

**ISLAMIC REPUBLIC OF PAKISTAN  
REPORT OF THE DETAILED PLANNING SURVEY  
ON  
THE PROJECT FOR TECHNICAL ASSISTANCE ON  
CAPACITY BUILDING IN CTTI**

**NOVEMBER 2015**

**JAPAN INTERNATIONAL COOPERATION AGENCY  
PAKISTAN OFFICE**

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## **Preface**

In accordance with a request received from the Islamic Republic of Pakistan, the Government of Japan decided to implement the Project to Provide Technical Assistance for Capacity Building at the Construction Technology Training Institute (CTTI). In light of this decision, the Japan International Cooperation Agency (JICA) was tasked with implementing the project.

To ensure that the project is implemented efficiently and effectively, JICA dispatched a detailed planning survey team led by Mr. Motoo Taki (Senior Representative for the JICA Pakistan Office) to the CTTI prior to the start of the project for a period of 17 days from December 9 to 25, 2014. The survey team confirmed the background to the project, conducted interviews and discussions with the CTTI and related organizations, and compiled a report on the results.

I hope that this report will contribute to the project's advancement and help to further develop the friendship and goodwill that exists between two countries.

Finally, I would like to express my gratitude to all those who participated in the survey.

**Mitsuyoshi Kawasaki**

Chief Representative, JICA Pakistan

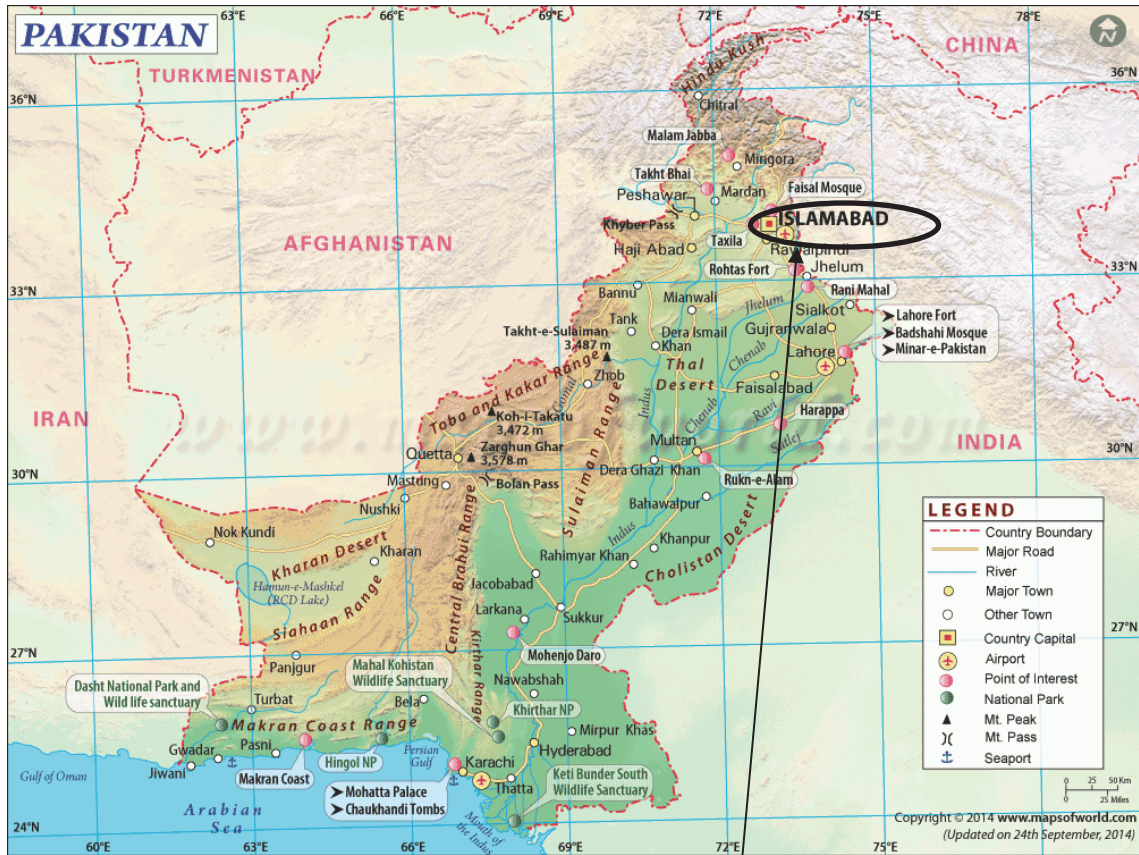
November 2015

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# MAP



source: <http://www.mapsofworld.com/pakistan/>

Project Site (Islamabad)

## Photos related to CTTI



Facade of Construction Technology Training Institute (CTTI)



Lobby of CTTI



Lesson 1



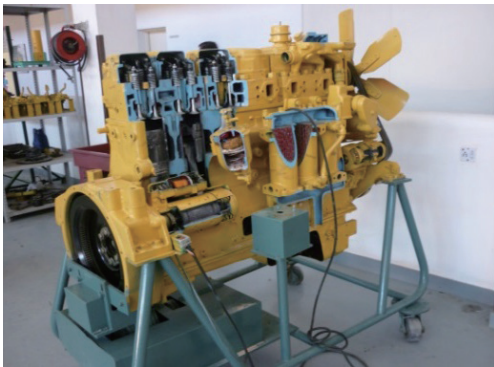
Lesson 2



Lesson 3



Machine for Practice 1



Machine for Practice 2



Machine for Practice 3



Machine for Practice 4



Machine for Practice 5



Construction Machinery for Practice 1



Construction Machinery for Practice 2



Construction Machinery for Practice 3



Operation Practice 1



Operation Practice 2



Tuition Payment





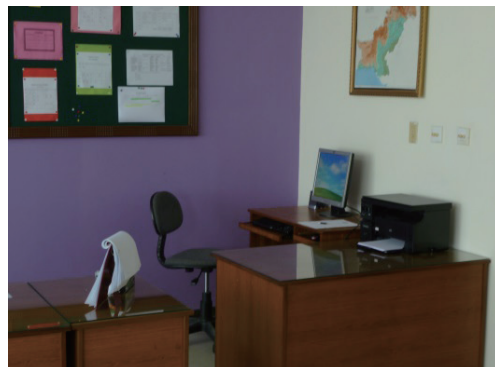
Textbooks (English) 1



Textbooks (Urdu) 2



Current Guidance and Counseling Cell  
(the Cell)



A Computer for Carrier Support



A Room to be converted into Guidance  
and Counseling Cell



Signing the M/M of the Detailed  
Planning Survey

## Abbreviations

ADM	Administration
AKRSP	Agha Khan Rural Support Program
A&D	Auto and Diesel
CMP&E	Construction Machinery Planning and Employment Course
CMSC	Construction Machinery Supervisory Course
CMTC	Construction Machinery Training Centre
CMTI	Construction Machinery Training Institute
CoE	Center of Excellence
CTTI	Construction Technology Training Institute
DAE	Diploma of Associate Engineer
FATA	Federally Administrated Tribal Area
FWO	Frontier Works Organization
GPI	Global Professional Institute
GCT	Government College of Technology, Railway, Road Lahore
GOP	Government of Pakistan
GOK	Government of the Republic of Korea
GDP	Gross Domestic Product
HOD	Head of Department
ICT	Information and Communication Technology
IDP	Internal Displaced Persons
JICA	Japan International Cooperation Agency
JCC	Joint Coordination Committee
KOICA	Korea International Cooperation Agency
KPK	Khyber Pukhtoon Khawa
MOC	Ministry of Communications
NHA	National Highway Authority
NLC	National Logistic Cell
NTB	National Training Bureau
NUST	National University of Science and Technology
NAVTTTC	National Vocational & Technical Training Commission
ODA	Official Development Assistance
PO	Plan of Operations

PDM	Project Design Matrix
PBTE	Punjab Board of Technical Education
QS	Quantity Surveyor
R/D	Record of Discussions
SUPTD	Superintendent
TVET	Technical and Vocational Education and Training
TEVTA	Technical and Vocational Training Authority
TCTP	Third Country Training Program
TRG	Training
WG	Working Group

# 1. Overview of the Survey

## 1-1 Background

In Pakistan's economy, the industrial sector (which includes the manufacturing and construction industries) continues to account for about 20% of GDP (2013<sup>1</sup>), and no advances have been made in terms of the country's industrial structure. Pakistan's manufacturing industry has traditionally been dominated by textiles, which account for 54% of the country's export figures. However, as technological and manpower limitations have resulted in no high-value-added products being developed, the country has suffered a loss of international competitiveness in this area. Its automobile-related industries, though, have grown recently. Although the GDP for the manufacturing industry is just 5%, the tax revenue from this industry is second only to that of the textile industry, so it is expected to be promoted as a high-value-added industry. Furthermore, vocational schools play an integral role in the training of the personnel employed in the industrial sector, with about 320,000 students a year entering vocational schools a year in the country (2011<sup>2</sup>). However, due to the issues mentioned above and the needs of the manufacturing industry, the curriculums of these schools have not fully incorporated the latest technological training programs, and a lack of appropriate measures for supporting the securement of job placements for current students has become an issue.

The Construction Technology Training Institute (CTTI) is a vocational training center that offers a training course on automobile maintenance to students from various different parts of the country. The institute is also the only vocational training center in the country that offers a training course for the maintenance and repair of construction equipment and other heavy machinery. The institute was established as the Construction Machinery Training Center (CMTC) in 1984 using grant aid from Japan. After that, JICA provided technical cooperation for the development of 4 short courses. In 1992, the CMTC began offering a diploma course (a three-year course specializing in construction equipment), changed its name to the Construction Machinery Training Institute (CMTI), and strengthened its organization as an engineering training center. Some years later in 2006, it began offering 10 courses specializing in automobile and diesel technologies and changed its name to the CTTI.

Now employing about 30 teachers, the CTTI runs 26 different courses a year (including 3 three-year courses, 1 one-year course, 17 six-month courses, 3 three-month courses, and 2 one-month courses). About 800 students a year attend the CTTI's diploma courses, while about 200 attend its short courses. After completing the courses, students are employed by well-known domestic and international civil engineering construction companies, equipment sales companies, and automobile companies. In this way, the CTTI plays an important role in training engineers and technicians in Pakistan. However, although there is a pressing need for automobile manufacturers, the construction industry, and heavy equipment manufacturers to employ CTTI graduates, it has been necessary to revise the curriculums based on the requests and needs of industry, to give guidance to and retrain teachers accordingly, to procure the necessary equipment, and to further strengthen the job placement service because the curriculums for the applicable 5 courses have not been revised since 1986.

In light of the above, the Government of the Islamic Republic of Pakistan has asked Japan to cooperate in the

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<sup>1</sup> Pakistan Economic Survey, 2013/14 (Ministry of Finance)

<sup>2</sup> National Skills Strategy 2009–2013 (NAVTTTC)

Project to Provide Technical Assistance for Capacity Building at the CTTI. The main purpose of this project is to improve the curriculums offered at the CTTI. Following its receipt of this request, JICA decided to conduct a detailed planning survey on capacity building at the CTTI in order to confirm that the project is needed and that the details of the request are appropriate and to agree the framework for the project.

#### 1-2 Survey Purpose

With a view to preparing a draft version of the Record of Discussions (R/D), including the Project Design Matrix (PDM) and the Project Outline (PO), this survey was conducted with the aim of collecting the required information and then analyzing it to determine the project details and reach an agreement with the Government of Pakistan.

#### 1-3 Survey Team Members

No.	Name	Responsibilities	Organization
1	Mr. Motoo Taki	Team leader	Senior Representative, JICA Pakistan Office
2	Mr. Yasunori Nagase	Organizational analysis/ placement support	PACET Corp.
3	Mr. Haruo Fukuchi	Planning training for mechanics	INGÉROSEC Corporation
4	Ms. Maki Suzuki	Cooperation planning	Representative, JICA Pakistan Office
5	Ms. Naila Almas	Cooperation planning	Senior Program Officer, JICA Pakistan Office

#### 1-4 Schedule

No.	Date	JICA			Consultants	
		Mr. Taki	Ms. Suzuki	Ms. Naila	Mr. Nagase	Mr. Fukuchi
1	Dec. 6, 2013 (Fri)	Video conference (Tokyo ⇔ Islamabad)				
2	9 (Mon)				Travel day Narita: 11:45 → Islamabad: 22:25	
3	10 (Tue)	Visit and meeting with JICA				
		Visit CTTI for presentation, explanation and confirmation of the survey				
		Visit MOC				
4	11 (Wed)	Interviews at CTTI				
		Interviews at private companies				
5	12 (Thu)	Interviews at CTTI				
		Interviews at private companies				

6	13 (Fri)				Interviews at CTTI
					Interviews at private companies
		Meeting with JICA from 15:00			
7	14 (Sat)				Internal meeting
8	15 (Sun)				Internal meeting
9	16 (Mon)	Meeting with CTTI and with JICA			
10	17 (Tue)				Interviews at CTTI
11	18 (Wed)			Interviews and discussions with CTTI	
12	19 (Thu)				Interviews at CTTI
13	20 (Fri)	Interviews and discussions with CTTI			
14	21 (Sat)				Internal meeting
15	22 (Sun)				Internal meeting
16	23 (Mon)				Interviews at CTTI
17	24 (Tue)	Signing ceremony at CTTI, report to Embassy of Japan, meeting with and report to JICA			
18	25 (Wed)				Leave for Japan Islamabad: 23:35 → Bangkok
19	26 (Thu)				Bangkok: 8:00 → Narita: 15:50

#### 1-5 List of CTTI Participants in the Survey

	Name	Designation
1	Mr. Muhabat Khan	Chief Instructor
2	Mr. Asmat Shakeel Khattak	Admin Officer
3	Mr. Raja Humayun Gohar	Training Officer
4	Mr. Altaf Qadar Bajwa	Head of the Civil & Quantity Survey Department
5	Mr. Muhammad Ejaz	Head of the Mechanical Department
6	Mr. Iftikhar Hussain	Head of the Auto Diesel Department
7	Ms. Humaira Waqar	Head of the General Department
8	Mr. Hassan Waraich	Coordinator (Instructor)

## 2 Present Situation at the CTTI

### 2-1 Overview of the CTTI

When the Construction Technology Training Institute (CTTI) was established in May 1986 by the Government of Japan (GOJ) through the Japan International Cooperation Agency (JICA), it was originally known as the Construction Machinery Training Center (CMTC). Funded by the Ministry of Communications (MOC) and the Government of Pakistan (GOP), the institute operates under the administrative control of the Frontier Works Organization (FWO).

The aims and objectives of the CTTI are as follows.

- To supply construction agencies with trained operators and skilled mechanics to ensure that construction machinery is well maintained.
- To provide construction project managers and supervisors with suitable know-how on the planning, use and supervision of construction machinery.
- To supply various agencies with supervisors and assistant engineers who are proficient in the planning and management of construction machinery/civil engineering works to facilitate the execution of projects in an efficient and economical manner.
- To contribute to the overall development of Pakistan's social infrastructure by developing skilled manpower.

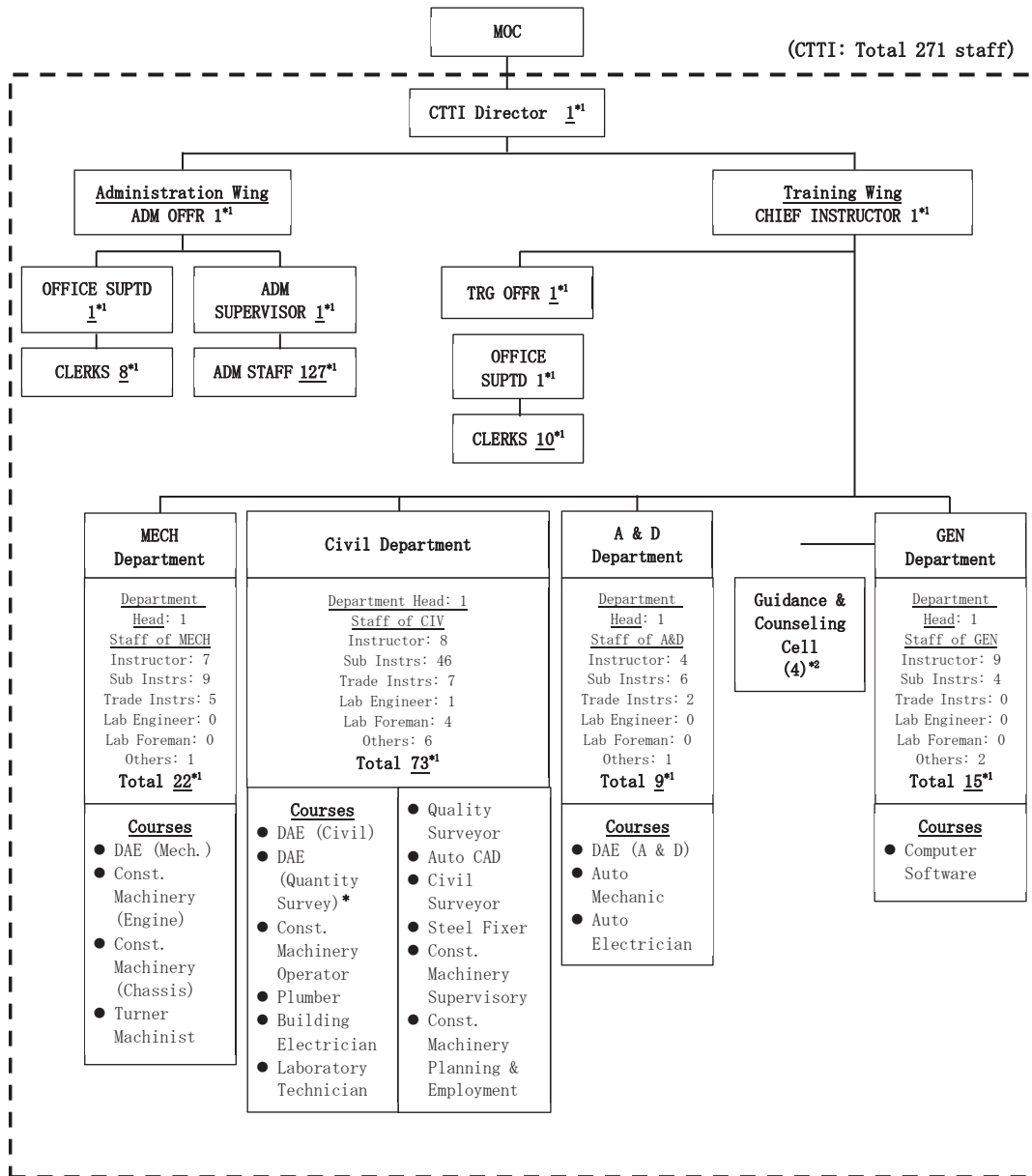
The institute is managed by the GOP, including the MOC, through a high level board of management. The CTTI Board of Management consists of a chairman, nine board members and an observer. Table 1 lists its members.

Table 1: Members of the CTTI Board of Management

Chairman	Secretary/Additional Secretary, MOC
Board Members	Director General, FWO
	Chairman, National Highway Authority
	Director General, National Training Bureau at the Ministry of Professional and Technical Training
	Joint Secretary (I), MOC
	Financial Advisor, MOC
	Chief of Transport and Communication (Planning Division)
	Commander Engineers, National Logistics Cell
	Director, CTTI
	Representative, All Pakistan Contractor's Association
Observer	Representative, JICA

Source: CTTI

Figure 1 below is a chart showing the organizational structure of the CTTI, its staff numbers and the training courses that are available.



Source: CTTI

Note: <sup>\*1</sup> The figures given in each block represent the number of staff.

<sup>\*2</sup> The number 15 that appears in the 'GEN Department' block includes the four staff that work in the Guidance and Counseling Cell.

ADM: Administration; TRG: Training; HOD: Head of Department; SUPTD: Superintendent

Figure 1: Chart showing the CTTI's organizational structure, staff numbers and training courses (as of 2013)

Consisting of two wings (one for training and the other for administration), the CTTI is managed by its director. The Training Wing is responsible for organizing, planning, coordinating and conducting all of the training courses and training activities offered at the CTTI. It is headed by a chief instructor, who is assisted by a training officer and various heads of departments. Four departments (the Mechanical Department, the Civil &



Quantity Survey Department, the Auto Diesel Department, and the General Department) are housed within the wing. The heads of departments are responsible for their respective department's operation, the content of its courses, and the management of its training staff. As of 2013, the number of training staff (including department heads, instructors, assistant/junior instructors, trade instructors and lab engineers/assistants) working in each department is as follows: 22 in the Mechanical Department; 73 in the Civil & Quantity Survey Department; 9 in the Auto Diesel Department; and 15 in the General Department. The minimum qualification for an instructor is a BSc in Engineering (Civil/Mechanical) or an MA/MSc in the subject they teach. The assistant instructors have strong technical qualifications and a lot of experience in their respective fields. The training officer is responsible for matters related to admissions, training, examinations, equipment and the collection of data on new technologies for the CTTI's Diploma of Associate Engineer (DAE) programs and short courses. The training officer also has overall responsibility for the safety and security of the Training Wing. An office superintendent provides support for the training officer and is responsible for the management of 10 clerks. All of the clerical work and office activities carried out within the Training Wing are conducted by the office superintendent and the clerks.

The Administration Wing is managed by an administration officer, who is supported by an administration supervisor and an office superintendent. The administration officer is responsible for all of the administrative matters at the institute, including the provision of board and lodging for students and training staff and the provision of support for all of the training activities. Overseeing 128 administration staff, the administration supervisor is responsible for the accounting operations at the CTTI, as well as implementing measures for ensuring maintenance and security at the CTTI together with the safety of students and training staff. The office superintendent manages 8 clerks and is responsible for carrying out all of the clerical work in the Administration Wing together with these clerks.

As of 2013, a total of 271 staff (including the institute's director) are working at the CTTI. There are 132 staff (including the chief instructor, the training officer, the 4 department heads and 119 training staff) working in the Training Wing, and 138 staff (including the administration officer) working in the Administration Wing. Table 2 shows the number of staff working at the CTTI for each job position.

Table 2: Number of staff at the CTTI by position

Position		No. of staff	
Director		1	
Training Wing	Chief Instructor	1	
	Department Head	4	
	Training Staff	115	
	Training Officer	1	
	Office Superintendent	1	
	Clerk	10	
	Total for Training Wing		<b>132</b>
	Administration Wing	Administration Wing	1
		Administration Supervisor	1
		Administration Staff	127
Office Superintendent		1	
Clerk		8	
Total for Administration Wing		<b>138</b>	
Total No. of CTTI Staff		<b>271</b>	

Source: CTTI

## 2-2 History of CTTI Courses

The CMTC originally offered training through 4 short courses (Heavy Machinery Operator, Construction Machinery Mechanic III, Construction Machinery Mechanic II (Engine) and Construction Machinery Mechanic II (Chassis)). In 1992, the CMTC was upgraded and renamed the Construction Machinery Training Institute (CMTI). Classes for a DAE in Mechanical Technology and 2 short courses (Construction Machinery Planning and Employment (CMP&E) and Construction Machinery Supervisory Course (CMSC)) were started in 1993. With continual improvements being implemented to make the institute more productive, 5 new short courses were introduced between 1997 and 2000. The DAE in Civil Technology, the DAE in Auto & Diesel and 8 Capacity Building short courses (Civil Surveyor, Civil Draughtsman, Building Electrician, Building Painter, Plumber and Sanitary Installer, Bricklayer/Mason, Carpenter, Construction Materials Laboratory Technician) were introduced in 2007, after which the institute was renamed the CTTI. The primary aim of these courses is to support the Prime Minister's Youth Skill Development Program with a view to combating the country's unemployment. Recently, the institute designed a curriculum for a DAE in Civil Technology (with specialization in quantity surveys), and the course was launched in 2011. The CTTI runs 4 DAE programs and 22 short courses as of 2013. A further 6 short courses (Mason, Carpenter, Building Painter, Civil Draughtsman, Welding and Computer Hardware) are to be newly introduced or re-introduced in the Civil & Quantity Survey Department, the Auto Diesel Department, and the General Department, and students for these new courses will be recruited in 2014. Table 3 shows the history of CTTI courses.

Table 3: History of CTTI courses

Period	1986–1992	1993–1996	1997–2006	2007–2010	2011–2012	2013– To date
Course	Heavy Machinery Operator; Construction Machinery Mechanic III; Construction Machinery Mechanic II (Engine); Construction Machinery Mechanic II (Chassis) (the above courses have been run with support from JICA)					
	DAE (Mechanical); Construction Machinery Planning and Employment; Construction Machinery Supervisory Course					
	TCTP (JICA) (start: 1995)					
	Steel Fixer.; Turner Machinist; Computer Software					
	PC Hardware (start: 2000)					
	AutoCAD (start: 2001)					
	DAE (Civil; start: 2007); DAE (A&D; start: 2008); Building Electrician; Building Painter; Plumber; Civil Surveyor; IT/E-commerce					
	Lab Technician (start: 2008)					
	DAE (Quantity Surveyor) (start: 2011)					
						Auto Electrician Auto Mechanic

Source: CTTI

### 2–3 Current Departments and Training Courses

As of 2013, there are four departments in the Training Wing (the Mechanical Department, the Civil & Quantity Survey Department, the Auto Diesel Department, and the General Department). The courses run at the CTTI can be roughly classified into the following three categories:

- Short Courses : The training period is one to six months. A total of 22 courses are being offered at present. If a course has a low number of applicants, it is not run.
- DAE Programs : The training period is three years. A total of 4 courses have been introduced for training associate engineers.
- Sponsored Courses : A total of 6 courses have been run with financial support from the GOP, foreign governments (e.g., Japan), and Pakistani citizens. Tuition for sponsored courses is provided free of charge, so they have proven very popular with students, especially those from poorer families.

The Mechanical Department offers 1 DAE program and 3 short courses. The Civil & Quantity Survey Department offers 2 DAE programs (Civil and Quantity Survey) and 10 short courses as of 2013. Student recruitment for 4 new short courses will begin in 2014. At present, the Auto Diesel Department offers 1 DAE program and 2 short courses. A welding course with an intake of 40 will be offered in 2014. The General Department runs a computer software course as of 2013, and it will be introducing a hardware course with an intake of 40 in 2014. This department also has a Guidance and Counseling Cell, which was established in 2013.

As mentioned above, students who enroll in sponsored courses do not need to pay tuition fees, but students

who take lessons for the short courses and the DAE programs do. For clarity, the short courses and DAE programs are referred to in this report as ‘regular courses’ to distinguish them from the sponsored courses.

Table 4: Training courses (regular) by department for 2013 (2014)

Department	Course	Duration	Intake	Times/year
Mechanical	DAE in Mechanical Technology (Construction Machinery)	3 years	120	1
	<b>Construction Machinery Mechanic II (Engine)</b>	6 months	40	2
	<b>Construction Machinery Mechanic II (Chassis)</b>	6 months	30 (40)	2
	Turner Machinist	6 months	30 (40)	2
Civil & Quantity Survey	DAE (Civil)	3 years	120	1
	DAE in Civil Technology (Quantity Survey)	3 years	50	1
	<b>Heavy Machinery Operator</b>	6 months	80	2
	Quantity Surveyor	6 months	40	2
	Basic Civil Surveyor	6 months	40	2
	<b>Construction Machinery Supervisory</b>	1 months	25	
	<b>CMP&amp;E</b>	1 months	30	2
	Construction Material Laboratory Technician	6 months	30 (40)	2
	Building Electrician	6 months	40	2
	Steel Fixer	6 months	30 (40)	2
	Plumber and Sanitary Installer	6 months	30 (40)	2
	AutoCAD	3 months	40	2
	(Carpenter)	6 months	(40)	2
	(Building Painter)	6 months	(40)	2
	(Mason)	6 months	(40)	2
(Civil Draughtsman)	6 months	(40)	2	
Auto Diesel	DAE in Auto & Diesel Technology	1 year	50	1
	Auto Mechanic	6 months	30 (40)	2
	Auto Electrician	6 months	30 (40)	2
	(Welding)	6 months	(40)	2
General	Computer Software	3 months	30	2
	(Computer Hardware)	3 months	(40)	2

Source: CTTI

Note: Brackets denote courses and intake for 2014.

Courses highlighted in bold are to be updated in the next project.

Short course students are recruited twice a year, in December and June. Entrance ceremonies are held for these two intake periods at the beginning of January and July, respectively. Meanwhile, DAE program students are recruited in August and an entrance ceremony for them is held at the beginning of September.

In addition to the above-mentioned regular courses, the CTTI has also run 6 sponsored training courses, but 4 of these are no longer offered. The Federally Administrated Tribal Area (FATA) and the Agha Khan Rural

Support Program (AKRSP) are the two courses that continue to be offered. The Third Country Training Program (TCTP) was run under the sponsorship of JICA. The target participants for this course were governmental engineers (manager class) from third-party countries other than Pakistan. The students that attended this program came from 13 countries in Africa and 15 countries in the area neighboring Pakistan. In addition, the National Vocational & Technical Training Commission (NAVTTTC) was begun in 2006 by the then prime minister of Pakistan, after which it ran for five years.

Table 5: Name of course sponsors and length of sponsorship

Sponsored course	Sponsor	Length of sponsorship
TCTP	JICA	15 years (1995 to 2009)
NAVTTTC	Prime Minister	5 years (2006 to 2010)
FATA	FATA Development Authority	6 years (started 2008)
IDP	JICA and KOICA	3 years (2010 to 2012)
KPK	Provincial Government	1 year (2012)
AKRSP	Agha Khan Rural Support Program	1 year (started 2013)

Source: CTTI

Note: TCTP: Third Country Training Program

NAVTTTC: National Vocational and Technical Training Commission

FATA: Federally Administrated Tribal Area

IDP: Internal Displaced Persons

KPK: Khyber Pukhtoon Khawa (Province of Pakistan)

AKRSP: Agha Khan Rural Support Program

Table 6 lists the training courses run under CTTI sponsored courses (excluding the TCTP).

Table 6: Training courses run under CTTI sponsored courses

Training course	Sponsored course				
	NAVTTTC	FATA	IDP	KPK	AKRSP
Turner Machinist	○	○			
Steel Fixer	○	○	○	○	
Building Electrician	○	○			
Plumber	○	○	○		
Carpenter	○	○			
Building Painter	○	○			
Mason	○	○			
Heavy Machinery Operator	○	○	○	○	○
Construction Machinery Mechanic III	○	○			
Laboratory Technician	○	○			
Construction Machinery Mechanic II (Engine)	○	○			
Construction Machinery Mechanic II (Chassis)	○	○			
Construction Machinery Planning and Employment	○				

Civil Surveyor	○	○			
Civil Draughtsman	○				
Quantity Surveyor	○	○			
AutoCAD	○				

Source: CTTI

A total of 17 short courses have been run to date, with 17 training courses being offered under NAVTTC, 14 under FATA, 3 under IDP, 2 under KPK, and 1 under AKRSP. A Heavy Machinery Operator course was available under all of the sponsored courses.

#### 2-4 Application, Selection and Performance Evaluation

##### Application and Selection

Selection is based purely on merit. The course schedule is advertised in the country's leading newspapers well before the courses actually commence. Applicants apply by completing and submitting the prescribed forms (provided with the prospectus) along with attested photocopies of any necessary documents, such as academic qualification certificates, character references, national identity cards, domicile certificates and detailed academic transcripts.

The selection process is carried out by a board of instructors/officers, and selected candidates are informed of their selection by registered post. Candidate are finally admitted to the CTTI after they complete any remaining formalities. Students can be expelled for a violation of discipline, immoral behavior, a prolonged absence, unsatisfactory academic performance or other undesirable behavior that is deemed to violate the rules.

In order to provide equal opportunities to people from all parts of the country, the distribution of places has been determined by the CTTI Board of Management as shown below.

Table 7: Allocation of places

Province	Distribution (%)
Punjab	45
Sindh	20
KPK	15
Balochistan	10
AJK/FANA/FATA	10

Source: CTTI

If the number of candidates from a particular area falls short of the allocated number of places for that area, the vacant places will be reallocated proportionately to other areas.

##### Performance Evaluation

The performance of students on all courses is regularly monitored by the training staff during the training period. In order to ascertain the proficiency and understanding of the students, examinations are conducted regularly.

The final performance evaluation for DAE programs is based on the results of term tests conducted by the institute throughout the training period and the grades that the students get in the annual examinations held by the Punjab Board of Technical Education (PBTE). The performance evaluation for short courses is based on the institute's internal criteria and practical tests as well as the results of a final examination conducted by the National Training Bureau (NTB).

## 2-5 Students and Graduates

### Number of CTTI Graduates by Year

The CTTI was established and began running 4 training courses in 1986. In the 28 years since then, a total of 14,036 students on regular courses (short courses and DAE programs) have graduated. Sponsored courses were started at the CTTI separately in 2006, and a total of 8,164 students had graduated by 2013. The total number of students to have graduated from the institute's regular and sponsored courses is 22,200.

The yearly number of graduates from regular courses has gradually increased, with the intake for each course having risen until 1992. The CTTI has begun new courses and further increased the intake for each course since 1993. The yearly number of CTTI graduates increased rapidly between 1993 and 2001, at which point the number peaked at 949. Since then, the yearly number of graduates has gradually decreased. In fact, the yearly number of graduates for 2011 (226) was almost the same as that for 1988 (224). Sponsored courses at the CTTI were started separately in 2006. According to some CTTI department heads, the introduction of sponsored courses had a significant impact on the CTTI's regular courses, especially the short courses. The reason for this is that students receiving training under the sponsored courses do not need to pay tuition fees. Many of the CTTI's students come from poor families, so it has been suggested that the sponsored courses, for which tuition is free, appeal greatly to those students and their families.

The following courses are the oldest courses offered at the CTTI: Heavy Machinery Operator, Construction Machinery Mechanic III, Construction Machinery Mechanic II (Engine), and Construction Machinery Mechanic II (Chassis). Begun in 1986, these 4 courses have produced 5,552, 1,806, 1,101 and 870 graduates, respectively. About two-thirds (66.5%) of the total number of CTTI graduates have graduated from these courses. However, since sponsored courses were begun in 2006, the number of graduates from these 4 courses has decreased. The following are some assumptions regarding this fall in the number of graduates from the 4 short courses. Students have concentrated on enrolling on sponsored courses because tuition is provided free of charge, and this has resulted in an increase in the number of students on sponsored courses. As a result, the total number of students attending the CTTI, including those on short courses, has increased, but this has put pressure on the institute's educational and training capacity due to the number of training staff and amount of equipment. To alleviate this pressure, the CTTI reduced the number of places available for short courses. This is assumed to be one reason why the number of graduates from short courses has fallen. This reduction in the number of places available for short courses has in turn caused a drop in the number of applicants for such courses. This reduction and the popularity of sponsored courses are assumed to be the reasons why no students applied to (or graduated from) the following courses in 2010, 2011 and 2012: Construction Machinery Mechanic II (Engine) or Construction Machinery Mechanic II (Chassis).

Launched 19 years ago, the DAE Mechanical program has produced 714 graduates. The DAE Civil program, the DAE Auto & Diesel program and the DAE Quantity Survey program have produced 230, 159 and 27

graduates, respectively. The DAE programs are three-year training courses while the sponsored courses are all short courses. Given this, the DAE programs have not been affected by the introduction of sponsored courses. Table 8 shows the number of graduates from regular and sponsored CTTI courses by graduation year.

Table 8: Number of graduates from regular and sponsored CTTI courses

Courses	86	87	88	89	90	91	92	93	94	95
<b>Regular courses</b>										
Heavy Machinery Operator	64	100	111	115	123	121	130	221	355	256
Mech. III	32	42	35	63	68	68	78	82	76	74
Mech. II (Eng.)	13	31	42	45	49	47	37	47	38	37
Mech. II (Chas.)	14	19	36	39	41	49	28	36	27	28
DAE (Mech.)	DAE (Mechanical) A three-year course that was started in 1993.									25
DAE (Civ.)	DAE (Mechanical) A three-year course that was started in 2007.									
DAE (A&D)	DAE (Mechanical) A three-year course that was started in 2008.									
DAE (QS)	DAE (Quantity Surveyor) A two-year course that was started in 2011.									
Others	-	-	-	-	-	-	-	27	30	55
<b>Subtotal 1</b>	123	192	224	262	281	285	273	413	526	475
<b>Sponsored courses (except TCTP)</b>										
<b>Subtotal 2</b>	Sponsored courses were started in 2006.									
<b>Grand total</b>	123	192	224	262	281	285	273	413	526	475

Courses	96	97	98	99	00	01	02	03	04	05
<b>Regular courses</b>										
Heavy Machinery Operator	306	214	280	272	217	282	210	307	309	391
Mech. III	74	88	88	86	98	108	130	81	81	86
Mech. II (Eng.)	36	40	40	60	62	77	67	44	32	48
Mech. II (Chas.)	33	31	28	50	58	63	40	33	41	28
DAE (Mech.)	33	33	39	41	30	30	33	28	30	29
DAE (Civ.)	DAE (Mechanical) A three-year course that was started in 2007.									
DAE (A&D)	DAE (Mechanical) A three-year course that was started in 2008.									
DAE (QS)	DAE (Quantity Surveyor) A two-year course that was started in 2011.									
Others	29	62	203	252	367	389	234	220	188	176
<b>Subtotal 1</b>	511	468	678	761	832	949	714	713	681	758
<b>Sponsored courses (excluding TCTP)</b>										
<b>Subtotal 2</b>	Sponsored courses were started in 2006.									
<b>Grand total</b>	511	468	678	761	832	949	714	713	681	758



Courses	06	07	08	09	10	11	12	13	Total
<b>Regular courses</b>									
Heavy Machinery Operator	380	135	110	115	142	48	101	137	<b>5,552</b>
Mech. III	101	46	72	44	5	Closing			<b>1,806</b>
Mech. II (Eng.)	41	49	37	24	0	0	0	58	<b>1,101</b>
Mech. II (Chas.)	29	26	17	55	0	0	0	21	<b>870</b>
DAE (Mech.)	33	36	35	48	45	45	42	79	<b>714</b>
DAE (Civ.)	Started in 2007			45	41	42	22	80	<b>230</b>
DAE (A&D)	Started in 2008				43	0	40	76	<b>159</b>
DAE (QS)	Started in 2011						27	0	<b>27</b>
Others	98	171	248	185	30	91	198	324	<b>3,604</b>
<b>Subtotal 1</b>	<b>682</b>	<b>463</b>	<b>519</b>	<b>516</b>	<b>306</b>	<b>226</b>	<b>430</b>	<b>775</b>	<b>14,036</b>
<b>Sponsored courses (excluding TCTP)</b>									
<b>Subtotal 2</b>	<b>321</b>	<b>1,014</b>	<b>1,811</b>	<b>2,057</b>	<b>1,196</b>	<b>836</b>	<b>463</b>	<b>201</b>	<b>8,164*</b>
<b>Grand total</b>	<b>1,003</b>	<b>1,477</b>	<b>2,330</b>	<b>2,593</b>	<b>1,502</b>	<b>1,062</b>	<b>893</b>	<b>976</b>	<b>22,200</b>

Source: CTTI

Note: The total figure of 8,164 for sponsored courses includes 264 TCTP graduates.

Table 9: Number of graduates from 3 courses available under sponsored courses

Course	Sponsor	06	07	08	09	10	11	12	13	Total
Heavy Machinery Operator	NAV TTC	52	201	519	352	113	-	-	-	1,237
	FATA	-	-	56	330	154	91	108	50	789
	IDP	-	-	-	-	-	0	290	233	523
	KPK	-	-	-	-	-	-	78	-	78
	AKRSP	-	-	-	-	-	-	-	43	43
	<b>Total</b>	<b>52</b>	<b>201</b>	<b>575</b>	<b>682</b>	<b>267</b>	<b>91</b>	<b>476</b>	<b>326</b>	<b>2,670</b>
Mech. II (Eng.)	NAV TTC	-	21	51	26	30	-	-	-	128
	FATA	-	-	-	-	-	28	-	-	28
	KPK	-	-	-	-	-	-	0	-	0
	<b>Total</b>	<b>-</b>	<b>21</b>	<b>51</b>	<b>26</b>	<b>30</b>	<b>28</b>	<b>0</b>	<b>-</b>	<b>156</b>
Mech. II (Cha.)	NAV TTC	-	19	48	25	30	-	-	-	122
	FATA	-	-	-	-	-	30	-	-	30
	KPK	-	-	-	-	-	-	0	-	0
	<b>Total</b>	<b>-</b>	<b>19</b>	<b>48</b>	<b>25</b>	<b>30</b>	<b>30</b>	<b>0</b>	<b>-</b>	<b>152</b>
Other	NAV TTC	269	773	1,072	758	359	-	-	-	3,231
	FATA	-	-	65	595	434	282	101	0	1,477
	IDP	-	-	-	-	47	115	41	0	203
	KPK	-	-	-	-	-	-	10	-	10
	<b>Total</b>	<b>269</b>	<b>773</b>	<b>1,137</b>	<b>1,353</b>	<b>840</b>	<b>397</b>	<b>152</b>	<b>0</b>	<b>4,921</b>
<b>Grand total</b>	<b>321</b>	<b>1,014</b>	<b>1,811</b>	<b>2,086</b>	<b>1,167</b>	<b>546</b>	<b>628</b>	<b>326</b>	<b>7,899</b>	

Source: CTTI

Table 10: Number of graduates from 3 courses available under regular and sponsored courses

Course		2006	07	08	09	10	11	12	13
Heavy Machinery Operator	Regular	380	135	110	115	142	48	101	137
	Sponsored	52	201	575	682	267	91	476	326
	<b>Total</b>	<b>432</b>	<b>336</b>	<b>685</b>	<b>797</b>	<b>409</b>	<b>139</b>	<b>577</b>	<b>463</b>
Mech. II (Eng.)	Regular	41	49	37	24	0	0	0	51
	Sponsored	-	21	51	26	30	28	0	-
	<b>Total</b>	<b>41</b>	<b>70</b>	<b>88</b>	<b>50</b>	<b>30</b>	<b>28</b>	<b>0</b>	<b>51</b>
Mech. II (Cha.)	Regular	29	26	17	55	0	0	0	21
	Sponsored	-	19	48	25	30	30	0	-
	<b>Total</b>	<b>29</b>	<b>45</b>	<b>65</b>	<b>80</b>	<b>30</b>	<b>30</b>	<b>0</b>	<b>21</b>

Source: CTTI

Excluding the figures for the TCTP, a total of 7,899 students have graduated from the 5 sponsored courses. The NAVTTC course produced 4,718 graduates in the five years from 2006 to 2010, while the FATA course has produced 2,324 graduates in the six years since 2008.

Table 11: Number of graduates from sponsored courses

Sponsored course	Sponsor	Length of Sponsorship	No. of graduates
NAVTTC	Prime Minister	5 years	4,718
FATA	FATA Development Authority	6 years	2,324
IDP	JICA and KOICA	3 years	726
KPK	KPK Provincial Government	1 year	88
AKRSP	Mr. Agha Khan	1 year	43
<b>Total</b>			<b>7,899</b>

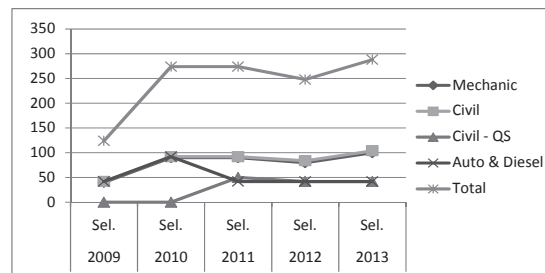
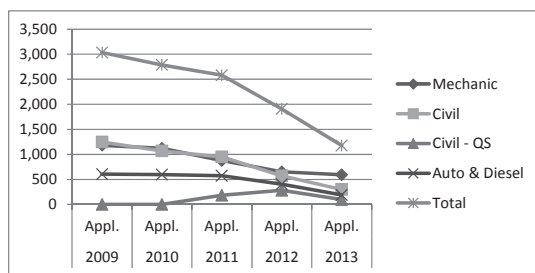
Source: CTTI

#### Number of Students: Applicants, Selected Students, and Graduates

Table 12 shows the number of applicants and selected students for the 4 DAE programs for the five years from 2009 to 2013. Table 13 gives figures from the same period for 3 regular short courses (Heavy Machinery Operator, Construction Machinery Mechanic II (Engine) and Construction Machinery Mechanic II (Chassis)).

The number of students selected for DAE programs increased because of a rise in the intake for each course and the establishment of a new program (Civil – QS). A total of 124 students were selected for DAE programs in 2009, while 288 students were selected in 2013. The number of DAE program applicants has decreased even though the number of places available has increased (see Table 12 and Figure 2).

The sponsored courses have had a great impact on 3 regular short courses. The number of applicants for the Heavy Machinery Operator course has decreased rapidly, but the situation is even more serious for the following two courses as no students applied to either of them in 2010, 2011 or 2012: Construction Machinery Mechanic II (Engine) and Construction Machinery Mechanic II (Chassis).



Number of applicants by course

Number of selected students by course

Source: Survey Team

Figure 2: Trends in the number of applicants and selected students for DAE programs

Table 12: Number of applicants and selected students for DAE programs over the past five years

Year	2009		2010		2011		2012		2013	
	Appl.	Sel.	Appl.	Sel.	Appl.	Sel.	Appl.	Sel.	Appl.	Sel.
Mechanical	1,182	40	1,121	90	876	90	650	80	592	100
Civil	1,245	42	1,068	92	949	92	572	84	299	104
Civil (QS)	-	-	-	-	181	50	281	42	95	42
Auto & Diesel	604	42	596	92	572	42	403	42	189	42
Total	3,031	124	2,785	274	2,578	274	1,906	248	1,175	288

Source: CTTI

Table 13: Number of applicants and selected students for 3 regular courses over the past five years

Year	2009		2010		2011		2012		2013	
	Appl.	Sel.	Appl.	Sel.	Appl.	Sel.	Appl.	Sel.	Appl.	Sel.
Heavy Machinery Operator	1,282	115	486	142	231	48	403	101	584	137
Mech. II (Engine)	34	24	0	0	0	0	0	0	61	51
Mech. II (Chassis)	87	55	0	0	0	0	0	0	28	21

Source: CTTI

### TCTP

The TCTP was run by JICA for a period of 15 years from 1995 to 2009. The target participants for this course were governmental engineers (manager class). The students received training for a period of one month on how to operate and maintain machines. This course was attended by a total of 264 students from 28 different countries.

Table 14: Number of TCTP course graduates by country (15 years from 1995 to 2009)

No.	Country	No. of students	No.	Country	No. of students
1	Afghanistan	2	15	Mauritius	6
2	Bangladesh	23	16	Morocco	6

3	Bhutan	7	17	Myanmar	20
4	Central Africa	1	18	Nepal	19
5	Egypt	1	19	Philippines	7
6	Ethiopia	6	20	Sri Lanka	30
7	Ghana	8	21	Tajikistan	6
8	Iran	3	22	Tanzania	8
9	Indonesia	2	23	Turkey	5
10	Jordan	19	24	Uganda	18
11	Kenya	18	25	Uzbekistan	6
12	Kyrgyzstan	5	26	Yemen	13
13	Malaysia	2	27	Zambia	3
14	Maldives	2	28	Zimbabwe	18
Total		264			

Source: CTTI

## 2-6 Teaching Staff (Instructors, Assistant/Junior/Trade Instructors, Staff)

### Number of Teaching Staff

The number of teaching staff (heads of departments, instructors, assistant/junior/trade instructors, etc.) has risen year by year in line with the increase in the number of courses. In 2013, a total of 119 teaching staff—including 28 department heads and instructors and 58 assistant instructors—worked in the four departments at the CTTI. The Civil & Quantity Survey Department employs 73 teaching staff, the Mechanic Department employs 22, the Auto Diesel Department employs 9, and the General Department employs 15. According to some of the heads of departments at the CTTI, the average length of service for the teaching staff—especially instructors—is three to four years.

### Training of Teaching Staff

The CTTI does not have a training program for its staff. Instead, it sends its staff to the NTB for teacher training. Furthermore, the CTTI is dependent on overseas official development assistance (ODA) for the acquisition of new technologies. Teaching staff who receive training conducted under the sponsorship of the CTTI, the GOP and overseas ODA must agree to work at the CTTI for a specified period (in years) after they finish their training. A contract for a two-year period of employment is usually agreed upon by the parties.

Table 15: Number of teaching staff (2006 to 2012)

Category	2006	2007	2008	2009	2010	2011	2012
Instructor	16	17	20	17	16	25	33
Assistant/jnr. instructor	44	45	44	45	47	61	57
Trade instructor	-	-	-	-	-	4	10
Total	60	62	64	62	63	90	100

Source: CTTI

Table 16: Number of teaching staff in four departments in 2013

Category	Civil & Quantity Survey	Mechanical	Auto Diesel	General	Total
HOD & instructor	9	6	4	9	28
Assistant instructor	46	7	3	2	58
Trade instructor	7	8	1	0	16
Lab engineer	1	0	0	0	1
Lab foreman	4	0	0	0	4
Lab attendant/asst./tech.	6	1	1	4	12
Total	73	22	9	15	119

Source: CTTI

### Evaluation of Teaching Staff

The system employed by the CTTI for evaluating its teaching staff consists of self-evaluations as well as evaluations by the relevant head of department, by the institute’s director and by the students. The teaching staff’s evaluation results are reflected in their salaries. In addition, teaching staff who receive a high evaluation are provided with accommodation and with training overseas as incentives.

### 2-7 Employment of CTTI Graduates

Until recently, the CTTI did not have a designated careers support department or section for its students. The chief instructor and the department heads conducted careers support activities and kept data and information on companies who came to recruit students individually. This data and information was not, however, collated in one section or department. Consequently, no one at the CTTI knew the exact number of jobseekers. They did not have accurate figures for the graduate employment rate; they simply estimated that 100% of students from the Mechanical Department find employment and that 80–85% of students from the Civil & Quantity Survey Department find employment. To improve on this situation, the CTTI established a Guidance and Counseling Cell within the General Department in 2013 (see 1-11 “Guidance and Counseling Cell”).

Table 17 gives an overview of students’ efforts to find employment over a three-year period from 2010 to 2012. In addition to the companies listed in this table, the National Highway Authority (NHA), the National Logistic Cell (NLC) and Jaffer Brothers have also recruited CTTI graduates. Graduates have found employment not only domestically, but also overseas. While we were conducting our survey, a Malaysian delegation visited the CTTI. They visited several institutes in Pakistan to explore the possibility of recruiting graduates. The number of graduates who find employment overseas may increase further in the future. The CTTI should conduct lessons in English for students on short courses.

Table 17: Employers and CTTI student intake

Employer name	Intake
Al Wasit (UAE)	62
Schlumberger	271
Descon (design and construction)	324

Atlas Honda (dealer and maintenance)	187
Al-Bahar (UAE) (construction)	35
Sprint Oil Field (oil drilling)	12
Toyota Japan (dealer and maintenance)	61
FWO (construction)	45
Best Way Cement	5
Total	1,002

Source: CTTI

## 2-8 Equipment at the CTTI

Table 18 lists the types and amounts of equipment provided through Japanese grant aid.

The CTTI received grant aid from Japan in 1984, 1995, and 2006 (twice): 29 vehicles and machines (14 different types) in 1984; 35 vehicles and machines (14 different types) in 1996; and 14 vehicles and machines (6 different types) and 8 vehicles and machines (4 different types) in 2006. Since then, the CTTI has stored and maintained these 86 vehicles and machines. Almost all of the equipment has been well maintained.

Table 18: Equipment types and amounts

Type	Phase				Total
	1984	1996	2006	2006	
Bulldozer	4	6	3		13
Motor grader	2	3	1		6
Wheel loader	2	4	3	2	11
Excavator	3	8	5	2	18
Motor scraper	2				2
Bulldozer shovel	2				2
Truck crane	2	1	1		4
Road roller	3	3			6
Asphalt finisher and bitumen distributor	2	1			3
Land fill compactor		1			1
Forklift truck	1			3	4
Dump truck	2	2			4
Generator	2	1	1		4
Air compressor	1	2			3
Road stabilizer	1				1
Pipe layer		1			1
Power splitter		1			1
Auto curber		1			1
Engine cart				1	1
Total	29	35	14	8	86

Source: CTTI

## 2-9 Budget and Expenditure

The CTTI produces an estimate for its annual budget and then submits it to a budget review and approval committee through the MOC. Around 95% of each of the budgets submitted over the last three years have been approved. However, expenditure has always exceeded the allotted budget. The FWO, which is an administrative body that serves as one of the board members for the CTTI, has lent the institute money to cover the shortfall, and the CTTI will include this loan in the following year's budget and submit it to the MOC. The payroll for CTTI staff has accounted for more than 70% of annual expenditure over the last five years.

Table 19: Requested budget, allotted budget and expenditure (Unit: PKR millions)

Item	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
<b>Requested</b>	<b>32.055</b>	<b>40.157</b>	<b>54.331</b>	<b>55.000</b>	<b>71.002</b>	<b>90.385</b>	<b>101.321</b>
<b>Allotted</b>	<b>25.707</b>	<b>28.280</b>	<b>31.800</b>	<b>50.000</b>	<b>70.000</b>	<b>86.000</b>	<b>95.460</b>
<b>% of budget request allotted</b>	<b>80.2%</b>	<b>70.4%</b>	<b>58.5%</b>	<b>90.9%</b>	<b>98.6%</b>	<b>95.1%</b>	<b>94.2%</b>
<b>Expenditure</b>	<b>32.126</b>	<b>35.471</b>	<b>38.198</b>	<b>57.397</b>	<b>84.681</b>	<b>100.815</b>	<b>110.141</b>
Payroll	18.51 (57.6%)	20.703 (58.4%)	26.700 (69.9%)	40.936 (71.3%)	60.196 (71.1%)	72.679 (72.1%)	79.091 (71.8%)
Fuel costs	0.830 (2.6%)	0.954 (2.7%)	2.988 (7.8%)	3.580 (6.2%)	3.473 (4.1%)	6.808 (6.8%)	4.189 (3.8%)
Utility costs	6.010 (18.7%)	6.511 (18.4%)	2.000 (5.2%)	5.391 (9.4%)	6.059 (7.2%)	6.312 (6.3%)	10.000 (9.1%)
Advertisements	0.357 (1.1%)	0.112 (0.3%)	0.112 (0.3%)	0.093 (0.1%)	0.272 (0.3%)	0.201 (0.2%)	2.180 (2.0%)
Vehicle repair/ maintenance	1.912 (6.0%)	2.134 (6.0%)	1.406 (3.7%)	1.224 (2.1%)	1.205 (1.4%)	2.378 (2.4%)	1.205 (1.1%)
Building repair/ maintenance	4.507 (14.0%)	5.057 (14.3%)	4.992 (13.1%)	6.173 (10.8%)	13.476 (15.9%)	12.437 (12.3%)	13.476 (12.2%)
<b>Balance</b>	<b>△ 6.419</b>	<b>△ 7.191</b>	<b>△ 6.398</b>	<b>△ 7.397</b>	<b>△ 14.681</b>	<b>△ 14.815</b>	<b>△ 14.681</b>

Source: CTTI

## 2-10 Tuition

According to the various department heads, many CTTI students tend to come from poor families. Therefore, tuition fees are kept as low as possible. Moreover, the CTTI offers a tuition waiver for orphans or students from the poorest of families. Apparently, around 120 students are benefitting from this waiver at present. The collected tuition fees are passed on to the MOC and then used as part of next year's budget.

Table 20: Tuition

Course	Tuition	Remarks
Short Course	Average: PKR 1,000/month	Tuition fees passed on to the MOC
DAE Program	Average: PKR 1,100–1,200/month	

Source: CTTI

## 2-11 Careers Support at the CTTI

### Careers Support in Pakistan

Universities such as the National University of Science and Technology (NUST) have student counseling cells or departments, which provide careers support for their graduate students in Pakistan. However, no organized careers support is provided for students at the Government College of Technology (GCT) or the Government Polytechnics Institute (GPI). Many students find work through their own efforts. To improve this situation, JICA has run a technical assistance project—called the Project for the Development of a Center of Excellence for Technical Education—at the GCT (Railway Road, Lahore) for the five years from 2008 to 2013. Under this project, the existing careers support section has been reformed, and a careers counseling program run by careers support teachers has been implemented.

Moreover, information on employment, internships and job opportunities has been stored on a computer, and a database on job offers made to students has also been established.

### Careers Support in Other Countries

Students in Asian countries are more likely to be dependent on their school, their family and their acquaintances to find employment. In India and China, the proportion of students that make use of the careers service is more than 30%. In Japan, many university and technical college students use employment-related information provided by their educational institute or by the magazines and websites of human resource companies. Many prefectural technology colleges in Japan perform careers support activities such as the following for their students.

- Prepare and distribute a guidebook with useful employment information.
- Offer employment guidance on how to find a job and make advance preparations.
- Organize joint recruitment fairs that give students the chance to speak directly to a company’s recruitment staff at their school.
- Have teachers responsible for graduate recruitment prepare casework on finding employment.

### Careers Support at the CTTI

The CTTI runs a careers day and offers internships as part of its careers support for students.

### Careers Day

Careers days are held by the CTTI to allow companies to recruit students. The CTTI asks companies to visit and give presentations to its students. The companies interview some of the students who show interest in the presentation. More than one company can make a presentation to the students on any given careers day. Careers days are held three times a year based on the completion of the institute’s courses: twice a year for short courses



and once a year for the DAE programs.

Each department head asks companies to give presentations to the students of each course for each department. However, according to the department heads, careers days at the CTTI tend to be attended by companies linked to the more popular short courses and DAE programs (e.g., Construction Machinery, Construction Work, and Auto).

### Internships

The CTTI also runs an internship program for its students. Participation in the internship program is mandatory for students on the Heavy Machinery Operator course, and they have to undertake an internship before completing the course. Students on other courses are not required to participate in this program. In 2013, six companies offered internships to CTTI students. The NHA, which took the largest number of students, received a total of 123 students according to the following breakdown: 52 from the Heavy Machinery Operator course; 22 from the Quantity Survey course; 30 from the Civil Surveyor course; 14 from the Construction Material Laboratory Technician course; and 5 from the DAE Civil course. The FWO also took in 37 students. The internships at both companies ran for four weeks.

### Guidance and Counseling Cell

In the past, the CTTI did not collect or organize data and information on the employment of its graduates (e.g., the number of job finders, the employment rates or the location of employment). The reason for this is that while the CTTI is interested in the education and training of students, it has not worked very hard on finding employment for its students. In Pakistan, many feel that the students themselves are responsible for finding employment. The chief instructor and the department heads had information on the companies that they contacted for careers day, but this information was not managed in an integrated fashion.

To improve on this situation and provide careers support for its students, the CTTI established a Guidance and Counseling Cell (the Cell) within the General Department in 2013. Four staff were appointed to manage the Cell. The Head of the General Department serves concurrently as the chief of the Cell. The duties of the Cell are as follows.

- Management of employment profiles for CTTI students.
- Provision of counseling to students and recording and maintaining of counseling results.
- Identification of job opportunities for students and provision of guidance.
- Planning and implementation of the internship program.

The Cell has begun collecting data and information on students and graduates of the short courses and DAE programs. The collection method has been to contact graduates directly using the data collected at the time of their admission and to utilize the CTTI website. The Cell also contacts companies to collect data on CTTI graduates. Data on around 250 students has been collected to date. The Cell has only one desktop computer, and this is used to manage all of the collected data and information. The Cell hopes to collect almost all of the data on CTTI graduates by mid-2014.

The chief of the Cell has submitted a request for an additional three staff from the MOC through the CTTI's

director. There is a possibility that these staff may be recruited by February 2014. However, the staff that work in the Cell have other duties to perform as well, so they cannot dedicate themselves solely to the work of the Cell.

## 2-12 Donor Support for the CTTI

### Japan

In accordance with requests from the GOP, the GOJ has provided grant aid on three occasions as well as technical cooperation since 1984.

The GOJ has provided grant aid for the construction of the CMTC (renamed the CTTI in 2008) and for the provision of training equipment three times (in 1984, 1996 and 2006). It also provided technical cooperation for the training of engineers and operators from 1985 to 1990.

Table 21: Past projects implemented by Japan

Project	Purpose	Output
<u>Phase I</u> Construction of the CMTC (Grant Aid: 1984)	The CMTC was planned and constructed with the aim of improving fundamental construction machine technologies so as to develop the infrastructure required for the economic development of Pakistan as well as developing the country's human resources through the training of less skilled workers.	Construction of an administration building (1,589 m <sup>2</sup> ), a training building (3,471 m <sup>2</sup> ), a canteen (347 m <sup>2</sup> ), a dormitory (1,785 m <sup>2</sup> ), a connecting corridor (272 m <sup>2</sup> ), a garage (425 m <sup>2</sup> ) and a workshop (88 m <sup>2</sup> ). Staff quarters (5,929 m <sup>2</sup> ) constructed by the GOP.
<u>Phase I</u> Technical Cooperation with the CMTC (1985 to 1990)	Technical transfers were carried out so that a heavy machinery operator course and mechanic courses could be run to train engineers and technicians for the maintenance of roads through the use of machines.	Heavy Machinery Operator Course Construction Machinery Mechanic Course III Construction Machinery Mechanic Course II (Engine) Construction Machinery Mechanic Course II (Chassis)
<u>Phase II</u> Enhancement of the CMTC (Grant Aid: 1996)	The construction vehicles and equipment required for the institute to be able to offer new courses and increase the intake for existing courses were procured and updated.	Procurement and updating of the road construction vehicles, equipment for mechanic training, equipment for training support, and transport vehicles required for the institute to be able to offer new training courses and increase the number of students on existing courses. Construction of a new training building (1,932 m <sup>2</sup> ), dormitory (1,785 m <sup>2</sup> ) and canteen (347 m <sup>2</sup> ) under the GOP's budget.

<p><u>Phase III</u> Enhancement of the CMTC (Grant Aid: 2006)</p>	<p>The training capacity of the CMTC was improved by developing buildings and equipment for new CMTC training courses.</p>	<p>Construction of a new training building (1,413 m<sup>2</sup>), dormitory (1,248 m<sup>2</sup>) and canteen (448 m<sup>2</sup>), as well as procurement of the training equipment necessary for three new courses (Construction Vehicle Mechanic, Construction Machine Electrician, Welding and Assembly)</p>
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Source: JICA Reports

### KOICA

The GOP and the Government of the Republic of Korea (GOK) agreed to undertake a project called the Establishment of the Pak-Korea Information Communication Technology Center of Excellence in Islamabad (the Center). The project was started in September 2012 with the CTTI acting as the implementation agency for the project. The Center's buildings are being constructed on the CTTI's site in front of its main building. Construction is expected to be completed by October 31, 2014. The Center is expected to accept 875 students per year.



Figure 3: View of the ICT Center



Photo 1: Construction of the ICT Center

Source: CTTI

From 2015, the Center will start running training courses made up of 3 main courses and 15 sub-courses. The 3 main courses are a General Software course, a Graphical Design course and a Programming Languages course. These 3 courses will have 3, 5 and 7 sub-courses, respectively. The intake for each sub-course will be 25 students. Each course will run for three to six months per year, with students being enrolled two to four times a year for each course. The General Software course and the Graphical Design course will target high school graduates, while the Programming Language course will target college graduates. The Center expects to train a total of 875 students a year.

Table 22: Project details for the ICT Center

Item	Amount/date
Foreign grant	US\$ 5.00 Million (PKR 445.00 million)
Local components	PKR 40.28 million

Area required	6,000 m <sup>2</sup>
Building	4 stories
Capacity (no. of students)	875/year
Date of construction commencement	Sep. 1, 2012
Date of construction completion	Oct. 31, 2014
No. of offices	2
No. of classrooms	15
No. of meeting rooms	4
No. of instructor rooms	4
Equipment	387 computers, IT network, software

Sources: CTTI

Table 23: Details of courses offered at the ICT Center (starting 2015)

Course	Intake	Duration (months)	Times/year	No, of students/year	Prerequisite
General Software Courses					
MS Office	25	3	4	100	High school graduate
Primavera	25	3	4	100	High school graduate
Computer Hardware	25	4	3	75	High school graduate/ DAE Electronic
Graphic Design Courses					
AutoCAD 2D/3D	25	6	2	50	High school graduate
Corel Draw	25	6	2	50	High school graduate
3D Max	25	6	2	50	High school graduate
Adobe Photoshop	25	6	2	50	High school graduate
MAYA	25	6	2	50	High school graduate
Programming Language Courses					
C++	25	6	2	50	ICS and above
Java	25	6	2	50	ICS and above
PHP	25	6	2	50	ICS and above
C#	25	6	2	50	ICS and above
VB.Net	25	6	2	50	ICS and above
E-commerce Development	25	6	2	50	ICS/DIT/BCS
Mobile Programming	25	6	2	50	ICS/DIT/BCS
Total				875	

Source: CTTI

## 2-13 Technical Transfer Projects Similar to the CTTI Project

JICA has implemented two other technical cooperation projects that are similar to the CTTI project: the

Highway Research and Training Center Project and the Project for the Development of a Center of Excellence for Technical Education. Table 24 provides an overview of these projects.

Table 24: Technical transfer projects similar to the CTTI Project in Pakistan

Project name	Highway Research and Training Center Project	Project for the Development of a Center of Excellence for Technical Education
Period	Sept. 2007 to Mar. 2013	Dec. 2008 to Dec. 2013
Counterpart	NHA	Technical Education and Vocational Training Authority (TEVTA) GCT (Railway Road, Lahore)
Project purpose	To strengthen the research capabilities necessary for preparing a pavement compounding standard (draft) and/or related study reports.	To develop the GCT (Railway Road, Lahore), which is a center of education (CoE) in the mechanic and architect field, into an institute that can provide technical education based on the needs of industry.
Outputs	<ul style="list-style-type: none"> <li>● Provision of facilities and equipment for research on pavements.</li> <li>● Improvement of HR&amp;TC staff's fundamental capacity for conducting experiments on road pavements.</li> <li>● Provision of a pavement compounding standard (draft) by the NHA to complement a research plan and a work plan, as well as provision of a detailed plan for road pavement research so as to prepare a study report.</li> <li>● Organization of a system for cooperation with universities on pavement research.</li> </ul>	<ul style="list-style-type: none"> <li>● Strengthening of the organizational structure of the GCT (Railway Road, Lahore) so as to provide technical education based on the needs of industry.</li> <li>● Strengthening of the training management cycle for the mechanic and architect courses.</li> <li>● Strengthening of the careers support system at the GCT (Railway Road, Lahore).</li> <li>● Sharing of the experience and knowledge that the GCT (Railway Road, Lahore) obtains via the project so that it can be adopted for other courses at the GCT and other TVET.</li> </ul>
Inputs (Japan)	<p>(1) Experts One long-term expert One short-term expert (planning for pavement research) Two consultants</p> <p>(2) Equipment provision Equipment necessary for research and experiments on road pavements and related fields</p> <p>(3) Counterpart training</p>	<p>(1) Experts Long-term: A chief advisor/administrator Mechanic and architect Short-term: Mechanic and architect</p> <p>(2) Counterpart training Training in Japan</p> <p>(3) Equipment provision Basic equipment indispensable for the implementation of the mechanic and architect courses</p> <p>(4) Other</p>

<p>Inputs (Pakistan)</p>	<p>1. HR&amp;TC manpower (1) One project director (2) One project manager (3) One HR&amp;TC executive director (4) One voluntary worker</p> <p>2. Technical manpower (1) One chief researcher (2) One researcher (3) One research technician (4) One IT engineer (5) One training coordinator (6) One assistant (7) One researcher dispatched from a university (8) Two NHA staff</p>	<p>1. Manpower (1) Project director: TEVTA general manager (2) Project manager: GCT principal (3) Project counterparts: TEVTA staff, GCT teachers (Mechanic and Architecture courses), careers support officer</p> <p>2. Building and equipment Office for experts at TEVTA and GCT Workshop for implementation of pilot training course Classroom, etc.</p> <p>3. Budget provision (1) NAVTEC Cost of NAVTEC staff (salaries, transportation, accommodation, etc.) Cost of skills competitions and work exhibits Cost of follow-up surveys for GCT graduates, etc. (2) TEVTA Cost of TEVTA staff (salaries, transportation, accommodation, etc.) Cost of implementing needs assessments Cost of consumables and spare parts</p>
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Source: JICA

## 2-14 Cooperation with Other Institutes

The NUST has been sending its students to the Civil & Quantity Survey Department of the CTTI since 2010. Around 200 senior students (fourth grade) receive training on the operation of heavy construction equipment as a part of the class. The training runs for two weeks.



Photo 2: NUST students undergoing training (1)



Photo 3: NUST students undergoing training (2)

## 2-15 Influence of the FWO on the CTTI

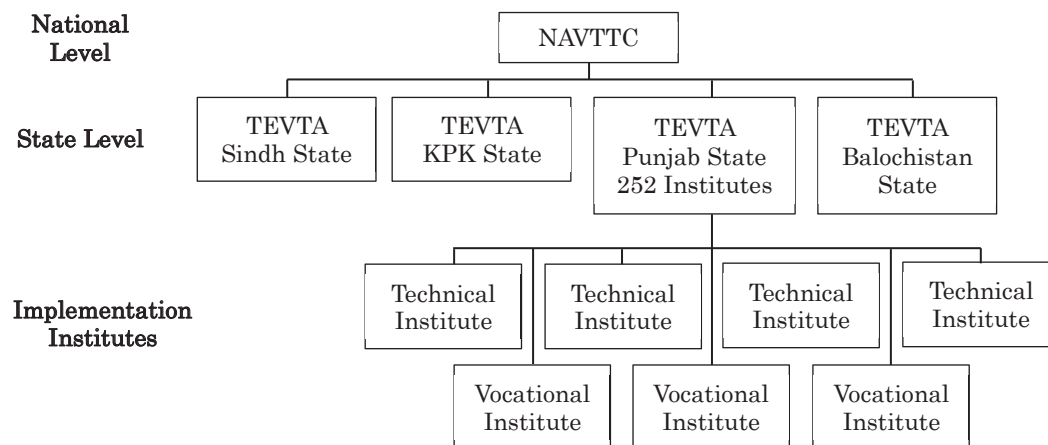
The CTTI operates under the administrative control of the FWO. Given this, the FWO supports the annual budget of the CTTI and regularly provides executives for the CTTI (e.g., the institute's director and the various heads of the departments). Moreover, the FWO regularly issues requests and provides advice to the CTTI on its management. The following are some examples of requests and advice that the director general of the FWO issued on September 2013 with regard to the CTTI's management.

- The curriculums for the 4 DAE programs should be sent to the FWO headquarters for inspection by the director general of the FWO.
- CTTI instructors should conduct market research to explore market demand and improve the institute's curriculums.
- Students on the DAE programs need to acquire more practical knowledge than theoretical knowledge. The FWO will offer paid internships that run for about three months to the institute's students.
- Accommodation should be provided for students from remote states and areas. If the CTTI has any difficulty providing board and lodging, the FWO can provide the necessary space.
- A Guidance and Counselling Cell should be established to develop and maintain employment profiles for CTTI students. A dedicated officer should be appointed and given responsibility for running the cell.
- Foreign students should be given the opportunity to attend CTTI courses.
- The pay package for instructors/assistant instructors in the Civil & Quantity Survey Department should be reviewed and recommendations should be forwarded to the FWO headquarters for approval.

In this way, the FWO issues wide-ranging requests to the CTTI with regard to its training methods and curriculums, student accommodation, the employment profiles for CTTI graduates, admissions and training staff salaries.

## 2-16 Other Institutes Offering Technical Training in Pakistan

In Pakistan, the Technical and Vocational Education and Training System consists of three levels: NAVTTC as the regulatory agency at the national level; TEVTA as the regulatory agencies at the state level,; and technical and vocational training institutes as the implementing institutes.



Source: Interviews at CTTI

Figure 4: Hierarchy for technical and vocational education and training

To advance the industrialization of Pakistan in line with Vision 2030 (a national development plan), technical education and vocational training have been implemented to develop mid-level engineers that can connect field sites and management levels. Table 25 shows how the technical and vocational institutes and their students are positioned in technical education.

Table 25: Positioning of technical education institutes

Educational institute	Length of education	Qualification	Category
University	4 years	Bachelor of Engineering (BE)	Manager
<b>Technical college/institute</b>	<b>3 years</b>	<b>DAE</b>	<b>Supervisor /foreman</b>
Vocational/technical institute	1 month to 1 year	Technician	Craftsperson

Source: Interviews at CTTI

As of 2012, there were 254 vocational training and technical training institutes in the Punjab province. A breakdown of these is shown in Table 26. These institutes are managed by the Punjab TEVTA.

Table 26: Technical institutes in Punjab

Institute	Course	No.
Technical training center	Diploma (one year) and short course	129
Vocational training institute	Short course only	122
Agricultural machinery training school	Short course only	3
Total		254

Source: TEVTA website, Government of Punjab

The total number of training courses offered at the 254 vocational training institutes is 53, and these courses run for 3 to 12 months. A few technical training institutes also offer a one-year diploma course. Some of these courses are similar to the ones offered at the CTTI, but some are distinct and unique courses that are not offered at the CTTI.



Table 27: Courses offered only at vocational training institutes

Courses	
Tailoring/Domestic Tailoring	Vocational Girls
Dress Designing and Making	Handicraft
Hand Embroidery/Machine Embroidery	Cooking and Baking
Beautician	

Source: TEVTA website, Government of Punjab

### 3 Present Training Situation at the CTTI

#### 3-1 General Content of Mechanic Training Courses in Pakistan and Abroad

##### In Pakistan

Car mechanic training has been introduced not only at the CTTI's Auto Diesel Department, but also at other organizations and vocational/technical training institutes in Pakistan. However, training and education for the maintenance and repair of heavy construction equipment are available only at the CTTI. The organizations offering training for car mechanics are as follows.

- NLC
- NTB
- GPI under the supervision of the NTB

Training and education for car mechanics are provided based on the NTB's curriculum, which is standardized throughout the country. The training and education relating to cars that is offered at the CTTI's Auto Diesel Department are also conducted in line with the NTB's curriculum.

Training for the operation of heavy construction equipment is also offered at the NLC. The NLC provides operator training using its own equipment. The operation of bulldozers, wheel loaders, excavators and motor graders is covered in the training. In addition, construction machinery dealers also offer operator training to their customers for a short period of time after delivery of the equipment.

##### Abroad

In general, heavy construction equipment manufacturers provide the dealers in each country with operator training. Furthermore, the trained operators working at the dealers in turn train the sub-dealers and customers. Morocco and Egypt have construction machinery training centers as well, both of which were founded using aid from Japan. These centers also offer the same training courses as the CTTI does for operators, mechanics and engineers.

#### 3-2 Details of Mechanic-related Courses Available at the CTTI

The following courses for civil engineers have been introduced and run as mechanic-related courses at the CTTI: Heavy Machine Operator; Construction Machinery Mechanic (Engine) and Construction Machinery Mechanic (Chassis); Turner Machinist; DAE in Construction Machinery Mechanical Technology; and Construction Machinery Management. Details of these courses are provided in Table 28.

Table 28: Details of mechanic-related courses at the CTTI

Course	Aim	Main content (syllabus)
Heavy Machinery Operator	To provide operators with the knowledge and skills required for the operation and daily maintenance of construction machinery.  Six-month course Intake: 80	<ol style="list-style-type: none"> <li>1. Basic Knowledge</li> <li>2. Construction Machines: General</li> <li>3. Components of Construction Machines</li> <li>4. Structure and Function of Construction Machines</li> <li>5. Operation and Maintenance Bulldozer, motor grader, wheel loader, dump truck, excavator, road roller, truck crane, road stabilizer, asphalt finisher, etc.</li> </ol>
Construction Machinery Mechanic II (Engine)	To provide mechanics with the knowledge and skills required for the maintenance, overhauling and troubleshooting of construction machinery engines.  Six-month course Intake: 40	<ol style="list-style-type: none"> <li>1. Basic Knowledge</li> <li>2. Fundamentals of Engines</li> <li>3. Fuel, Oil and Air</li> <li>4. Structure and Function of the Komatsu Engine: Disassembly, Assembly and Adjustment</li> <li>5. Structure and Function of the Cummins Engine: Disassembly, Assembly and Adjustment</li> <li>6. Fundamentals of Electrical Systems; Testing and Diagnosis</li> <li>7. Structure and Function of the Bosch Pump: Disassembly, Assembly and Adjustment</li> <li>8. Functions of the Dynamometer: Engine Performance</li> <li>9. Welding and Types of Welding</li> <li>10. Machine Shop</li> <li>11. Operation of Construction Machines</li> <li>12. Troubleshooting</li> </ol>
Construction Machinery Mechanic II (Chassis)	To provide mechanics with the knowledge and skills required for the maintenance, overhauling and troubleshooting of construction machinery chassis.  Six-month course Intake: 30	<ol style="list-style-type: none"> <li>1. Basic Knowledge.</li> <li>2. Measuring Instruments and Tools</li> <li>3. Workshop Knowledge</li> <li>4. The Future of Construction Machinery</li> <li>5. Structure and Function of Components: Inspection, Testing and Adjustment Engines, clutches, torque convertors, transmission, steering, brakes, tires, etc.</li> <li>6. Hydraulic Systems: Structure and Function, Adjustment and Testing</li> <li>7. Undercarriage: Structure and Function, Inspection, Rebuilding and Adjustment</li> <li>8. Troubleshooting</li> </ol>

Construction Machinery Planning and Employment (CMP&E)	To train managers in the management and administration of construction machinery during a project.  One-month course Intake: 20	<ol style="list-style-type: none"> <li>1. Soils and Rocks</li> <li>2. Construction Machinery and Operation</li> <li>3. Characteristics of Construction Machinery</li> <li>4. Project Monitoring/Safety</li> <li>5. Planning/Management Methodology</li> <li>6. Maintenance/Troubleshooting</li> <li>7. Selection of Construction Machinery</li> <li>8. Modern Trends in Construction Machinery</li> <li>9. Machine Replacement Policy/Costs</li> </ol>
Construction Machinery Supervisory Course (CMSC)	To train supervisors in the management and supervision of construction machinery during construction projects.  One-month course Intake: 25	<ol style="list-style-type: none"> <li>1. Fundamentals of Soils and Rocks</li> <li>2. Construction Materials</li> <li>3. Construction Machinery and Operation</li> <li>4. Characteristic of Construction Machinery</li> <li>5. Maintenance of Construction Machinery</li> <li>6. Planning and Employment Methodology</li> <li>7. Selection of Construction Machinery</li> <li>8. Fundamentals of Earth-moving</li> </ol>
Turner Machinist	To provide machinists with knowledge and skills in metal working.  Six-month course Intake: 30	<ol style="list-style-type: none"> <li>1. Measurements</li> <li>2. Grinding and Drilling</li> <li>3. Turning</li> <li>4. Shaping</li> <li>5. Milling</li> <li>6. Welding</li> </ol>
DAE in Mechanical Technology with Specialization in Construction Machinery	Diploma Associate Engineer.  Three-year course Intake: 120	<ol style="list-style-type: none"> <li>1. English, Mathematics, etc.</li> <li>2. Scientific Knowledge</li> <li>3. Workshop Practice</li> <li>4. Operation of Construction Machinery</li> <li>5. Structure and Function of Construction Machinery Engines, transmission, hydraulic systems, steering, brakes, etc.</li> <li>6. Planning and Management of Construction Machinery</li> </ol>

Source: Survey Team

## 4 Construction Industry Views on Operator/Engineer Courses for Heavy Construction Equipment

The Survey Team conducted interviews with one auto dealer and four construction industry companies with a particular focus on the handling of heavy construction equipment. With the exception of Toyota, the other four companies that handle heavy construction equipment (selling and maintenance/repair) had almost identical views, requests and/or complaints with regard to CTTI courses on the operation and engineering of heavy construction equipment. The following are some of the key views shared by the construction-related companies.

- There is a shortage of operators who can operate advanced heavy construction equipment;
- There is a shortage of engineers who have sufficient knowledge and skill to be able to repair and maintain advanced heavy construction equipment;
- The syllabuses adopted at the CTTI with regard to heavy construction equipment do not fit well with contemporary advanced equipment;
- The CTTI should be an institute for developing such human resources; and
- Companies handling heavy construction equipment are willing to support the CTTI.

Table 29: Key comments made by the companies

Company	Business	Key comments
Toyota	Dealer/maintenance	<ul style="list-style-type: none"> <li>● CTTI students have superior technical knowledge, competence and discipline compared to students at other institutes.</li> <li>● During careers days, more than 50% of students expressed an interest in working for Toyota.</li> <li>● Toyota promised to focus on professional and technical training run by various Toyota technical staff to enhance their capabilities.</li> <li>● Employees leave Toyota after training and move on to other companies, complaining about lower pay packages. Toyota is giving serious consideration to increasing their pay packages.</li> <li>● Toyota has always supported the CTTI by providing job assistance and training support to the Auto Diesel Department.</li> </ul>

<p>Jaffer Brothers (Komatsu)</p>	<p>Dealer/maintenance</p>	<ul style="list-style-type: none"> <li>● The CTTI is the only institute in Pakistan to offer DAE programs and short courses for construction machinery.</li> <li>● CTTI students enjoy greater demand from various multinational companies due to their competence and their good technical knowledge and skills.</li> <li>● Construction machinery technologies have improved and more recent construction machines have mechatronics and electronic control systems. However, the CTTI is still training its students on old, outdated machinery.</li> <li>● The CTTI's curriculums need to be updated to cover the latest construction machines.</li> <li>● Instructors must be trained on modern technology.</li> <li>● Jaffer Brothers offers internships to and employs CTTI students.</li> <li>● Selected CTTI students are given on-the-job training on modern machinery.</li> </ul>
<p>Allied Engineering (Caterpillar)</p> <hr/> <p>WillWays Technologies (Mitsubishi)</p>	<p>Dealer/maintenance</p>	<ul style="list-style-type: none"> <li>● Due to their superior competence and good technical background, there is greater demand for CTTI students than there is for students from other institutes.</li> <li>● Construction machinery technologies include more mechatronics and are more complex. However, the content of CTTI classes has not kept up with this trend.</li> <li>● The CTTI must change its course/training aids in line with modern technological trends.</li> <li>● Generators are in high demand, so the CTTI should also offer a generator course. Technicians must have ample knowledge of this type of equipment as well.</li> <li>● CTTI graduates are excellent and capable of serving in any good multinational company.</li> <li>● Companies that have received fresh CTTI graduates train them on the latest machinery.</li> </ul>

NLC	Transport/construction	<ul style="list-style-type: none"> <li>● The NLC is a multi-faceted company that engages in a variety of operations (i.e., transportation and construction of roads, bridges, buildings, etc.).</li> <li>● The NLC has always preferred CTTI graduates over other graduates.</li> <li>● The NLC is in the process of acquiring the latest machines.</li> <li>● Currently, CTTI graduates are able to perform all tasks pertaining to the repair, operation and maintenance of old technology machines, but the CTTI needs to train its students to handle the latest technologies. This could save companies time and effort in terms of training students.</li> <li>● Students trained on modern technologies will be of more use to companies and—ultimately—to the country as a whole.</li> </ul>
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Source: Comments made to the Survey Team by the interviewed companies

## 5 Discussions and Agreement on Implementation of the Project

### Subject of the Discussions and Agreement

The Survey Team held discussions with the CTTI about the training courses that need to be updated under the project. The following are the training courses that the CTTI originally requested be updated under the project.

- Heavy Machinery Operator.
- Construction Machinery Mechanic II (Engine)
- Construction Machinery Mechanic II (Chassis)
- Construction Machinery Mechanic I
- Construction Equipment Service Manual Control

Following the discussions with the CTTI, both sides agreed that the following courses would be updated.

- Heavy Machinery Operator.
- Construction Machinery Mechanic II (Engine)
- Construction Machinery Mechanic II (Chassis)
- CMP&E
- CMSC
- Construction Machinery Mechanic I (if it is not covered under the Construction Machinery Mechanic II courses)

The employment of its graduate students is one of the most important aspects of the CTTI's operations. Given this, in addition to updating the above-mentioned 6 training courses, the Survey Team suggested that the CTTI should include Placement Support for CTTI Graduate Students as part of the project. The CTTI showed a strong interest in this suggestion, and both sides agreed to include this as a sub-component of the project.

In Pakistan, an agency implementing a project has to prepare and submit a documented plan for the project (PC-1) to the GOP (Planning Committee) in order to get official approval. Consequently, the Survey Team also discussed the preparation and submission of the PC-1 with the CTTI. The Survey Team and the CTTI both agreed upon the following.

- The CTTI will prepare and submit the PC-1 to the Planning Commission through the MOC by March 2014.
- The Survey Team consultants will prepare a draft of the PC-1 and share it with the CTTI by the beginning of January 2014.
- The CTTI will follow the agreed process for preparation and approval of the PC-1 so as to ensure its timely approval.

The following information must be provided in the PC-1.



Table 30: Information to be provided in the PC-1

A	Executive Summary	
B	PC-1	
	1	Name of Project
	2	Location
	3	Authorities
	4	Plan Provisions
	5	Project Objectives and Relationship with Sector Objectives
	6	Justification, Description, Technical Parameters and Technology Transfer Aspects
	7	Capital Costs
	8	Annual Operating and Maintenance Costs after Project Completion
	9	Demand and Supply Analysis
	10	Financial Plan and Mode of Financing
	11	Project Benefits and Analysis
	12	Implementation Schedule
	13	Management Structure and Manpower Requirements, including Specialized Skills Required during Construction and Operational Phases
	14	Additional Projects/Decisions Required to Maximize the Socio-economic Benefits of the Proposed Project
	15	Certificate

Source: CTTI

### Reasons for Updating Courses

- 1) The Construction Machinery Mechanic I course is said to be a more advanced version of the Construction Machinery Mechanic II course. However, a lot of the content for both courses overlap. Moreover, there is only a textbook for Construction Machinery Mechanic I, no actual syllabus. In fact, this course has never been conducted at the CTTI. The need to update this course will be discussed and studied as part of the project.
- 2) Construction Equipment Service Manual Control is the name of a manual, not the name of a course. The curriculums for the Heavy Machinery Operator course and the 2 Construction Machinery Mechanic II courses are to be updated so that they can adapt to the latest advanced equipment that becomes prevalent in the construction fields. The content of Construction Equipment Service Manual Control should also be updated to match contemporary advanced equipment. At present, the content of the Construction Equipment Service Manual Control is used for the CMP&E course and the CMSC. Consequently, these 2 courses will need to be modified in accordance with the update of the Construction Equipment Service Manual Control.

Some parts of the syllabuses and textbooks related to the construction equipment used for the second and third

years of the DAE Mechanical course should be updated. However, the updated syllabuses and textbooks for the Construction Machinery Mechanic II (Engine) and Construction Machinery Mechanic II (Chassis) courses could also be used for the DAE Mechanical course.

The curriculums of the other courses (i.e., those other than the 5 courses to be updated under the project) are governed by governmental organizations. These organizations will update these curriculums when revisions are necessary. Given this, the CTTI will not need to update these curriculums themselves. The following two governmental organizations provide the curriculums for the short courses and DAE programs.

- Short courses: NTB
- DAE programs: PBTE

## **6 Problems and Issues Regarding the Required Outputs**

### 6-1 Curriculum and Training Staff

#### Curriculum

##### **Outdated Curriculums used at the CTTI**

The curriculums for the operation and maintenance of heavy construction equipment that currently used at the CTTI were originally created in 1986. The target equipment consisted of combinations of machine elements. However, contemporary construction equipment that meets global standards makes use of numerous electronic and mechatronic components. Moreover, such equipment employs engines with a variety of new technologies for exhaust gas control in consideration of the environment.

At present, a lot of construction equipment that makes use of advanced technologies is imported for use at a variety of construction sites in Pakistan. An update of the curriculums, as well as the training equipment, is required to ensure that CTTI students develop an understanding of the structural functions, inspections and overhaul techniques with regard to engines and mechatronics. The quality of engineers, mechanics and operators trained and educated using the updated curriculums will be improved. As a result, mechanical failures resulting from improper operation, delays in maintenance caused by erroneous failure diagnoses and repair errors will decrease.

#### Training and Teaching Equipment

##### **The Available Training and Teaching Equipment Is Outdated and Inadequate for the Training and Teaching of Advanced Technologies**

The CTTI training staff have trained and taught students using textbooks and training equipment provided in 1986. To efficiently and effectively train and teach the staff about advanced technologies by using the updated textbooks, the CTTI will need equipment that meets the standards of these advanced technologies.

#### Training Staff

##### **None of the Teaching Staff Have Knowledge of the Advanced Technologies Used in Contemporary Equipment**

The CTTI teaching staff train and teach students based on technologies and knowledge transferred under the technical transfer project implemented by JICA between 1985 and 1990. Given this, the staff have little or none of the knowledge required to train and teach the above-mentioned advanced technologies to students.

The support of experts will be necessary for not only updating the syllabuses and textbooks, but also training and teaching the staff about advanced technologies by using the updated textbooks.

### 6-2 Placement Support

#### Data and Information

##### **No Database for the Employment Status of CTTI Graduates Has Been Developed or Maintained**

In the past, the CTTI did not collect or organize data and information on the employment of its graduates (e.g., the number of jobseekers, the employment rate and the place of employment). Each department head

contacted companies with regard to student internships and careers day, but they kept data and information on these companies themselves. Given this, the data and information was never managed in an integrated fashion.

#### Organization: Establishment of the Cell

##### **Improvements Need to Be Made to the Cell**

A new sub-department within the General Department called the Guidance and Counselling Cell was established in 2013. The Cell is responsible for collecting data/information on students, graduates and companies, developing and maintaining the database, counseling students and finding job opportunities for students. Four staff have already been appointed and an additional three staff are to be recruited by the CTTI by February 2014. However, the staff that work in the Cell have other duties to perform as well, so they cannot dedicate themselves solely to the work of the Cell. For the Cell's duties to be performed smoothly, steadily and efficiently, at least one staff member who can dedicate themselves solely to the work of the Cell should be hired as soon as possible.

#### 6-3 Problems and Issues Unrelated to the Required Outputs

##### Fall in the Number of Applicants to the CTTI and Poor Management Awareness

The number of students selected for DAE programs increased from 124 in 2009 to 288 in 2013 because of an increase in the intake for each of the existing courses and the establishment of a new course. However, the number of applicants for DAE programs decreased despite the increased intake. The reason why the number of applicants, selected students and graduates for the three short courses (Heavy Machinery Operator, Construction Machinery Mechanic II (Engine) Construction Machinery Mechanic II (Chassis)) offered as regular courses fell from 2006 may be because of the establishment of sponsored courses. The grounds for believing this is because the number of students has been increasing since the CTTI stopped offering sponsored courses. However, no clear reason has been found to explain the decrease in the number of applicants for the DAE programs. At present, the number of applicants exceeds the number of places available on the courses. However, the ratio of applicants to selected students has been dropping year after year (from 24.4:1 in 2009 to 4.1:1 in 2013), despite the increase in the number of places available. All of the heads of department who manage a DEA program are eager to educate and train their students. However, they do not understand the reason for the drop in the number of applicants and have not implemented any countermeasures to address this issue. It seems that they lack a sufficiently strong desire to manage the CTTI.

An investigation (interview and survey targeting high school students, their teachers and companies) and analysis to determine the reason for this decrease should be conducted immediately. After that, countermeasures should be implemented as soon as possible to stop this decrease and to increase not only the number of applicants, but also the number of places available on the DAE programs. Furthermore, a shift away from older department heads (in their late-50s to 60s) to younger ones with more passion and greater management awareness will be necessary.

Table 31: Changes in the number of applicants and selected students and the ratio of applicants to selected students for DAE programs over the past five years

Year	2009		2010		2011		2012		2013	
	Appl.	Sel.	Appl.	Sel.	Appl.	Sel.	Appl.	Sel.	Appl.	Sel.
Mechanic	1,182	40	1,121	90	876	90	650	80	592	100
Civil	1,245	42	1,068	92	949	92	572	84	299	104
Civil - QS	-	-	-	-	181	50	281	42	95	42
Auto & Diesel	604	42	596	92	572	42	403	42	189	42
Total	3,031	124	2,785	274	2,578	274	1,906	248	1,175	288
Ratio	24.4:1		10.2:1		9.4:1		7.7:1		4.1:1	

Source: CTTI

#### A Lack of Internal Training and Education Systems for Training Staff at the CTTI: Development of a Cooperative Relationship with Heavy Machinery Equipment Distributors

The CTTI has a system for evaluating the methods and content of the education and training provided to students by its teaching staff. However, the CTTI lacks an internal system for training its teaching staff by utilizing the evaluation system. The CTTI relies on the education and training that is provided to its teaching staff by the NTB and through ODA (grant). Heavy construction vehicles equipped with the latest technologies are needed for the teaching staff to learn about the latest technologies related to construction equipment and construction works. For the updating of its equipment, the CTTI has relied on Japan's ODA, which has been provided only once every 6 to 10 years. Given this, the CTTI has been unable to respond quickly in improving the teaching skills of its teaching staff based on the results of its internal evaluation system. This makes it difficult for the CTTI to keep up with the surge in technical innovations and to teach its students about the latest know-how and technologies, because it has had to use old-fashioned equipment and outdated knowledge and techniques. It also makes it difficult for the construction industry to undertake construction works using machines equipped with the latest technologies. This situation means that the latest technologies cannot be used to deliver economic benefits such as a reduction in construction costs and a shortening of construction periods through improved work efficiency, or environmental benefits such as reduced noise, vibrations and air pollution.

The budgetary limitations of the CTTI and the development of an internal training system also need to be addressed. To this end, the cooperation of distributors that sell and maintain heavy machinery equipment will be indispensable. In Pakistan, these distributors have maintenance factories at which they repair, inspect and maintain equipment. The services that they provide involve not only repairing, inspecting and maintaining equipment, but also training the customer's equipment operators on how to operate the equipment. With the cooperation of these distributors, CTTI training staff can be trained at these factories so that they can learn about the latest know-how and technologies with regard to equipment. The staff can then use the training they received at the factory in teaching their students, thereby ensuring that the students have the necessary skillset to meet the needs of the construction industry when they graduate. An increase in the number of graduates who have been taught about the latest know-how and technologies will prompt the construction industry to update its equipment. This will lead to increased equipment sales, which will be good for the business of the distributors.

### Dependence on Others for the Updating of Training and Education Equipment: Development of a Cooperative Relationship with the Construction Industry

Almost all of the education and training equipment (vehicles and machines used for construction) that the CTTI possesses has been acquired through ODA from Japan. The equipment has been well maintained and managed by the CTTI and has been used to provide education and training. However, the equipment has been updated only once every 6 to 10 years, which means that the equipment at the CTTI is quite old. It is very difficult for the CTTI to purchase equipment that uses the latest technologies because it is very expensive. Consequently, the CTTI has to educate and train its students using old equipment that does not meet the needs of the construction industry. This may have an adverse effect on the employment prospects of CTTI graduates in the future.

Efforts to make improvements by, for example, securing a budget increase from the GOP are needed in order to ensure that the education and training that the CTTI gives its students meet the needs of the industry. Moreover, consideration also needs to be given to the updating of the education and training equipment, which can be achieved by establishing a supporting organization made up of construction-related companies with strong ties to the CTTI (e.g., the FWO, the NHA and the NLC, as well as distributors for heavy construction vehicle manufacturers).

### The Fragile Independence and Governance of the CTTI

The CTTI's expenditure on management has always exceeded its allotted budget. In recent years, its expenditure has exceeded the budget submitted to the MOC. As a result, the CTTI has had to borrow money to cover this shortfall from the FWO. It has then included the loan in the budget for the following year that it submitted to the MOC. The CTTI has then repaid the FWO loan from the approved budget. Consequently, no problems have arisen in terms of the management of the CTTI. However, this strong dependence on the FWO for its budget is thought to have weakened the independence of the CTTI. For instance, both the department heads and the director of the CTTI come from the FWO. Moreover, the FWO issues wide-ranging requests to the CTTI with regard to its lesson methods and content, the accommodation it provides for students, employment profiles for CTTI graduates, its admissions policy and the salaries paid to CTTI training staff. Given this, the FWO is involved in a large part of the management and operation of the CTTI. It could look as if the CTTI is governed by the FWO.

To enhance the independence and governance of the CTTI, its financial dependence on the FWO must be reduced. The NHA, the NLC and the All Pakistan Contractor's Association are also members of the CTTI Board of Management. The CTTI should consider obtaining financial support from these board members as well in order to reduce its degree of dependence on the FWO.

## 7 Updating CTTI Curriculums and Staff Training

### 7-1 Policy for Updating CTTI Curriculums and Syllabus Content

#### Policy

There is no need to update the basic elements of the curriculums for CTTI courses. However, an overview of electronics and mechatronics must be added. The structure and functions of contemporary heavy construction machinery now incorporate mechatronics in accordance with advancing technologies. Consequently, the curriculums for courses related to heavy construction equipment need to be revised.

#### Syllabus Content to be Revised

##### (1) Heavy Machinery Operator Course

Table 32 indicates which aspects of the syllabus content for the Heavy Machinery Operator course need to be revised.

Table 32: Syllabus content to be revised for the Heavy Machinery Operator course

No.	Content	Revision	Reason
1	Opening Ceremony & Orientation	None	General and fundamental
2	Basic Science Review		
3	Hand Tools and Machine Elements		
4	General		
5	Prime Mover/Engine	Update	Apply advanced equipment
6	Engine System		
7	Chassis a. Powertrain and Transmission b. Clutch and Torque Converter c. Brake and Steering System d. Undercarriage e. Wheels and Tires		
8	Fuel, Coolant and Lubricants		
9	Hydraulic Systems		
10-1	Construction Machines: General		
10-2	Mechatronics	Addition	Apply advanced equipment
11.12	Bulldozer: General and Operation	Update	Apply advanced equipment
13,14	Motor Grader: General and Operation	None	No advanced equipment
15.16	Wheel Loader: General and Operation	Update	Apply advanced equipment
17.18	Bulldozer Shovel: General and Operation	None	No advanced equipment
19.20	Dump Truck: General and Operation	None	No advanced equipment
21.22	Excavator: General and Operation	Update	Apply advanced equipment
23.24	Road Roller: General and Operation	None	No advanced equipment

25.26	Motor Scraper: General and Operation	Deletion	Not commonly used equipment
27.28	Truck Crane: General and Operation	None	No advanced equipment
29.30	Road Stabilizer: General and Operation	None	No advanced equipment
31.32	Asphalt Finisher: General and Operation	None	No advanced equipment
33	Compressor and Generator: General	None	No advanced equipment
34	Written Test	None	General
34	Practical Test		
35	Closing Ceremony		

Source: Survey Team

### (2) Construction Machinery Mechanic II (Engine) Course

Table 33 indicates which aspects of the syllabus content for the Construction Machinery Mechanic II (Engine) course need to be revised.

Table 33: Syllabus content to be revised for the Construction Machinery Mechanic II (Engine) course

No.	Content	Revision	Reason
1	Fundamentals of Diesel/Gasoline Engine	None	Fundamental
2	Structure and Function of a Komatsu Engine	Update	Apply advanced engine
2-1	Structure and Function of a Caterpillar Engine	Addition	Apply advanced engine
3	Structure and Function of a Cummins Engine	Update	Apply advanced engine
4	Gasoline Engine	Deletion	Few gasoline engines
5	Electricity	Update	Apply advanced technology
5-1	Mechatronics	Addition	Apply advanced technology
6	Bosch Pump	Update	Apply advanced technology
6-1	Common Rail System	Addition	Apply advanced technology
7	PT Pump	Update	Apply advanced technology
8	Dynamometer	None	No advanced systems
9	Welding and Types of Welding	None	Fundamental
10	Machine Shop	None	No advanced machinery
11	Operation of Machinery	Update	Apply advanced equipment
12	Troubleshooting	Update	Apply advanced equipment

Source: Survey Team

### (3) Construction Machinery Mechanic II (Chassis) Course

Table 34 indicates which aspects of the syllabus content for the Construction Machinery Mechanic II (Chassis) course need to be revised.



Table 34: Syllabus content to be revised for the Construction Machinery Mechanic II (Chassis) course

No.	Content	Revision	Reason
1	Opening Ceremony & Orientation	None	General and fundamental
2	Basic Science Review		
3	Measuring Instruments and Tools		
4	Future of Construction Machinery	Update	Apply advanced equipment
5	Engines	Update	Apply advanced equipment
6	Clutches	Update	Apply advanced equipment
7	Torque Convertors	Update	Apply advanced equipment
8	Transmission	Update	Apply advanced equipment
9	Differentials and Driving Axels	Update	Apply advanced equipment
10	Chassis/Main Frame and Suspension	Update	Apply advanced equipment
11	Steering Systems	Update	Apply advanced equipment
12	Braking Systems	Update	Apply advanced equipment
13	Wheels and Tires	None	No advanced systems
14	Hydraulic Systems/Components	Update	Apply advanced equipment
15	Truck Undercarriage	Update	Apply advanced equipment
16	Truck Chassis Inspections/Testing	Update	Apply advanced equipment
17	Maintenance of Chassis for Tired Vehicles	Update	Apply advanced equipment
18	Introduction to Chassis Special Features	Update	Apply advanced equipment
19	Application	None	General

Source: Survey Team

#### (4) The CMP&E Course

Table 35 indicates which aspects of the syllabus content for the CMP&E course need to be revised.

Table 35: Syllabus content to be revised for the CMP&E course

No	Content	Revision	Reason
1	Introduction	None	General and fundamental
2	Visits		
3	Tests		
4	Mechanical Work		
5	Soils/Rocks		Civil
6	Construction Machinery and its Operation	Update	Apply advanced equipment
7	Engine/Fuel Systems		
8	Undercarriages		
9	Characteristics of Machines	None	Civil
10	Project Monitoring/Safety		
11	Planning/Management Methodology		

12	Equipment Maintenance/ Troubleshooting	Update	Apply advanced equipment
13	Project Planning and Management	None	Civil
14	Construction Management		
15	Factors Affecting the Selection of Construction Equipment		
16	Earth Moving Planning		
17	Fundamentals of Earth Moving		
18	Modern Trends in Construction Machinery	Update	Apply advanced equipment
19	Compaction Theory and Practice	None	Civil
20	Log Planning		
21	Machine Replacement Policy/Allocation of the Cost of Construction Machinery to the Project		
22	Construction Activities in Project Analysis		

Source: Survey Team

#### (5) CMSC

Table 36 indicates which aspects of the syllabus content for the CMS course need to be revised.

Table 36: Syllabus content to be revised for the CMS course

No.	Content	Revision	Reason
1	General/Miscellaneous/Visits/Tests	None	General
2	Fundamentals of Soils/Rocks		Civil
3	Building/Construction Materials		
4	Brick/Stone Masonry		
5	Concrete (Preparation/Handling/Placing, Etc.)		
6	Construction Machinery and its Operation	Update	Apply advanced equipment
7	Characteristics of Individual Machines		
8	Equipment Maintenance		
9	Planning and Employment Methodology	None	Civil
10	Project Planning and Management		
11	Factors Affecting the Selection of Construction Equipment		
12	Fundamentals of Earth Moving		
13	Surveying	None	Civil

Source: Survey Team

#### 7-2 Framework for the Training of Teaching Staff

The targets for the number of staff to be trained under the project are shown in Table 37 below. All of the staff to be trained under the project should be permanent teaching staff. A total of 35 staff in the Civil & Quantity Survey Department and the Mechanical Department are to be trained. The CTTI should enter into a contract/

agreement with the teaching staff to be trained under the project with regard to the length of service that will be required of them following completion of the training.

Table 37: Number of staff to be trained

Course	Department	Senior instructor (lecture)	Instructor (lecture)	Assistant instructor (practice)	Trade instructor (practice)	Total
Heavy Machinery Operator	Civil & Quantity Survey		2	5	8	15
Construction Machinery Mechanic II (Engine)	Mechanical	1	1	2	2	6
Construction Machinery Mechanic II (Chassis)	Mechanical	1	1	2	2	6
CMP&E	Civil & Quantity Survey		1	1	2	4
Construction Machinery Supervisor	Civil & Quantity Survey		1	1	2	4
<b>Total</b>		<b>2</b>	<b>6</b>	<b>11</b>	<b>16</b>	<b>35</b>

Source: Survey Team

The staff training process is as follows.

1. Updating of each curriculum, especially the syllabus and the textbook, by the staff for each course based on advice and instructions from long-term experts.
2. Training of appointed staff by long-term experts using the updated textbook.
3. Training of selected trained staff in Japan.
4. Preparation by trained staff of lesson plans and trial lessons for students.
5. Evaluation by experts of the trial lessons and staff training.

### 7-3 Equipment Necessary for the Conducting of Training with Updated Textbooks

To train and teach the staff about the above-mentioned advanced technologies using the updated textbooks efficiently and effectively, the following equipment is necessary.

Table 38: Necessary equipment and its purpose

Necessary equipment	Purpose
Components of engines, transmissions, etc.	To perform practical work on equipment disassembly and assembly at a workshop.
Cutaway models of engines and transmissions	To teach the functions of these structures in the classroom.
Training DVD	To teach the functions of these structures in the classroom.
Fault diagnostic tools	To provide inspection and maintenance training in the classroom and at a workshop.
Equipment for testing components	To provide training on maintenance confirmation in the classroom and at a workshop.

Source: Survey Team

## **8 Strengthening of Placement Support**

The establishment of a database on CTTI graduates and the companies at which they find employment forms the basic tool for placement support. Counseling students and holding job exhibitions/careers days are very important activities in the provision of placement support. In addition, a needs assessment for industry needs to be conducted. Four staff have been appointed to work in the Cell but they have to work using just one desktop computer (at present). An additional three staff are to be recruited to strengthen the operations of the Cell. However, these seven staff all have other duties to perform in their roles as teachers or staff members of other departments, so they cannot dedicate themselves 100% to the work of the Cell. Given this, the present organization of the Cell is not robust enough for the above-mentioned placement support activities to be implemented. The first thing that needs to be done then is to recruit at least one staff member who can dedicate themselves 100% to the work of the Cell. This new staff member and two of the present staff working in the Cell should also serve as counterpart personnel for the project. Three desktop computers will need to be acquired for the three staff joining the project in order for the duties of the Cell to be carried out smoothly and efficiently both during and after the project's completion.

## 9 Overview of the Project

JICA has held several meetings with the CTTI and the relevant authorities with regard to designing the details of the project. Both sides agreed on the following details for the project.

### 9-1 Project Implementation Structure

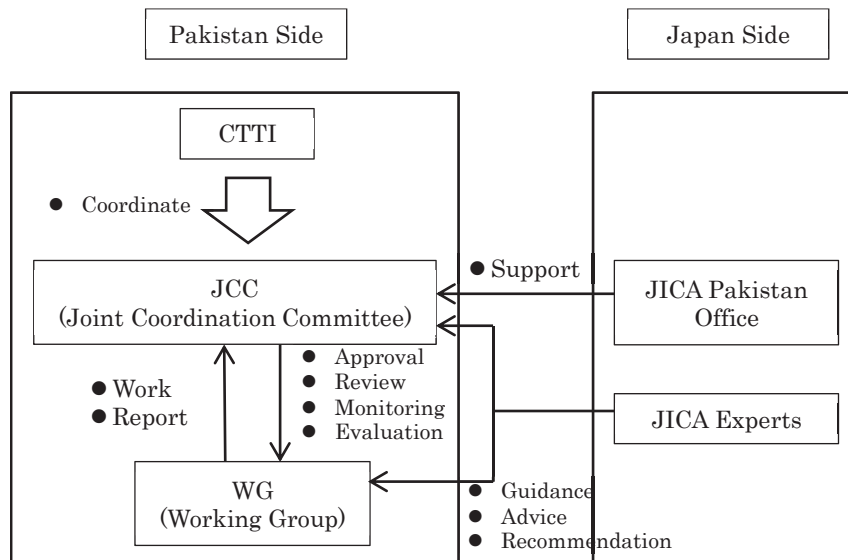
A Joint Coordination Committee (JCC) and a Working Group (WG) will be set up to ensure the project is implemented smoothly and effectively. At the same time, JICA experts will be selected. The roles of the organizations concerned are described in Table 39.

Table 39: Roles of the implementation organizations

Organization	Role
CTTI	Coordination.
JICA Pakistan Office	Provision of support to the CTTI and JCC.
JCC	Approval of annual work plans, review of overall progress, monitoring and evaluation of the project, and exchange of opinions.
WG	Work on each activity with the support of Japanese experts.
JICA Experts	Provision of technical guidance, advice and recommendations to the WG and the JCC.

Source: Survey Team

Figure 5 shows the implementation structure.



Source: Survey Team

Figure 5: Implementation Structure

## 9-2 Project Purpose, Outputs and Activities

An overview of the project’s purpose, its outputs and the activities required to deliver these outputs is provided in Table 40 below.

Table 40: Overview of the project purpose, outputs and activities

Overall goal	For the CTTI to supply qualified technical human resources to key industries.	
Project purpose	To provide quality technical education and placement support at the CTTI based on the latest industrial needs.	
Outputs	<ol style="list-style-type: none"> <li>1. The curriculums (*) for the targeted courses are updated.</li> <li>2. Instructors are trained to be able to teach the new targeted courses in line with the updated curriculums.</li> <li>3. The placement support provided by the CTTI is strengthened.</li> </ol>	
Activities	1	<ol style="list-style-type: none"> <li>1.1 The working group conducts a needs assessment of the market.</li> <li>1.2 The working group reviews and analyzes the existing curriculums.</li> <li>1.3 The working group prepares and revises the draft curriculums.</li> <li>1.4 The working group arranges seminars and workshops to be attended by construction and industrial companies, instructors and students so as to obtain their opinions.</li> <li>1.5 The working group reviews and finalizes the draft curriculums.</li> <li>1.6 The board of the CTTI approves the finalized curriculums.</li> <li>1.7 JICA procures equipment, which is then installed by the CTTI and JICA.</li> </ol>
	2	<ol style="list-style-type: none"> <li>2.1 Japanese experts train instructors in relation to the targeted courses at the CTTI.</li> <li>2.2 Trained instructors conduct trial lessons.</li> <li>2.3 Japanese experts evaluate the trial lessons.</li> <li>2.4 Japanese experts share feedback with and provide further training for the instructors.</li> </ol>
	3	<ol style="list-style-type: none"> <li>3.1 The Guidance and Counseling Cell at the CTTI conducts a basic survey on current placement support.</li> <li>3.2 The Guidance and Counseling Cell at the CTTI develops an action plan to strengthen the CTTI’s placement support system.</li> <li>3.3 The Guidance and Counseling Cell at the CTTI implements the action plan.</li> <li>3.4 The JCC monitors the progress of the action plan.</li> <li>3.5 The Guidance and Counseling Cell at the CTTI incorporates the action plan into its routine operations.</li> </ol>

Source: Survey Team

## 9-3 Possible Project Inputs

At present, the following inputs from both the Japanese and Pakistani sides will be necessary for the implementation of the project.

### Japan

- Japanese experts
  - Mechanical engineer for engines
  - Mechanical engineer for chassis
  - Placement support

- Materials and equipment needed for implementing the updated curriculums and the targeted courses
- Counterpart study visits and training in Japan
- Technical support for equipment installation

#### Pakistan

- Assignment of appropriate counterparts to carry out the project activities.
- Payment of salaries and other allowances (if any) for the CTTI staff to be assigned as counterparts.
- Provision of office space for the project staff and the conducting of project activities.
- Sharing of information/data necessary for the project's implementation.
- Inter-departmental coordination within the government setup (where necessary).
- Customs clearance and installation expenses for equipment (if any).
- Operational and maintenance expenses for the equipment.
- Other local expenses necessary for the project's implementation.

#### 9-4 Implementation Schedule

The project is scheduled to begin in July 2014 and run for two years. The implementation schedule for the project is shown in Figure 6.



		Draft PLAN OF OPERATION																										
JFY		JFY13			JFY2014												JFY2015											
Month		2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
Project Term																												
	Long-Term Expert (Machanical Engineer for Engine)																											
	Long-Term Expert (Mechanical Engineer for Chassis)																											
	Expert (Plasement Support)																											
	R/D Signing	▶																										
Admin & Project Operation	Recruitment of Japanese Experts																											
	Set-up of the project office																											
Output 1	1.1 Conduct needs assessment of industry market by working group																											
	1.2 Review and analysis of existing curriculums by working group																											
	1.3 Revise and finalize draft curriculums by working group																											
	1.4 Arrange seminars/workshop inviting construction industrial companies, instructors and students for their opinion by working group.																											
	1.5 Review the final curriculums by working group.																											
	1.6 Approve final curriculums by Board of CTTI.																											
	1.7 Procure equipment by JICA and install them by CTTI and JICA.																											
Output 2	2.1 Conduct training for instructors related to above 5 courses by Japanese experts in CTTI																											
	2.2 Conduct trial lessons by trained instructors.																											
	2.3 Trial lessons are evaluated by Japanese experts..																											
	2.4 Share feedback with instructors and re-educate instructors by Japanese experts																											
Output 3	3.1 Conduct basic survey for current placement support.																											
	3.2 Conduct data / information collection for development of database																											
	3.3 Develop action plan for strengthening the placement support system for CTTI by guidance and counseling cell, CTTI																											
	3.4 Implement action plan by guidance and counseling cell, CTTI																											
	3.5 Monitor the progress of action plan by JCC																											
	3.6 Institutionalize action plan into CTTI's guidance and counseling cell's routine operation.																											

Figure 6: Tentative schedule for the project

## **Attachment**

Attachment – I M/M

Attachment – II Draft R/D

Attachment – III PDM

Attachment – IV List of Educational and Workshop Equipment to be renew

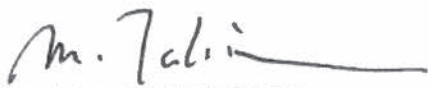
Attachment – V Year Wise State of Plant received from Japan through JICA

Attachment – VI List of Education / Workshop Equipment – CTTI Islamabad

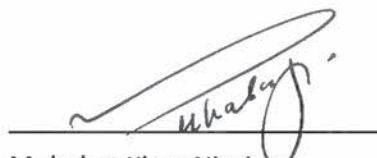
**MINUTES OF MEETINGS**  
**BETWEEN**  
**JICA's DETAILED PLANNING SURVEY TEAM**  
**AND**  
**CONSTRUCTION TECHNOLOGY TRAINING INSTITUTE (CTTI)**  
**ON**  
**THE PROJECT FOR TECHNICAL ASSISTANCE ON**  
**CAPACITY BUILDING IN CTTI**

Japan International Cooperation Agency (hereinafter referred to as "JICA") conducted a series of meetings (hereinafter referred to as "the Meeting") that aims to design the details on "Capacity Building in CTTI" (hereinafter referred to as "the Project"). JICA held the meeting with Construction Technology Training Institute (hereinafter referred to as "CTTI"), and the authorities concerned during the period of December 10<sup>th</sup> to 24<sup>th</sup>, 2013. As a result of the Meeting, JICA and the Pakistani authorities concerned mutually agreed upon the matters referred to in the documents attached hereto.

Islamabad, 24<sup>th</sup> December 2013



Motoo Taki  
Senior Representative  
JICA Pakistan Office  
Japan International Cooperation Agency  
Japan



Mohabat Khan Niazi  
Chief Instructor  
Construction Technology Training Institute  
Ministry of Communications  
Islamic Republic of Pakistan

Witness



Dr. Shahid Karim  
Section Officer, Technical  
Ministry of Communications  
Government of Pakistan



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Section Officer (Japan-I)  
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## **Main Points Discussed**

### **1. TITLE OF THE PROJECT**

Both the Japanese and the Pakistani sides agreed with the title of the project.

### **2. CHANGE FROM OFFICIAL REQUESTPROJECT**

(1) Initially CTTI requested to update the 5 short courses (6 months duration) as follows;

- (a) Operator Course
- (b) Mechanic-II Engine Course
- (c) Mechanic-II Chassis Course
- (d) Mechanic-I Course
- (e) Construction Equipment Service Manual Control

(2) According to CTTI as for above mentioned (d) Mechanic-I Course, only the book of Mechanic-I was prepared previously in 1986. Both Japanese and Pakistani sides agreed that it will be confirmed under the Project whether contents of Mechanic-I are able to be included in Mechanic-II, Engine course and Chassis course (6 months duration each). Both sides also agreed that Mechanic-I course will be target of Project if the contents of Mechanic-I are not able to be included in Mechanic-II courses.

(3) As for (e) Construction Equipment Service Manual Control, CTTI informed JICA that this is the name of a text book covers two courses "Construction Machinery Planning Employment Course" and "Construction Machinery Supervisory Course". Therefore, CTTI requested to JICA to cover the said two courses in the Project. JICA agreed to it.

(4) Based on the above (1) to (3), it was decided target courses in the Project are as follows:

- (a) Operator Course
- (b) Mechanic-II Engine Course
- (c) Mechanic-II Chassis Course
- (d) Construction Machinery Planning Employment Course
- (e) Construction Machinery Supervisory Course
- (f) Mechanic-I Course (if it is not covered in Mechanic-II)

(5) Based on JICA's suggestion on including "Placement support to graduate students of CTTI" in the Project for ensuring high employment rate which is one of the most important aspects of CTTI's operation. CTTI strongly showed its interest, and both sides agreed to include this sub component into the Project.

(6) The contents of curriculum(\*) to be updated in the Project will be reviewed based on its necessity.

3. PC-I

According to the official appraisal procedure of the Government of Pakistan for foreign aid projects, PC-I of the Project will be prepared and forwarded by CTTI through Ministry of Communications to the Planning Commission by March 2014. JICA informed that draft PC-1 will be prepared by consultant and shared with CTTI in the beginning of January. CTTI stated to follow PC-1 preparation and approval process for ensuring timely approval.

4. CTTI requested for affiliation of targeted courses with some Japanese recognized technical institute, company or university. JICA replied that its necessity and the ways how it can be included in the Project will be determined by the experts.

5. RECORD OF DISCUSSION

Both sides agreed that the Record of Discussions (hereinafter referred to as "R/D"), the draft of which is attached hereto, will determine the framework of the Project. After the official approval of PC-I of the Project by CDWP of Pakistan, R/D will be forwarded by JICA to the authorities concerned of the Pakistani side for signing, which is the necessary process for the commencement of the project.

(\* ) Curriculum includes 1) Aim of the course; 2) Specific objectives; 3) Duration; 4) Number of students; 5) Prequalification; 6) Instructors qualification and number of Instructors; 7) Block syllabus; 8) Detail syllabus; 9) Equipment and training aids(training films video DVD/CD); 10) Text book and other related material like shop manuals, operation and maintenance manual etc; 11) Class rooms/workshop and educational aids (multimedia, computers & white board & overhead projectors); and 12) test.

-END -

ANNEX Draft Record of Discussions

ANNEX

**Draft  
RECORD OF DISCUSSIONS  
ON  
THE PROJECT FOR TECHNICAL ASSISTANCE ON  
CAPACITY BUILDING IN CTTI  
IN  
ISLAMIC REPUBLIC OF PAKISTAN**

**AGREED UPON BETWEEN**

**THE AUTHORITIES CONCERNED OF  
THE ISLAMIC REPUBLIC OF PAKISTAN**

**AND**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

Islamabad, , 2014

\_\_\_\_\_  
Mitsuyoshi Kawasaki  
Chief Representative  
JICA Pakistan Office  
Japan International Cooperation Agency  
Japan

Witness

\_\_\_\_\_  
.....  
Director  
Ministry of Communications  
Islamic Republic of Pakistan

\_\_\_\_\_  
.....  
Director  
Construction Technology Training Institute  
Ministry of Communications  
Islamic Republic of Pakistan

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.....  
Joint Secretary (Japan)  
Economic Affairs Division  
Ministry of Economic Affairs and Statistics  
Islamic Republic of Pakistan

Based on the minutes of meetings on the Detailed Planning Survey Mission for the project for Technical Assistance on Capacity Building in CTTI (hereinafter referred to as “the Project”) signed on 24<sup>th</sup> December 2013 between the authorities concerned of Islamic Republic of Pakistan (hereinafter referred to as “Pakistan”) represented by Construction Technical Training Institute (hereinafter referred to as “CTTI”) and Japan International Cooperation Agency (hereinafter referred to as “JICA”), and the PC-I approved on \_\_\_\_\_ by Central Development Working Party of Pakistan, both parties agreed the details of the Project and the main points discussed as described in the Appendix 1 and the Appendix 2 respectively.

Both parties also agreed that CTTI, the counterpart to JICA, will be responsible for the implementation of the Project in cooperation with JICA, coordinate with other relevant organization and ensure that the self-reliant operation of the Project is sustained during and after the implementation period in order to contribute toward social and economic development of Pakistan.

In addition, both parties confirmed the sincere cooperation with each other with a view to contributing toward smooth implementation and enhancing development effect of the past projects to CTTI.

The project will be implemented within the framework of the Agreement on Technical Cooperation signed on 30<sup>th</sup> April 2005 and the Note Verbales to be exchanged between the Government of Japan (hereinafter referred to as “GOJ”) and the Government of Pakistan (hereinafter referred to as “GOP”).

Appendix 1: Project Description

Appendix 2: Main Points Discussed (to be prepared at the time of signing)

## PROJECT DESCRIPTION

### I. BACKGROUND:

Construction Technology Training Institute, known as CTTI, was initially established as Construction Machinery Training Center (CMTC) in 1984 under the grant assistance of Government of Japan, and JICA further assisted to prepare 4 short courses in construction machinery Training Center (CMTC) for 3 months duration each. In 1989, CMTC was inaugurated by the Prime Minister, Benazir Bhutto. In 1992, after the introduction of Diploma classes in Mechanical Technology with Specialization in Construction Machinery, CMTC was upgraded to CMTI. In August 2006, CMTI started 10 skill Development Short Courses for 3 to 6 months along with 3 years Diploma in Auto & Diesel Technology. In the same year, CTTI launched Phase-IV for capacity enhancement to cope with the emergent requirements of Government's Skill Development Program as directed by the Prime Minister Shoukat Aziz during his visit to CTTI. As the training mandate shifted from Construction Machinery to Construction Technology, CMTI was renamed to Construction Technology Training Institute (CTTI).

CTTI is a Construction Technology Training Institute offers technical and vocational trainings with 26 courses (22 short courses and 4 Diploma courses) every year, technical staff capacity is 31 and number of students 784 for Diploma courses and 214 for short courses. Students graduated from CTTI got good employment in multinational companies like Al Wasit (UAE), Schlumberger, DECON, Atlas Honda, Toyota etc.

Since CTTI plays an important role producing young engineers who become a part of technical human resource in construction project/industrial project. There is a need to update the curriculum, textbooks and courses which are taught in CTTI according to international standards.

The Government of Japan received the official request from EAD in 2012 for Technical Cooperation for Capacity Building in CTTI to update the curriculum and textbooks which have not been changed since 1990. The project was officially approved by the Government of Japan in February 2013.

### II. OUTLINE OF THE PROJECT

#### Details of the Project

Details of the Project are described in the Logical Framework (Project Design Matrix: PDM) (Annex 1) and the tentative Plan of Operation (Annex 2).

#### 1. IMPLEMENTATION STRUCTURE

The Project organization chart is given in the Annex 3. The roles and assignments of relevant organizations are as follows;

##### (1) CTTI

[Administrative Personnel]

Project Director (Chief Instructor), who will be responsible for overall administration and implementation of the project

[Counterpart Personnel]

Project Coordinator, who will be responsible for overall coordination of the project



(2) JICA EXPERTS

The JICA experts will give necessary technical guidance, advice and recommendations to CTTI on any matters pertaining to the implementation of the Project.

(3) JOINT COORDINATION COMMITTEE

Joint Coordination Committee (hereinafter referred to as "JCC") will be established in order to facilitate inter-organizational coordination. JCC will be held on quarterly basis and whenever deems it necessary. JCC will approve an annual work plan, review overall progress, conduct monitoring and evaluation of the project, and exchange opinions on major issues that arise during the implementation of the Project. A list of proposed member of JCC is show in Annex 4.

(4) WORKING GROUP for each course and placement support activities

Working group will be established in order to mainly work for each activity with support of Japanese experts. A list of proposed member of working group is shown in Annex 5.

Working group will be composed of head of departments (civil, mechanical, general) along with one instructor and sub-instructor from each department to support Japanese Experts.

2. PROJECT SITES AND BENEFICIARIES

The main activities of the project will be implemented at CTTI, Islamabad  
Beneficiaries of the Project will be instructors of the targeted courses, CTTI staff who are responsible for placement activities, and CTTI students.

3. DURATION

The duration of the Project will be Two (2) years. The tentative plan of Operation is shown in Annex 2.

4. TRAINING OF CTTI PERSONNEL IN JAPAN

JICA will receive CTTI Personnel connected with the Project for technical training in Japan.

III. EVALUATION

JICA and CTTI will jointly conduct the terminal evaluation upon completion.

IV. PROMOTION OF PUBLIC SUPPORT

For the purpose of promoting support for the Project, CTTI will take appropriate measures to make the Project widely known to the people of Pakistan.

V. MUTUAL CONSULTATION

JICA and CTTI will consult with each other whenever any major issues arise in the course of Project implementation.

VI. AMENDMENTS

The record of discussion may be amended by the minutes of the meetings between JICA and CTTI. The minutes of meetings will be signed by authorized persons of each side who may be different from the signers of the record of discussion.

- ANNEX 1: Logical Framework (Project Design Matrix: PDM)
- ANNEX 2: Tentative Plan of Operation
- ANNEX 3: Project Organization Chart
- ANNEX 4: A list of proposed members of joint coordination committee
- ANNEX 5: A list of proposed member of working group
- ANNEX 6: Ideas of Placement Support Activities

**PROJECT Design Matrix**

PDM Ver.0 (Drafted: 24th December 2013)

Project Name: The Project for Capacity Building of CTII

Target groups: Construction Technology Training Institute (CTII), Ministry of Communication

Direct: Faculty &amp; students of CTII (Construction Technology Training Institute), Islamabad

Indirect: Local and multinational construction companies in particular.

Project duration (tentative): July 2014 to June 2016 (2 years)

Narrative Summary	Verifiable Indicators	Means of Verification	Important Assumptions
<b>Overall Goal</b>  Provide qualified technical human resource to major industries by CTII	1. Number of students certified in targeted courses 2. Number of graduates employed	1. Database of students certified from CTII 2. Database of students employed in different industries 3. CTII's Annual Reports	<ul style="list-style-type: none"> <li>Policy and priority areas of the Pakistan Government on human resource development are not changed</li> </ul>
<b>Project Purpose</b>  Provide quality technical education and placement support at CTII based on the latest industrial needs	1. Number of firms consider the performance of graduates from CTII is higher than previous after introduction of new curriculum 2. Number of graduates of CTII satisfied with the new curriculum 3. Passing percentage of students in targeted courses	1.1 Results of employers' satisfaction survey (to be conducted) 2.1 Results of graduates' satisfaction survey (to be conducted) 3.1 Result of exam of targeted courses	<ul style="list-style-type: none"> <li>Economic development and labor demand of technical personnel for different industries will be continued</li> </ul>
<b>Outputs</b> 1. The curriculum (*) of targeted courses are updated.	1.1 Updated curriculum for targeted courses is introduced	1.1 Revised curriculum	<ul style="list-style-type: none"> <li>CTII will not change its policy and plan</li> </ul>

**PROJECT Design Matrix**

<p>2. Trained instructors are developed who are able to conduct new targeted courses in line with the updated curriculum.</p> <p>3. Placement support to CTTI strengthened.</p>	<p>1.2 Usage of necessary equipment for conducting updated curriculum for targeted courses in trial lessons</p> <p>2.1 Sufficient number of trained instructors of CTTI who can train students in the targeted courses in line with the updated curriculum</p> <p>3.1 Number of students get career support services at CTTI</p> <p>3.2 Number of students satisfied with career support system at CTTI</p> <p>3.3 Number of employers satisfied with career support system at CTTI</p>	<p>1.2 List and maintenance records of equipment used in targeted courses</p> <p>2.1 List of instructors of the targeted courses with their qualification</p> <p>2.2 Reports on trainers' training</p> <p>3.1 Counseling record</p> <p>3.2 Result of questionnaire to students</p> <p>3.3 Result of questionnaire to firms</p>	<ul style="list-style-type: none"> <li>• Trained staff will remain working for CTTI</li> </ul>
<p><b>Activities</b></p> <p><b>Output 1</b></p> <p>1.1 Conduct needs assessment of industry market by working group</p> <p>1.2 Review and analysis of existing curriculum by working group</p> <p>1.3 Revise and finalize draft curriculum by working group</p> <p>1.4 Arrange seminars/workshop inviting construction industrial companies, instructors and students for their opinion by working group</p> <p>1.5 Review the final curriculum by working group</p> <p>1.6 Approve final curriculum by Board of CTTI</p> <p>1.7 Procure equipment by JICA and install them by</p>	<p style="text-align: center;"><b>Inputs</b></p> <p>(Japan side)</p> <ol style="list-style-type: none"> <li>1. Japanese Experts Mechanical Engineer for Engine Mechanical Engineer for Chassis Placement Support</li> <li>2. Necessary materials and equipment for conducting updated curriculum and targeted courses</li> <li>3. Counterparts study visits and training in Japan</li> <li>4. Technical support to CTTI to install the equipment</li> </ol> <p>(Pakistan side)</p> <ol style="list-style-type: none"> <li>1. Assignment of appropriate counterparts for implementation of project activities</li> <li>2. Salaries and other allowances (if any) for CTTI staff to be assigned as</li> </ol>		<p>Pre-Conditions:</p> <ul style="list-style-type: none"> <li>• There will be no significant incidents (e.g. natural disaster, large scale of military operations, etc.) in Islamabad/Rawalpindi which may hinder the project implementation</li> </ul>

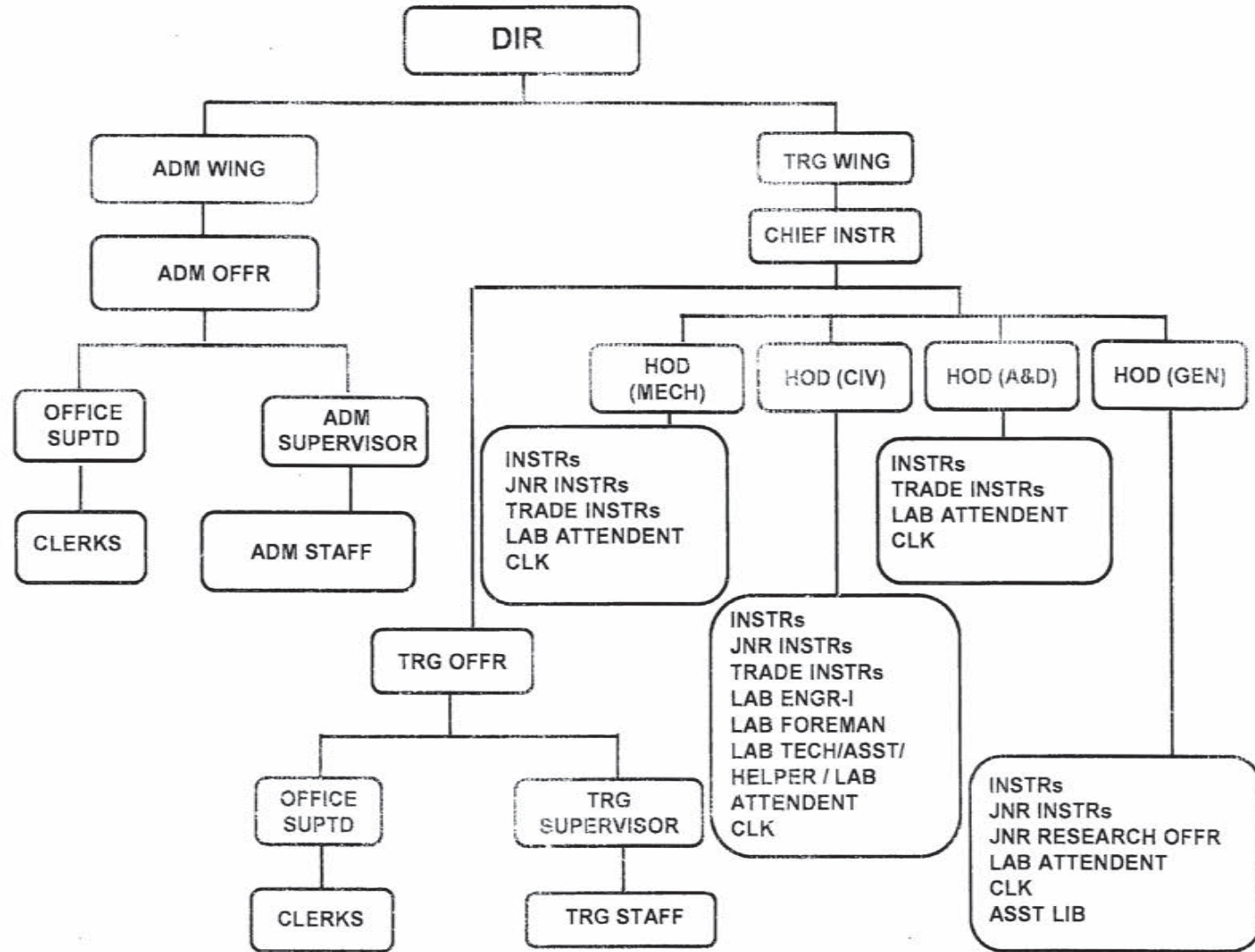
**PROJECT Design Matrix**

<p>CTTI and JICA</p> <p><b>Output 2</b></p> <p>2.1 Conduct training for instructors related to above targeted courses by Japanese experts in CTTI</p> <p>2.2 Conduct trial lessons by trained instructors.</p> <p>2.3 Trial lessons are evaluated by Japanese experts.</p> <p>2.4 Share feedback with instructors and re-educate instructors by Japanese experts.</p> <p><b>Output 3</b></p> <p>3.1 Conduct basic survey for current placement support by guidance and counseling cell, CTTI.</p> <p>3.2 Develop action plan for strengthening the placement support system for CTTI by guidance and counseling cell, CTTI..</p> <p>3.3 Implement action plan by guidance and counseling cell, CTTI.</p> <p>3.4 Monitor the progress of action plan by JCC</p> <p>3.5 Institutionalize action plan into CTTI's guidance and counseling cell's routine operation</p>	<p>counterparts</p> <p>3. Provision of office space for project staff &amp; activities</p> <p>4. Sharing of information/data necessary for project implementation</p> <p>5. Inter departmental coordination within government setup, where necessary</p> <p>6. Custom clearance and installation expenses for equipment if any</p> <p>7. Operational and maintenance expenses for the equipment</p> <p>8. Other necessary local expenses of the project</p>	
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(\*) Curriculum includes 1) Aim of the course; 2) Specific objectives; 3) Duration; 4) Number of students; 5) Prequalification; 6) Instructors qualification and number of Instructors; 7) Block syllabus; 8) Detail syllabus; 9) Equipment and training aids(training films video DVD/CD); 10) Text book and other related material like shop manuals, operation and maintenance manual etc; 11) Class rooms/workshop and educational aids (multimedia, computers & white board & overhead projectors); and 12) test.



# ORG CHART - CTTI



ANNEX 3

**List of JCC (Joint Coordination Committee Members)**

1. Project Director (Chief Instructor)
2. Heads of Departments of targeted courses
3. Instructors of targeted courses
4. Sub-Instructor of targeted courses
5. Representative from JICA Pakistan Office
6. JICA Experts



**List of Workgroup Members**

1. Head of Department of each targeted courses
2. Instructor of each targeted courses\*
3. Sub instructor of each targeted courses\*
4. Japanese Experts

[\*Instructors and sub-instructors will be selected by CTTI]

**Placement Support Activities:**

1. Establish database for graduate students from CTTI employed in industry/firms
2. Establish database of firms provide job opportunity for graduate students
3. Carrying out counseling of students by CTTI
4. Data collection from construction industry about needs assessment
5. Conduct collaboration activities with industries
6. Job exhibition/career day held by CTTI

PDM Ver.0 (Drafted: 24th December 2013)

Project Name: The Project for Capacity Building of CTTI

Target groups: Construction Technology Training Institute (CTTI), Ministry of Communication

Direct: Faculty & students of CTTI (Construction Technology Training Institute), Islamabad

Indirect: Local and multinational construction companies in particular.

Project duration (tentative): July 2014 to June 2016 (2 years)

**Attachment – III**

Narrative Summary	Verifiable Indicators	Means of Verification	Important Assumptions
<p><b>Overall Goal</b></p> <p>Provide qualified technical human resource to major industries by CTTI</p>	<ol style="list-style-type: none"> <li>1. Number of students certified in targeted courses</li> <li>2. Number of graduates employed</li> </ol>	<ol style="list-style-type: none"> <li>1. Database of students certified from CTTI</li> <li>2. Database of students employed in different industries</li> <li>3. CTTI's Annual Reports</li> </ol>	<ul style="list-style-type: none"> <li>• Policy and priority areas of the Pakistan Government on human resource development are not changed</li> </ul>
<p><b>Project Purpose</b></p> <p>Provide quality technical education and placement support at CTTI based on the latest industrial needs</p>	<ol style="list-style-type: none"> <li>1. Number of firms consider the performance of graduates from CTTI is higher than previous after introduction of new curriculum</li> <li>2. Number of graduates of CTTI satisfied with the new curriculum</li> <li>3. Passing percentage of students in targeted courses</li> </ol>	<ol style="list-style-type: none"> <li>1.1 Results of employers' satisfaction survey (to be conducted)</li> <li>2.1 Results of graduates' satisfaction survey (to be conducted)</li> <li>3.1 Result of exam of targeted courses</li> </ol>	<ul style="list-style-type: none"> <li>• Economic development and labor demand of technical personnel for different industries will be continued</li> </ul>
<p><b>Outputs</b></p> <p>1. The curriculum (*) of targeted courses are</p>	<ol style="list-style-type: none"> <li>1.1 Updated curriculum for</li> </ol>	<ol style="list-style-type: none"> <li>1.1 Revised curriculum</li> </ol>	<ul style="list-style-type: none"> <li>• CTTI will not change its policy</li> </ul>

<p>updated.</p> <p>2. Trained instructors are developed who are able to conduct new targeted courses in line with the updated curriculum.</p> <p>3. Placement support to CTTI strengthened.</p>	<p>targeted courses is introduced</p> <p>1.2 Usage of necessary equipment for conducting updated curriculum for targeted courses in trial lessons</p> <p>2.1 Sufficient number of trained instructors of CTTI who can train students in the targeted courses in line with the updated curriculum</p> <p>3.1 Number of students get career support services at CTTI</p> <p>3.2 Number of students satisfied with career support system at CTTI</p> <p>3.3 Number of employers satisfied with career support system at CTTI</p>	<p>1.2 List and maintenance records of equipment used in targeted courses</p> <p>2.1 List of instructors of the targeted courses with their qualification</p> <p>2.2 Reports on trainers' training</p> <p>3.1 Counseling record</p> <p>3.2 Result of questionnaire to students</p> <p>3.3 Result of questionnaire to firms</p>	<p>and plan</p> <ul style="list-style-type: none"> <li>• Trained staff will remain working for CTTI</li> </ul>
<p><b>Activities</b></p> <p><b>Output 1</b></p> <p>1.1 Conduct needs assessment of industry market by working group</p> <p>1.2 Review and analysis of existing curriculum by working group</p> <p>1.3 Revise and finalize draft curriculum by working group</p> <p>1.4 Arrange seminars/workshop inviting construction industrial companies, instructors and students for their opinion by working group</p> <p>1.5 Review the final curriculum by working group</p> <p>1.6 Approve final curriculum by Board of CTTI</p>	<p style="text-align: center;"><b>Inputs</b></p> <p>(Japan side)</p> <ol style="list-style-type: none"> <li>1. Japanese Experts Mechanical Engineer for Engine Mechanical Engineer for Chassis Placement Support</li> <li>2. Necessary materials and equipment for conducting updated curriculum and targeted courses</li> <li>3. Counterparts study visits and training in Japan</li> <li>4. Technical support CTTI to install the equipment</li> </ol> <p>(Pakistan side)</p> <ol style="list-style-type: none"> <li>1. Assignment of appropriate counterparts for implementation of project activities</li> </ol>		<p>Pre-Conditions:</p> <ul style="list-style-type: none"> <li>• There will be no significant incidents (e.g. natural disaster, large scale of military operations, etc.) in Islamabad/Rawalpindi which may hinder the project implementation</li> </ul>

<p>1.7 Procure equipment by JICA and install them by CTTI and JICA</p> <p><b>Output 2</b></p> <p>2.1 Conduct training for instructors related to above targeted courses by Japanese experts in CTTI</p> <p>2.2 Conduct trial lessons by trained instructors.</p> <p>2.3 Trial lessons are evaluated by Japanese experts.</p> <p>2.4 Share feedback with instructors and re-educate instructors by Japanese experts.</p> <p><b>Output 2</b></p> <p>3.1 Conduct basic survey for current placement support by guidance and counseling cell, CTTI.</p> <p>3.2 Develop action plan for strengthening the placement support system for CTTI by guidance and counseling cell, CTTI..</p> <p>3.3 Implement action plan by guidance and counseling cell, CTTI.</p> <p>3.4 Monitor the progress of action plan by JCC</p> <p>3.5 Institutionalize action plan into CTTI's guidance and counseling cell's routine operation</p>	<p>2. Salaries and other allowances (if any) for CTTI staff to be assigned as counterparts</p> <p>3. Provision of office space for project staff &amp; activities</p> <p>4. Sharing of information/data necessary for project implementation</p> <p>5. Inter departmental coordination within government setup, where necessary</p> <p>6. Custom clearance and installation expenses for equipment if any</p> <p>7. Operational and maintenance expenses for the equipment</p> <p>8. Other necessary local expenses of the project</p>	
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(\*) Curriculum includes 1) Aim of the course; 2) Specific objectives; 3) Duration; 4) Number of students; 5) Prequalification; 6) Instructors qualification and number of Instructors; 7) Block syllabus; 8) Detail syllabus; 9) Equipment and training aids(training films video DVD/CD); 10) Text book and other related material like shop manuals, operation and maintenance manual etc; 11) Class rooms/workshop and educational aids (multimedia, computers & white board & overhead projectors); and 12) test.

## List of Educational and Workshop Equipment to Be Updated

## Attachment IV

No.	Item	Qty	Course	Reason(s)	Priority	Rough estimate	
						Price (Yen FOB Yokohama)	CIP CTTI
1	Common Rail Type Engine Simulator	1	Engine	Essential equipment for providing theoretical and practical training in the latest engine technologies.	A	No manufacturing	
2	Cutaway Model Board of Common Rail Type Fuel System	1				1,000,000	
3	Engine Assembly SA6D125E-3 for D85EX-15	3				30,000,000	
4	Cutaway Model of SA6D125E-3 for D85EX-15	1				13,000,000	
5	Mechatronics System Board for Engine	1				No manufacturing	
6	Mechatronics System Simulator	1				No manufacturing	
7	Diagnostic Tools for Engine	1				1,400,000	
8	Training Aid (DVD, etc.) for Engine	1				1,000,000	
9	Mechatronics System Board for Chassis	1	Chassis	Essential equipment for providing theoretical and practical training in the latest chassis technologies. Key points: Mechatronics System (Chassis) and Hydraulic System (Chassis)	A	No manufacturing	
10	Cutaway Model of Transmission for D85EX-15	1				9,900,000	
11	Cutaway Model of Transmission Control Valve	1				No manufacturing	
12	Transmission Assembly D85EX-15	3				22,500,000	
13	Hydraulic System Board	1				No manufacturing	
14	Hydraulic Pump Assembly PC200-7	3				8,400,000	
15	Hydraulic Control Valve Assembly PC200-7	3				6,600,000	
16	Diagnostic Tools for Chassis	1				1,800,000	
17	Training Aid (DVD, etc.) for Chassis	1				1,000,000	
18	Steering Control Valve Assembly	3				4,500,000	
	<b>Total for Priority A</b>					<b>101,100,000</b>	<b>111,210,000</b>
19	Fuel Pump Test Stand (Common Rail)	1	Engine	Important equipment for confirming the final performance of components	B	40,000,000	
20	Injector Test Stand (Common Rail)	1				15,000,000	
21	Dynamometer Brake Unit, Control Panel	1				8,000,000	
22	Hydraulic Component Universal Tester Flow Meter	1	Chassis			405,000	
	<b>Total for Priority B</b>					<b>63,405,000</b>	<b>69,745,500</b>
23	Timing Fixture (for CUMMINS)	1	Engine	General equipment that is used for assembly, disassembly and testing. The CTTI's equipment is	C	170,000	
24	Plug Cleaner and Tester	1				No manufacturing	
25	Eccentric Valve Seat Grinder	1				1,300,000	
26	Hydraulic Test Gauge Set	1				Include in Item 16	

27	Portable Hydraulic Flow Tester	1	Chassis	outdated and/or broken, so it needs to be replaced.		Include in Item 16	
28	Cylinder Gauge, 150/250 mm	2				300,000	
29	Torque Wrench, 12/45/180/700/1,000 N·m	6	Engine and Chassis			2,400,000	
30	Thermistor Kit	2				Include in Item 7	
31	Driving Simulator Bulldozer	1	Operator	Equipment that facilitates operator training.		No manufacturing	
32	Driving Simulator Wheel Loader	1				No manufacturing	
33	Driving Simulator Excavator	1				No manufacturing	
34	Driving Simulator Truck Crane	1				No manufacturing	
	<b>Total for Priority C</b>					<b>2,023,000</b>	<b>2,225,300</b>
<b>Grand total</b>						<b>166,528,000</b>	<b>183,180,800</b>

Attachment V

**Chronological Breakdown of the State of Equipment Received from Japan through JICA**

No.	Year of manufacture	Serial No.	Nomenclature	Model	Country of manufacture	Hours/ distance used	Condition
1	1986	28283	Komatsu Dozer	D-155 A-1	Japan	3,027 h	Satisfactory
2		30884	Komatsu Dozer	D-85 A-18	Japan	3,445 h	Satisfactory
3		45294	Komatsu Dozer	D-65 A-8	Japan	2,400 h	Satisfactory
4		80588	Komatsu Dozer	D-50 A-17	Japan	2,830 h	Satisfactory
5		45160	Komatsu Shovel Dozer	D-65 S-8	Japan	1,686 h	Satisfactory
6		80114	Komatsu Shovel Dozer	D-53 S-17	Japan	2,770 h	Satisfactory
7		10203	Wheel Loader	WA-450	Japan	3,618 h	Satisfactory
8		10326	Wheel Loader	WA-200-1	Japan	4,210 h	Satisfactory
9		54104	Motor Grader	DG-605A	Japan	4,696 h	Satisfactory
10		2G-000186	Motor Grader	MG-200	Japan	3,628 h	Satisfactory
11		10033	Komatsu Road Stabilizer	GS-360	Japan	1,565 h	Satisfactory
12		24856	Komatsu Excavator	PC-200-3	Japan	2,937 h	Satisfactory
13		01769	Komatsu Excavator	PC-150	Japan	700 h	Satisfactory
14		12603	Komatsu Excavator	PC-30	Japan	547 h	Satisfactory
15		2138	Komatsu Motor Scraper	WS-16S	Japan	1,151 h	Out of action due to tires
16		2139	Komatsu Motor Scraper	WS-16S	Japan	1,369 h	
17		148543	Komatsu Forklift	Komatsu	Japan	792 h	Satisfactory
18		3518003	Hanta Asphalt Distributor	DS-30	Japan	2,100 km	Satisfactory
19		1176	Komatsu Dump Truck	HD-200	Japan	1,444 km	Satisfactory
20		2009546	Isuzu Dump Truck	6-RBI	Japan	1,600 km	Satisfactory
21		4231	Air Compressor	EC-35Z-1	Japan	535 h	Satisfactory
22		-	Air Compressor (Used)	EC35VS	Japan	-	Satisfactory
23		-	Generator Set (Used)	EG-15S-2	Japan	-	Satisfactory
24		3260	Komatsu Generator Set	EG-15-3	Japan	850 h	Satisfactory
25		2037	Komatsu Generator	-	Japan	1,575 h	Satisfactory
26		10145	Komatsu Vibration Roller	JV-100	Japan	2,200 h	Satisfactory
27		30057	Sakai Vibration Roller	SV-70	Japan	1,700 h	Satisfactory
28		41542	Pneumatic Tired Roller	TS-150	Japan	1,291 h	Satisfactory
29		1030	Niigata Asphalt Finisher	NF-220	Japan	817 h	Satisfactory
30		211668	Tadano Crane (10 Ton)	TS-100L	Japan	3,500 h	Satisfactory
31		211669	Tadano Crane (10 Ton)	TS-100L	Japan	3,400 h	Satisfactory
32		1993	765488	Denyo Generator	20 KVA	Japan	1,912 h



No.	Year of manufacture	Serial No.	Nomenclature	Model	Country of manufacture	Hours/ distance used	Condition
33	1997	60501	Komatsu Dozer	D-155 A-3	Japan	1,305 h	Satisfactory
33	1997	60501	Komatsu Dozer	D-155 A-3	Japan	1,305 h	Satisfactory
34		31474	Komatsu Pipe Layer	D-155 C-1	Japan	540 h	Satisfactory
35		36993	Komatsu Dozer	D-85 A-21	Japan	1,593 h	Satisfactory
36		36994	Komatsu Dozer	D-85 A-21	Japan	1,620 h	Satisfactory
37		36995	Komatsu Dozer	D-85 A-21	Japan	1,317 h	Satisfactory
38		36996	Komatsu Dozer	D-85 A-21	Japan	1,422 h	Satisfactory
39		36997	Komatsu Dozer	D-85 A-21	Japan	1,534 h	Satisfactory
40		00216	Wheel Loader	928F	Japan	1,825 h	Satisfactory
41		03099	Wheel Loader	966F	Japan	2,725 h	Satisfactory
42		03100	Wheel Loader	966F	Japan	1,590 h	Satisfactory
43		000591	Motor Grader	MG-430	Japan	1,482 h	Satisfactory
44		00756	Motor Grader	MG-330	Japan	2,930 h	Satisfactory
45		00757	Motor Grader	MG-330	Japan	2,578 h	Satisfactory
46		29914	Komatsu Excavator	PC-30	Japan	265 h	Satisfactory
47		54648	Komatsu Excavator	PC-120-6	Japan	2,632 h	Satisfactory
48		54649	Komatsu Excavator	PC-120-6	Japan	2,947 h	Satisfactory
49		95505	Komatsu Excavator Pipe Drive	PC-200-6	Japan	422 h	Satisfactory
50		95506	Komatsu Excavator	PC-200	Japan	3,331 h	Satisfactory
51		95507	Komatsu Excavator	PC-200	Japan	3,540 h	Satisfactory
52		95508	Komatsu Excavator Mobile Hammer	PC-200-6	Japan	601 h	Satisfactory
53		95509	Komatsu Excavator Super Long Boom	PC-200-6	Japan	924 h	Satisfactory
54		00138	Komatsu Excavator Power Splitter	322-B	Japan	435 h	Satisfactory
55		117696T	Nissan Dump Truck	Nissan	Japan	546 km	Satisfactory
56		2264	Komatsu Dump Truck	HD-205-3	Japan	570 km	Satisfactory
57		4180062	Air Compressor	PDS-125S	Japan	175 h	Satisfactory
58		10147	Air Compressor	PDS-125S	Japan	195 h	Satisfactory
59		227593	Air Compressor	3LD1	Japan	300 h	Satisfactory
60		715450	Air Compressor	3KR2	Japan	225 h	Satisfactory
61		2324759	Generator Set	HP-6500	Japan	1,200 h	Satisfactory
62		55006	Pneumatic Tired Roller	CP-201	Japan	737 h	Satisfactory
63		58318166	Vibratory Roller	CA-251	Japan	590 h	Satisfactory
64		9611201	Dynapac/Kobata Roller	LP-650	Japan	324 h	Satisfactory
65		10469	Niigata Asphalt Finisher	NF-6 WVDMZ	Japan	1,120 h	Satisfactory

No.	Year of manufacture	Serial No.	Nomenclature	Model	Country of manufacture	Hours/ distance used	Condition
66		SAC-9H	Automatic Crub	-	Japan	75 h	Satisfactory
67	1997	00300	Landfill Compactor	816-F	Japan	254 h	Satisfactory
68		560357	Tadano Crane (30 Ton)	TR-300 EX	Japan	3,240 h	Satisfactory
69	1998	03101	Wheel Loader	966F	Japan	2,230 h	Satisfactory
70	2007	10620	Komatsu Dozer	D-85 EX15	Japan	324 h	Satisfactory
71		10621	Komatsu Dozer	D-85 EX15	Japan	403 h	Satisfactory
72		10633	Komatsu Dozer	D-85 EX15	Japan	606 h	Satisfactory
73		61608	Wheel Loader	WA-320-5	Japan	253 h	Satisfactory
74		61610	Wheel Loader	WA-320-5	Japan	345 h	Satisfactory
75		61611	Wheel Loader	WA-320-5	Japan	425 h	Satisfactory
76		10881	Komatsu Motor Grader	GD611 A1	Japan	709 h	Satisfactory
77		257244	Komatsu Excavator	PC-200-7	Japan	610 h	Satisfactory
78		257245	Komatsu Excavator	PC-200-7	Japan	735 h	Satisfactory
79		257246	Komatsu Excavator	PC-200-7	Japan	690 h	Satisfactory
80		01860	New Holland MH Excavator	MH City	Japan	234 h	Satisfactory
81		01864	New Holland MH Excavator	MH City	Japan	325 h	Satisfactory
82		3806393	Denyo Generator Set	20 KVA	Japan	1,300 h	Satisfactory
83		10390	Kobalco Crane (25 Ton)	RK250-6	Japan	145 h	Satisfactory
84	2013	005597	Wheel Loader	ZW 250	Japan	-	Good
85		005599	Wheel Loader	ZW 250	Japan	-	Good
86		163867	Excavator	PC-ZX350H-3 G	Japan	-	Good
87		163963	Excavator	PC-ZX350H-3 G	Japan	-	Good
88		322156	Komatsu Forklift	Komatsu	Japan	-	Good
89		322157	Komatsu Forklift	Komatsu	Japan	-	Good
90		322158	Komatsu Forklift	Komatsu	Japan	-	Good
91		30258	Engine Cart	V-3	Japan	-	Good

Source: CTTI

<b>Attachment VI</b>
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**The Detailed Planning Survey on Capacity Building in CTTI****List of Educational and Workshop Equipment at the CTTI, Islamabad**

No.	Nomenclature	A/U	Qty Held	Remarks
<b>Engine Shop (Mechanical Department)</b>				
1	Cutaway Model of Gasoline Engine	No.	1	Satisfactory
2	Mobile Work Bench	Set	6	Satisfactory
3	Tools for Mechanics	No.	19	50% of tools OK
4	Air Hose Reel	"	2	Satisfactory
5	Tool Cabinet	"	4	Repair required
6	Forklift (FD-25)	"	2	Satisfactory
7	Oil Lubricator Engine	"	2	Satisfactory
8	Oil Lubricator for Hydraulic Oil	"	2	Satisfactory
9	Drum Porter	"	1	Satisfactory
10	Valve Refacer	"	2	Satisfactory
11	Valve Spring Tester	"	1	Satisfactory
12	Connecting Rod Aligner	"	1	Satisfactory
13	Eccentric Valve Seat Grinder	"	1	Defective
14	Bench Drill Press	"	1	Satisfactory
15	Engine Stand	"	1	Satisfactory
16	Cylinder Head Test Stand	"	1	Satisfactory
17	Parts Cleaner (Shaking Type)	Set	1	Satisfactory
18	Parts Try. Set	"	1	Satisfactory
19	Engine Repair Tool	No.	1	Satisfactory
20	Engine Assembly (NT855)	"	3	Old model
21	Engine Assembly (6D125)	"	4	Old Model
22	Gasoline Engine (4ZC1)	"	2	Satisfactory
23	Engine Assembly (NT855)	"	1	Old model
24	Hydraulic Component Universal Tester	Set	1	Old model/flow meter not working
25	Electric Chain Block (1 Ton)	"	1	Satisfactory
26	Unit Repair Stand	"	1	Satisfactory
27	Air Compressor	"	1	Satisfactory
<b>Diesel/Electrical Shop (Mechanical Department)</b>				
28	Nozzle Tester	No.	1	Satisfactory
29	Starter Generator Bench	"	1	Satisfactory
30	Motor Puller Set	"	1	Satisfactory
31	Fuel Pump and Nozzle Tool Set	"	1	Satisfactory
32	PT Pump Test Stand	"	1	Defective
33	Diesel Fuel Injection Pump Tester	"	1	Defective
34	Electrical System Board for Dozers	"	1	Old model/defective
35	Electrical System for Dump Trucks	"	1	Old model/defective
36	Track Roller	"	1	Worn out
37	Fuel Injection Pump	"	1	Defective
38	Fuel Pump (PT)	"	1	Defective
39	Injector (PT)	"	1	Defective
40	Water Pump	"	1	Defective
41	Fuel Flow Oil Filter	"	1	Defective
42	Turbo Charger	"	1	Defective
43	Starting Motor	"	1	Satisfactory
44	Alternator	"	1	Satisfactory
45	2-Cylinder Engine Model	"	1	Satisfactory
46	4-Cylinder Engine Model	"	1	Satisfactory
47	Cutaway Model of Hydraulic Oil Filter	No.	1	Defective
48	Cutaway Model of Pre-Cleaner	"	1	Satisfactory
49	Cutaway Model of Air Cleaner	"	1	Satisfactory
50	Cutaway Model of Muffler	"	1	Satisfactory
51	Cutaway Model of After-Cooler	"	1	Satisfactory

**The Detailed Planning Survey on Capacity Building in CTTI**

No.	Nomenclature	A/U	Qty Held	Remarks
52	Cutaway Model of Turbo Charger	"	1	Satisfactory
53	Plug Cleaner and Tester	"	1	Satisfactory
54	Diesel Fuel Pump Test Stand	"	1	Defective
55	PT Pump Test Stand	"	1	Defective
56	Injector Tester	"	1	Defective
57	Fuel Feed Pump Tester	"	1	Defective
58	Cutaway Model of Starter Motor	"	1	Satisfactory
59	Cutaway Model of Alternator	"	1	Satisfactory
60	Electrical System Board for Dozers	"	1	Old model
<b>Chassis Shop (Mechanical Department)</b>				
61	Tire Service Tool Set	Set	1	Defective
62	Cutaway Model of Swing Motor	No.	2	Satisfactory
63	Transmission Control Valve Model	"	2	Defective
64	Cutaway Model of Hydraulic Tank	"	1	Satisfactory
65	Hydraulic Cutaway Model	"	1	Satisfactory
66	Cutaway Model of Torque Converter	"	1	Satisfactory
67	Cutaway Model of Steering System (Truck)	"	1	Satisfactory
68	Cutaway Model of Steering Assembly	"	1	Satisfactory
69	Cutaway Model of Universal Joint	"	1	Satisfactory
70	Transmission Model	"	1	Defective
71	Differential Model	"	1	Defective
72	Front Alignment Model	"	1	Defective
73	Turning Radius Model	"	1	Defective
74	Wheel Balance Model	"	1	Defective
75	Cutaway Model of Hydraulic Pump for PC-200	"	1	OLLS defective
76	Transmission Plastic Model	"	1	Defective
77	Plastic Model of Torque Converter	"	1	Defective
78	Plastic Model of Planetary Gear	"	1	Defective
79	Automobile Chassis Model	"	1	Defective
80	Sling Chain Kit	"	2	Satisfactory
81	Parts Cleaner	"	1	Satisfactory
82	Hydraulic Garage Jack	"	2	Satisfactory
83	Transmission Jack	"	1	Satisfactory
84	Chassis Lubricator for Grease	"	2	Satisfactory
85	Hand Truck	"	2	Satisfactory
86	Piston Pump (PC-200)	"	1	Satisfactory
87	Hydraulic Cylinder Service Stand	"	1	Satisfactory
88	Jib Crane (Wall Type)	"	1	Satisfactory
89	Torque Converter Assembly	"	4	Satisfactory
90	Torque Flow Transmission (D-65)	"	4	Old model
91	Transmission (WA-200)	"	2	Old model
92	Transmission (D-50)	"	4	Old model
93	Hydraulic Pump	"	10	Defective
94	Hydraulic Pump Assembly for Transmission	"	4	Defective
95	Hydraulic Control Valve with Tank of Dozer	"	4	Satisfactory
<b>No.</b>	<b>Nomenclature</b>	<b>A/U</b>	<b>Qty Held</b>	<b>Remarks</b>
96	Steering Control Valve of Dozer	No.	4	Defective
97	Hydraulic Pump (PC-150)	"	2	Defective
98	Hydraulic Motor (PC-150)	"	2	Defective
99	Hydraulic Cylinder	"	6	Defective x 3

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No.	Nomenclature	A/U	Qty Held	Remarks
100	Hydraulic System Board	"	1	Defective
101	Air Brake System Board	"	1	Defective
102	Differential Assembly Isuzu Dumper	"	4	Old model
103	Transmission for Dump Truck	"	2	Old model
104	Air Compressor	"	1	Satisfactory
105	Hydraulic Pump	"	1	Satisfactory
106	Hydraulic Control Valve	"	1	Satisfactory
107	Cutaway Model of Brake Booster (GD-600)	"	1	Defective
108	Mini Plastic Model of Planetary Transmission	"	1	Defective
109	Torque Convertor	"	1	Satisfactory
110	Torque Flow Transmission	"	1	Satisfactory
111	Transmission Control Valve	"	2	Satisfactory
112	Cutaway Model of Steering Clutch Dozer	"	1	Satisfactory
113	Cutaway Model of Steering Valve for WA-200	"	1	Satisfactory
114	Cutaway Model of Hydraulic Tank and Valve	"	1	Satisfactory
115	Swing Motor PC-200	"	1	Satisfactory
116	Cutaway Model of Propeller Shaft (Hollow Type)	"	1	Satisfactory
117	Cutaway Model of Propeller Shaft (Soil Type)	"	1	Satisfactory
118	Hydraulic Tire Removing Tool	"	1	Satisfactory
<b>Engine Test Room (Mechanical Department)</b>				
119	Fuel Consumption Meter	No.	1	Defective
120	Engine Dynamometer	"	1	Defective
121	Silicon Quick Charger	"	1	Satisfactory
<b>Machine Shop – I (Mechanical Department)</b>				
122	Portable Hydraulic Jack	No.	1	Satisfactory
123	Torque Wrench	"	1	Defective
124	Torque Wrench	"	1	Defective
125	Torque Wrench	"	1	Defective
126	Torque Wrench	"	1	Defective

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No.	Nomenclature	A/U	Qty Held	Remarks
127	Torque Wrench	"	1	Defective
128	Ratchet Head	"	1	Defective
129	Ratchet Head	"	1	Defective
130	Ratchet Head	"	1	Defective
131	Ratchet Head	"	1	Defective
132	Digital Thermometer	"	1	Defective
133	Bench Electric Grinder	"	1	Satisfactory
134	Hydraulic Press (35 Ton)	Unit	1	Satisfactory
135	Crankshaft Grinder	"	1	Satisfactory
136	Honing Machine	"	1	Satisfactory
137	Main Line Boring Machine	"	1	Satisfactory
138	Cylinder Boring Machine	"	1	Satisfactory
139	Milling Machine	"	1	Satisfactory
140	Connecting Rod Boring Machine	No.	1	Satisfactory
141	Surface Grinder	"	1	Satisfactory
142	Shaping Machine	"	1	Satisfactory
143	Manual Hacksaw Machine	No.	1	Satisfactory
144	Electric Bench Grinder	"	1	Satisfactory
145	Universal Milling Machine	"	1	Satisfactory
146	Lathe Machine	"	3	Satisfactory
147	AC Arc Welding	"	2	Satisfactory
148	Gas Welding Set	"	4	Satisfactory
149	Hand Lever Shear	"	1	Satisfactory
150	Roller Idler Press	"	1	Satisfactory
151	Track Link Press	"	1	Defective
152	Shoe Bolt Impact Wrench	"	1	Satisfactory
153	Track Link Rebuilding Machine	"	1	Defective
154	Electric Grinder	"	1	Satisfactory

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No.	Nomenclature	A/U	Qty Held	Remarks
155	Hydraulic Press	"	1	Satisfactory
156	Crankshaft Rebuilding Machine	"	1	Satisfactory
157	Turntable	"	1	Satisfactory
158	Large-Scale Tire Mounting and Demounting Machine	"	1	Satisfactory
<b>Machine Shop – II (Mechanical Department)</b>				
159	Mag Welding Machine	No.	1	Satisfactory
160	Spot Welder	"	1	Satisfactory
161	Pipe Cutting Machine	"	1	Satisfactory
162	TIG Welding Machine	"	1	Satisfactory
163	Portable Electric Grinder	"	1	Satisfactory
164	Stand for Bench Grinder	"	1	Satisfactory
165	Bench Drill Press	"	1	Satisfactory
166	Portable Electric Crane	"	1	Satisfactory
167	Portable Gantry Crane	"	2	Satisfactory
168	Engine Measuring Tool	Set	1	Satisfactory
169	Gasoline Engine Analyzer	"	1	Satisfactory
170	Electric Wheel Balancer	No.	1	Defective
171	Wheel Alignment Tester	"	1	Defective
172	Distr Test Bench	"	1	Defective
<b>Tool Store (Mechanical Department)</b>				
173	Test Equipment	No.	1	Defective
174	Dial Gauge for Crank Shaft Grinder	"	1	Satisfactory
175	Battery Tool Set	"	1	Satisfactory

Source: CTTI

