4	ditto	Komatsu D50A-17	2,728 H	O	Out of problems			12 ton, 120 PS
5	Shovel Dozer	Komatsu D65S-8	1,803 H	O	Out of problems			18 ton, 160 PS
6	ditto	Komatsu D52S-17	1,664 H	O	Out of problems			14 ton, 110 PS
7	Wheel Loader	Komatsu WA450-1	3,034 H	O	Out of problems			3.5 m <sup>3</sup> , 237 PS
8	ditto	Komatsu WA200-1	3,246 H	O	Out of problems			1.7 m <sup>3</sup> , 108 PS
9	Hydraulic Excavator	Komatsu PC200-3	2,722 H	O	Out of problems			0.7 m <sup>3</sup> , 120 PS
10	ditto	Komatsu PC150-1	2,775 H	O	Out of problems			0.5 m <sup>3</sup> , 100 PS
11	ditto	Komatsu PC30-6	2,221 H	O	Out of problems		Budget: 1988	0.09 m <sup>3</sup> , 30 PS
12	Motor Grader	Komatsu GD605A-3	3,801 H	O	Out of problems			Blade width: 3.7m, 145 PS
13	ditto	Mitsubishi MG200	2,926 H	O	Out of problems			Blade width: 3.7m, 110 PS
14	Road Stabilizer	Komatsu GS360	956 H	O	Out of problems			Width: 1.97 m
15	Asphalt Finisher	Niigata Tekko NF220AV	1,745 H	O	Out of problems			349 PS
16	Asphalt Distributor	Hanta Kikai DS-30DADT	1,628 H	O	Out of problems			Width: 2.5 m
17	Motor Scraper	Komatsu WS16S-2	969 H	O	Out of problems			3,000 ltr
18	ditto	Komatsu WS16S-2	945 H	O	Out of problems			16 m <sup>2</sup>
								16 m <sup>3</sup>

19	Vibration Roller	Komatsu JV100A-1	843 H	0	Out of problems		9.6 ton
20	ditto	Sakai SV70	688 H	0	Out of problems		6.5 ton
21	Tire Roller	Sakai TS150	634 H	0	Out of problems		15.5 ton
22	Dump Truck	Komatsu HD200-2	1,215 H	0	Out of problems		20 ton
23	ditto	Isuzu DR11-135	3,139 H	0	Out of problems		12 ton
24	Truck Crane	Tadano TS100L	1,216 H	0	Out of problems		10 ton
25	ditto	Tadano TS100L	1,232 H	0	Out of problems		10 ton
26	Air Compressor	Komatsu EC35Z-1	171 H	0	Out of problems		3.7 m <sup>3</sup> /min.
27	Diesel Generator	Komatsu EG15-3	90 H	0	Out of problems		9.7 kw

Total: 42,798 H Average: 1,712 H



**PRESENT SITUATION OF CONSTRUCTION MACHINERY TRAINING INSTITUTE EQUIPMENT  
IN THE ISLAMIC REPUBLIC OF PAKISTAN (No.2: Vehicles)**

(Note) Machine condition—O: Workable, #: Repairable, X: Unworkable within 1 - 2 years

No	Machine	Machine Model	Running Hr	Present situation	Results of the Study	Action to be taken	JICA Fund	Remarks
1	Service car	Isuzu BE22U	196,931 km	X	Engine oil consumption is high due to wear of engine moving parts. This machine will be in poor condition even after repair of engine within 1 year.	From an economic point of view, procurement of spare parts for repairing will not be cost effective within 1 year.		S/No.IDB2704
2	ditto	Isuzu BE22U	204,302 km	X	Engine oil consumption is high due to wear of engine moving parts. This machine will be in poor condition even after repair of engine within 1 year.	From an economic point of view, procurement of spare parts for repairing will not be cost effective within 1 year.		S/No.IDB2703
3	Micro-bus	Isuzu BE22U	92,346 km	X	Engine oil consumption is high due to wear of engine moving parts. This machine will be in poor condition even after repair of engine within 1 year.	From an economic point of view, procurement of spare parts for repairing will not be cost effective within 1 year.		S/No.2935
4	ditto	Isuzu BE22U	66,691 km	#	At present this machine is repairable. However, this machine will be in poor condition within 3 years due to wear of engine moving parts.	From an economic point of view, procurement of spare parts for repairing will not be cost effective within 3 year.		S/No.2536
5	Training Center-car	Toyota Creceada	135,228 km	X	Engine oil consumption is high due to wear of engine moving parts. This machine will be in poor condition even after repair of engine within 1 year.	From an economic point of view, procurement of spare parts for repairing will not be cost effective within 1 year.	Budget: 1985	
6	4WD	Mitsubishi Pajero	126,640 km	X	Engine oil consumption is high due to wear of engine moving parts. This machine will be in poor condition even after repair of engine within 1 year.	From an economic point of view, procurement of spare parts for repairing will not be cost effective within 1 year.	Budget: 1988	S/No.4819
7	ditto	ditto	91,502 km	O	Out of problems		Budget: 1987	S/No.9817
8	Fuel Tanker		177 km	O	Out of problems		Budget: 1988	
9	Sprinkler Truck		30,133 km	O	Out of problems		Budget: 1988	

PRESENT SITUATION OF CONSTRUCTION MACHINERY TRAINING CENTER EQUIPMENT  
IN THE ISLAMIC REPUBLIC OF PAKISTAN (No.3: Main Equipment of Workshop)

(Note) Machine condition----O: Workable, Δ: Repairable, X: Unworkable within  
1 - 2 years

No	Machine	Machine Model	Working Hr	Present situation	Results of the Study	Action to be taken	JICA Fund	Remarks
1	Overhead Crane	5 ton		O	Out of problems			for Chassis repair shop
2	Parts Cleaner	Pouring type		O	Out of problems			ditto
3	Forklift Truck	2.5 ton	242 H	O	Out of problems			ditto
4	Lubricator	for Engine oil 2 pcs		O	Out of problems			ditto
5	ditto	for Hydraulic oil 2 pcs		O	Out of problems			ditto
6	ditto	for Grease 2 pcs		O	Out of problems			ditto
7	Air Com-pressor			O	Out of problems			ditto
8	Overhead Crane	3 ton		O	Out of problems			for Engine repair shop
9	Jib Crane	1 ton, 2 pcs		O	Out of problems			ditto
10	Mobile Floor crane	2 ton		O	Out of problems			ditto
11	Valve seat Grinder	Eccentric type		O	Out of problems			ditto
12	Parts Cleaner	Pouring type		O	Out of problems			ditto
13	Valve Refacer			O	Out of problems			ditto
14	Piston Heater			Δ	Piston heater cannot work due to oil element burn out. This is due to without care of manual.	Piston heater needs to replace new elements.		ditto
15	Parts Cleaner	Shaking type		O	Out of problems			ditto
16	Hydraulic unit tester			O	Out of problems			for Hydraulic testing room
17	Engine dy-namometer	with Pannel stand .etc.		O	Out of problems			for Engine testing room

18	Diesel fuel injection pump tester				○	Out of problems			for Diesel fuel injection pump testing room
19	PT-Pump Test stand				○	Vacuum gauge is unworkable.	This stand needs to change new vacuum gauge.		ditto
20	Injector Tester				○	Out of problems.			ditto
21	Nozzle Tester				○	Out of problems.			ditto
22	Parts Cleaner				○	Out of problems			ditto
23	Starter Generator Test bench				○	Out of problems			for Electric testing room
24	Silicon Quick charger				○	Out of problems			ditto
25	Hydraulic cylinder service stand				○	Out of problems			for Hydraulic repair shop
26	Water Purifier				△	Regenerate feed valves (2 pcs) are not workable.	It needs to change two valves.		for Diesel fuel injection pump testing room
27	Jib crane				○	Out of problems			for Hydraulic repair shop

PRESENT SITUATION OF CONSTRUCTION MACHINERY TRAINING CENTER EQUIPMENT  
IN THE ISLAMIC REPUBLIC OF PAKISTAN (No.4: Main Equipment of Welding)

(Note) Machine condition-----O: Workable, Δ: Repairable, X: Unworkable within  
1 - 2 years

No	Machine	Machine Model	Working Hr	Present situation	Results of the Study	Action to be taken	JICA Fund	Remarks
1	Arc Welder	AC		O	Out of problems			
2	ditto	AC		O	Out of problems			
3	ditto	CO <sub>2</sub> gas-shielded		O	Out of problems			
4	Drying oven	for Electrodes		O	Out of problems			
5	Gas welder set	4 pcs		O	Out of problems			
6	High-speed abrasive cut-off machine			O	Out of problems			
7	Roller Press	for Track roller & Idler		O	Out of problems			
8	Track Press	for Track link		O	Out of Problems			
9	Impact wrench	for Shoe bolts		O	Out of problems			
10	Track welder	for rebuild of Track link		O	Out of problems			
11	Roller Idler Attachment	for rebuild of Roller, Idler with Track welder		O	Out of problems			
12	Grinder	Electric type		O	Out of problems			
13	Parts Cleaner	Electric type		O	Out of problems			
14	Hydraulic Press			O	Out of problems			
15	Crankshaft rebuild. M.			O	Out of problems			

PRESENT SITUATION OF CONSTRUCTION MACHINERY TRAINING CENTER EQUIPMENT  
IN THE ISLAMIC REPUBLIC OF PAKISTAN (No.5: Main Equipment of Machine Tool, etc.)

(Note) Machine condition---O: Workable, Δ: Repairable, X: Unworkable within 1 - 2 years

No	Machine	Machine Model	Working Hr	Present situation	Results of the Study	Action to be taken	JICA Fund	Remarks
1	Lathe			O	Out of problems			
2	ditto			O	Out of Problems			
3	ditto			O	Out of problems			
4	Upright Drill			O	Out of problems			
5	Bench Drill			O	Out of problems			
6	Milling Machine	Universal type		O	Out of problems			
7	Shapper			O	Out of problems			
8	Sawing Machine	Hack type		O	Out of problems			
9	Electric Grinder	Bench type		O	Out of problems			
10	Boring Machine	for Connecting rod		O	Out of problems			
11	ditto	for Cylinder		O	Out of Problems			
12	Surface Grinding Machine			O	Out of problems			
13	Cylinder Boring Machine	Portable type		O	Out of problems			
14	Line Boring Machine			O	Out of problems			
15	Honing Machine	for cylinder		O	Out of problems			
16	Crankshaft Grinding Machine	for Crankshaft		O	Out of problems			

17	High pressure washer	Hot water type		0	Out of problems		for Washing facilities
18	Steam cleaner			0	Out of problems		ditto

PRESENT SITUATION OF CONSTRUCTION MACHINERY TRAINING CENTER EQUIPMENT  
IN THE ISLAMIC REPUBLIC OF PAKISTAN (No.6: Cutaway model)

(Note) Machine condition-----O: Unusable, X: Unusable

No	Machine	Machine Model	Present situation	Results of the Study	Action to be taken	JICA Fund	Remarks
1	Engine Assy		O	Out of problems			
2	Fuel injection pump	for Bosch type	O	Out of problems			
3	PT-pump	for Cummins	O	Out of problems			
4	Injector	ditto	O	Out of problems			
5	Water pump		O	Out of problems			
6	Fuel filter		O	Out of problems			
7	Turbo-charger		O	Out of problems			
8	Torque converter		O	Out of problems			
9	Trans-mission		O	Out of problems			
10	Control valve	for Transmission	O	Out of problems			
11	Steering clutch	for Bulldozer	O	Out of problems			
12	Track roller	ditto	O	Out of problems			
13	Track link	ditto	O	Out of problems			
14	Starting motor		O	Out of problems			
15	Alternator		O	Out of problems			
16	Hydraulic pump		O	Out of problems			
17	Hydraulic Control valve	for Bulldozer	O	Out of problems			
18	Brake booster	for Dump truck	O	Out of problems			

## Appendix 14 References

Sector	Title	Outline	
Socio-Economy	Statistical Pocket Book of Pakistan, 1994	Published by Date of Publication Original/Print Contents	Economic Affairs & Statistics Division Jan. 1995 Original Socio-Economic Statistics
Socio-Economy	Economic Survey 1994-95	Published by Date of Publication Original/Print Contents	Finance Division Economic Advisor's Wing Jun. 1995 Original Socio-Economic Statistics
Socio-Economy	Eighth Five Year Plan 1993-98	Published by Date of Publication Original/Print Contents	Planning Commission Jun. 1994 Original Five Year Development Plan
Socio-Economy	Annual Plan 1994-95	Published by Date of Publication Original/Print Contents	Planning Commission Dec. 1994 Original Annual Development Programme
Labour	Workforce Situation Report and Statistical Yearbook 1993	Published by Date of Publication Original/Print Contents	Manpower Wing 1995 Original Labour Statistics
Labour	Ministry of Labour, Manpower, and Overseas Pakistanis - A Profile -	Published by Date of Publication Original/Print Contents	Manpower Wing 1995 Original Outline of the Ministry
Manpower Development	National Training Board	Published by Date of Publication Original/Print Contents	Manpower Division Apr. 1990 Original Outline of the Government's Manpower Development Programme
Transport	The Study on National Transportation Plan in the Islamic Republic of Pakistan - Interim Report -	Published by Date of Publication Original/Print Contents	JICA Jul. 1994 Copy Transport Master Plan Study
Road	Lahore - Islamabad Motorway Project (Project Description)	Published by Date of Publication Original/Print Contents	JICA Jul. 1994 Copy Outline of the Project











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